Sri Lanka Agriculture Sector Modernisation Project (ASMP)

ENVIRONMENTAL SCREENING REPORT

FOR

CDP № 19 – POMAGRENATE (CHILLI INTERCROPPED), MULLAITIVU

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

Revised: 13 July 2022

FCG

NEW ZEALAND G2G KNOW-HOW

InfotechsIDEAS

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TABLE OF ABBREVIATIONS

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

ASMP

ENVIRONMENTAL SCREENING REPORT

PROJECT IDENTIFICATION

Project title	Introduction of Improved Technologies to enhance the quality and productivity of Pomagrenate Cluster (Chilli intercropped), Mullaitivu
Project Proponent	Project Management unit, ASMP, Ministry of Agriculture

PROJECT LOCATION

Location

(Relative to the nearest town, highway)

The pomegranate cluster is in Maritime Patthu DS Division is located on the South Eastern side of the Mullaitivu District mainly along the costal belt, covering a land area of 744.6 sq.km which is 28.4 percent of the district's total. The proposed cluster area belongs to 7 GN divisions in the South eastern side of the Maritime Pattu DS divisions in the Mullaitivu District of Northern Province. Maritime Pattu DSD is covering a land area of 74,460ha which is 28.4% of the district cover.

The Maritime Pattu Pomegranate Cluster comprises seven GN divisions and namely Kokkuthuduwai South, Kokkuthuduwai North, Kokkuthuduwai Centre, Kokulai West, Kokulai East, Karunaddukerny and Alampil South. There are eight villages in seven GNDs selected.

This year 50 farmers have been selected for cultivating Pomegranate from these divisions. All the cluster area included from Kokkuthuduwai and Kumulamunai ADC areas. The selected villages are located along B297 Mullaitivu - Kokilai Road. Figure 1 shows the selected areas in the three GNDs.

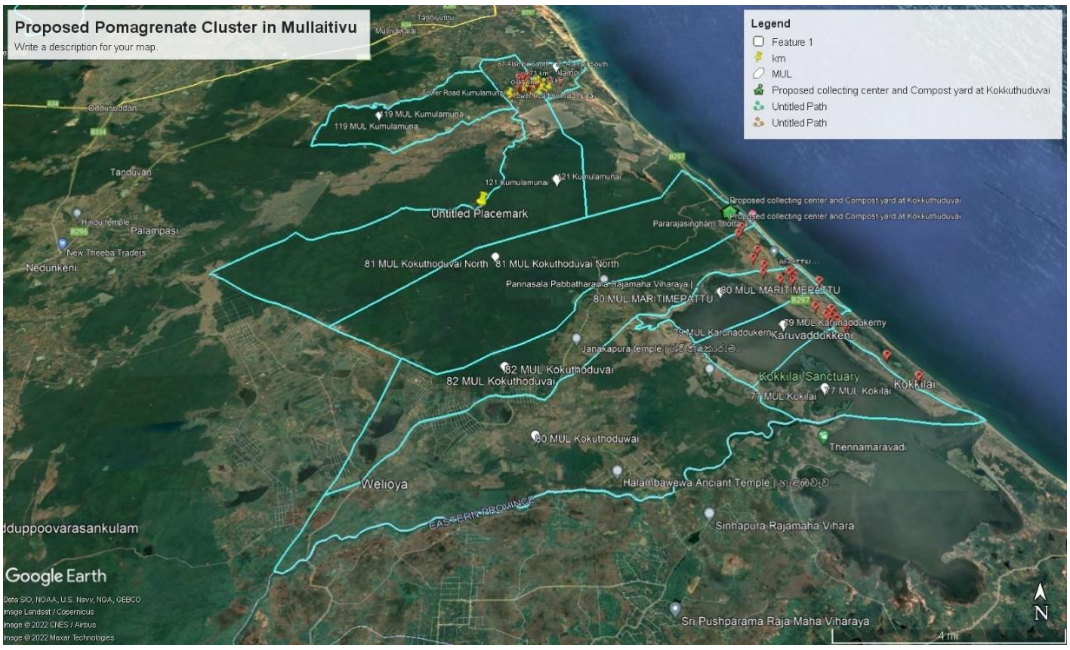

Figure 1: Selected farmlands

The area is closest to Mullaitivu township the distance is ranging from 8 – 30km. Kokkuthuduvai is extending up to the boarder of easter province. Welioya is also located about 17km away from Kokilai.

Figure 2: Selected Rural Road sections in Alampil South and Kumulamunai west

Figure 3: Selected Land for Collection Centre

Proposed land for Collection Centre is located along the B297 road in Kokkuthuduwai where closer to forest area.

Definition of project area

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

The cluster is distributed over seven GNDs in Maritime Pattu DSD. There are 50 selected for the Pomegranate cluser within seven GNDs named above where about 20.12ha of lands have been selected for this cluster. Minimum of 0.5acre of land selected from each farmer. Cultivation of Pomegranate will be limited to this allocated land extent.

Table 1: Information on number of farmers and extents identified for proposed Pomegranate and Chilli cluster in Maritimepattu DS area

Agrarian Development Centre	AI Range	GN Division	Village	Number of Farmers	Extent Ha
Kokkuthuduwai	Kokkuthuduwai	MUL-80	Kokkuthuduwai South	8	3.23
		MUL-81	Kokkuthuduwai North	2	0.8
		MUL-82	Kokkuthuduwai Centre	4	1.6
	Kokulai	MUL-77	Kokulai West	1	0.4
		MUL-78	Kokulai East	3	1.2
		MUL 79	Karunaddukerny	9	3.63
Kumulamunai	Kumulamunai	MUL-119	Alampil South	3	1.2
			5th Ward	20	8.06
Total	**3**	**07**	**8**	**50**	**20.12**

In addition, there are four rural road sections equalling to 4.2km length are proposed to rehabilitate which are located in Alampil south and Kumulamunai west. The impact due to proposed road rehabilitations will be restricted to either side of the road sections but benefits will be common for all users.

There is 4.75km length of elephant fence proposed for Kokkuthuduvai North, Kokkuthuduvai South and Kokkuthuduvai Centre GN divisions as elephant threat is significant.

Further, proposed collection centre will also benefit farmers in the area even though they are not in the cluster. However, size of the land is not yet finalised. Minimum requirement of the land would be 0.5 acre.

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

Adjacent land and features

Maritime Pattu DS division is an important area in terms of the agricultural production in the district. Although there is no information at the DS division level, the Department of Land Use Planning has reported that district extents of paddy, home gardening and coconut cultivations has been increased by 18% (3593 ha), 28% (3647 ha) and 286 (3574 ha) respectively in year 2015 compare to the 1985.

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

Land use category	Land Extent ha		% Of Cluster DS
	Mullaitivu District	Maritime Pattu	
Buildup Areas	-	-	-
Non-Agriculture	-	-	-
Homesteads	13,220	3,480	26.3
Coconut	1,250	1,040	83.2
Paddy	20,290	8,720	43.0
Sparsely Used Crop Lands	22,400	8,620	38.5
Other Crops	100	40	40.0
Forests	167,790	42,970	25.6
Scrublands	13,010	4,100	31.5

	Grass lands	640	130	20.3
	Wet lands - Forest Mangroves	270	230	85.2
	Wetlands - Non-Forest Marshes	1,260	620	49.2
	Water Bodies	20,160	11,060	54.9
	Barren Lands	1,230	1,150	93.5
	Total	**26,1700**	**82,160**	**31.4**

Source: Survey Department of Sri Lanka

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

About 69% of the land area of the district is still covered with forests and scrub. Most of them remain as dense forests. About 55% of the inland water bodies in the district are in the Maritime Pattu DS division and most of them belong to lagoons.

In particular to the selected GNDs, many of these lands are along the coastal belt and closer to lagoons, mangrove areas and forest areas. Some areas are still under demining. Cleared lands are cultivated mainly vegetables and fruits.

PROJECT JUSTIFICATION

Need for the project **(What problem is the project going to solve)**	Cultivation of the traditional field crops will not help to improve the standard of living of small-scale farmers. Although there are a large number of alternative crops that can be selected for cultivation in limited area of lands, many of the field crops are not very profitable for small land plots. It is essential to shift the farmers to the higher value and higher remunerative crops using modern technology and value addition. Farmers need to organise around the same crop to obtain the economies of scale and produce a marketable surplus. High value fruits provide a profitable opportunity compared to the traditional crops that the farmers are cultivating. Most of identified farmers in the cluster area are, newly resettled, hardworking and well experienced traditional farmers and poor marketing system and the low prices for agriculture produce in addition to the issues given above are the key issues faced by them. Most of the farm families were displaced due to war situation prevailed during the past and resettled in their original villages. As far as Pomegranate cultivation is concerned, farmers are growing as a home garden crop and most of farmers are not experienced in this crop. As there is no considerable quantity of production farmers have sold their products to local buyers at lower rates. Overall, following concerns will be addressed by the proposed cluster: 1. Poor living standards of small-scale farmers in the area 2. Poorly managed land use practices 3. Low productivity and quality of agriculture products 4. High poverty levels 5. High water uses practices such as flood irrigations 6. High pollution levels due to high chemical usage 7. High number of marginalised communities in the recently cleared areas 8. Less or no market potentials for agriculture products in the area

	9. High imports of fruits which requires foreign exchange 10. No or poor sustainability in post-harvest practices 11. Edge effects on forest areas due to encroachments 12. High post-harvest losses due to poor pratices 13. High level of unemployment in the area 14. Four major hazards namely draught, floods, strong winds and elephant damages are badly affecting the agriculture production With emphasis on the international demand for the five tropical fruits selected for export ("Five Queens") and the local demand for **Pomegranate** and Grapes that make up the ISP-ASMP "Seven Queens", the ISP will work to make sure agribusinesses contracted high-quality product from FO's flows smoothly to local and international markets, according to required product specifications and market demand. For this purpose, joined planning, constant communication and harmonized execution will be the pillars to make sure that agricultural and value chain components are in sync with each other to assure the required success and sustainability of the FO's commercial enterprises. Agriculture Technology Demonstration Parks (ATDPs) will support farmers to: (a) develop professional producer associations; (b) achieve economies of scale in production and exports; (c) improve marketing and value addition; and (d) achieve greater efficiency in the provision of technical and other support services. Farmers are expected to directly benefit through improved production capacity and input supply/management, better and more efficient technologies for production and post-harvest, improved market linkages as well as opportunities for value addition. Furthermore, farmers would benefit from capacity building through farmer business and marketing training. The business opportunity identified with farmers and agribusiness is the modernisation of existing and renewed plantation of Pomegranate, for export to the Middle East.
Purpose of the project **(What is going to be achieved by carrying out the project)**	New and improved technology packages to enhance productivity and quality will only be featured in newly planted plots, strategically located for maximum exposure to large numbers of farmers. These plots will serve as learn-by-doing sites where, at the beginning when technology is first introduced, training of trainers will take place to prepare "change agents" to work in the dissemination and expansion of the new technology packages to large numbers of farmers. The technology package and other management practices will be introduced to the selected group. This group will provide the foundation to initiate quick marketing of high-quality pomegranate for export market. It all begins at the market where the value chain experts determine the demand for product and identify local and foreign buyers. These buyers and the market, including governments issuing market norms and regulations, have a set of quality and product specifications that suppliers must comply with to gain and maintain market access. The value chain experts relay these quality and product specifications to the agricultural production experts to make sure compliance is achieved. Compliance begins at the farm level where farmers apply modern and improved technology introduced to produce the product the market wants, including certifications (GAP, GlobalGap, Organic, etc.) and quality (size, color, appearance and condition) working in close agreement with the Agribusiness buyers. These field practices will be followed by timely harvests, coordinated by the ISP agricultural experts, using maturity and size indicators based on market quality requirements issued by the value chain experts. The timely harvest, using market quality parameters, will provide the consistency in the flow of volumes required by the Agribusiness partners to satisfy market demands and to safe-guard market share. With the proposed cluster developments, following achievements will be made:

	1. Improve the standard of living of small-scale farmers in the area 2. Maximize the available land use 3. Enhance productivity and quality 4. Eradicate poverty through enhancing income levels 5. Conserve water resources through modern irrigation practices 6. Reduce the level of pollutions by reducing the use of chemicals 7. Empower communities through integrating female farmers, youth and vulnerable groups 8. Establish stable market potentials 9. Saving of foreign exchange 10. Establish sustainable post-harvest practices 11. Reduce deforestration 12. Reduce post harvest losses 13. Creation of employment opportunities
Justification and Alternatives considered **(Different ways to meet the project need and achieve the project purpose)**	Tropical fruits were selected by the ISP in accordance with the National Export Strategy, and in direct consultation with agribusinesses as the backbone of the market strategy for the development of commercial farming enterprises to be created and managed by targeted clusters of farmer organizations. The rationale for selecting tropical fruits is as follows: i. High demand in international markets in proximity to Sri Lanka – Several of the tropical fruits produced in Sri Lanka are in the top 12 fruits consumed around the world. In addition, they meet consumers preferences for healthy and high-quality foods, as well as convenience foods. They are also available all year around and their production by-products have a very high acceptance as specialty products in modern niche markets. ii. Sri Lanka has comparative and competitive advantages in the production of tropical fruits. Its geographical location in the middle of the shipping lanes bringing trade east and west is a strong comparative advantage for the country. iii. Because of the large number of farmer organizations (FO) already producing tropical fruits, dimension and economies of scale are relatively easy to achieve, including the targeted number of project beneficiaries participating in the ISP's clusters. There is wide scope for the systematic cultivation of a range of fruit crops that are required for local and export markets. In general, dry weather prevailing in the district is favorable for crops such as fruits and vegetables where supplementary irrigation is available. The hydrological system of Mullaitivu district consists of sea, lagoons, small and medium scale streams and tanks. In general, water table in the district is shallow; as a result, farmers used agro-wells for obtaining irrigation water for crop production. In many instances, underground water from wells is lifted and used for successful cultivation of crops other than rice. Water, therefore, has been a serious limiting factor in the expansion of particularly crops such as fruits and vegetables in the district. Maritime Pattu has already established 11 farmer organisations in Kokkuthuduwai and Kumulamunai. According to available information from Land Use Policy Planning Department (LUPPD), 13% of the land area have been used for agricultural activities and potential extent could be increased to higher level through effective involvement of government to overcome the prevailing issues hindering the agriculture development in

the area. Pomegranate production in Mullaitivu District will be done in coastal areas where the agri-ecological factors are very favourable for pomegranate production. Irrigation water is sufficient and available all year around through agrowells. However, the soils are beach type soils made up mostly of coarse sands. These soils are very permeable and, additionally, have a low nutrient content. Thus, water management and fertilization need to be optimal. Accordingly, there are seven GNDs named as potential areas for pomegranate cultivation in Maritime Pattu. Most of the farmers have small scale, low flat farmer-based lands with shallow water depth with less drainage concerns. Further an attitude and market-led vision of field staff is highly acceptable. Hence, the selected area is highly supportive to meet the project needs within short period of time with the expected quality.

New On-farm technology package with control/prevention of Anar butterfly/ Pomegranate fruit borer, Stem borer, Whitefly, Thrips, tailed mealy bug, Aphid, and Shot hole borer to be introduced. Further, crop management by fruit control using bags, oriented to export will be used. New and improved quality enhancing technologies and Productivity Enhancing Technologies such as drone technology, water conserving and low pressure drip or mini sprinkler irrigation systems, basic flood prevention and drainage field techniques, new planting patterns with high population densities, precision fertilisation techniques, pest and disease control based on integrated pest management (IPM) practices and modern spray techniques and precision agriculture practices to be introduced to meet the expected project out comes.

The "no-action" alternative would mean that no Pomegranate Cluster Development undertake by the ASMP and hence no financial, technical and market support for the existing farmers in seven GNDs in Maritime Pattu DSD. Therefore, conventional farm practices, low productivity, low quality and low income will continue to dominate the economy of the farmers and agriculture sector will not develop in Mullaitivu. Poverty levels and low level of living standards of the farmers in area will continue to grow.

Legal framework and WB Safeguards Policies

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

#	Permit/Clearance	YES	NO	TBD	Remarks
1	The National Environmental Act. No. 47 of 1980 & its amendments		√		None of the proposed activities are coming under prescribed activities
2	Agrarian Development Act of No 46 of 2000 and 2011 (Section 32)	√			The proposed development interventions in the Pomegranate cluster should be consented by the Department of Agrarian Development
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 Maritime Pattu Pradeshiya Sabha.

5	Water Resources Board Act No. 29 of 1964	√			Extraction of ground water should be consented by the WRB
6	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
7	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
8	Forest Ordinance including Amendments	√			The project area is bordered to forest areas including Mangrove areas. Measures should be taken to mitigate the impact on forest areas including mangroves such as edge effects.

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]

PROJECT DESCRIPTION

Proposed start date	January 2022
Proposed completion date	August 2023
Estimated total cost	LKR 47 million
Present land ownership	Private Farmlands, Lands with Deed and Leased Lands Rural Roads – Local Authority (Maritime Pattu Pradeshiya Sabha) Collection Centre – Department of Agriculture
Description of the project	Proposed technological improvments and infrastructure development under the Pomegranate Cluster given below:

(With supporting material such as maps, drawings etc attached as required)

Table 3: Improved Technology Package for Pomegranate

Main Technology	Practice (s)	Comments
Variety	The Bhagawan (Bagwan) variety from India is the most common in Sri Lanka	Tissue culture seedlings were imported from India by a private entrepreneur in 2017
Planting material	Airlayering technique, to produce Bhagwan variety root stock for transplant, has proven reliable in Sri Lanka. The root stock from airlayering must be 15 cm to 20 cm in length with a pencil thick girth. Root stock can also be obtained from terminal branches of the Pomegranate tree using common rooting techniques (rooted cuttings), but it has not been as reliable as airlayering in Sri Lanka	Vegetative propagation techniques will provide planting material to begin new plantings in a short period of time using new and improved technology
Land Preparation	• Deep ploughing using moaboard plow • Application of compost • Deep ploughing again using moaboard plow (perpendicular to first ploughin) • Disking or harrowing (two perpendicular passes) • Micro levelling to facilitate drainage works	Improved land preparation practices
Mini-sprinkler irrigation systems	• Computer controlled heads for water application scheduling supported by fertility sensors and soil moisture sensors • Precision fertigation with liquid organic compounds • Precision application of liquid pesticides • Anti-clogging flushing components	Mini-sprinkler systems create a waterhead that allows the wetting front to reach the depth of the feeder roots of fruit trees. Irrigation scheduling-based evapotranspiration measurements
Flood prevention and drainage field techniques	Site levelling using laser levelling machinery, quick water evacuation ditches, surface drainage techniques (removal of wet spots)	On-farm drainage works avoid water from standing in the field for long periods of time preventing waterlogging
Precision planting	Construction type twine to demarcate planting rows, planting templates with plant spacing measurements	Practical tools and aids assure accurate precise field layout and measurements of planting distances to assure desired population densities which are the foundation of productivity
Double row planting system	Pomegranate seedlings from airlayering, directly from the mother plant to the field, are planted in two double rows 1 m apart. The seedling spacing within a double row is 2 m. An alley, 4 m wide, separates the double rows.	This double row planting pattern accommodates 2,100 Pomegranate trees per hectare or 840 per acre and it is suitable for multiple cropping

		Multiple cropping	Intercropping with short term vegetables	The alley of the Double row planting system can be used for intercropping vegetables with fruit trees. In most cases, 3 beds of vegetables can be planted is this space using the new and improved technology package introduced by the ISP for the particular vegetable
		Precision fertilization	Fertigation with organic liquid fertilizers supplemented with fertilization and/or fertigation with chemical fertilizers	Formulation of fertilizer regimes based on complete soil tests and foliar analyses
		Weeding	Intercropping prevents weed infestation. Otherwise, mechanical weeding is practiced	Mechanical weeding is herbicide free. It is a very environmentally friendly technology
		Integrated Pest Management (IPM)	• Pest population and pest damage assessment surveys to evaluate pest and disease intensity/quantity factors for damage prevention and to determine pest populations threshold status for rational application of pesticides • Prevention and control of pre and postharvest pests and diseases. Fruit flies, sucking moths, fruit borer and nematodes are of special concern	IPM practices are combined with modern spray techniques when necessary i.e. ultra low volume spray using drones Pesticide application through irrigation system
		Pruning Practices	• Two single trunks are preferred to multiple trunks • Pruning to develop lateral production branches and a compact canopy is practiced one year after transplant • After that, light pruning of the terminal branches should be practiced maintaining proper tree architecture • Light pruning cycles should be scheduled every two weeks • Pruning must be done after stress period to induce flowering	Canopy architecture pruning of young trees must favor a tree architecture that promotes the bushy structure of the Pomegranate tree
		Tagging of the Pomegranate fruit with coloured synthetic fiber bags	Every week a different coloured bag is applied to fruit soon after the color conversion period (21 days after fruit set). Bags should be removed a few days before harvest to maximize the red colour of the fruit. The period from flowering to harvest is 26 to 30 weeks (6 to 7 months)	Tagging of the Pomegranate fruit fixes the age of the fruit. At tagging, the age is 1 week. The count of fruits tagged develops a true fruit inventory that needs to be maintained and managed. The fruit inventory 23 weeks before harvest improves marketing and selling practices to maximise pricing for farmers and maintains quality and shelf life. Bagging advances maturity and helps control pests and diseases

Harvesting	Pomegranate fruits to be harvested are chosen based on age (bag colour), visual signs of maturity (bright, deep red colour fruit should be harvested), by size (the local market takes from to 200 gm fruit to 400 + gm fruit. Large fruits have more value) and by sweetness.	• Bagging increases the efficiency of the harvesting task by reducing the labour required. Pomegranate pickers go directly to fruit bagged with the color to be harvested on a given day • Bagging also increases the quality and shelf life of the fruit due to the fact that coloured bags allow for fruit at the optimum maturity stage to be harvested
Transport to packing center	The harvested fruit is placed carefully into 20-kg plastic trays lined with foam. The color bags that were on the fruit are also placed in the crate to allow for inventory management at the packing center	Protects the Pomegranate fruit from damage during transport to packing center
Labelling for precision agriculture	Production area blocks and tree tagging labelling	Production area blocking and tree tagging labelling develop a tree identification nomenclature to find tress quickly to apply precision agriculture practices on a timely basis
Postharvest technology	Field heat removal Line packing Cold chain management Integration of export protocols into standard SOP's	These practices are utilized to preserve optimum quality and shelf life throughout value chain
Quality monitoring and evaluation system	Quality score Tally of defects Value chain feedback loop	The quality monitoring and evaluation system provides data for quality management and creates a feedback mechanism to correct quality problems to ensure and maintain high pomegranate quality throughout the value chain

Table 4: Proposed Rural Roads Rehabilitation

NO	LOCATION	UNIT	Length
1	Tower road in Kumulamunai and Alampili South	m	2500
2	Tower road First Cross lane	m	910
3	Tower road Second Cross lane	m	470
4	Access road in Kokuthoduvai West	m	940
	Total	meter	**4820**
Total length of roads identified for repairs		**kilometre**	**4.82**

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

Table 5: Summary of Project Interventions in the Cluster

#	Project component	Key Activities	Approx. extent / quantity	Implementation responsibility
1	Cultivation of Pomegranate	Land Preparation Irrigation pipelaying	20.12ha	ISP PPMU

		(Refer table 1)	Installation of mini-sprinklers		
	2	Improvements of Rural Roads (Rehabilitation) (Refer table 4)	Trimming, levelling and compaction of sub grade Supplying and pilling approved gravel Spreading and compaction garvel	4road sections Total length 4.82km	Contractor LAs Civil Engineer –ISP PPMU Engineer - PMU
	3	Construction of Collection Centre and Compost Production Unit (Construction of Storage building including office space, toilet and solid waste management facilities)	Fencing Constrution of builing Disposal yards Mixing yards Leachat management	1 Shelter - Approximately 5m x 10m Building - Approximately 7.50m x 15m	Contractor FO Civil Engineer –ISP PPMU Engineer - PMU
	4	Suppling and fixing Hanging type electric fence with GI posts, two horizontal power cables and hanging wires at 750mm centre. Rate includes energizer with all other accessories and jungle clearing. Length 4.75 km.	Construction/ Rehabilitation of fence Electrification Maintanance	4.75km length	Contractor FO Civil Engineer –ISP PPMU Engineer - PMU

Project management team

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

Contact Persons

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	Fax: +94 112 877 546 Email: sanjayadms@hotmail.com Web: https://www.asmp.lk/ **Nature of Consultations and Inputs Received** Consultations with Environmental and Social Safeguard Specialist/ PMU In preparation of this CDP, the PPMU of ASMP made all the discussions with Chief Secretary of Northern Province, Provincial Director of Agriculture (Northern Province), District Secretary, Mullaitivu, Deputy Commissioner of Agrarian Development, Mullaitivu who are responsible for all the development coordination activities and agriculture extension works in the cluster area. Consultation was also held with the private sector involved in input supplies, marketing and transportation of agricultural products. Most importantly, attention has been paid on the existing situation of Farmer Organisations and their expected roles and functions in organic manure production to meet the demand for cultivation. The PPMU (Northern Province) has played a key role in identification of proposed areas and villages with the support of the ISP District Coordinator (DC) and Cluster Coordinators (CC). Selection of potential cluster villages with interested farmers were carried out by the DC and CCs with the active support of Agriculture Instructors in the selected areas under the direction of PPMU and ISP consultants. The existing Farmer Organisations also have been consulted in this process. However, institutional mechanism for the Pomegranate Cluster Development has been proposed. Institutional roles in this cluster (Cluster Development Plan (CDP) № 19 - Pomegranate and Chilli Cultivation) are attached in Annexure 3. Provincial Agriculture Department, consisting of all the line agencies such as irrigation, Agrarian Development, DS and Land), and all the chairmen of farmer organisations have extended cooperation for Pomegranate cultivation considering following reasons. • Great potential to increase Farmer income with less labour and inputs. • Effective mechanism to attract young farmers for commercial agriculture. • All the farmers are members of farmer organisations or successors.

DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 PHYSICAL FEATURES	
Topography and terrain	Maritime Pattu DS Division is flat, and the elevation varies from sea level to 40 meters above sea level with the area vulnerable to flooding. However, there are small rock outcrops can be recognised in the forest area. Most of Sri Lanka (90% of the island) is under laid by Proterozoic high-grade metamorphic rocks with quaternary sediments being restricted to a narrow strip in the North West, north and north east coastal regions. Geologically, the western half of the Mullaitivu District lies within the WC, while its eastern half is located within the Miocene to Quaternary cover.

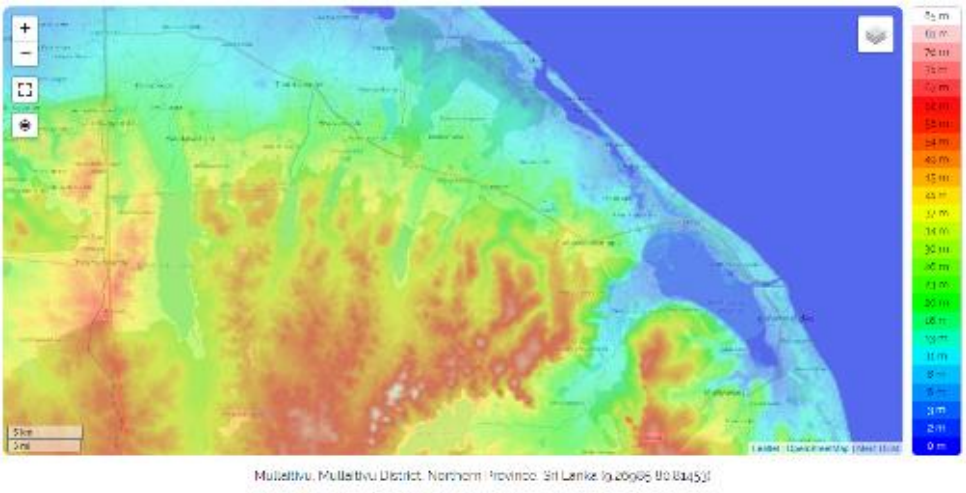


Figure 4: Topography of Maritime Pattu DSD

Table 6: Terrain Characteristics of the Cluster Area

	Land Extent		Terrain Types
	sq.km	% to DS	
Maritime Pattu	14.47	23	Undulating and Flat
	31.38	51	Undulating and Flat
	16.01	26	Undulating and Flat
Total Area	**61.86**		

Source: Punyawardana, 2003

Climate and Meteorology

More than 65% of the annual rainfall is during the Maha season (October to February) and other 7 months remain as dry months with monthly average sunshine hr in the dry period more than 7 hrs per day. As year-round ground water availability is assured in selected land area, intensive agriculture is highly potential.

Table 7: Monthly Agro Ecological Characteristic Variation Relevant to Mullaitivu

Parameter	Month of the Year												
	J	F	M	A	M	J	J	A	S	O	N	D	Avg
Rainfall mm	107	110.1	22.0	55.5	40.8	23.8	54.1	70.0	72.8	200.1	396.1	232.5	
Max.Temperature C	28.4	29.8	31.6	32.1	31.3	30.4	30.1	30.1	30.2	29.9	28.9	28.1	30.1
Min.Temperature C	22.3	22.4	24.3	26.8	27.6	27.2	26.6	26.3	26.4	25.4	23.8	22.9	25.2
Daily Sunshine hours	8.0	9.4	9.4	8.9	8.0	4.7	7.4	7.3	7.3	5.8	5.4	5.3	7.2
Daily Evaporation mm	3.8	4.3	4.7	5.2	5.6	6.1	5.5	4.7	5.2	3.5	2.8	2.9	4.5
Relative Humidity %	81	81	77	81	81	81	78	79	81	82	85	85	81.0

Source: Punyawardana, 2003

The average maximum temperature is about 32.1^{0}C and the average minimum temperature is about 23.2^{0}C. As the minimum temperature goes down around 22^{0}C in January and February.

Soil
(Type and quality)

About 51% of the land area of the Maritime Pattu DS Division (Cluster Area) belongs to DL1e Agro-Climate Zone. Although the area receives more than 900 mm of annual rainfall, 65% of it falls during the Maha season (October to February). Land in this Agro-Ecological Zone does not belong to the proposed pomegranate cultivation project. About 26% of the land of the DS division is belongs to DL1d AEZ. Its precipitation is not as unsatisfactory as in the DL1e AEZ, but the first inter monsoonal rains are not sufficient to sustain the Yala season in this region either. Land in this Agro-Ecological Zone also does not belong to the proposed pomegranate cultivation project. About 23% of the land area of the cluster area belongs to the DL3 Agro Ecological Zone (AEZ). This area is formed along the coastal belt of the Divisional Secretariat area. Monthly rainfall pattern

of this AZEs do not show a bimodal shape like DL1 or DL1b. The dominant soil group of the DL3 area are the Red Yellow Latasol (RYL). Soils of the upper part of the soil catena is red in colour and named as Red Latasol and soil in the lower part known as yellow latasol. This area contains more groundwater than any other part of the island. As a result, even after a light rainfall, a significant volume of water accumulates in the groundwater. Therefore, a very intensive cultivation system could be observed in DL3 areas that provides pumped water for crop cultivations is found in this region. The proposed Pomegranate Project is being implemented mainly in this agro-climatic zone.

Table 8 : Agro Ecological Characteristics of the Cluster Area

	AEZ	Land Extent		Soil Types
		sq.km	% to DS	
Maritime Pattu	DL3	14.47	23	**RYL, Regosol**
	DL1e	31.38	51	**RBE, LHG**
	DL1d	16.01	26	**RBE, LHG, Regosol**
Total Area		**61.86**		

RBE-Redish Brown Earth, LHG-Low Humic Gley, RYL – Red Yellow Latasol

Source: Punyawardana, 2003

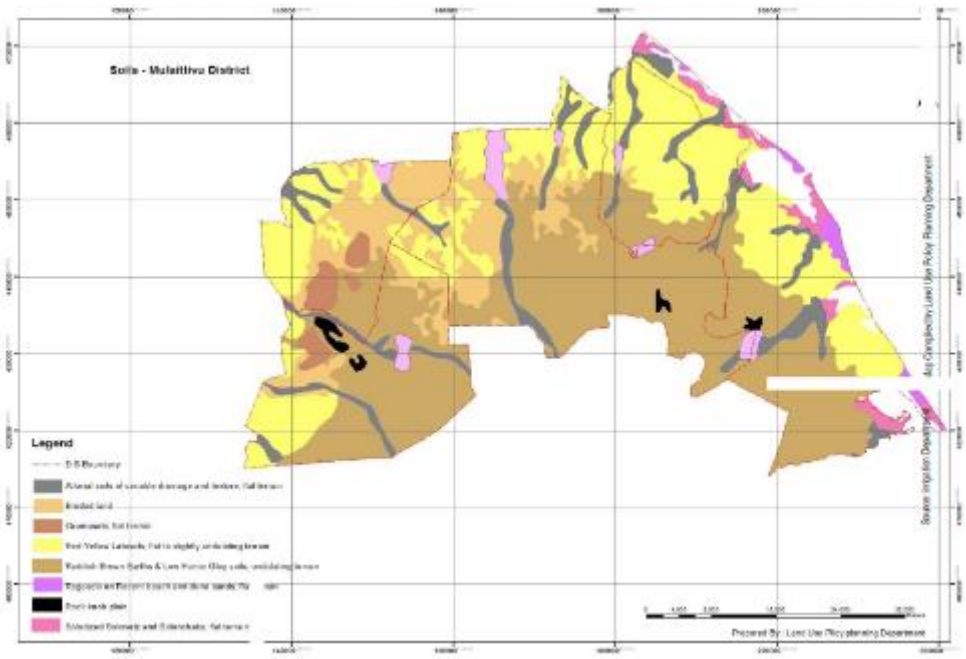


Figure 5: Soils of Mullaitivu District

Data Source: LUPPD, 2016

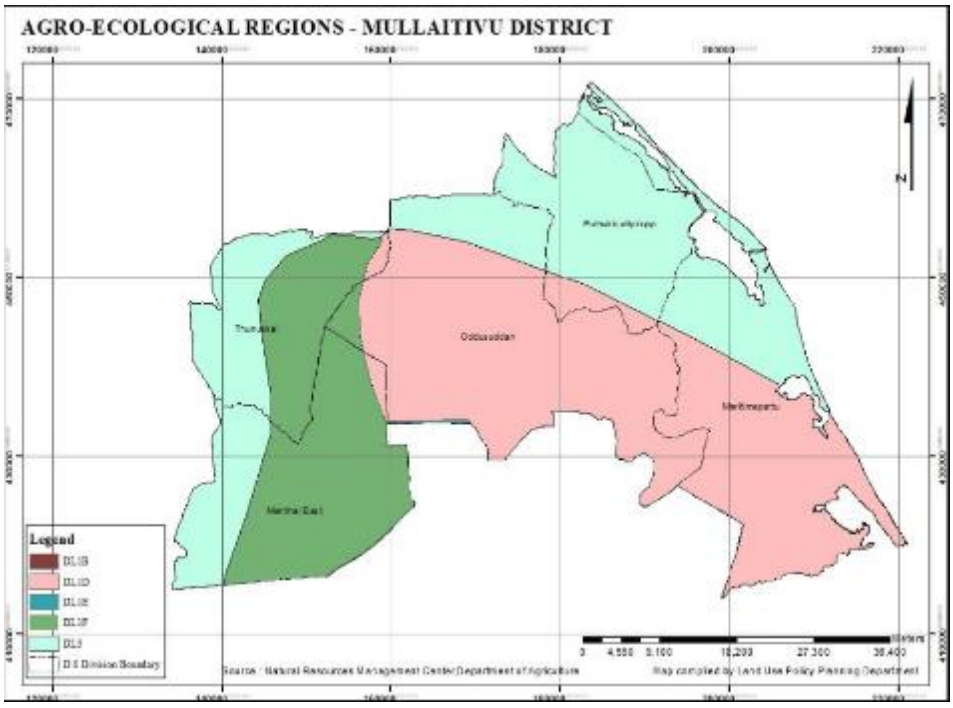


Figure 6: Agro-ecological Areas of Mullaitivu District

Data Source: LUPPD, 2016

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

Within the cluster area, there are no major surface waterbodies. There are four small tanks naely Marutamadukulam, Kanukernikulam, Chilawattekulam and Kottuvatile kulam.

There are two lagoons within the cluster area namely Nayaru and Kokilai.

All these waterbodies are irrigation waterbodies and no one using for drinking purposes. There are no scientific records regarding quality of the water. The water bodies of the district are shown in Figure 6.

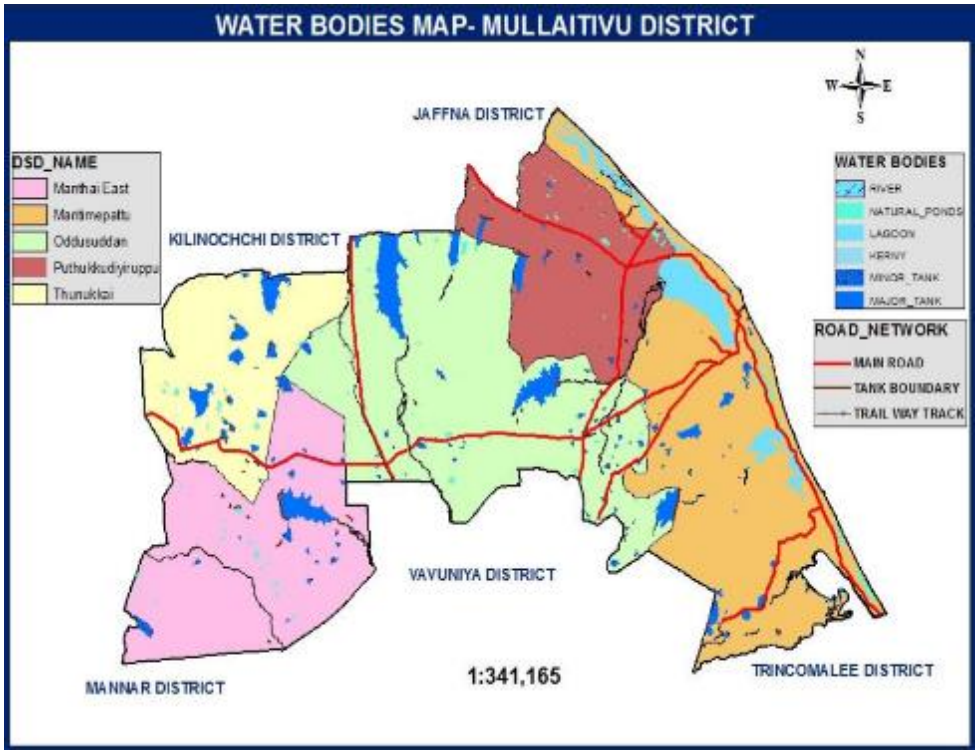


Figure 7: Surface Waterbodies of Mullaitivu District

Data Source: LUPPD, 2016

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

Ground water is the main source of drinking water in the area. People are using well water for drinking purposes other than community water supply schemes. There are large ponds, deep wells and dug wells with an average depth of 4-5 meters and water available all year. However, there are certain areas in Maritime Pattu is having poor water quality and established RO plants for purification.

Air quality (Any pollution issues)

Any major air pollution sources in the vicinity of the project site are not recorded. There are no industries which leads to pollutions. However, Live Air Quality & Forecast Pollution - BreezoMeter shows that the Air Quality Index (AQI) of Kokkuthuduvai is 31/500 and $PM_{2.5}$ is the dominant pollutant while O_3, PM_{10} and CO are having lower concentration than $PM_{2.5}$.

5.2 Ecological features – Ecosystem components

Vegetation (Trees, ground cover, aquatic vegetation)

Floral species recorded during initial screening done within the proposed farmlands are given below:

Table 9: Floral Species Recorded in the Cluster Area

Common English Name	Scientific Name	Conservation status according to the National red list 2020
1. Mahogany	*Swietenia macrophylla*	-
2. Palmyra	*Borassus flabellifer*	-
3. Ipil ipil	*Leucaena leucocephala*	-
4. Wood Apple	*Limonia acidissima*	LC
5. Guava	*Psidium guajava*	-
6. Teak	*Tectona grandis*	-
7. Ebony	*Diospyros ebenum*	VU
8. Tamarind	*Dialium ovoideum Thwaites*	VU
9. Jamun/ Black plum	*Syzygium cumini*	LC
10. Myrabalans	*Terminalia elliptica*	LC

LC – Least Concern/ NT – Near Threaten/ EN – Endangered/ CR – Critically Endangered

A detailed Flora Study will be conducted and report will be submitted as an addendum.

Presence of wetlands

There are no wetlands in the project area. However, there are many mangrove areas in the cluster area with rich vegetation.

Fish and fish habitats

Lagoons and small tanks are observed to be good fishing habitats in the area. Nayaru and Kokilai are famous fishing industry areas for sea fishing. These two lagoons and associated areas are being used by many seasonal fishermen in Western coast. According to reports, the lagoons have extensive sea grass beds, small areas of mangrove swamp and mudflats, and have a high potential for prawn fishing and culture.

Small tanks are also providing habitats for inland fishing industry.

A detailed ecological assessment will be done and report will be submitted as an addendum.

Birds (waterfowl, migratory birds, others)

Bird species recorded during field visits are given below:

Table 10: Bird Species recorded in the Cluster Area

Common English Name	Scientific Name	Conservation status according to the IUCN red list 2012
1. Indian peafowl	*Pavo cristatus*	LC
2. Greater Coucal	*Centropus sinensis*	LC
3. Barn Owl	*Tyto alba*	NT

	4. Common Tailorbird — *Orthotomus sutorius* — LC 5. Jungle bush quails — *Perdicula asiatica* — CR LC – Least Concern/ NT – Near Threaten/ EN – Endangered/ CR – Critically Endangered The Kokkulai Lagoon was designated a wildlife sanctuary in 1951. The shallow waters of the lagoon is said to attract a wide variety of water birds including pelican, cormorant, herons, egrets, wild duck, stork, waders and pink flamingoes. A detailed ecological assessment will be done and report will be submitted as an addendum.
Presence of special habitat areas **(special designations and identified sensitive zones)**	Nearly half of the Martime Pattu is under forest cover with agriculture land area being about 24% of the Division. Nagancholai, Andankulam, Veppankulam and Thannimurippu Forest areas are located in the close proximity to the cluster areas. There are forest areas including Mangrove areas in the cluster area. Kumulamunai west mangrove area is significant out of all. Therefore, a detailed ecological assessment will be done and report will be submitted as an addendum. The area is highly abundant with elephants from the forest areas closer to the cluster.
5.3 OTHER FEATURES	
Residential/sensitive areas **(e.g., hospitals, schools)**	Health sector of Maritimepattu is functioning to improve the healthcare services in a sustainable way under a friendly environment. Health services in Maritimepattu are provided through one District General Hospital (DGH), three Divisional Hospital (DH), and two Primary Medical Care Units (PMCU) and Medical Officer of Health (MOH) Maritimepattu. DGH Mullaitivu is the major hospital in Mullaitivu District with consultant services, Operating theatre facilities and intensive care facilities. Therefore, all the peripheral Hospitals in the District are referring their patients to DGH Mullaitivu for surgical intervention and for secondary and tertiary health care services. The people are expecting to get all the health care from Mullaitivu DGH. There are 11 General Health Care (GHC's) Centres under the MOH Maritimepattu engaged in providing maternal childcare services in the division. Non communicable diseases are increasing, and more attention should be given for awareness programs in modifying lifestyle and diet habits. Nutritional status, poverty, malnutrition, and post war situation have the major problems on health care delivery in Maritimepattu MOH division. Lack of medical officers and technical staff is the major hinderance for delivering the health services to the public. There are 20 Gramodaya Health Centres in the division and three of them are in Kokulai, Kokuthodduwai and Kmulamunai. As per the Resource Profile 2020, there are four 1AB schools, five 1C type school, 10 type II schools and 15 type III schools are available in Maritimepattu DS division. Except one type III School all other schools are functioning. There are 3,942 male and 4,087 female students are attending these school and 633 teachers are servicing these students. In general, the teacher student ratio is 1:13 is satisfactory but there is a shortage of staff for teaching specialized subjects. School leavers belongs to the selected GN areas of Maritimepattu DS division should be encouraged to contribute to the pomegranate cultivation or to get employment opportunities as skilled farmers or opportunities at post-harvest processing activities. Modernisation of agriculture sector increase or stabilize the monthly income and other income generating opportunities in the agriculture sector should attract the school leavers, youths, and females in the area.

Traditional, economic and cultural activities

Maritimepattu Divisional Secretariat Division has 46 Grama Niladari divisions, and population about 42,581[1]. The Maritimepattu Pomegranate Cluster comprises of seven GN divisions namely Kokulai West, Koklai East, Karunaddukerny, Kokuthoduwai South, Kokuthoduwai North, Kokuthoduwai Cneter, and Kuulamnai. In these seven GN divisions there are seventy-one villages and 1,349 families living in these selected GN divisions representing total population of 4,044 or 9.5% of the district total population.

Table 11: No. of Families and population breakdown with gender

(GN No)	No of Families	Population	Male	Female
MU77	308	934	471	463
MU78	234	604	288	316
MU79	229	714	365	349
MU80	89	270	131	139
MU81	180	546	296	250
MU82	130	415	200	215
MU119	179	561	267	294

Source: Resource profile, Maritimepattu Divisional Secretariat Resource Profile 2020

There are 715 youths belonging in the 19-30 age group in these GN divisions, potentially providing a good opportunity to become involved in pomegranate cultivation. There are 2,820 Hindus, 1,049 Catholics, 107 Christians, 56 Buddhist and 9 Islam religious followers recorded within the selected GN divisions. The major occupation of people in the Cluster area is fishing with farmers being the second major occupational category. The number of unemployed and under employed youths are very high in the Cluster area. In Maritimepattu DS division main source of income for the families are farming and fishing. Families living in the coastal belt are engaged in fishing. The income from the fishing is vulnerable due to weather and reducing fishing stocks. In the interior area of the division farming is the main source of income and farming is also badly affected by the changing weather. Flooding and drought, declining soil fertility, increasing prices of inputs and unstable market prices for the farm products pushing farmers into debt traps and poverty. Stable income for families in the division is experienced only by the families engaged in government and private sector employment. Farming including livestock raring, and fishing are becoming more and more risky and vulnerable.

Table 12: Livelihood Status of the DS division

Type	Male	Female	Total	Type	Male	Female	Total
Government	1,325	915	2,240	Farm labor	1871	517	2,388
Statutory Boards	69	49	118	Fishermen	2,961	767	3,728
Banks	9	8	17	Private	550	313	863
Cooperatives	32	15	47	Skill Workers	1,281	28	1,309
INGO's	12	11	23	Food preparation	162	115	277
Local NGOs	56	27	83	Beauticians	15	30	45
Other Institutions	775	419	1,194	Printers	31	5	36
Farmers	2,862	731	3,593	Tailors	27	60	87

Source: Resource profile, Maritimepattu Divisional Secretariat 2020

[1] Resource profile, Maritimepattu Divisional Secretariat 2021

In general, the household Income and Expenditure Statistics in Mullaitivu District - 2006/07 – 2016, published by Department of Census & Statistics shows that the household monthly mean and median income in 2016 of Mullaitivu district is about LKR 18,416. and LKR 12,864 respectively. The district monthly mean and median expenditure amounts to LKR 32,576 and LKR 20,578 respectively. People in the District spend nearly 50% on food.

Table 13: Income distribution in the Maritimepattu DS Division

Income Group	No of families	Number of persons
Below Rs 5,000	5,175	14,645
Rs.5,001- Rs 10,000	3,366	11,238
Rs.10,001-Rs.15,000	1,527	5,045
Rs.15,001-Rs.20,000	810	2,885
Rs.20,001-Rs.25,000	758	2,779
Above 25,000	1,726	5,645

Source: Maritiepattu DS Division Resource Profile 2020

There are three Samurdhi Banks operating in the division, in Mulliyawallai, Chilawattai and Chemmalai and servicing people through making payments and providing relief and loans for the selected Samurdhi beneficiaries. The '' Spatial Distribution of Poverty in Sri Lanka' published by Department of Census and Statistics - Sri Lanka in 2015, indicated high poverty incidence concentrates in, Mullaitivu district. Maritimepattu DS division is ranked ninth in the 10 poorest DS divisions in Sri Lanka.

Archaeological resources (Recorded or potential to exist)

Punitha Anthoniyar Temple and Kumarapuram Murunkan Temple are located closer to the cluster area. However, there are no locations observed within project area. The protected archaeological locations are given in the below figure:

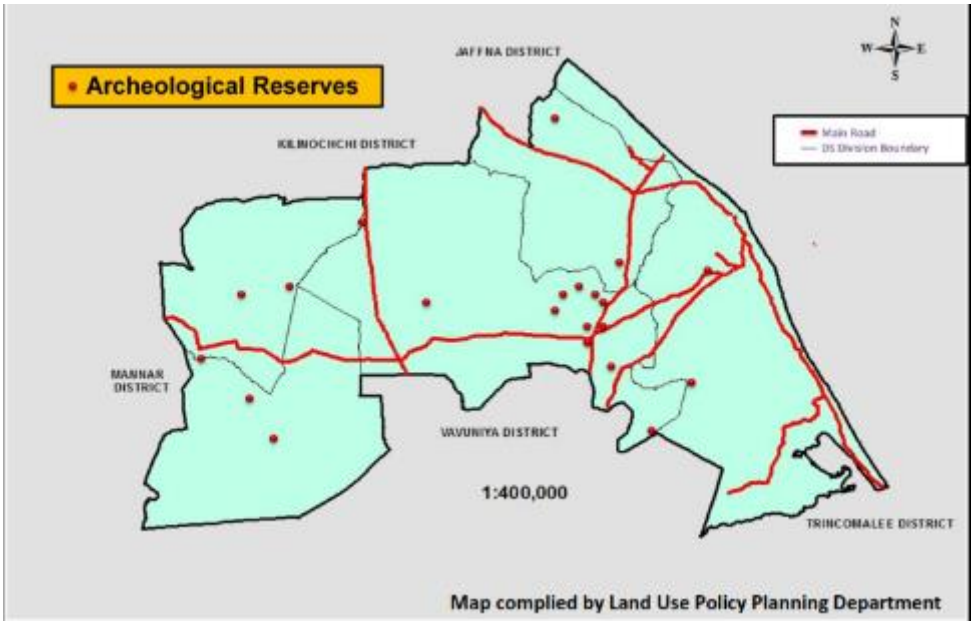


Figure 8: Archaeological Reserves in Maritime Pattu

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

DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES

6.1 CULTIVATION	
Existing condition of the crop	Pomegranate (Punica granatum) is a popular fruit in Sri Lanka, rich with medicinal properties and extensively used in traditional Ayurvedic medicines. It is one of the most popular fruits in Sri Lankan home gardens. It is well adopted in diverse climatic conditions; especially in regions where dry and intermediate zones preferably with sandy/loamy soils. Sri Lanka has several varieties of pomegranates developed and promoted by DOA. These include; Kalpitiya hybrid, Nimali, Daya and Thilina showing improved fruit characteristics. However, the volumes available are limited due to inadequate investment for growing pomegranate in regional areas and lack of knowledge for growing, crop management, post-harvest handling and poor market access. According statistical information available it was recorded an extent of 1678ha under pomegranate envisaged production of 66000mt annually. However, the main volumes are received through home garden cultivations where there is no assurance for regular supply of fruits as required by the markets. Apart from the local varieties, Sri Lanka imports pomegranate in sizable volumes for which consumer attraction is mostly diverted influenced to buy due to the reddish colour skin, large size of fruits, and the juicy red colour arils. The imported fruits are available in uniform sizes, assured fruit quality, packaged in well-designed boxes and marketed through retail/wholesale chains in Sri Lanka. Pomegranate imported from India, Egypt, Iran, Pakistan is dominated the Sri Lankan pomegranate market over the decades. In line with great consumer preference for the imported fruits the private plants nurseries registered under DOA/Seed Act, promoted planting materials of select variety known as Red Angle that has dark red skin and juicy maroon colour arils for home garden and commercial planting. Northern Province is a high potential region in Sri Lanka for pomegranate cultivation. Project propose the red angel to the project beneficiary. According to FAOSTATS[2], imports of fruits, including pomegranate, rose sharply from 2010 to 2016. Imports declined in 2017 and 2018 and began to increase again in 2019. After 2019, the future is uncertain due to Covid19 and the foreign exchange crisis in Sri Lanka. The value of imports of fresh fruits in 2019 was US$ 4,253,000[2].
POLLUTING PROCESSES (POINT SOURCE)	
In cultivation some key polluting steps, although limited, takes place; mainly in the cultivating and post harvesting phases.	

[2] https://www.fao.org/faostat/en/#data

Land preparation for cultivation	At the beginning, removal of all shrubs and bushes takes place. Manual weed control is the best method at preliminary land preparation stage. Then, any branches of big trees near the field that might shade the new plants are removed. Also, this removes an alternative host for pests and diseases. Soil preparation follows, doing first ploughing with disc or mould board ploughs and doing second deep ploughing with disc or mould board ploughs perpendicular to the first ploughing. Then the disking or harrowing is taking place by each pass being perpendicular to the previous one. These activities provide benefits such as improvement of soil aeration, destroy pest cycles in different stages, destroy harmful bacteria and microorganisms due to aeration is improved and destroy harmful pathogens due to exposing silos to sun light. Adding compost and mixing with soil will increase beneficial macro and microorganism in the soil and decrease pathogenic microorganism. Water by means of irrigation is applied immediately after transplanting. High density planting is adopted in temperate regions. A spacing of 5-6 m. is usually followed. High density planting with a spacing gives 2-2.5 times more yield than that obtained when the normal planting distance of 5 X 5 m. is adopted. Farmers have adopted a spacing of 2.5 X 4.5 m. Closer spacing increases disease and pest incidence. Pomegranate seedlings from airlayering, directly from the mother plant to the field, are planted in two double rows 1 m apart. The seedling spacing within a double row is 2 m. An alley, 4 m wide, separates the double rows. This double row planting pattern accommodates 2,100 Pomegranate trees per hectare or 840 per acre and it is suitable for multiple cropping. Square system of planting is mostly adopted. Planting distance is decided on the basis of soil type and climate. A spacing of 4-5 m. on marginal and very light soils is recommended. Pits of 60 X 60 X 60 cm. size are dug (at a spacing of 5 cm. in square system) about a month prior to planting and kept open under the sun for a fortnight. About 50 g. of 5% BHC or carbaryl dust is dusted on the bottom and sides of the pits as a pre-caution against termites. The pits are filled with top soil mixed with 20 kg. farmyard manure and 1 kg. super phosphate. After filling the pit, watering is done to allow soil to settle down. Cuttings/air layers are then planted and staked. Irrigation is provided immediately after planting. Mechanical weeding is herbicide free. It is a very environmentally friendly technology. To address these critical concerns (e.g. waterlogged plants), the ISP will introduce a new and/or improved technology package that will cover practices from land preparation for a new plantation, use of drones for to guide land preparation and levelling, new planting patterns (e.g. to reduce water logging) and population densities, basic flood prevention and drainage techniques. Pruning is not much required except for removal of ground suckers, water shoots, cross branches, dead and diseased twigs and also to give shape to the tree. A little thinning and pruning of old spurs are done to encourage growth of new ones. Inter-cropping with low growing vegetables, pulses or green manure crops is beneficial. The alley of the Double row planting system can be used for intercropping vegetables with fruit trees. In most cases, 3 beds of vegetables can be planted is this space using the new and improved technology package introduced by the ISP for the particular vegetable.

	Plants are trained on a single stem or in multi-stem system. Since the crops trained on single stem training system are more susceptible to pests viz. stem borer and shoot hole borer, the other system is more prevalent in the country. Canopy architecture pruning of young trees must favor a tree architecture that promotes the bushy structure of the Pomegranate tree. Tagging of the Pomegranate fruit fixes the age of the fruit. At tagging, the age is 1 week. The count of fruits tagged develops a true fruit inventory that needs to be maintained and managed. The fruit inventory 23 weeks before harvest improves marketing and selling practices to maximise pricing for farmers and maintains quality and shelf life. Bagging advances maturity and helps control pests and diseases.
Water requirement	The main source of irrigation for the Maritime Pattu Pomegranate Cluster is Agrowells. Farmers are not keen on traditional sprinkler irrigation because the sprinkler height causes the fruit bags to become wet and damaged. Consequently, farmers prefer drip rather than sprinkler irrigation. First irrigation is provided in case of mrig bahar crop in the middle of May followed by regular irrigation till the monsoon sets in. Weekly irrigation in summers and that during winters at fortnightly intervals is recommended. The check basin system of irrigation is usually followed. The average annual water requirement through drip irrigation is 20 cm. Drip irrigation helps to save 44% on irrigation and 64% when sugarcane trash mulch is used. It also helps to increase the yield by 30-35%. Mini-sprinkler systems create a waterhead that allows the wetting front to reach the depth of the feeder roots of fruit trees. Irrigation scheduling-based evapotranspiration measurements. Site levelling using laser levelling machinery, quick water evacuation ditches, surface drainage techniques (removal of wet spots). On-farm drainage works avoid water from standing in the field for long periods of time preventing waterlogging. The proposed use of micro sprinkler system will improve the water use efficiency (normally 75%) as compared to the current commonly use surface systems with lower water use efficiency (up to 50%). Introduction of water conserving and low-pressure drip and mini sprinkler irrigation systems powered by solar panels is one aim of the project to support pomegranate farming.
Use of fertiliser and pesticides and weedicides	The recommended fertilizer dose is 600-700 g. N, 200-250 g. P_2O_5 and 200-250 g. K_2O /tree/year. Application of 10 kg. farmyard manure and 75 g. ammonium sulphate to 5-year-old tree annually is adequate, whereas application of 50 kg. farmyard manure and 3.5 kg. oil cake or 1 kg. sulphate of ammonia prior to flowering is ideal for healthy growth and fruiting. Fertigation with organic liquid fertilizers supplemented with fertilization and/ or fertigation with chemical fertilizers. The basal dose of farmyard manure @ 25-40 cart-loads /ha. besides the recommended doses of N, P and K should be applied to non-bearing trees in 3 split doses coinciding with growth of flushes during January, June and September. Fruiting should be encouraged from fourth year onwards. Nitrogenous fertilizer is applied in two split doses starting at the time of first irrigation after bahar treatment and next at 3 weeks interval, whereas full dose of P and K should be applied at one time. These should be applied in a shallow circular trench below tree canopy not beyond a depth of 8-10 cm. After application, fertilizers are covered with top soil and irrigated. Fertiliser is applied 15 days after transplanting in a small trench on both sides of the plant that is covered with soil after the fertiliser is applied. Generally, weeds are

	controlled with a bush cutter. Some farmers use weedicides such as Round up. After transplanting, the tree is trained and 1 month after pruning begins when the top of the young tree is removed (topping). Afterwards, the tree is pruned 4 to 5 times to induce flowering. The most common insect pests are white fly and fruit fly. They spray insecticide using knapsack sprayers. Large scale farmers use power sprayers with long hoses. Fungicides and borax are sprayed before bagging. In addition, applications of different types of foliar fertilisers are also a common practice. Urea is used as the nitrogen source, Rock Phosphate and Triple Super Phosphate are used as the phosphate source and Muriate of Potash is the Potassium source. To control pest and diseases, there are several crop management methods apart from pesticide application. They are: Covering the Pomegranate fruit at early stage • Use improved varieties of Pomegranate resistance to pest and diseases • Select healthy budded plants from DOA certified nursery • Keep the hygienic condition of the land • Weed controlling • Use of organic manure before planting • High amount of nitrogen fertiliser (urea) may increase the susceptibility to pests. Therefore, excessive use of nitrogen fertiliser must be avoided • Use of micro-sprinkler or drip irrigation methods Insect pests mostly observed are fruit borer, mealy bugs, aphids, white fly and fruit sucking moths. Spraying with dimethoate, deltamethrin or malathion etc. depending upon the type of pest infestation has been found to be effective in most cases. The main diseases reported are leaf spot and fruit rot. Fruit cracking is a serious disorder. This physiological disorder observed in young fruits is due to boron deficiency and that in fully grown fruits is mainly due to moisture imbalances. Tolerant varieties viz. Bedana Bose and Khog may be cultivated and in other cases spraying with calcium hydroxide soon after fruit set has been found to be beneficial. IPM is encouraged to control the pest and diseases in the crop management as per the pest management plan (PMP) prepared for ASMP and for both pest and diseases the recommended pesticides and the fungicides are applied by the framers. Proposed IPM technologies in table 14 should be implemented during the project. These agrochemicals are recommended by the Pesticides Register of DOA and PMP as well.
Harvesting	Pomegranate being a non-climacteric fruit should be picked when fully ripe. Pomegranate plants take 6-8 months to come into bearing. Harvesting of immature or over mature fruits affects the quality of the fruits. The fruits become ready for picking 120-130 days after fruit set. The calyx at the distal end of the fruit gets closed on maturity. At maturity, the fruits turn yellowish-red and get suppressed on sides. Pomegranate fruits to be harvested are chosen based on age (bag colour), visual signs of maturity (bright, deep red colour fruit should be harvested), by size (the local market takes from to 200 gm fruit to 400 + gm fruit. Large fruits have more value) and by sweetness. Bagging increases the efficiency of the harvesting task by reducing the labour required. Pomegranate pickers go directly to fruit bagged with the color to be harvested on a given day. Bagging also increases the quality and shelf life of the fruit due to the fact that coloured bags allow for fruit at the optimum maturity stage to be harvested. The harvested fruit is placed carefully into 20-kg plastic trays lined with foam. The color bags that were on the fruit are also placed in the crate to allow for inventory management at the packing center.

	Usually, harvesting is done using crates or sacks. Mainly, Pomegranates are imported and prices are at very high level about LKR 2500 per kg. Therefore, targeting local and internations markets would benefit farmers.
Postharvest storage and transportation	Fruits are graded on the basis of their weight, size and colour. The various grades are super, king, queen and prince-sized. Besides that, pomegranates are also graded into two grades. Fruits can be stored in cold storage upto 2 months or 10 weeks at a temperature of 5^0 C. Longer storage should be at 10^0 C and 95% RH to avoid chilling injury and weight loss. The size of packages varies according to the grade of the fruits. Corrugated fibre board boxes are mostly used. In a single box, 4-5 queen sized fruits, 12 princes sized and some of grades may be packed. The white coloured boxes having 5 plies are generally used for export purpose, whereas red-coloured ones having 3 plies are used for domestic markets. The red coloured boxes are cheaper than white coloured ones. The cut pieces of waste paper are generally used as cushioning material. Majority of the growers sell their produce either through trade agents at village level or commission agents at the market. The quality monitoring and evaluation system provides data for quality management and creates a feedback mechanism to correct quality problems to ensure and maintain high pomegranate quality throughout the value chain.
Other factors	
Solid waste	The solid organic waste is generated as crop residuals and at postharvest period and all are biodegradable. However, compost production unit (See Annexure 6: Compost plant proposal) will be implemented to produce compost using solid waste generated from post harvesting processing centre and these organic fertilisers will be used at land preparation stage. Solid waste is a critical consideration during implementation of this cluster. Bags which will be using to cover the fruits will be significant. Hence, site level segregation, collection, reuse, recycling of polythene and plastics should be implemented properly to avoid solid waste becoming a nuisance to the community. In addition, Polythene/Plastic collectors at the Local Authority can be made use for this as final method of disposal if reuse/recycling is infeasible. However, farmers will be made aware on proper disposal mechanism during implementation.
Wastewater	Surface runoff will carry the fertilisers and applicable chemicals (pesticides, weedicides etc.) and impact is higher due to flood irrigation system. This will minimise by introducing water conservation techniques. Further, due to application of IPM mechanism, soil and ground/surface water pollution will be minimalised. ASMP will conduct the awareness creation and training programmes for both farmers as well as the officers regarding the IPM as per the PMP. Proposed application of IPM during implementation of Pomegranate cluster is given in table 14.

Table 14: ISP of ASMP - Proposed IPM Technologies for Crop Pomagrenate in Mullaitivu (CDP 19)

Stages	IPM Practices	Impacts of Implementation	Benefit for farmers
Pre-Land preparation stage	Removal of all shrubs and bushes. Shading branches of big trees near the field are removed	Destroying of all alternative host for pest and diseases	Future risk of pest damages is minimised
Land preparation stage	Doing 1st ploghing with disk or mould board ploghs	• Different stages of pest cyles are destroyed. • Harmfull bacteria and other micro-organisms are desroyed due to aration is improved. • Also, Harmful pathogens are destroyed due to exposing soils in to the sunlight.	Future pest and disease incidences and damages are minimized. Cost reduced.
	Adding Compost		
	Doing 2nd deep ploghing with disk or mould board ploghs perpendicular to 1st ploghing		
	Disking or harrowing (two perpendicular passes)		
	Flood prevention and Drainage improvements		
Planting stage	Healthy Planting Materials are selected	strong and vigorous Saplings are enssured for planting	A healthy plantation is assured. Cost reduced
	Plant of non standerd are removed		
	Saplings will be purchassed from recognized institutions registered under DOA		
	Saplings of same hight and growth are planted in separate rows	Easy to manage agronomic practices. Uniform plantation is assured	A healthy plantation is assured. Cost reduced
	Two Row High density plantings will be applied. Saplings are planted in two double rows 1 m apart. The seedling spacing within a double row is 2 m. An alley, 4 m wide, separates the double rows.	4 metre alleys can be used for intercropping and weed management will be no or less cost. Pest and deseases attacks will also be minimised	additional income and cost reduction
Sapling stage	Daily attention on each and every sapling will be assured	Early identification of pest and diseases incidents	A healthy plantation is assured. Cost reduced
	Every plant will be tied to a stalk errected closed to the plant	Prevent from wing damage	No mechanical damage to the plant
	weakend plants are replaced by new saplings	Even plantation is assured	A healthy plantation is assured. Cost reduced
	Care will be taken to get no water stress	Vigorous growth and Even plantation is assured	A healthy plantation is assured. Cost reduced

	Only correct dose of nutritionally balanced fertilizers will be applied	No unwanted canopy development and vigorous growth is assured	A healthy plantation is assured. Cost reduced
Growth Stage Juvenile stage	Daily attention on evry saplings is assured. This procedure is folloewed in every growth stage of the crop cycle	A healthy crop field is assured	A healthy plantation is assured. Cost reduced
	weakend plant parts are removed and vacancies will be immediately filled		
	• One single trunk is prefered to multiple trunks. Pruning to develop lateral production branches and a compact canopy is practiced one year after transplant. • After that, light pruning of the terminal branches should be practiced. • Pruning cycles should be scheduled every two weeks	Canopy architecture pruning of young trees must favor a tree architecture that promotes the bushy structure of the Pomegranate tree. Tree inspection and adopting agronomic practices are easy. Risk of pest and diseses inpestations are minimized	
	Field sanitation is assured by managing garbage in the field		
	Suspicious plants are marked and will be monitored for pest and diseases. Treatment is followed if identified a pest or a desease incident if needed		
	Attacked plants and parts are uprooted and immediately destroyed		
	Intercropping	• Minimize the weed control. • No need to weedicide application	additional income and cost reduction
	Low pressure mini sprinkler irrigation system	• Volume of water need for the effective root zone is assured. • Percolation of irrigated water toward the ground water is minimized. • Possibility of applying Agro chemical through the irrigation system	Easy to handle. Environmentally safe. Less risk of pest and diseases incidents.

	Fertigation with organic liquid fertilizers supplemented with fertilization and/or fertigation with chemical fertilizers. Formulation of fertiliser regimes based on complete soil tests and foliar analyses. It will be continued flowering and maturity stages too	• Correct dose of nutrient to the plant is assured	Easy to handle
	Fruit thining	Asure optimised no of fruits in the tree.	An economic production is assured
	Every selected fruit will be covered with a bag which is also easy to identify the age of the fruit too	Fruits are protected from the fruit fly infestation	Asure fruit fly free fruits
	Integrated Pest Management (IPM)	• Pest population and pest damage assessment surveys to evaluate pest and disease intensity/quantity factors for damage prevention and to determine pest populations threshold status for rational application of pesticides • Prevention and controland of pre and postharvest pests and diseases. Fruit flies, sucking moths, fruit borer and nematodes are of special concern	• IPM practices are combined with modern spray techniques when necessary i.e. ultra low volume spray using drones • Pesticide appication through irrigation system
Maturity stage	promegranate plants are regularly inspected for possible pest and diseases attacks	Healthy fruits are assured	Expected yield with high quality is assured
Harvesting stage	Fruits in the field are chosen based on age (Bag color) Shorting and cleaning of fruits will be done at the farmers' mini processing room and cafully transported to the buyers' yards	only best fruits are selected for marketing	Expected yield with required quality is assured
Post Harvesting and storage	Field heat removal Line packing Cold chain management Integration of export protocols into standard SOP	These practices are utilized to preserve optimum quality and shelf life throughout value chain.	Pomegranate producers will win a brand of quality product suppliers

Transport stage	The harvested fruit is placed carefully into 20-kg plastic trays lined with foam. The color bags that were on the fruit are also placed in the crate to allow for inventory management at the packing center	Protects Pomegranate hands from damage during transport to packing center. Possible cause of pest and desease incidents are minimized.	Expected quantity of produce is assured. Reasonable price ia assured.
Marketing stage	Export protocol, guidelines to grow, pack and ship Pomegranate for export	The export protocol ensures Pomegranates arrive in optimum biological and commercial condition to international markets	Pomegranate producers will win a brand of quality product suppliers

PUBLIC CONSULTATION

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

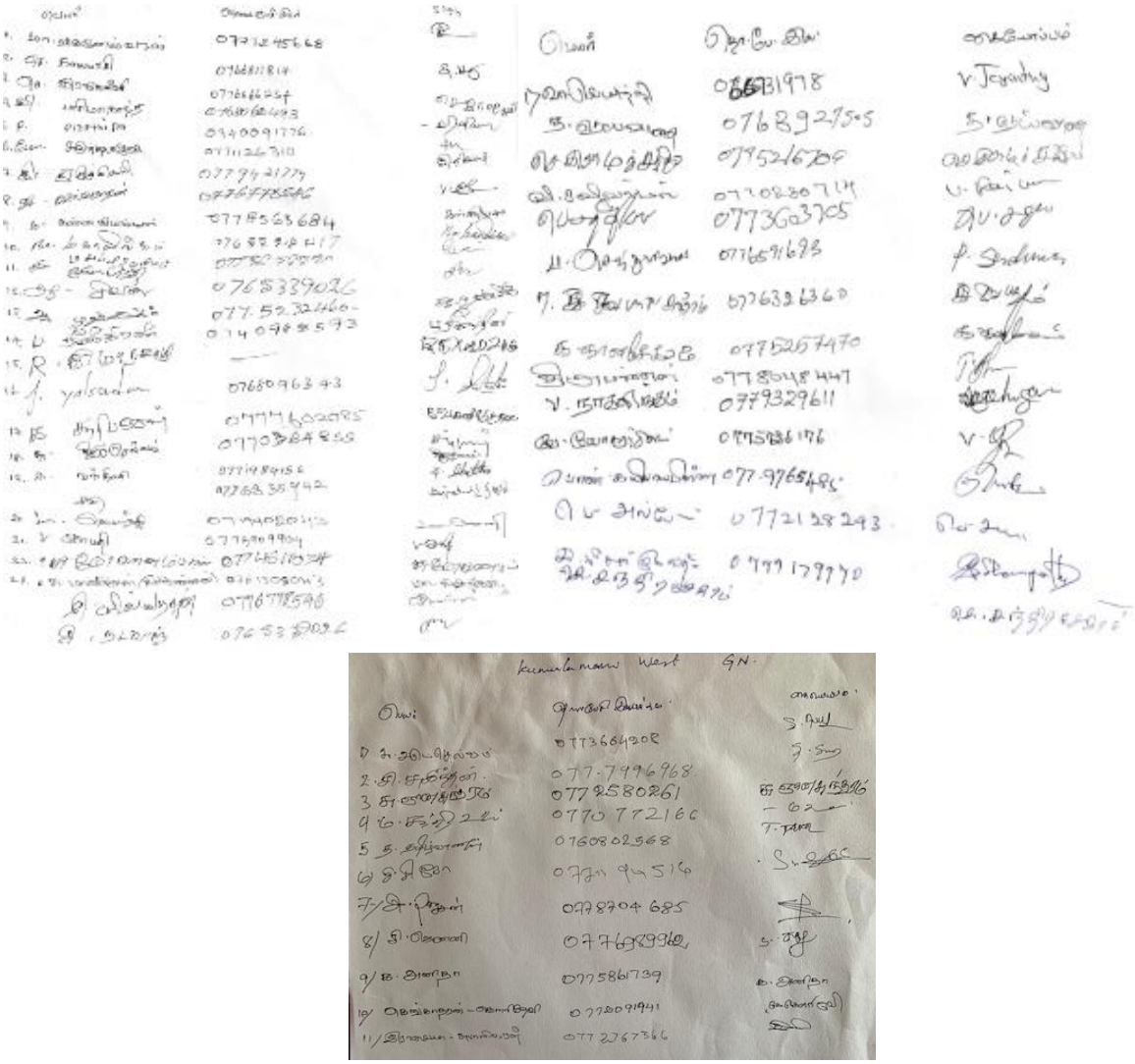


Figure 9: Attendance Sheets of Public Consultations

Table 15: Outcomes of the Public Consultations

#	Farmer's Representation	Summary of Public Consultations
1	Kumulamunai West	They were keen in cultivating pomegranate; however, this is the first time they are going to plant this fruit crop in large area in acres. They were having few plants in their back yard garden. They were very much concern about the fertility of they soil which is very sandy. Land ownership is not a problem in the division. They have either deeds or government permits, and the lands are in large extents. Since it is a sandy soil, the water will drain quickly during heavy rain and stagnation of water is not likely to happen. They are interested in inter-cropping seasonal crops like chili and ground nut and perineal crops like cashew and coconut. These crops are planted by farmers in the area in a traditional way and they have been

		struggling to earn adequate income for the family. If a high income is guaranteed by the modern farming technologies and practices the farmers are ready to adopt those technologies and farming practices without hesitation. There is no Archeological or reserve forest land in the area selected for pomegranate planting. There are several minor tanks in the area which acts as s source of recharging ground water. They pointed out the wrong taxation policy of the government which affect the prices of their produce in the past. They were asking us for an appropriate policy measure focusing on producers considering the seasonal variation of products in different regions. The farmers were in a hurry, and they were not able to draw the community map. They indicated monkey's and squirrels are thread for pomegranate and some protective measures need to be introduced to protect the fruits and get it ready for processing and marketing. They were asking for air guns to chase monkey's from the gardens.
2	Kokkuthuduwai and Kokilai	The source of water for irrigating the crops is mainly tube wells and they face a problem of water scarcity during the months of April, May, June, July, and August. One selected farmer has received the planting material and planted the plot. Others have prepared the land and waiting for planting materials. Social and environmental safeguard specialist visited the fields. People said that they wish to plant groundnut as an inter cropping plant in between the pomegranate plants. Lands of course permit lands, and they have a safety guaranteed by the state issued documents. They were encountering wild animals' attacks on the crops in their lands. Specially, monkey's, peacocks and birds damage the fruits and nuts. In one of the GN division bordering the Welioya DS division elephants also damages the planted crops. Department of wildlife do not take any prompt action to chase these wild animals and birds even if the farmers inform them. The activities of Department of Forest and Department of wildlife are not satisfactory according to the people. In spite of these issues the farmers interested in cultivating pomegranate fruit plant due to its high value in the market and its medicinal properties.

- **Existing issues**

At the moment commercial pomegranate farming is hardly existing in the Cluster area. Only 8 hectares have been reported in the Maritimepattu DS area where this project is to be implemented. But overall, commercial pomegranate farming is new all over Sri Lanka with the project promoting this being a real innovation and diversification of the commercial agricultural production base. The intervention is a real challenge as farmers are dealing with a new crop and the project will face issues such as:

1) Lack of knowledge and skill on practicing agronomical practices.
2) Risk of damages by pest and diseases.
3) Poor crop management practices and poor sanitation.
4) Most of the youth in the labor force have left the district or gone abroad for employments.
5) Reluctance of even the youth in the district to engage in agriculture.
6) Contamination of ground water due to irregular application of chemical fertilizers and pesticides.
7) Low quality of product and grading is not practiced.
8) Lack of reasonable prices for the products.
9) Demining is still in-progress in certain areas

Figure 10: Public Consultations with Pomegranate Cluster Farmers

Figure 11: Existing Conditions of Proposed Lands

Figure 12: Current irrigating practices

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

Table 16: 8a. Screening for Potential Environmental Impacts

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
1	Will construction and operation of the project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.?)	√		Low-moderate	• Existing land preparation and flood irrigation system will be changed. Land preparation techniques will focus on reducing the effects of flood irrigation. No significant disturbances for any existing land use, or water bodies and no negative impact causes are anticipated
2	Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	√		Moderate	• Fertilisers and some additional chemicals will be used and there is a possibility to have chronic impacts due to the long-term usage. However, proposed techniques will reduce the amount of chemicals and fertilisers use and modern techniques/methods will be introduced to increase the productivity by other means • In terms of public infrastructure development, handling, storage, transportation and use of substances which will be harmful for human health such as cement
3	Will the project produce solid wastes during construction or operation?	√		Moderate - High	• During its operation, solid organic waste will be produced as crop residue that can be used for the compost production unit. Fruit covering bags will be a main source of solid waste for which EMP measures should be applied. • However, development of infrastructure will create solid waste during clearing and grubbing, construction, etc which need to handle with care, but quantum would be small • During the deep well construction, considerable volume of excavated material will be generated. The excavated materials can be reused for mixing with compost during

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
					land preparation and embankment construction of rural roads. However, precautions are given in EMP.
4	Will the project release pollutants or any hazardous, toxic or noxious substances to air?	√		Moderate	• Implementation of proposed IPM practices will reduce the use of chemical fertilisers for cultivation of Mango • 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. The area selected is a coastal belt where lagoons and waterboadies may have the potential for pollution due to wastewater discharges, chemicals and fertilizers and leachat from waste.

№	Screening question	Yes	No	Significance: (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?	√		Low	• There won't be any possibility of localised flooding due to proposed agricultural activities and it will enhance the existing drainage system. The area is naturally prone for flooding due low elevation. • However, due to improper practices by the civil contractors during construction activities may have a possibility of creating drainages disturbances and blockage of natural drainages which leads to localise flooding
8	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?	√		Low - Moderate	• No medium and large-scale infrastructure development envisaged and hence, no severe health and safety hazard identified. Better hazard identification and prevention and corrective measures during construction will eliminate the risk associate
9	Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?	√		Low	• Pomegranate transportation from cultivated lands to collection centre and transportation from collection centre to shipments/or any other location will be taken place. No creation of significant environmental problems • However, improvements to existing road network will create some form of traffic during construction which can be reduced or prevented by adhering to proper traffic management plan during construction
10	Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?		√		• There are no such places located within the project area
11	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?		√		• Even though a forest reserve is located within few GNDs. There are NO activities proposed closer to those areas which has the possibility of creating disturbances

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
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?	√		Low	• As mentioned above, the area is a coastal belt. Nayaru and Kokilai area lagoons closer to the cluster lands. There are rich mangrove areas in the area and forest areas are also within the project area. However, impact on the said habitats is low.
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?	√		Low	• As there are forest areas and mangrove areas in the cluster area, there may be habitats which are important in terms of fauna and flora. The forest areas have habitats of elephants in the area as well.
14	Is the project located in a previously undeveloped area where there will be loss of green field land		√		• All agricultural activities proposed are within farmers lands which they are being cultivated at present and no new land will be converted to agriculture • The proposed collection centre and compost yard will be constructed on a government land which are not categorized as undeveloped green fields
15	Will the project cause the removal of trees in the locality?	√		Low	• Avoid removal of trees in the Collection centre and agriculture lands. If not follow the instruction 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?		√		There is no culturally important location which will be affected due to agricultural or construction activities. However, Hindu kovils are located at many places in the area
17	Are there existing land uses on or around the location e.g. home gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?		√		• As mentioned above all proposed cultivation areas are cultivating lands at present and no new lands will be converted to agricultural purposes • Proposed construction activities are also taking place on government lands which are designated for development

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
					but no conflict of interest due to any other proposed activities
18	Are there any areas on or around the location which are densely populated or built up, which could be affected by the project?		√		• There are no densely populated areas in the area as the areas selected are purely rural
19	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project	√		Low	• As mentioned, due to proposed agricultural activities no negative impact on such sensitive locations in the area • Due to proposed rural road improvements, there will be minor level of impact on accessing of schools, kovils and community facilities but NO hospitals will be disturbed
20	Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?		√		• No such important locations observed in and around the area
21	Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?		√		• Within proposed cultivation areas, no such already polluted or environmentally damaged areas recognized.

8B. Environmental Management Plan

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

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

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

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

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored • Any suspicious objects found, stop work and move out immediately and inform Police and deming groups including Army • Evacuate the area about 500m radius • Pest and disease control according to the international standard including IPM frame work of the world bank and pest management action plan prepared by ASMP • Formulation of fertiliser regimes based on complete soil tests and foliar analysis • Pest population and pest damage surveys to assess pest threshold status for application of pesticides

Table 18: EMP for Improvements of Rural Farm Access Roads (This should be part and partial of the bidding document during bidding)

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

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			4. Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours. 5. Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented. 6. Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. 7. An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days. 8. Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.
3	Spreading COVID 19 virus	▪ All activities	• take all necessary precautions to maintain the health and safety of all Staffs including labourers • The contractor must ensure that all workers, including managers, are well trained on COVID 19 safety precautions published by the health ministry. • appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents • ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics • Follow all necessary guidance stipulated under Interim Guidance on COVID-19 Version 1- April 2020 (see Annex 6)
4	Over extraction of natural resources	Material Sourcing	1. The contractor is required to ensure that sand, aggregates and other quarry material is sourced from licensed sources. The contractor is required to maintain the necessary licenses and environmental clearances for all burrow and quarry material they are sourcing –including soil, fine aggregate and coarse aggregate. 2. Sourcing of any material from protected areas and/or designated natural areas, including tank beds, are strictly prohibited. 3. If the contractor uses a non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			4. The contractor should submit in writing all the relevant numbers and relevant details of all pre-requisite licenses etc. and report of their status accordingly.
5	Impact on habitats of fauna and flora	▪ Vehicle and machinery movements ▪ Site preparation including tree removal (if any)	1. The contractor shall make every effort to avoid removal and/or destruction of trees, including those of religious, cultural and aesthetic significance. 2. If such action is unavoidable, the Engineer shall be informed in advance to verify and report on the technical justification for the trees that will be required to be removed. • The following steps are to be followed if trees are identified for removal during the renovation. • Identify and document the number of trees that will be affected with girth size and species type. • Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department (LA). • Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area. • The contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority (CEA), if any with regard to felling of trees and removal of vegetation. • Removed trees of economic value must be handed over to the State Timber Corporation.
6	Air Pollution including dust generation that can affect nearby vegetation	▪ Site Preparation activities, setting up of material storage yards, and removal of vegetation ▪ Transport of construction material and storage on site	1. In the construction method statement, the contractor should clearly designate areas for maintaining material stock piles, waste stock piles, labour camps and vehicle maintenance yards. These dust emitting sources should be located away from human activity and natural drainage paths as much as possible. 2. Stock piles should be suitably covered to minimise washing off. 3. The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. 4. Transporting out debris to be carried out with minimal use of heavy transport vehicles and taking due care to avoid unwanted damages to existing structures. 5. Until removal to arranged disposal sites, waste shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to local traffic, local residents. 6. There should be no burning of wastes on site.

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

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			site ponding or flooding.
10	Solid Waste Disposal	Site clearing Construction debris Unsuitable soil	1. The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type. 2. Any hazardous type of waste shall be dealt with special care and instructions from the LA. 3. The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations. 4. The contractor shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
11	Public/occupational safety hazard	Site clearing, storage of equipment, material etc Increased traffic of heavy vehicles for material transportation Noise and vibration of construction machinery	**Training** 1. The contractor must ensure that all workers, including managers are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets). 3. In addition, the contractor shall be 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. 10. Warning signs related mines should be displayed with necessary preventive meausres **Equipment safety** 11. 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** 12. An emergency aid services must be in place in the work site. 13. 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. 14. Any suspicious objects found, stop work and move out immediately and inform Police and deming groups including Army 15. Evacuate the area about 500m radius **Information management** 16. Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities. 17. Provide advance notice to local communities by way of information boards or leaflet about the schedule of construction activities, interruption to services and access etc.
12	Access restrictions and public inconvenience	Site Preparation activities Vehicle and machinery movements	1. Prior consultation and consent should be taken from relevant authorities and should conduct work with a minimum disturbance to public. 2. Provision of access during designated times of day or where possible provides temporary access paths for users/ staff within the premises.
	Post construction phase		

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
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 19: EMP for Construction of Collection Centre and Compost Yard (This should be part and partial of the bidding document during bidding)

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

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
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	Water Quality	• Spill out of fuels and lubricants from machinery	• Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets • Prioritize re-use of excess spoils and materials in the construction works. • Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; • Place storage areas for fuels and lubricants away from any drainage leading to water bodies; • Dispose of any wastes generated by construction activities in designated sites. • Irrigation works must be planned to be carried out during times of lowest flow
4	Spreading of Invasive Alien Species	• Vegetation clearing • Material transportation • Desilting	• Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done. • Vehicles should be covered during transportation of cleared vegetation to and from the construction site. • Borrow material to be brought from properly identified borrow pits and quarry sites, the sites should be inspected in order to ensure that no invasive plant species are being carried with the burrowing material. • Washing the vehicles should be conducted periodically to prevent carrying any invasive species • The construction site should be inspected periodically to ensure that no invasive species are establishing themselves at the site. • Good housekeeping

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
5	Noise Pollution & Vibration that can affect nearby structures	• Operation of equipment and machinery. • Material storage and transport • Use of hammer type pile driving will generate high noise and vibration.	• Working time for noise/vibration generation activities should be restricted and carried out only from 6.00 am to 6.00 pm. • All equipment and machinery should be operated of noise not to exceed 75 dB (during construction) as practical as possible. Regularly maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12). If the construction activities happen during the night-time, it is necessary to maintain the noise level at below 50 db. • Use of mechanically driven saw blades for tree felling will make the noise levels restricted to only a short period of time. • Construction equipment and machinery should be maintained in good condition. The contractor shall submit the list of high noise/vibration generating machinery & equipment to the PE for approval
6	Air Pollution including dust generation that can affect nearby vegetation and households	1. Site Preparation activities setting up of material storage yards, and removal of vegetation 2. Transport of construction material and storage on site	• In the construction method statement, the contractor should clearly designate areas for maintaining material stockpiles, waste stockpiles, labor camps, and vehicle maintenance yards. These dust-emitting sources should be located away from human activity and natural drainage paths as much as possible. • All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. • Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. • The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. • Vehicles transporting soil, sand, and other construction materials shall be covered. Limitations to the speeds of such vehicles are necessary. Transport through densely populated areas should be avoided. • Regular and proper maintenance of construction vehicles and machinery to avoid air emissions. • There should be no burning of wastes on-site. • Until removal to arranged disposal sites, waste from demolition shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic, local residents.
7	Solid Waste Disposal	• Site clearing • Construction waste	• 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.

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

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			12. Warning Signs related to Mines and necessary precautionary measures should be displayed **Equipment safety** 13. 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** 14. An emergency aid service must be in place on the worksite. 15. 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. 16. Any suspicious objects found, stop work and move out immediately and inform Police and deming groups including Army 17. Evacuate the area about 500m radius **Construction camps** 18. Construction camps should have adequate sanitation facilities for construction workers to control the transmission of infectious diseases. 19. Avoid housing workers in camps and provide socio-economic benefits locally by employing local people. If there is no alternative to employing workers from elsewhere, locate accommodation camps away from communities on land acquired from willing sellers. Provide labour camps with adequate sanitation, waste disposal, and health facilities according to labour laws. Clear work campsites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS. **Information management** 20. Develop and establish the contractor's own procedure for receiving, documenting, and addressing complaints from the affected public and nearby communities. 21. 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.

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

Table 20: 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** 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.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			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 be 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. 10. Warning Signs related to Mines and precautionary measures should be displayed **Equipment safety** 11. 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** 12. An emergency aid service must be in place in the work site.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			13. 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. 14. Any suspicious objects found, stop work and move out immediately and inform Police and deming groups including Army 15. Evacuate the area about 500m radius **Information management** 16. Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities. 17. 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

COST OF MITIGATION

Table 21: Environmental mitigation measures and estimated cost

No.	Environmental mitigation measure	Cost (LKR)	Remarks
1	Information Boards, leaflets	100,000	Awareness leaflets for organic cultivation practices and IPM
2	On-site first aid facilities	50,000	
3	Safety equipment's including COVID-19	150,000	Personal protection equipment should be provided for road and canal renovation activities
4	Dust suppression	75,000	Need to be done during road and canal renovation activities
5	Waste removal from site	75,000	Waste from vegetation clearing, site preparation, labour camps
6	Training of farmers and village level stakeholders on IPM and new technological applications	200,000	Should be scheduled to a few sessions
	Total	**650,000**	

CONCLUSION AND SCREENING DECISION

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

Table 22: Summary of environmental effects

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
DURING AGRICULTURAL ACTIVITIES		
• Land preparation • Fencing (if applicable) • Land preparation • Drainage Labour • Preparation of pits and planting • Planting materials	• No significant negative impacts since new lands are not used for the cultivation activities. Water accessibility will be improved	SP
• Introduction of basic flood prevention and drainage field techniques • Site levelling using drone surveying and laser levelling machinery • Quick water evacuation ditches • Surface drainage techniques (removal of wet spots)	• Less water consumption, less soil erosion	SP
• Use of fertilisers and chemicals • Mechanical Weeding • Insect Control • Other Spray	• Land, water an air contamination	NS
• Product transportation and storage	• No significant impacts	NS
• Introduction of drone technology • Geo-positioning • Land surveys for site selection • Levelling for land preparation and drainage • Disease surveys using infra-red photography • Application of pesticides	• Less agro-chemical contamination on Land, water, and air	SP
• New and improved quality enhancing technologies • De-flowering, de-handing, debudding, bagging, propping and guying • Fish line de-handing, de-latexing in the field, disposal of organic waste in the plantation, prolonging the usefulness of the mother plant	• Solid waste generation	SN

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
• Introduction of water conserving and low-pressure drip and mini sprinkler irrigation systems • Computer controlled heads for water application scheduling supported by fertility sensors, soil moisture sensors and irrigation friendly double row planting • Precision fertigation with liquid organic compounds • Precision application of liquid pesticides • Anti-clogging flushing components	• No such harm, less use of water and Less contamination of agro-chemicals on Land, air and water	SP
INFRASTRUCTURE ACTIVITIES (RENOVATION OF ROADS, CONSTRUCTION OF COLLECTION CENTRE AND ERECTION OF 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
• 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

EMP IMPLEMENTATION RESPONSIBILITIES AND COSTS

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

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

SCREENING DECISION RECOMMENDATION

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

Majority of the potential adverse effects can be classified as general agricultural activities and construction related impacts and can be mitigated on site with proper engineering interventions as all activities proposed are minor scale of infrastructures limited to very small span of area. These potential constructional impacts are temporary in nature. Implementation of the EMPs proposed are sufficient to mitigate the identified impacts. These proposed EMPs for each distinctive activities should be accompanied with civil contracts which enforces contractors to adhere. 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 chemicals should be discouraged. Water conservation practices such as proposed micro sprinkling should be encouraged and farmers should be educated on the benefits of the same. Reuse/recycling of polythene is recommended up to maximum possible. Failing with, proper segregation, collection and disposal of waste through LA's collectors is recommended. Organic solid waste should be directed to the compost facility as much as possible.

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

Improvements of Rural roads: Implementation of the Environmental Management Plan will be sufficient to mitigate the identified impacts and EMP shall be updated with detailed designs of infrastructure improvements. Health and Safety proactive measures should be implemented by the contractors. Siltation of adjoining drains, lagoons, streams, etc will be significant as roads will be basically earth filling and should implement mitigation measures proposed in the EMP. Avoid construction of lengthy sections at a time to avoid disturbances to the public. Proper traffic arrangements including diversions, signs, etc should be available. Construction activities should be

restricted to 0600-1800hours to avoid inconvenience to the general public. Disposal of soil abruptly should be avoided which can leads to many environmental issues. Maximum of 250m stretch should be open at a time for construction to minimise the public convenience.

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

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

Table 23: Screening Recommendations for each activity

Key recommendations	Actions / Approvals to be attended	Time period to attend each action	Responsibility / Remarks
Disposal of Waste (covering bags)	Start collection and segregation of waste Reuse and Recycle Dispose through LAs Implement Waste Minimization Programme	During harvesting During harvesting time	FOs ISP PPMU ISP PPMU
Integrated Pest Management Practices	Implement IPM activities proposed above at each stage	From land preparation onwards	National and International Agronomist – ISP Agronomist – PPMU
Construction of rural roads	Construction of silt-traps where drains and lagoons are adjoining which has the potential for siltation	During construction of rural roads	Civil Engineer – ISP PPMU
Rehabilitation of Elephant fence	Construction or rehabilitation of fence Electrification Maintanance	During construction During Operations	FOs DWLC – Range Office Civil Engineer – ISP PPMU
Construction of Collection centre	Construction of Building Fencing of land Landscaping of area Post-harvest operations	During construction Installation of equipments/ machineries During operations	Civil Engineer – ISP Agronomost - ISP PPMU
Construction of compost yard	Construction of Building Fencing of land Landscaping of area Drying and sorting of waste Leachate collection Odor control Operations of composting	During construction Installation of machineries During operations	Civil Engineer – ISP Agronomost - ISP PPMU
Confirmation of demining from relevant authorities	Land clearing, preparation, excavation activities	Before starting	Police DOA Army FOs ISP PPMU

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

ANNEXURE 1: LIST OF REFERENCES

1) Resource profile & SHB Maritime Pattu Divisional Secretariat 2019

2) ISP District Coordinator, Mullaitivu

3) District Statistical Handbook, 2018

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

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

6) Draft Cluster Development Plan – CDP 19 – Pomegranate Cluster in Maritime Pattu

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

8) Statistical Handbook 2021 Maritime Pattu Divisional Secretariat

ANNEXURE 2: BENEFICIARY LIST

#	Name of the Farmer	Gender (M/F)	NIC	ADC	AI Range	GN Division	Address	Mobile TP	Land Extent Ac	Type of Irrigation Available	GPS E	GPS N	Remarks
1	Muththaiya Pathmavathi	F		Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	765342713	0.50	Well	491119	1000120	
2	Pathmanathan Selvaranjana	F	705564490V	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	769442031	0.50	Well	491219	1000190	
3	Kanakalingam Thivakaran	M	197212004090	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	769087885	0.50	Well	491176	999684	
4	Sukumar Nirojan	M	900193190V	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	7731599669	0.50	Well	491177	999753	
5	Inparasa Valarmathi	F	797174270V	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	776488046	0.50	Well	491175	999732	
6	Balasivarasa Viknarasa	M	681022024V	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	772057846	0.50	Well	491272	999936	
7	Thambapillai Rushanthan	M	453212224V	Kokkuthoduvai	Kokkuthoduvai	MUL-82	Kokkuthoduvai Center	765742760	0.50	Well	489545	1002368	Elephant attack
8	Sellathurai Sayanthan	M	910755120V	Kokkuthoduvai	Kokkuthoduvai	MUL-82	Kokkuthoduvai Center	775378556	0.50	Well	490142	1000111	
9	Kanthaiya Palaninathan	M	194618610080	Kokkuthoduvai	Kokkuthoduvai	MUL-82	Kokkuthoduvai Center	761187627	0.50	Well	490252	1000516	
10	Sasikaran Jegatheeswari	F	935403898V	Kokkuthoduvai	Kokkuthoduvai	MUL-82	Kokkuthoduvai Center	777395226	0.50	Well	489888	1000918	
11	Ravichanthiran Saraswathi	F	197656210026	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	778956592	0.50	Well	490712	999705	
12	Ranjithkumar Sobana	F	828121278V	Kokkuthoduvai	Kokkuthoduvai	MUL-81	Kokkuthoduvai North	778498231	0.50	Well	489741	1002748	
13	Sellathurai Selvasuthan	M	741364638V	Kokkuthoduvai	Kokkuthoduvai	MUL-80	Kokkuthoduvai South	779364558	0.50	Well	491203	999956	
14	Iyaththurai Vickneswaran	M	650162340V	Kokkuthoduvai	Kokkuthoduvai	MUL-81	Kokkuthoduvai North	778206538	0.50	Well	490130	1001384	Elephant attack
15	Natkunam Naguleswaran	M	723373310V	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	764511513	0.50	Well	491740	998267	

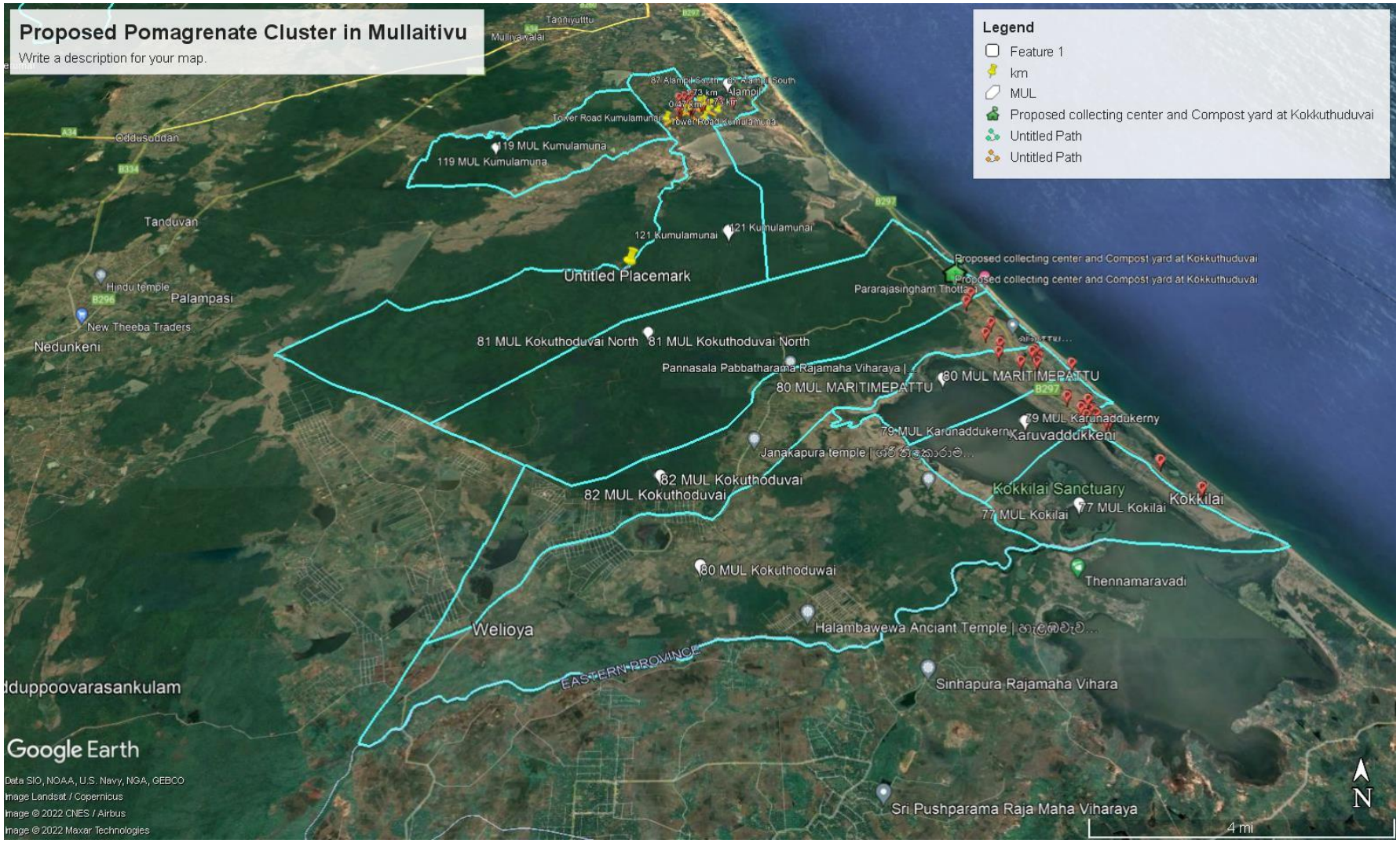
16	Sinnathambi Kulasekaram	M		Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	778398379	0.50	Well	492300	998141	
17	Sivathasan Santhini	F	197770904300	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	773319097	0.50	Well	491978	997774	
18	Akempanathan Sukenthiran	M		Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	779435597	0.50	Well	492168	997540	
19	Kaneshalinga Lingeswaran	M	197232304816	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	761127352	0.50	Well	492117	997533	
20	Kanthasami Jeyaraj	M	771763715V	Kokkuthoduvai	Kokkilai	MUL-78	Kokkilai East	772912895	0.50	Well	492735	997337	
21	Kanthaiya Rathinasingam	M	570410954V	Kokkuthoduvai	Kokkilai	MUL-77	Kokkilai West	773062273	0.50	Well	492621	997309	
22	Palasubiramanium Rani	F	677623624V	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	765352571	0.50	Well	492252	997761	
23	Sivalingam Sasikala	F	685642484V	Kokkuthoduvai	Kokkilai	MUL-78	Kokkilai East	773876712	0.50	Well	493723	995847	
24	Erasaratnam Theivanaipillai	F	506030633V	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	765352571	0.50	Well	492308	997789	
25	Akampanathan Kajenthini	F	199081210089	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	773319097	0.50	Well	492405	997603	
26	A.Jeevithan	M	950832045V	Kokkuthoduvai	Kokkilai	MUL-78	Kokkilai East	772453604	0.50	Well	494555	994889	
27	Kasinathan Saruka	F	987443430V	Kokkuthoduvai	Kokkilai	MUL-79	Karunaddakeni	773319097	0.50	Well	492033	997833	
28	Pasthiyampillai Vinothvimalraj	M	853463116V	Kumulamunai	Kumulamunai	MUL-119	Alampil South	779083397	0.50	Well	482671	1013663	
29	Antony Diron	M	200326710022	Kumulamunai	Kumulamunai	MUL-119	Alampil South	767241291	0.50	Well	482206	1013735	
30	M.Sivam	M		Kumulamunai	Kumulamunai	MUL-119	Alampil South	7716881647	0.50	Well			
31	Sivarasa Sukinthan	M	750644171V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	777996968	0.50	Well	480730	1013148	
32	Siventhiran Uthayakumari	F	845284571V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	762609319	0.50	Well	480655	1013960	
33	Selvarathithinam Pratheepan	M	810515481V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	772580261	0.50	Well	481152	1013124	
34	Sirunerakavasam Siso	M	940123437V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	771194516	0.50	Well	481072	1013189	

35	Manokar Santhirothayam	M	711234764V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	770772166	0.50	Well	481135	1014097	
36	Siriratha Thanusan	M	931334409V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	760308727	0.50	Well	481075	1013477	
37	Palaniyappan Kumar	M	783375095V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	778448955	0.50	Well	480854	1014046	
38	Subiramanium Ganasuntharam	M	592683974V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	761218247	0.50	Well	480946	1013757	
39	Kaneshanathan Aniththa	F	876224623V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	775861739	0.50	Well	481126	1013341	
40	Nagarasa Sivaruban	M	086564688V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	761153381	0.50	Well	481090	1013376	
41	K.Jegarani	F	645604326V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	779783810	0.50	Well			
42	Rasaiya Subashkaran	M	720381427V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	772767366	0.50	Well	481476	1013475	
43	Ponrasa Thangamalar	F	607334706V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	779329983	0.50	Well	481620	1013627	
44	Kanagasuntharam Subaalathan	M	920034264V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	773084342	0.50	Well	481008	1013482	
45	Akambaram Ramanasahnthi	F	737171470V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	773858956	0.50	Well	480655	1013344	
46	Tharumalingam Thamilvanan	M	871423148V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	768647104	0.50	Well	480655	1013109	
47	Subiramanium Arulselvan	M	791134447V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	773664208	0.50	Well	480727	1013006	
48	B.Thayananthan	M	9726011934V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	774958729	0.50	Well	481442	1013717	
49	Kengatharan Gowrithevi	F	717601483V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	741017015	0.50	Well	481542	1013402	
50	U.Puspalatha	F	656294000V	Kumulamunai	Kumulamunai	MUL-119	5th Ward	779719131	0.50	Well			

ANNEXURE 3: INSTITUTIONAL ROLES IN THE POMAGRENATE CLUSTER

Govt. Agency	Officer Responsible	Expected role in cluster development
Provincial Department of Agriculture (North)	Provincial Director (Agriculture)	Lead and provide guidance to relevant officers and FPO. Coordinate all line agencies at District level
	Deputy Director (Agriculture)	Provide guidance to relevant officers and FPO. Provide extension services and inputs. Solving farmer problems. Coordinate with all line agencies at Cluster level
	2 Agriculture Instructors	Maintain close link with farmers in the cluster area. Training of farmers, Play the role of farmer facilitator
Divisional Secretariat Maritimepattu	1 Divisional Secretary	Make representation for review committees to assist DD (Agriculture) Settlement of land issues and issue land permits, if necessary Make required services available to FPO from other agencies
	1 Land Officers	Settlement of land disputes. Clearing boundary demarcations
	7 Grama Niladaris	Assist to identify eligible legal farmers Organize farmer meetings
Agrarian Development Department	2 Agrarian Development Officers	Get the involvement for input supplies such as seeds, organic and chemical fertilizers, machineries For effective cooperation from existing Farmer Organizations Gather Agrarian related farmer information
Regional Agriculture Research and Development Centre, Kilinochchi (RARDC) Agriculture Insurance Board- Mullaitivu	Deputy Director, Pathologist, Entomologist and Soil scientist, Irrigation Agronomist Assistant Director/Mullaitivu District	Provide research support to farmers whenever a problem emerges Introduction of agriculture insurance policies and take necessary steps for assessment of damages and payment settlement for damages
Divisional Agriculture Committee/Maritimepattu (Chaired by DS)	Divisional Secretary, all divisional level officers attached to Agriculture, Irrigation and Development sectors. Selected Farmer Representatives	Make decisions on agriculture related issues emerged at the meeting. Introduce problem solving mechanism to overcome issues (marketing, input supplies, draught and flood relief, irrigation, wild elephant damages, crop insurance) that are common in the area

ANNEXURE 4: PROJECT AREA MAPS




Proposed Pomegranate Farmlands in Kukkuthuduvai
Write a description for your map.
Legend
Pomegranate Farm Land 1
Untitled Polygon
Pomegranate Farm Land 1
Mullaitivu-Kokkilai Rd
Google Earth
Image © 2022 CNES / Airbus
N
400 ft


1037 m
1985


Mullaittivu-Kokkilai Rd
127 m
1985

ANNEXURE 5: COMPOST PLANT PROPOSAL

1. Rationale

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

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

2. Integrated plant nutrition system

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

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

Farmers in Sri Lanka are used to apply only chemical fertiliser for their cultivations which has been a contributory factor towards gradual decline of fertility in soil. This situation is adversely affecting crop production in all clusters. Hence, the utilisation of organic fertiliser in addition to the chemical fertiliser is essential for successful crop production in clusters. In this regard, it is necessary to increase the overall organic fertiliser production in all clusters as well as in throughout the country. The objective of this programme is to encourage farmers to produce total requirement of compost within the cluster areas because transport of compost from long distance is not economical. Therefore, it is expected to encourage some producers to make large scale productions on commercial basis.

3. Objectives of the compost production programme

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

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

4. Site selection

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

5. Steps of compost production process

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

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

- Selection of farmers or FPOs those who can do compost production
- Registration of compost production in relevant authorities
- Collection of information on raw- materials availability in each cluster areas
- Selection of suitable sites in each cluster
- Establishment of compost production units in each cluster
- Training of farmers in groups through field demonstrations on complete package of the compost production
- Educate farmers on quick compost production technologies, maintenance of the quality, storage, stocks, run as a business etc.
- Arrange compost production with individuals or FPOs

- Laboratory testing of produced compost samples for quality testing
- Design bags with brand names and other relevant details
- Guide for marketing of compost

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

Table 24: List of structures, implements and equipment Required for the Compost Production Unit

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

8. Method of compost production by the heap method

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

The aerobic composting process starts with the formation of the pile. First, mesophilic organisms multiply rapidly with the temperature of 20 - 45^{0}C on the readily available sugars and amino acids. Under such conditions, they generate heat by their own metabolism and raise the temperature to a point where their

own activities become suppressed. Then some thermophilic fungi and several thermophilic bacteria under the temperature range 50 - 70^{0}C or more continue the process, raising the temperature up to 65^{0}C or higher. In many cases, the temperature goes up to 70 - 80^{0}C and this peak heating phase is important for the quality of the compost as the heat kills pathogens and weed seeds.

The general process of producing compost involves piling the organic waste in long rows. The heap is usually started with 20-30 cm layer of different raw materials. Alternate layers should be placed with different raw materials available in the area in the heap. The manure, dung and animal urine are excellent for composting due to high nitrogen content and less C/N ratio. The application of Eppawala rock phosphate is also an important step in compost production. It is well-known fact that quality of compost could be improved when rock phosphate is added. Different raw materials are placed until the pile is 1.5 - 2.0m high. It is advisable to maintain the width about 2 - 2.5m at the base for successful aeration. The sides are tapered so that the top is about 0.5m narrower in width than the base. The substrates should be piled loosely in a compost heap to provide better aeration within the heap. After 3-4 layers of raw materials normally apply sufficient quantity of water and compost activator/inoculant. After formation, the pile is covered with black polythene to retain heat and moisture but leave a sufficient space at the bottom for ventilation. The active composting stage is followed by turning stage, and the pile temperature decreases gradually with the time. Therefore, turning/mixing should be done every 3 - 4 weeks interval to activate the decomposition of raw materials. However, maximum three turning/mixing steps are recommended during the whole period of the composting process due to high labour involvement for this process. At each turning, the material is mixed thoroughly and moistened with water and apply compost activator/inoculant such as the Trichoderma spp. of fungus. In general, the C/N ratio should be maintained with carbonaceous and nitrogenous materials for successful decomposition. Under such conditions, compost can be typically produced within 8-12 weeks depend on raw materials used. In reasonably mature compost contains a wide range of particle sizes from fine grains to partly decomposed twigs and un-compostable fragments from refuse. Therefore, compost may need sieving by 4mm sieve before sending to the market. Mature compost should have a crumbly texture, an earthy smell and be dark brown or black in colour.

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

9. Management of compost production unit

a. Approvals

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

b. Manage composting

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

c. Compost quality

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

d. Record keeping

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

10. Marketing

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

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

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

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

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

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

11. Environmental impact

The unit will be established to minimise the environmental impact. In order to reduce the environmental impact, measures will be taken to minimise odour, dust, leachate etc. Breakdown of organic matter by aerobic oxidation produces no odours. It is important therefore, to supply sufficient air during the composting process. Another important aspect of some of the materials that can be used in composting is their attractiveness of flies. To avoid the problem, the

suggestion is to maintain higher temperature. Fly larvae are unlikely to survive if temperature is above 55^0C. In addition, by turning the heap and placing the outer material in the hot central region many of the larvae will be destroyed; satisfactory fly control is possible by proper turning. Similarly, maintain the high temperature is the most significant factor in causing the death of pathogens too. In addition, steps should be taken to avoid release of leachate to the environment by avoiding excess water use, construction a place to collect leachate and reuse for compost production etc. As a further safety measures, it is recommended that no compost unit be set up close to drinking water source. This should prevent any liquid percolating from the compost heap into the water supply, particularly during the rainy season.

ANNEXURE 6: INTERIM GUIDELINES ON COVID-19 OF WORLD BANK

ESF/SAFEGUARDS INTERIM NOTE: COVID-19 CONSIDERATIONS IN CONSTRUCTION/CIVIL WORKS PROJECTS

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

1. INTRODUCTION

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

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

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

2. CHALLENGES WITH CONSTRUCTION/CIVIL WORKS

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

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

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

3. DOES THE CONSTRUCTION CONTRACT COVER THIS SITUATION?

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

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

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

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

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

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

4. WHAT PLANNING SHOULD THE BORROWER BE DOING?

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

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

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

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

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

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

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

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

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

5. WHAT SHOULD THE CONTRACTOR COVER?

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

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

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

(a) ASSESSING WORKFORCE CHARACTERISTICS

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

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

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

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

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

(c) GENERAL HYGIENE

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

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

(d) CLEANING AND WASTE DISPOSAL

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

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

(e) ADJUSTING WORK PRACTICES

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

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

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

(f) PROJECT MEDICAL SERVICES

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

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

(g) LOCAL MEDICAL AND OTHER SERVICES

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

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

(h) INSTANCES OR SPREAD OF THE VIRUS

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

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

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

(i) CONTINUITY OF SUPPLIES AND PROJECT ACTIVITIES

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

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

(j) TRAINING AND COMMUNICATION WITH WORKERS

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

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

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

(k) COMMUNICATION AND CONTACT WITH THE COMMUNITY

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

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

6. EMERGENCY POWERS AND LEGISLATION

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

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

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

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

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

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

ANNEX

WHO Guidance

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

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

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

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

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

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

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

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

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

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

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

ILO GUIDANCE

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

MFI GUIDANCE

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

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

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