
# Sri Lanka Agriculture Sector Modernisation Project (ASMP)

## ENVIRONMENTAL SCREENING REPORT

## FOR

## CDP № 5 - MATALE (DAMBULLA) - MANGO AND BIG ONION

**Prepared for Democratic Socialist Republic of Sri Lanka, Ministry of Agriculture (MoA)**

**Revised: 18 June 2022**

FCG

InfotechsIDEAS

NEW ZEALAND G2G KNOW-HOW

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## Figures and tables

## Acronyms and abbreviations

| | |
|---|---|
| AB | Agribusiness |
| AEZ | Agro-Ecological Zones |
| ASMP | Agriculture Sector Modernisation Project |
| CDP | Cluster Development Plan |
| CEA | Central Environment Authority |
| CKD | Chronic Kidney Disease |
| DOA | Department of Agriculture |
| DS | Divisional Secretary Division |
| EMP | Environmental Management Plan |
| FPO | Farmers' Production Organisation |
| GN | Grama Niladari Division |
| GPS | Global Positioning System |
| IPM | Integrated Pest Management |
| IPNS | Integrated Plant Nutrition System |
| ISP | International Service Provider |
| LA | Local Authority |
| PCR | Physical Cultural Resources |
| PMU | Project Management Unit |
| PPME | Provincial Project Management Unit |
| PPE | Personal Protective Equipment |
| WB | World Bank |
| WHO | World Health Organization |

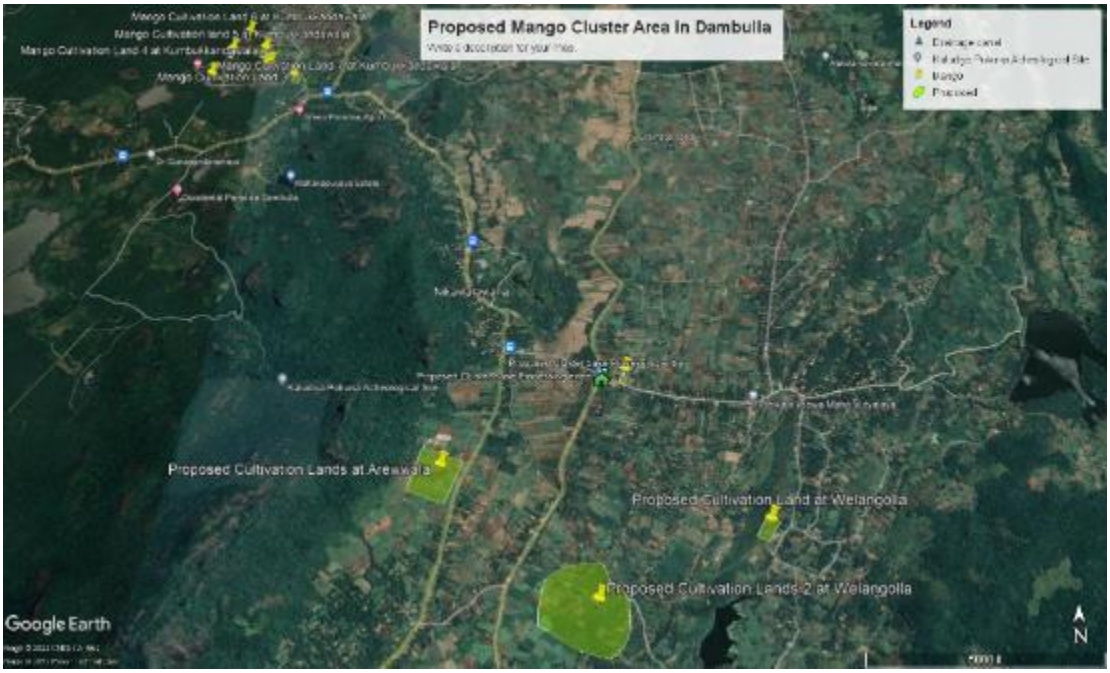
# ASMP

# ENVIRONMENTAL SCREENING REPORT

## 1. PROJECT IDENTIFICATION

| | |
|---|---|
| **Project title** | Introduction of improved technologies to enhance the quality and productivity of mango in Matale District (Dambulla) |
| **Project Proponent** | Project Management Unit, ASMP, Ministry of Agriculture |

## 2. PROJECT LOCATION

| | |
|---|---|
| **Location (Relative to the nearest town, highway)** | There are eight (8) Grama Niladhari (GN) Divisions in Dambulla Divisional Secretariat (DS) Division of Matale District: Alakolawewa, Wewalwewa, Gonawala, Ihala Erewwala, Nikawatuwana, Humbasgamuwa, Kumbukkandawala and Welangolla (project location map is attached as Annex 4) have been selected. B561 Dambulla-Kandalama Road and Kandalama Erewwala roads are the main access routes for these areas. These villages are located within 10km from Dambulla township and 5km from Kimbissa Junction.<br><br>  <br>*Figure 1: Proposed mango cluster lands in Dambulla*<br><br>Based on the information available on Dambulla Mango Cluster, there are about 204 farmers showing a strong interest in mango growing on commercial level. Their land covers about 82 ha in eight villages. |
| **Definition of project area** *(The geographical extent of the project & areas affected during construction)* | Mango cluster area falling into Dambulla DS division is in Matale District. The mango cluster area covers 9 of 59 GNDs. The approximate land extent of Dambulla DSD is 44,400 ha and per capita land consumption is 0.6 ha.<br><br>Well-known irrigation water source for cultivations in Pahala Erewwala area of the cluster is known as Hurulu feeder canal which runs through the area to carry water to Huruluwewa where it is about 60 km away from the area. Earlier, these water pumping took place in illegal manner but today it has been formalised. Another sources of irrigation water are agro wells |

and tube wells. In addition, Pahala Erewula and Wewalawewa tanks and some perennial water sources also contribute for the irrigation water requirement.

Table 1: Information on selected areas in the Dambulla Mango Cluster

| No. | GN Division | Estimated area growing mango | Total № of farmers | № of female farmers | % female farmers |
|---|---|---|---|---|---|
| 1 | Alakolawewa | 12 ha | 29 | 06 | 21 % |
| 2 | Welangolla | 11 ha | 27 | 06 | 22 % |
| 3 | Gonawala | 9 ha | 22 | 10 | 45 % |
| 4 | Ihala Erewula | 14 ha | 36 | 12 | 36 % |
| 5 | Wewalawewa | 20 ha | 51 | 29 | 57 % |
| 6 | Nikawatwana | 2.5 ha | 06 | 01 | 16 % |
| 7 | Humbasgamuwa | 6.5 ha | 16 | 08 | 50 % |
| 8 | Kumbukkandanwala | 7 ha | 17 | 06 | 35 % |
| | **Total** | **82 ha** | **204** | **78** | **38.2 %** |

Source: Provincial Project Management Unit (PPMU)–Matale

In addition, 3.8km length of rural roads improvements, 3km length of elephant fence, 1.3km length of drainage canal rehabilitation, construction of collection centre, construction of new 10 deep wells and construction of compost yard. Improvements of rural roads, elephant fence, and drainage canals will have impact on either side of the proposed activities whereas construction of collection centre, and compost yard will have impact on the particular site. However, construction of deep wells will have an impact on the ground water layer depending extraction rate.

The important factor identified in this cluster is the considerable participation of women in the mango cluster area which is about 39%. ASMP pilot mango cluster is also established in the same area where the same will be expanded.

**Adjacent land and features**

All the villages identified for mango cluster are traditional villages having experience in farming for long period especially in other field crop. Most of their farmlands are government lands under permanent or temporary permits. The farmers usually cultivate cash crops and vegetables on lowlands during both Yala and Maha (rainy) seasons. Perennial trees have been cultivated in their homestead gardens including timber trees and other fruit-bearing trees for their households' consumption. But the majority of farmers are now engaged with the cultivation of fruit-bearing perennial trees on upland land as it gives the supplementary income for farm families.

The habitat types are including grassland, cultivated area, home gardens and secondary vegetation. The Kaludiya pokuna and Welangolla Forest Reserves are located adjoining in the Ihala and Pahala Erewwala, Wewala and Welangolla GNDs. Identified technology demonstration park is located about 10 km away from the Dambulla city area.

Dambulla Divisional Secretariat is an area which has a significant contribution to the national agricultural production. Dambulla is the largest supplier of big onions and sweet potatoes to the local market. Apart from that it is also popular as a vegetable supplier. Table 2 elaborates the land use status of Dambulla DS division.

***Table 2 : Status of land use in Dambulla DS***

| Category | Extents | |
|---|---|---|
| | ha | % |
| Paddy cultivation | 1,107 | 13 |
| Mixed cropping | 773 | 9 |
| Forests | 2,630 | 30 |
| Reservations | 835 | 10 |
| Other (including: homesteads, gardens, build ups) | 3,340 | 38 |

| | | | |
|---|---|---|---|
| | **Grand total** | **8,685** | **100** |

*Source: Resource Profile, Dambulla DS, 2015*

Main economic activity of the Dambulla Mango Cluster is the agriculture where main enterprises are paddy, big onions and vegetable cultivation. Almost all lands used for paddy cultivation is under irrigation. About 30% of the land belongs to state departments and forest plantations. These plantations mainly cultivate dry zone vegetables such as ladies' fingers, bitter gourd, cucumber, pumpkin, snake gourd etc. Dry zone vegetables are cultivated mainly during Yala season under supplementary irrigation. In addition, 38% lands are covered under the home gardens, built-up area, etc. Most of vegetables and big onions are cultivated in home gardens too. Average per capita land availability is about 0.7 hectares in the Dambulla Mango Cluster.

Mango cultivated lands in this area are undulating terrain with little slope. Although there is a satisfactory drainage available in upper parts, drainage is poor in lower parts of the catena. As a result, with the continuous cultivation without adopting proper drainage systems at present, crops are in danger in terms of productivity. However, in upland production areas drainage is satisfactory. Hurulu feeder canal which carry irrigation water to the "Hurulu wewa" (Hurulu Reservoir) runs through the project area. It is reported that there are about 1,235 formally and informally constructed agro wells in Dambulla DS Division.

## 3. PROJECT JUSTIFICATION

| | |
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| **Need for the project**<br><br>(What problem is the project going to solve) | The Dambulla Mango Cluster (CDP № 5 – Matale (Dambulla) – mango and big onion) will target production of mango as a potential export crop for the international market. The business opportunity identified with farmers and agribusiness is the modernisation of existing and renewed plantation of mango for export to the Middle East. The Central Province Provincial Agriculture Department is the responsible agency in providing extension services to farmers in this mango cluster area through their agriculture instructors. As well, the Agrarian Research and Productivity Assistants attached to Agrarian Service Centres of Dambulla and Kimbissa are working with mango farmers in the area. Even though there are some involvements in solving of problems emerged in cultivating mango, no proper mechanism has been developed by line agency officers to evaluate or monitor the mango cultivation programme except the involvement of Project Management Unit (PMU) of ASMP. This indicates the importance of developing effective coordinating mechanism linking all relevant parties with the establishment of FPOs for this mango cluster.<br><br>Generally, Dambulla is considered a dry area with a **scarcity of water for agriculture**. Most of the farmers are from the ancestral villages where their traditional means of support was by means of seasonal rainfed farming in the Maha rainy season (October to January). Other than rainfed cultivations, farmers grow few other crops using irrigation water from minor tanks, agro wells and some tapped water from natural perennial streams created due to drainage water from minor and medium tanks, Mahaweli fields and runoff water during rainy season.<br><br>Through the introduction of mango cultivation with improved technologies and Agriculture Sector Modernisation Project (ASMP) intervention, it is expected that more farmers will return from other crops to mango which could significantly improve their household incomes. Furthermore, there are about 15 farmers growing mango as a commercial crop in the area for the past six years. Therefore, it is a good example to attract new farmers to this crop and demonstrate that it can be grown with limited |

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|---|---|
| | quantities of water compared to paddy crop. Some farmers have converted their uplands to small mango plantations where water sources are available. Even though the price is fluctuating, the price for mango fruit remains higher and satisfactory compared to other fruit crops in the local markets for mango.<br><br>Mango, popularly known as the king of fruits, belongs to Anacardeaceae family of trees. Taste, flavour and fragrance of mango is very characteristic to the same. Mango originated in India. Although not endemic to Sri Lanka, it is seen growing in many parts of the country. It is very rare to find a home garden without a mango tree in our country except in some upcountry areas. As a fresh fruit, mango has a high demand in local markets. Likewise, a considerable amount of foreign exchange could be earned by exporting both fresh and processed mango products.<br><br>It is planned to improve the productivity of both new and existing cultivation via introducing latest crop management technologies and providing required training, equipment, and machineries. Further, farmers in the cluster will be mobilised as farmer producer organisation to carry out all the production and market operations. As an intermediate crop, big onion will be cultivated as an intercropped.<br><br>The cluster area has good access roads and also good access to water that facilitates flood irrigation which is a convenient way for the farmers to water the mango crop; however, this type of irrigation causes substantial amounts of laminar erosion and poor drainage conditions, exposing the mango roots to waterlogged environments. These adverse conditions make mango trees more susceptible to soil-borne diseases and other phyto-pathological disorders. The accumulation of these numerous negative factors creates an unfavourable agro-ecological environment against good quality and high yields of mango.<br><br>To address these critical limiting factors and the constraints listed before, the International Service Provider (ISP) will introduce a new and improved technology package that will cover practices from land preparation for a new plantation to loading a container for export at the Postharvest Processing Centre. In other words, from A to Z, including practices for flood prevention, drainage macro works and farm-level drainage technology; the use of drones for land preparation and levelling; new double row planting patterns with ultra-high population densities; new pruning systems to manage ultra-high mango densities with trellises; new low-pressure mini-sprinkler irrigation systems that conserve water and prevent laminar erosion; precise application of fertilisers using the low-pressure irrigation systems and based on soil and foliar analyses; new pests and disease control technology based on IPM practices and using drones for the precise and localised application of pesticides; precision agriculture technology to lower the unit cost of production by improving the overall management of the planation and expand the localised application of agricultural amendments; improved harvesting techniques incorporating the age of the fruit as a major maturity index parameter and introducing the management of the hanging fruit inventory and the application of harvest and postharvest field practices to preserve the quality and shelf-life of the mangos. |
| **Purpose of the project**<br>(What is going to be achieved by carrying out the project) | The CDPs are prepared under ASMP Component 2, which is for productivity enhancement, diversification and demonstrations to support smallholder farmers to produce competitive and marketable commodities, improve their ability to respond to market requirements and move towards an increase in commercialisation.[1] Agriculture Technology Demonstration Parks will support farmers to: |

[1] ASMP Project Appraisal Document.

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|---|---|
| | 1. Develop professional producer associations and establish Public Unlisted Company (PUC)<br>2. Achieve economies of scale in production and exports<br>3. Improve marketing and value addition<br>4. Achieve greater efficiency in the provision of technical and other support services<br><br>Farmers are expected to directly benefit through 1) improved production capacity and input supply/management; 2) better and more efficient technologies for production and postharvest; and 3) improved market linkages as well as opportunities for value addition. Furthermore, farmers will benefit from capacity building through farmer business and marketing training.<br><br>The Dambulla Mango Cluster (see Figure 2) will bring in a dramatic change in the process of cultivation and sale of mango. Members of this cluster are small and medium scale farmers with less than 1 ha (2.5 acres) of land. Some famers have all their land growing mango while other farmers only have a portion of land for mango growing. Presently mango production for distinctive markets is the key activity only for few farmers in this cluster. Superior value is created in the product through usage of innovative production technologies, good agricultural practice, certification, and modern production and delivery scheduling. With a minimal acreage of land, maximum utilization of land through modern technology, reduce water consumption through micro/mini sprinklers, use of IPM practices instead of chemicals, etc will be a great achievement due to the proposed cluster.<br><br>Core values of the farmers' production organisations (FPO) will be quality, innovativeness, business professionalism, legal compliance, ownership by farmers and equitable benefits. A business plan will be formulated with the members at the incorporation of the PUC. Tentative long-term business objectives will cover the following aspects:<br>1. Develop and manage a competitive and sustainable agribusiness enterprise to provide benefits to its members and to the public unlisted company at large<br>2. Develop a dynamic and manage a cluster of farmers to introduce modern technology to mango cultivation in Sri Lanka for the enhancement of productivity<br>3. Develop and manage a modern value chain and use latest technologies along with it<br>4. Introduce superior quality of the product for local market<br>5. Develop sustainable links with agribusiness partners<br><br>The produce of the highest quality will be channelled over to the local market at the beginning, through agribusiness partners who have already expressed interest. |

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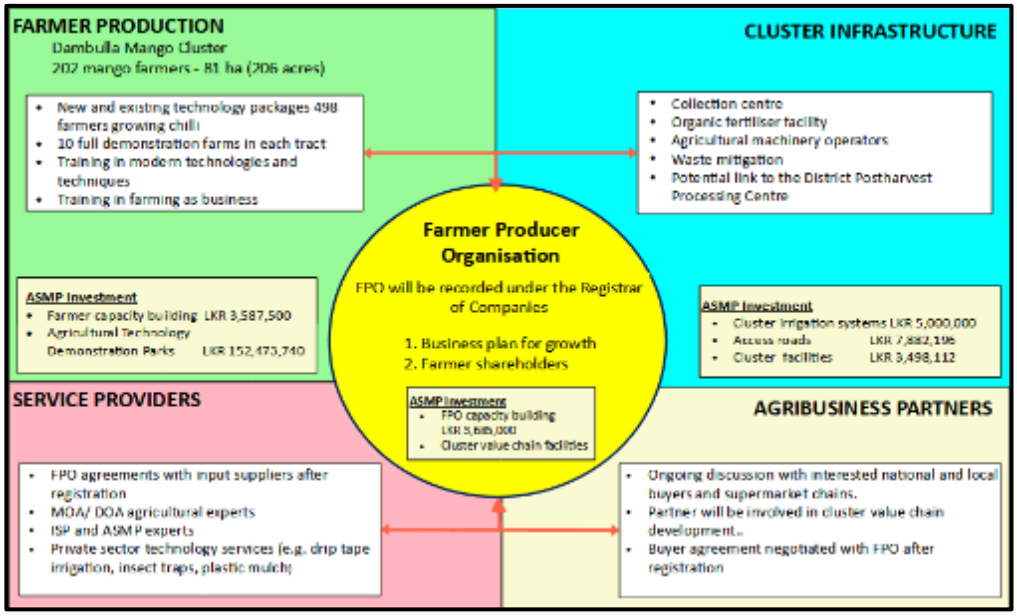
| | ***Figure 2: Summary for Dambulla Mango Cluster***<br>  <br><br>Eventually, the cluster will be developed to cater for an export-oriented value chain. The produce of the highest quality will be channelled over to the export market, particularly to the Middle East market as several agribusiness partners have already expressed interest. |
| **Justification and Alternatives considered**<br>*(Different ways to meet the project need and achieve the project purpose)* | Mango production in Dambulla, Matale is expanding rapidly in an area that also has extensive guava production. This combination of production creates a natural Agricultural Technology Demonstration Park in the area.<br>• Ability to cultivate mango with **limited quantities of water** compared to other crops.<br>• Ability to cultivate a greater number of trees within minimal acreage of land<br>• Regular and year-round income that will **attract other farmers including young farmers** to mango cultivation.<br><br>Most of farmers of Dambulla grow mango, so there are many experienced mango growers. Particularly, export-oriented growers. ASMP has established its pilot cluster also in the same area. Most of the farmers have large-scale, low, flat farmer-based lands with water available with fewer drainage concerns. Dambulla can be considered as a dominant agriculture area and considering the establishment of mango cluster, with a **less damages to the environment**, area can be used for cultivation of mango. **Water table** in the selected area is somewhat low as there are many surface waterbodies including Hurulu feeder canal which runs through the area.<br><br>The 'technology alternative' would mean different technology applications to meet the project needs at the selected cluster. A new on-farm technology package with **control/ prevention of fungal disease and Fusarium wilt** to be introduced. Further, crop management by fruit age control using coloured fruit bags, oriented to export will be used. New and improved quality enhancing technologies and productivity enhancing technologies such as drone technology, **water conserving** and low-pressure drip and mini-sprinkler irrigation systems, basic **flood prevention** and **drainage field techniques**, new planting patterns with high population densities, **precision fertilisation techniques**, pest and disease control based on **integrated pest management (IPM) practices**, modern spray techniques and precision agriculture practices will be introduced to meet the expected project out comes. |

<table>
<tr><td></td><td>The ‘no-action’ alternative would mean that no mango cluster development is undertaken by the ASMP and hence no financial, technical and market support for the existing mango cultivators in Dambulla selected GN Divisions. Therefore, conventional farm practices, low productivity, high water usage, high volume of chemical usage, low quality and low income will continue to dominate the economy of the farmers and agriculture sector will not develop in Matale.</td></tr>
<tr><td>Legal framework and WB Safeguards Policies</td><td>According to the nature of project activities, following local legal framework and WB safeguards policies will be applicable:
<table>
<tr><th>#</th><th>Permit/Clearance</th><th>YES</th><th>NO</th><th>TBD</th><th>Remarks</th></tr>
<tr><td>1</td><td>The National Environmental Act. No. 47 of 1980 & its amendments</td><td></td><td>√</td><td></td><td>None of the proposed activities are coming under prescribed activities</td></tr>
<tr><td>2</td><td>Soil Conservation (Amendment)Act No. 24 of 1996</td><td>√</td><td></td><td></td><td>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</td></tr>
<tr><td>3</td><td>The Mines and Mineral Act No.33 of 1992</td><td>√</td><td></td><td></td><td>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.</td></tr>
<tr><td>4</td><td>Local Authorities Acts</td><td>√</td><td></td><td></td><td>Improvements of rural roads, waste disposal should be approved by the Dambulla Pradeshiya Sabha.</td></tr>
<tr><td>5</td><td>Water Resources Board Act No. 29 of 1964</td><td>√</td><td></td><td></td><td>Extraction of ground water should be consented by the WRB</td></tr>
<tr><td>6</td><td>The Fauna & Flora Protection Ordinance Act No. 49 of 1993 & its amendments</td><td>√</td><td></td><td></td><td>Any cluster activity or infrastructure development closer to a protected area or outside which hinders wildlife movements restrictions should be adhered to FFPO measures</td></tr>
<tr><td>7</td><td>Forest Ordinance including Amendments</td><td>√</td><td></td><td></td><td>Any activity within forest reserve or buffer zone of Kaludiyapokuna and Welangolla or removal of trees required to be carried out should follow regulation stipulated under this legal framework.</td></tr>
<tr><td>8</td><td>Mahaweli Authority of Sri Lanka Act (Act No.23 of 1979)</td><td>√</td><td></td><td></td><td>Interventions proposed to be carried out in and around Mahaweli Development area should obtain consents from</td></tr>
</table></td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Mahaweli Authority of Sri Lanka as per the Act. No unauthorized extraction of water from Hurulu feeder canal. |

World Bank safeguards policies triggered by the project

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

## 4. PROJECT DESCRIPTION

| | |
|---|---|
| **Proposed start date** | September 2021 |
| **Proposed completion date** | December 2023 |
| **Estimated total cost** | LKR 112,301,920 |
| **Present land ownership** | • Private Lands, LDO Permits by Divisional Secretary, PAT<br>• Rural roads belong to Dambulla Pradeshiya Sabha<br>• Proposed Collection Centre land belongs to Provincial Secretary, Central Province |
| **Description of the project** *(With supporting material such as maps, drawings etc attached as required)* | To address these critical limiting factors and the constraints listed above, the International Service Provider (ISP) will introduce a new and improved technology package that will cover practices from land preparation for a new plantation to loading a container for export at the Postharvest Processing Centre. Table 3, 4, 5, 6 and 7 are presenting all interventions proposed under this Cluster including infrastructure development: |

***Table 3: Improved technology package for mangoes***

| Category | Practice | Detail |
|---|---|---|
| Irrigation | Micro-sprinkler irrigation system | Computer controlled heads for water application scheduling supported by soil moisture sensors and evapotranspiration measuring devices. Cluster scale system design based on local agri-climatic conditions and soil physical properties. System includes anti-clogging flushing components |
| | Drone technology | Drone geo-positioning |

| Category | Practice | Detail |
|---|---|---|
| Land preparation | | Drone land surveys for site selection |
| | | Drone levelling for land preparation and drainage |
| | Ploughing and disking | Deep ploughing and shallow disking to improve physical soils characteristics |
| | Incorporation of organic compost | Organic material incorporated in ploughing and disking operations to improve placement and facilitate bulk handling of organic materials |
| | Micro levelling | Levelling with laser device mounted on tractor accessory will accelerate water removal from the crop area to avoid drainage problems and facilitate operations such as bed making |
| | Micro drainage practices | In addition to levelling, drainage micro works such as small ditches and quick water evacuation works will prevent water accumulation in the soil profile, improving pest prevention conditions and root aeration and health |
| Transplanting | TJC mango (private variety) seedlings | Ultra-High Density double row planting (560 plants per acre, 1,400 per ha) that allows for intercropping |
| | Planting tools and aids | Practical tools and aids to secure accurate measurements of planting distances to assure desired population densities such as planting templates |
| | Precision Agriculture Nomenclature | Introduction of blocking and tree tagging systems to allow precision practices |
| Trellis | Support and training for young mango trees important in new pruning technology favouring height over branching | There are different types of trellises for mango from traditional posts and wire support to open 'tatura' trellises |
| Weed control | Mechanical weeding | Mechanical weeding is herbicide free. It is a very environmentally friendly technology |
| Fertigation | Liquid organic fertiliser | Precision fertigation with liquid organic and chemical compounds based on soil and foliar analysis and fertility sensors |
| Pest and disease control | Pestigation (*the automated management of unwanted pest*) | Precision application of liquid pesticides in the vicinity of the root zone as required i.e. control of soil-borne diseases |
| | IPM technology | Scheduling of pest control operations using pesticides based on pest population dynamics and their risk assessment thresholds |
| | Drone application of pesticides | Localised, ultra-low volume spray on equipment mounted on drones to minimise negative impact of operation |
| | Use of organic pesticides | Approved organic pesticides found locally in Sri Lanka preferred to imported agro-chemicals |
| | Die-back disease | Mitigation of mango die-back disease using disease specific fungicide mixes, control of anthracnosis and other pre- and postharvest diseases |
| Pruning practices | In ultra-high-density planting, pruning for height instead of branching is best practice | Only one straight branch pointed upward is promoted for tree architecture. With this technique, lateral branches become only fruit producing branches |
| Flower Induction | Bio-stimulators to induce early flowering of the mango trees | Pacobutrasol and KNO3 combination at recommended growth stages to increase early flowering of all the trees receiving treatment |
| Bagging | Coloured paper bags | Age control system to facilitate harvesting by age for better fruit quality, uniformity and shelf-life. |

| Category | Practice | Detail |
|---|---|---|
| | | With coloured bags, a fruit inventory is developed and managed to improve marketing and selling practices and to maximise pricing for farmers |
| Harvest and haul to packing centre | Harvest technology | Harvesting, using age control as indicated by coloured mango bags and observing maturity stage |
| Postharvest handling | Postharvest technology | Field heat removal, line packing, cold-chain, export protocols |
| Quality assurance | Quality assurance evaluation | Quality scores, defects tally, quality improvement feedback loop throughout supply chain |

In addition to the above-mentioned technology package, the following capacity building programmes will be carried out for selected farmers.

***Table 4: Selection, training and other processes for harvest***

| Activity | Sub-activity |
|---|---|
| Selection of the progressive farmers group | |
| Rapid assessment of the exportable portion of their harvest (pack-out) to determine the quality of the harvest for export | |
| Practical training for the selected farmers on basic harvest and postharvest practices to protect the quality of the product and to assure the packing facility receives only clean and viable product | Caring for harvesting crates |
| | Best harvest time |
| | Harvest maturity index by age and calliper |
| | Discarding poor-quality fruit and other waste organic materials in the field to leave as organic fertiliser |
| | Avoiding mechanical scarring and bruising quality defects |
| | Selecting the best product for packing |
| | Cleaning the selected product |
| | Properly storing the harvested product before delivery to the packing facility |
| Procurement of packaging material – The AB partner will procure the packaging material to be used to pack their product according to their own specifications | |
| Establishment of temporary packing facilities – This activity will allow the AB to begin packing and shipping operations very rapidly and early on in project implementation. The International Agronomist will lead this effort with the support of the FPO, DPD and PPMU in the district | |
| Simulation of a shipment in a cold storage room using the shipping parameters in the Export Protocol to adjust harvesting indexes and container set points | |
| Simulation of a shipment in a 20-ft reefer container using the set points adjusted in the cold storage room | |
| Shipment of a first 20-ft or 40-ft container – the AB shall make all the required reservations and will obtain all necessary export/import documentation | |

| | |
|---|---|
| Preparation of shipments of subsequent containers | |

Existing roads needed to be improved for the mango farmers to transport their harvest safely to the destinations. Existing road network in the cluster area is maintained by Dambulla Pradeshiya Sabha. A few essential roads were selected (Table 5).

Table 5: Selected essential roads for the mango farmer transport needs

| No | Location | Unit | Length |
|---|---|---|---|
| 1 | Proposed concrete paved road at Diulapitiya in Wewalawewa GN Division | km | 2 |
| 2 | Renovation of the Gravel Road alone the drainage canal in Nikawatawana GN division | km | 0.80 |
| 3 | Proposed concrete paved road at Gonawala in Welangolla GN Division | km | 1 |
| Total length of roads identified for repairs | | km | 3 |

Some farmers in Humbasgamuwa area have drainage issues in their lands. Hence two drainage canals have been identified to be rehabilitated.

Table 6: Selected drainage canals to be rehabilitated

| No | Description | Unit | Qty |
|---|---|---|---|
| 1 | Excavation the drainage canal using machineries in Nikawatawana GN division to meet the prevailing drainage issue. Length 800 m | $m^3$ | 400 |
| 2 | Construction of a course way across the stream at Diulapitiya road | item | 1 |
| 3 | Proposed drainage canal at Humbasgamuwa to meet the prevailing drainage issue. Length 500 m | $m^3$ | 225 |

Table 7: Summary of Project Interventions in the Cluster

| # | Project component | Key Activities | Approx. extent / quantity | Implementation responsibility |
|---|---|---|---|---|
| 1 | Cultivation of Mango<br>(Refer table 1) | Land Preparation<br>Irrigation pipe laying<br>Installation of mini-sprinklers | 82ha | ISP<br>PPMU |
| 2 | Improvements of Rural Roads (Rehabilitation)<br>(Refer table 3) | Trimming, levelling and compaction of sub grade<br>Supplying and pilling approved gravel<br>Spreading and compaction gravel<br>Concreting<br>Causeway construction | 3 road sections<br>Total length 3.8km<br>1 causeway | Contractor<br>LAs<br>Civil Engineer – ISP<br>PPMU<br>Engineer - PMU |
| 3 | Construction Deep wells | Yield testing<br>Excavation<br>Construction wall<br>Installation of Pumps | 10 new deep wells with solar powered pumps | Contractor<br>LAs<br>Civil Engineer – ISP<br>PPMU |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Engineer - PMU |
| | 4 | Renovation of storage and production collection facilities | Laying interlock tiles<br>Widening the existing entrance gate<br>Provision of equipments | 1 Collection Centre<br>providing 1500x600x450 mm stainless steel sink including heavy quality taps, wastes and plumbing and Providing 2400x1200 mm stainless steel sorting table including heavy quality GI frame | Contractor<br>FO<br>Civil Engineer – ISP<br>PPMU<br>Engineer - PMU |
| | 5 | Construction of Compost Production Unit (Construction of Storage building including office space, toilet and solid waste management facilities) | Fencing<br>Construction of building<br>Disposal yards<br>Mixing yards<br>Leachate management | 1<br>Shelter - Approximately 5m x 10m<br>Building - Approximately 7.50m x 15m | Contractor<br>FO<br>Civil Engineer – ISP<br>PPMU<br>Engineer - PMU |
| | 6 | Rehabilitation of electric fence – existing electric fences of the selected project area will be rehabilitated | Construction/ Rehabilitation of fence<br>Electrification<br>Maintenance | 3km Length<br>1650 mm height | Contractor<br>FO<br>Civil Engineer – ISP<br>PPMU<br>Engineer - PMU |
| **Project management team** | A PMU was established under the Ministry of Agriculture to implement proposed project activities.<br>Contact persons<br>Project Director<br>ASMP. Ministry of Agriculture<br>No. 123/2 Pannipitiya Road,<br>Battaramulla<br>Tel: +94 112 877 550<br>Fax: +94 112 877 546<br>Email: projectdirectorasmp2@hotmail.com<br>Web: https://www.asmp.lk/<br><br>Deputy Project Director – Central Province<br>No. 20, Kotuwegedara Road,<br>Kohombiliwela,<br>Matale<br>Environmental and Social Safeguards Specialist<br>ASMP, Ministry of Agriculture | | | | |

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| | No. 123/2 Pannipitiya Road,<br>Battaramulla<br>Tel: +94 112 877 550<br>Fax: +94 112 877 546<br>Email: sanjayadms@hotmail.com<br>Web: https://www.asmp.lk<br><br>Nature of consultations and inputs received.<br><br>Consultations with Environmental and Social Safeguard Specialist/PMU<br><br>However, institutional mechanism for the mango cluster development has been proposed. Project Management Committee chaired by Assistant Commissioner of Agriculture Department, Matale consisting of all the line agencies (Agriculture, Irrigation, Agrarian Development and Land), and all the chairmen of farmer organisations have extended cooperation for mango cultivation considering following reasons (see Annex 3):<br>• Great potential to increase Farmer income with less labour and inputs<br>• Ability to save water in the reservoir<br>• Effective mechanism to attract young farmers for commercial agriculture<br>• All the mango farmers are members of farmer organisations or successors |

## 5. DESCRIPTION OF THE EXISTING ENVIRONMENT

### 5.1. Physical features

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| **Topography and terrain** | Generally, the project area covering a hilly and rolling terrain with a medium slope (slope 30–40%) and the relief is 30–40m. The related road section lies at an elevation ranging from 115–120m average mean sea level.<br><br>Topography of the Dambulla Mango Cluster is undulating terrain. Mango cultivated lands in this area are undulating terrain with little slope |
| **Soil**<br><br>***(type and quality)*** | Reddish Brown Latasolic, Reddish Brown Earth, Immature Brown Loam<br>The depth of top soil varies from 20–40m.<br><br>The project site falls into mid country intermediate zone of Sri Lanka and IM 3 Agro-ecological zone. Farmers grow mainly field crops and tree crops in upper slopes where main soil group is Reddish Brown Earths (Chromic Luvisols – LVx) and in lesser extent in Low Humic Gley soils (Eutric Gleysols – GLe) and Alluvial soils – Eutric Fluvisols (FLe) present in valley bottoms used for paddy cultivation (Soil Survey Staff, 1992). A narrow strip of alluvial soils occurs along the natural drainage stream (Panabokke, 1996). The soils are high in exchangeable bases, neutral or moderately acid in reaction rich in potassium and low in phosphorus and nitrogen and low organic matter due to the high temperature and low rainfall (Panabokke, 1996).<br><br>Total land areas of Dambulla DS division are fallen in to five agro-ecological zones (AEZ) namely DL1b, DL1c, IL3, IM1b and IM3b. Among them 65% of lands are coming under DL1b where the mango cluster too fallen under it.<br><br>In Reddish Brown Earths normal soil profile consists of sandy loam to a sandy clay loam surface horizon underlain by a sandy clay loam to sandy clay subsoil. The surface soil structure is weak to moderate, coarse, sub-angular blocky. The base saturation in the subsoil is almost 60–80% and soil reaction slightly acid to neutral.<br><br>Low humic gley soils are characterised by wetness or gleiing throughout the profile or gleiing immediately below the surface horizon. The dominant factor that governs |

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| | the expression of these soils is the periodically high ground water level. The colour of the surface soil is dark greyish brown to dark brown. Calcium carbonate concretions are found in the lower depths of the profile in the drier environments (Panabokke, 2003). Mango growing lands in Dambulla could be categorised as flat lands with poor drainage. |
| **Climate and Meteorology** | DL1b AEZ shows a bi-modal pattern of annual rainfall. The average annual rainfall is 1300 mm and number of rainless days (< 0.3 mm) is about 266 days. In general, heavy rains are received during second inter-monsoonal and followed by Northeast Monsoonal period from September to February. Likewise, some significant rainfall is experienced during first inter-monsoonal rainy period (March to May) which is generally sufficient to commence a crop cultivation and maintain it to up to early growth period but has to be practiced supplementary irrigation thereafter as the Southwest monsoonal rains are not effective to this AEZ.<br><br>Average maximum and minimum temperatures vary from 32°C to 23°C throughout the year. Annual average pan evaporation is about 4.2 mm/day and average humidity is 83% (Punyawardena, 2010). These climatic conditions are favourable for cultivation of food crops where supplementary irrigation facilities are available. |
| **Surface water**<br><br>*(Sources, distance from the site, local uses and quality)* | Several water bodies are located in the close vicinity of the proposed mango cluster area. These include tanks, perennial streams and seasonal streams. One major stream flow in a northerly direction to the proposed development and it is within 5 km from the area. There are many small-scale tanks such as Wewala Wewa, Welangolla Wewa, Gonawala wewa, Mahawewa, etc. in addition to reservoirs such as Kandalama. Elahera Canal (Mahaweli Canal) also flowing through Wewala area which is a Mahaweli canal. Kiri Oya is flowing within 2 km. Hurulu feeder canal is running through the cluster area.<br><br>Use: The main surface water source of the area is from tanks. The use of surface water for domestic purposes and agriculture are common.<br><br>Quality: The quality of surface water in the area in is moderate condition and it could be varied due to several key factors, i.e. rainfall runoff, soil erosion and using of fertilisers and pesticides in the cultivations. |
| **Ground water**<br><br>*(Sources, distance from the site, local uses and quality)* | The data on groundwater availability in the project area is very sketchy, and therefore it is not possible to exactly quantify the availability, yield and capacity within the project area. As per villagers, Kosgaha Springs located in Wewala.<br><br>Database of Agriculture Instructor of Dambulla indicate that there are about 1235 such wells in Dambulla DS area.<br><br>As stated by villagers, protected wells, unprotected wells, and tube wells are used for bathing, domestic purposes, home gardening and some agricultural activities.<br><br>Water levels in the area is about 7 m deep. However, the quality of ground water present in this area is moderate in condition and use for washing/ bathing activities.<br><br>However, as per the Presidential Taskforce Report on Chronic Kidney Disease Unit (2015), ground water in deep wells has high fluoride and chloride concentrations as well as increased total solids and high electrical conductivity as per the water quality analysis carried out by World Health Organization (WHO) and NWSDB for last 20 years. In general, geochemically, Na/K with Cl is high in the ground water in the Matale District especially during the dry period. It is believed that high fluoride content in ground water has affected to cause dental fluorosis and chronic kidney disease (CKD). Numbers of people suffering from CKD is increasing despite medical |

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| | treatments. Further it has been observed that heavy elements like Cr, Mn and Cu are also high in ground water. Although the actual cause of CKD is not known, high fluoride content and total solids have affected seriously on the people of Matale area. |
| Air quality<br>*(Any pollution issues)* | Any major pollution source near the project area is not recorded. However, https://www.breezometer.com/air-quality-map/air-quality shows that the Air Quality Index of Dambulla (Wewala and Kumbukkandawala) is 75/500 and $PM_{2.5}$ is the dominant pollutant while $O_3$, $PM_{10}$ and CO are having lower concentration than PM 2.5.[2]<br><br>Burning of forest patches for chena cultivation (slash and burn cultivation), wood and kerosene burning stoves in settlements and villages are the main sources of emissions due to human activities. Dust generated during dry and windy weather conditions could be attributed as natural ways of emitting air pollutants. The project sites fall within the limits of Dambulla DS. Activities that generate high noise levels could not be observed within the subproject area. Movement of vehicles could be considered as the main noise generating activity during the daytime. |
| **5.2. Ecological features – Ecosystem components** | |
| Vegetation<br>*(Trees, ground cover, aquatic vegetation)* | The predominant land use type of the project area is agriculture.<br><br>The identified farm lands are located within the several habitat types including grassland, cultivated area, home gardens and secondary vegetation.<br><br>Dry mixed evergreen forests and shrubs forests are the main vegetation types existing in the areas. Out of these, dry mixed evergreen forests are dominant and have been subjected to disturbances due to natural and anthropogenic activities and resulted in loss of mosaic of patches of forest cover in the past. The plant communities representing in the forest type are categorised as dominant, co-dominant, and understory and ground layer. The predominant feature in the dry mixed evergreen forests is the discontinuous tree canopy across the forest landscape. The proposed water supply project is not passing through any nature reserve and there is no any natural reserve close to the proposed subproject area.<br><br>The area lands itself found with a good vegetation including species such as Lolu, Velang, Maila, Burutha, Kon, Lunumidella, Dam, Suriya Mara, Eraminiya, Milla, Ketakala, Teak, and many lianas. There are invasive species such as Gandapana and Manan spread in the area. Detailed ecological assessment report will be submitted separately. |
| Presence of wetlands | There are no wetlands in the Dambulla DS division as classified by the Convention on Wetlands. The proposed project area is not located close to a marshy land too. Therefore, it can be concluded that there will not be any environmental impact on the wetland or marshy land due to implementation of the proposed project |
| Fish and fish habitats | Fish and fish habitats are dominant as there are many surface waterbodies such as lakes, tanks, reservoirs, canals, rivers, etc. These sources will provide better habitat for fish. Aquaculture activities can be seen in these water bodies. There are people whose livelihood is freshwater fishing. |

[2] Check the Air Quality in Dambulla Sri Lanka – BreezoMeter

| | |
|---|---|
| Birds (*waterfowl, migratory birds, others)* | The project area is closer to the waterways and agricultural lands and there is a possibility of recording bird species in these habitat types.<br>Green imperial pigeon, Emerald dove, Malabar pied hornbill bird species are common in this area. Proposed area is good habitat for birds as many food items are there. It is understood that this forest provides shelter for some migratory and native birds, and other reptiles. |
| Presence of special habitat areas<br>*(special designations and identified sensitive zones)* | The area has not been identified as a special habitat area. According to the sensitive area map produced by the Central Environment Authority (CEA) other DSDs of the Matale District and part of Dambulla DSD are considered as sensitive as this particular locality is listed under landslide prone as well as erosion-prone areas but the proposed site is not listed as sensitive for landslides or soil erosion due to flat terrain. However, Kaludiyapokuna, Kandalama and Welangolla Forest Reserves belong to Forest Department is adjoining to many of these selected lands.<br>The project site has not been identified as a special habitat area, however, according to the sensitive area map produced by the CEA Minneriya-Giritale Nature Reserve & Polattawa proposed Forest Reserve are approx. 3 km away from the one end of proposed road improvement. |
| **5.3. Other features** | |
| Residential/sensitive areas<br>*(E.g., Hospitals, Schools)* | Wewala Maha Vidyalaya, Ihala Erewwala Vidyalaya, Wewala Primary School or Kandalama DS Senanayake Schools are there in the selected area.<br>Wewala Dispensary, Closet hospital to the location is Kimbissa Divisional Hospital which is located in 6 km towards Sigiriya. However, District Base Hospital is located in Dambulla town which is 15 km away from the site. Both these hospitals are providing quality service with free of charge. In addition, one western medical and one Ayurvedic dispensaries are available in the GND.<br>There are few temples namely Ihala Erewwala Temple, Sambodhi Viharaya, Welangolla Temple, etc in addition to Aranya Senasanaya, and Sunguardian Monastery. |
| Traditional, economic and cultural activities | Dambulla DS division extends up to 456.3 km$^2$ and is comprised of 59 GN Divisions and 164 villages. The project area lies within seven GNDs, i.e. 1) Wewala Wewa; 2) Welangolla; 3) Ihala Arawwala; 4) Pahala Arawwala; 5) Nikawatuwana; 6) Kumbukkadanwala; and 7) Pol Aththawa GNDs.<br>***Table 8: Household in project area*** |

| | Dambulla DSD |
|---|---|
| Households (No) | 25,131 |
| Male headed | 21,816 |
| Female headed | 3,315 |
| % female headed | 15.2 |

*Source: Resource profile of Dambulla DSD, 2020*

According to resource profile, agriculture has the highest percentage of livelihood status (55.85%) (Table 9).

The majority of people in this area are between the ages of 19 and 59. (About 54% of the total population.) All of this is reflected in the labour force, which represents the largest pool of available labour. Furthermore, in the project area, 58% of the population aged 15 and up is employed (Table 10). Because the area's population

density is low, there are plenty of agricultural fields accessible. Agriculture is the main source of income in the area and most school leavers join the industry as soon as they finish high school. The majority of young people prefer to work in agriculture rather than pursue vocational training. As a result, there is an abundance of non-skilled labour relative to skilled labour. And there are many other agriculture related employment opportunities in Dambulla dedicated economic centre.

***Table 9: Employment details of project area***

| DSD | Agriculture | Service sector | Industrial | Foreign employment |
|---|---|---|---|---|
| Dambulla | 55.85% | 27.88% | 13.40% | 2.88% |

*Source: Resource profile of Dambulla DSD, 2020*

***Table 10: Population aged 15 yr and above by GND, and economic activity status***

| GN Division | Total | Employed | Unemployed | Economically not active |
|---|---|---|---|---|
| Wewala wewa | 1,344 | 777 | 9 | 558 |
| Welangolla | 650 | 324 | 22 | 304 |
| Pahala Arawwala | 844 | 526 | 31 | 287 |
| Ihala Arawwala | 664 | 426 | 16 | 222 |
| Nikawatuwana | 1,763 | 988 | 38 | 737 |
| Kumbukkandawala | 649 | 390 | 10 | 240 |
| Polaththawa | 468 | 250 | 14 | 204 |

*Source: Census of Population and Housing, 2012*

The project will benefit the people by providing many options for unemployed individuals to find work on a daily basis, with some of them being able to work as competent agricultural labourers. Additionally, there will be job openings at the postharvest processing centres. As a result, the development of agriculture in this area will provide an excellent opportunity for the youth to have a secure income while also preventing local job migration. Youth and women should be encouraged to participate in agriculture projects by providing training and raising awareness. Furthermore, exploring new/innovative areas within the sector would result in more job possibilities or an increase in revenue.

According to the 2016 Household Income and Expenditure Survey, the average monthly household income in Matale District is LKR 56,075.00. This is lower than the average monthly household income in Sri Lanka, which was LKR 62,237 in 2016. Despite the fact that the monthly revenue levels stated in Resource Profiles are lower, it is critical to have economically solid agricultural enterprises in these targeted locations. Due to poor income, farmers began shifting or converting paddy fields to other crops, and the implementation of this agricultural project will have a positive impact on their annual income.

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| Archaeological resources<br>*(Recorded or potential to exist)* | Kaludiyapokuna Archaeological site is located closer (about 1.5km) which belongs to King Saddhathissa. There are not any other archaeological or physical cultural resource (PCR) to record or potential to exist. |

## 6. DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES

### 6.1. Cultivation

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| Existing condition of the crop | The mango cultivation was introduced by the Department of Agriculture (DOA) as pilot project in selected area and it was good alternative crops for farmers to get maximum output from their upland as perennial plantation.<br><br>The farmer extension service is delivering by the Department of Agriculture and there is well established marketing system for inputs of cultivation. The farmers mainly produce the mango and farmers bring their harvest to Dambulla Markets for selling. Due to the reason of mango has high demand in fruit market, it can be sold at farm gate with attractive price. The price of mango varies from LKR 80 to LKR 200 per kg.<br><br>The most common and serious insect pest is the fruit fly. This damage is so severe that not a single fruit can be saved if the fruit is not covered in time. Specially manufactured imported bags are used for this purpose. Leaf hoppers are the other significant pest in mango. Anthracnose and colour rot are the major diseases reported in mango.<br><br>Postharvest losses are high due to poor packaging and grading technics applied. The price is fluctuating with the seasonal changes as well as the production comes from other areas. Mango has high demand in both export market and in hotel industry. Grading and Packing of the Mango harvest is essential for export market and the hotel industry. At present, farmers do not have knowledge and the experiences on grading and packaging of the mango products. It is highly influenced on income of mango growers. |

### 6.2. Polluting Processes (point source)

In cultivation some key polluting steps, although limited, takes place; mainly in the cultivating and post harvesting phases.

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|---|---|
| Land preparation for cultivation | Mango is cultivated both as a home garden crop and a commercial scale crop. Before establishment of a commercial cultivation, clear the land and plough and harrow. At the same time, take steps to adopt appropriate soil conservation measures.<br><br>Before staring land preparation removal of all shrubs, bushes and shading branches of big trees near the field will be removed in terms of destroying of all alternative host for pest and diseases.<br><br>When preparing the land before preparing holes, ploughing with disc or mould board ploughs, adding compost, 2nd deep ploughing with disc or mould board ploughs perpendicular to 1st ploughing, disking or harrowing (two perpendicular passes), and flood prevention and drainage improvements will be undertaken. These activities will destroy pest cycles of different stages, harmful bacteria and microorganisms are destroyed and minimise due to aeration will be improved and harmful pathogens are destroyed also due to exposing soils to sunlight.<br><br>Spacing should be 7 x 10 m and the planting hole measuring is 60 x 60 x 60 cm.<br><br>It is more important to fill the planting hole with well composted organic materials and top soil two weeks before planting and heap the soil to about 6 inches above the ground level over the planting hole. |

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| Water requirement | 1 mm water per 1 m2 soil surface = 1 litre per day. The water requirement per farmer per day is 4,000 litres to irrigate mango cultivation. Each farmer will irrigate using their existing water supply system. ASMP and DOA jointly selected the farmers who have their own sources for irrigation. |
| Use of fertiliser and pesticides and weedicides | Farmers use chemical fertiliser for the Mango production. Urea is used as the nitrogen source, Rock Phosphate and Triple Super Phosphate are used as the phosphate source and Mutreate of Potash is the Potassium source.<br><br>Termite is the common pest in mango cultivation during dry periods, termites may damage underground parts of the tree. To overcome this problem, apply a band of engine oil on the base of the stem up to about 45 cm height.<br><br>Fruit fly (Bactocera dorsalis) is another common pest in mango cultivation. Crop management is the best controlling system of this pest. Remove all dropped fruit and destroy. Before dispatching fruit to market, dip the fruit in 40˚C water for 20 minutes; also a mechanical methods of controlling fruit fly is by using methyl eugenol traps to trap and destroy the flies. The use of traps from flowering through to harvesting stage is the easiest and least costly system of controlling fruit flies.<br><br>To control pest and diseases, there are several crop management methods apart from pesticide application. They are establishing the crop at proper time, proper land preparation, destroy crop residuals, manually destroy the eggs and larva and weed control.<br><br>Integrated pest management (IPM) is encouraged to control the pest and diseases in the crop management as per the pest management plan prepared for ASMP and for both pest and diseases the recommended pesticides and the fungicides are applied by the framers (Refer Table 11). These agro-chemicals are recommended by the pesticides register of DOA as well as the pest management plan.<br><br>Chemical fertilisers are applied every four months after the application of basic fertilisers as per the recommendations of the DOA. Generally, weeds are controlled with a bush cutter. Some farmers use weedicides such as Roundup. Growth of side branches are not allowed up to 45–50 cm of height and lateral branches are not allowed to grow until the mango plant grows to a height of 45–50 cm. Thereafter, at the height of 15 cm intervals, three or four branches are allowed to grow on different sides and topping takes place. Tree is treated accordingly until flowering and fruit bearing. Farmers have recorded different yield from their cultivation and 9–10 tonnes per hectare is considered a good yield. |
| Harvesting | Seasonal fruit bearing occurs 3 years after planting. Fruits in the field are chosen based on age (bag colour); sorting and cleaning of fruits will be done at the farmers' mini processing room and carefully transported to the buyers' yards in order to supply best fruits for marketing. |
| Postharvest storage and transportation | Postharvest losses are a big challenge in mango production. Grading, treating for fungus and fruit fly, packing is essential elements to avoid the postharvest losses and it will indirectly help to access market in hotel industry and export market as well. Grading, treating, packing and storing should be done at the processing unit which is specially arranged to get maximum benefits. |

| 6.3. Other factors | |
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| Solid waste | The solid organic waste is generated as crop residuals and at postharvest period. All the crop residuals and postharvest waste should be burnt to keep the hygienic condition of the farm lands. |
| Wastewater | 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 pest management plan (refer Table 11). |

Table 11: Application of IPM practices during cultivation of mango in Dambulla (CDP 5)

| 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 ploughing with disc or mould board ploughs | Different stages of pest cycles are destroyed<br>Harmful bacteria and microorganisms are destroyed and minimise due to aeration is improved<br>Also, Harmful pathogens are destroyed also due to exposing soils to sunlight | Future pest and disease incidences and damages are minimised. Cost reduced |
| | Adding compost | | |
| | Doing 2nd deep ploughing with disc or mould board ploughs perpendicular to 1st ploughing | | |
| | Disking or harrowing (two perpendicular passes) | | |
| | Flood prevention and drainage improvements | | |
| Planting stage | Healthy planting materials are selected | Strong and vigorous saplings are ensured for planting | A healthy plantation is assured. Cost reduced |
| | Plant of nonstandard are removed | | |
| | Saplings will be purchased from recognised institutions registered under DOA | | |
| | Saplings of same height and growth are planted in separate rows | Easy to manage agronomic practices. Uniform plantation is assured | A healthy plantation is assured. Cost reduced |
| Sapling stage | Daily attention on all saplings is assured | Early identification of pest and diseases incidents | A healthy plantation is assured. Cost reduced |
| | Every plant will be tied to a stalk erected closed to the plant | Prevent from wing damage | No mechanical damage to the plant |
| | weakened 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 fertilisers 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 all saplings is assured. This procedure is followed in every growth stage of the crop cycle | A healthy crop field is assured | A healthy plantation is assured. Cost reduced |

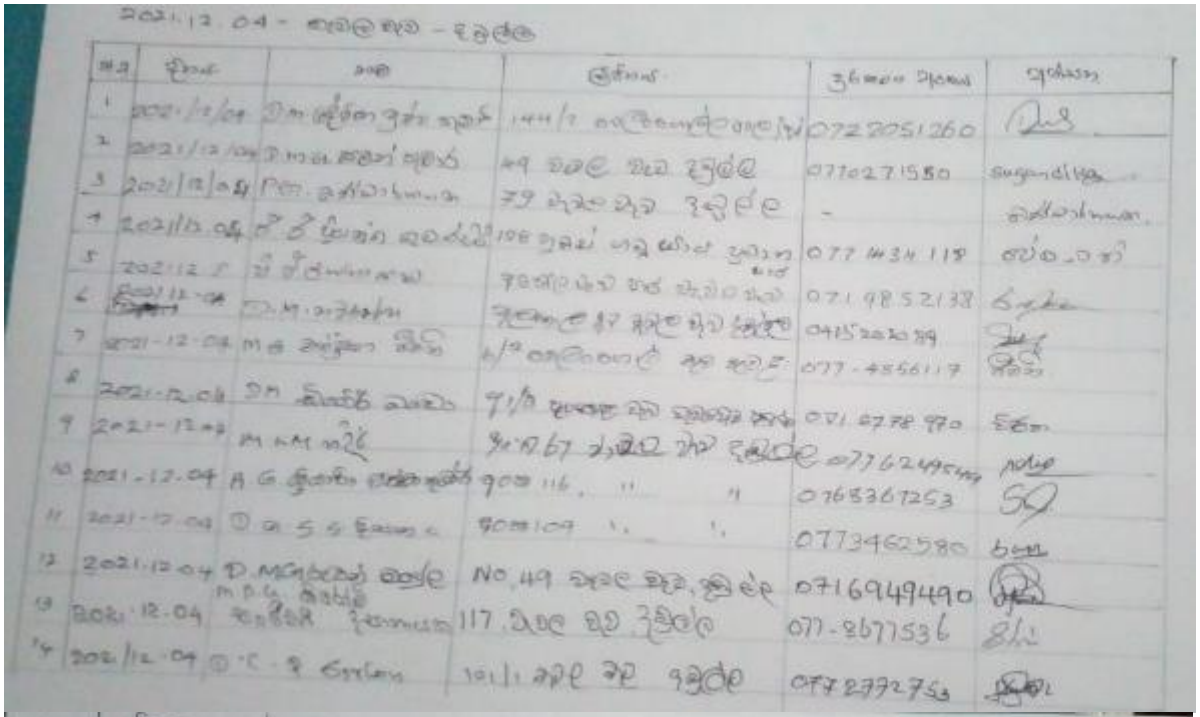
| Stages | IPM practices | Impacts of Implementation | Benefit for farmers |
|---|---|---|---|
| | weakened plant parts are removed and vacancies will be immediately filled | | |
| | Pruning and training of mango trees will be done suitably to high density planting. Height of the tree will be restricted to 3 metres. Only lateral productive branches are allowed to grow | Tree inspection and adopting agronomic practices are easy. Risk of pest and diseases infestations are minimised | |
| | Field sanitation is assured by managing garbage in the field | | |
| | Suspicious plants are marked and will be monitored for pest and diseases. Treatment is followed if identified a pest or a disease incident if needed | | |
| | Attacked plants and parts are uprooted and immediately destroyed | | |
| | Intercropping | Minimise the weed control<br>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<br>Percolation of irrigated water toward the ground water is minimised. Possibility of applying agro-chemicals through the irrigation system | Easy to handle<br>Environmentally safe<br>Less risk of pest and diseases incidents |
| | Fertigation with organic liquid fertilisers supplemented with fertilisation and/or fertigation with chemical fertilisers. Formulation of fertiliser regimes based on complete soil tests and foliar analyses. It will be continued flowering and maturity stages too | Correct dose of nutrient to the plant is assured | Easy to handle |
| | Fruit thinning | Assure optimised no of fruits in the tree | An economic production is assured |
| | Every selected fruits 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 | Assure fruit fly free fruits |

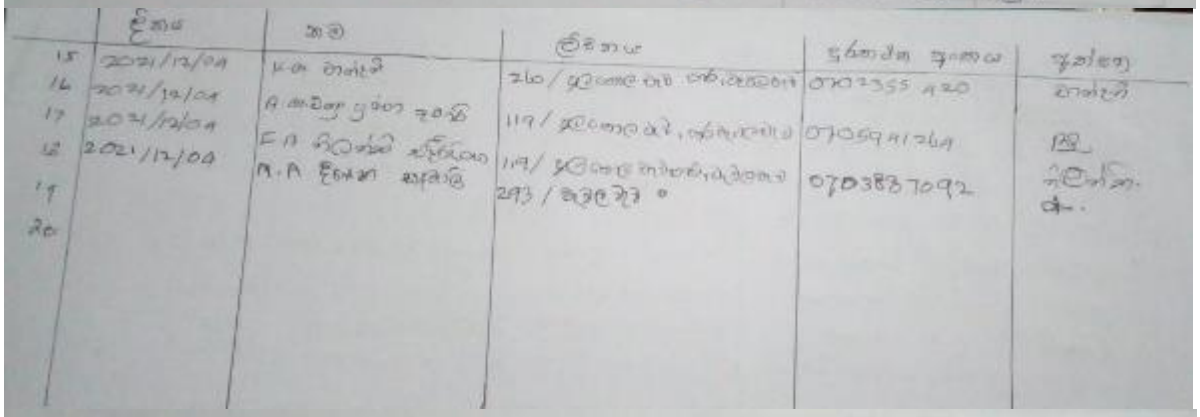
| Stages | IPM practices | Impacts of Implementation | Benefit for farmers |
|---|---|---|---|
| | Integrated pest management (IPM) | Pest population and pest damage assessment surveys to evaluate pest and disease intensity/ quantity factors for damage prevention and to determine pest populations threshold status for rational application of pesticides<br>Prevention and management of the Anthracnose fungus<br>Prevention and control of mango die-back disease<br>Prevention and control and other pre and postharvest diseases | IPM practices are combined with modern spray techniques, when necessary, i.e. ultra-low volume spray using drones<br>Pesticide application through irrigation system |
| Maturity stage | Mango 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 colour) sorting and cleaning of fruits will be done at the farmers' mini processing room and carefully 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<br>Line packing<br>Cold-chain management<br>Integration of export protocols into standard operating procedures | These practices are utilised to preserve optimum quality and shelf-life throughout value chain | Mango producers will win a brand of quality product suppliers |
| Transport stage | Packing the de-latexed hands into 20 kg plastic trays lined with foam. One bunch, one crate. Colour ribbon tied securely to crate to allow for inventory management at packing centre | Protects mango hands from damage during transport to packing centre. Possible cause of pest and disease incidents are minimised | Expected quantity of produce is assured. Reasonable price is assured |
| Marketing stage | Export protocol, guidelines to grow, pack and ship bananas for export | The export protocol ensures mango arrive in optimum biological and commercial condition to international markets | Mango producers will win a brand of quality product suppliers |

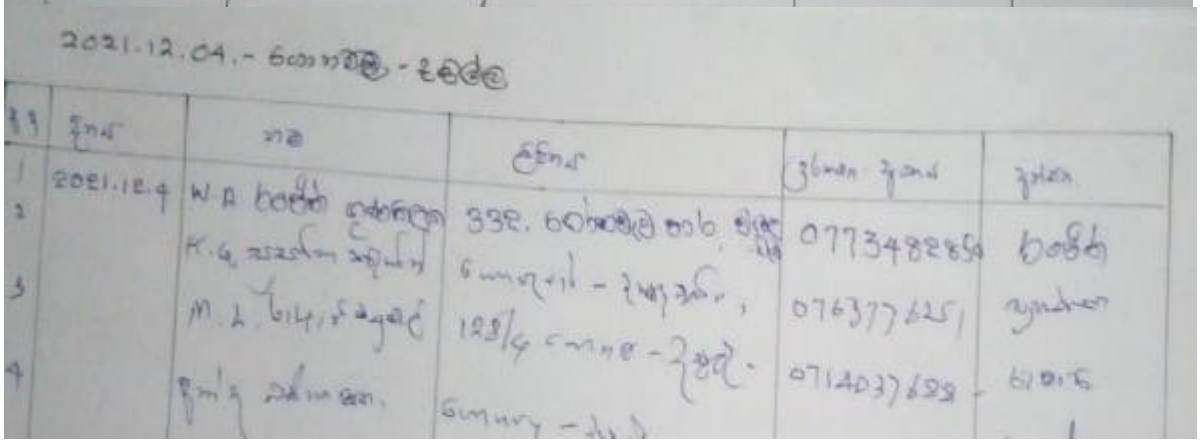
## 7. PUBLIC CONSULTATION

Consultations conducted with potential farmers of the selected areas, agriculture instructors, development officers, social mobilisers, and district and cluster coordinators. Community mapping carried out during the focus groups discussions held with farmers and key informant interviews carried out with key officials. Outcomes of the discussions are summarised below:

***Figure 3: Attendance sheets of community consultations conducted***







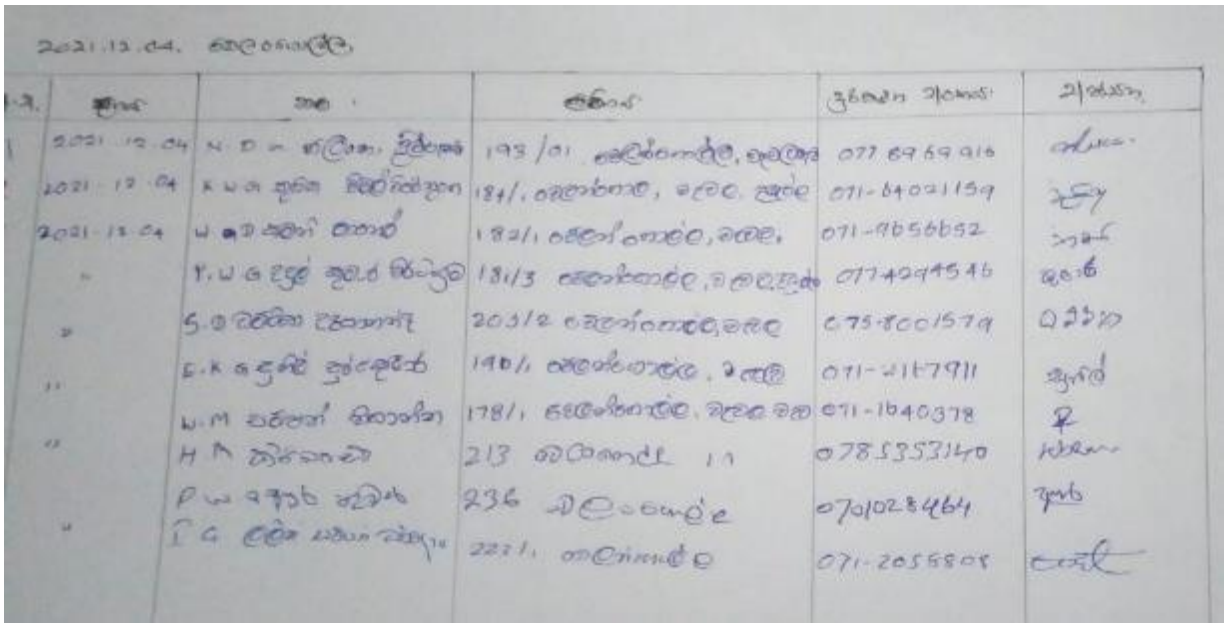


***Figure 4: Community mapping outcomes of Ihala Erewwala***

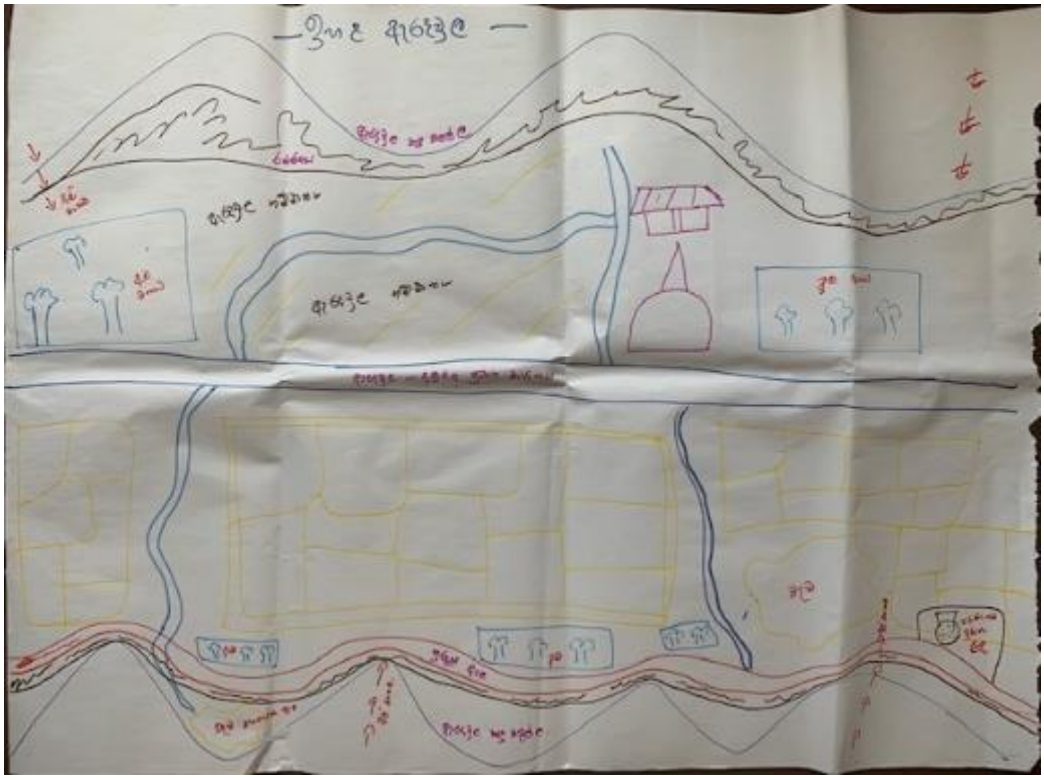
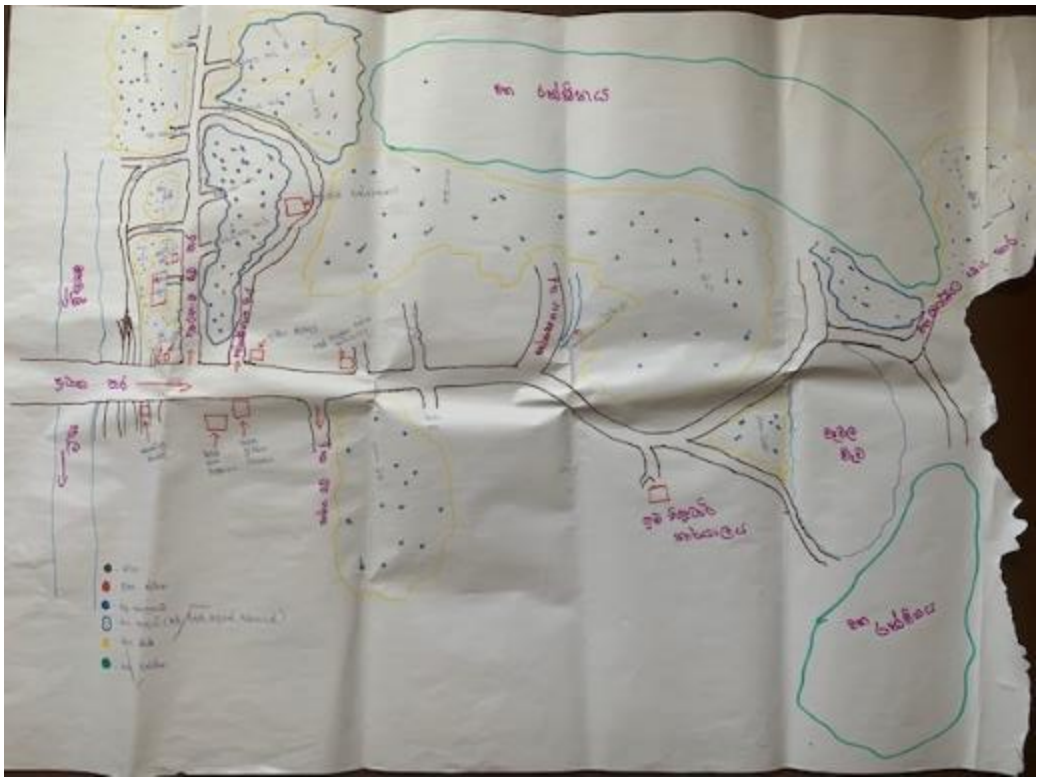


***Figure 5: Outcomes of community mapping at Wewala Wewa***



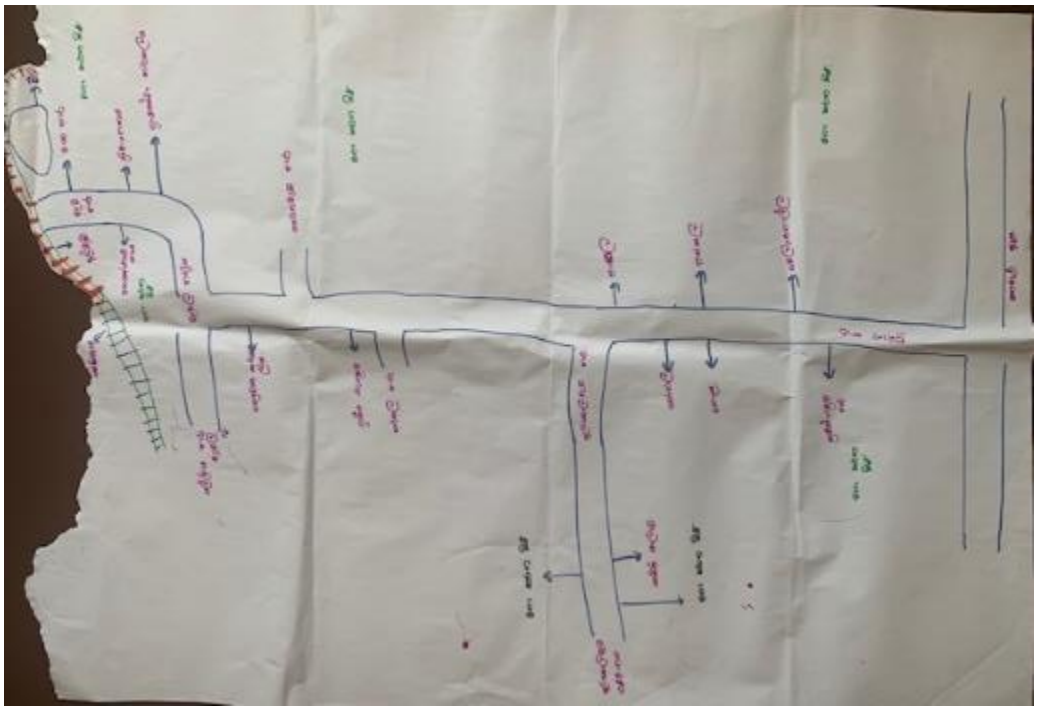


***Figure 6: Outcomes of community mapping at Welangolla***

***Figure 7: Outcomes of community mapping at Kumbukkandawala***

## Existing condition

Through the introduction of mango cultivation with improved technologies and Agriculture Sector Modernisation Project (ASMP) intervention, it is expected that more farmers will return from other crops to mango which could significantly improve their household incomes. Furthermore, there are about 15 farmers growing mango as a commercial crop in the area for the past six years. Therefore, it is a good example to attract new farmers to this crop and demonstrate that it can be grown with limited quantities of water compared to paddy crop.

Some farmers have converted their uplands to small mango plantations where water sources are available. Even though the price is fluctuating, the price for mango fruit remains higher and satisfactory compared to other fruit crops in the local markets for mango.

During the feasibility study and cluster development plan field visits the ISP identified major production and quality constraints affecting the commercial agricultural development of the mango cluster in Dambulla as follows:

- Low yield than expected due to poor agronomic practices adopted by farmers
- Low quality of product and major portions are not suitable for export market due to small fruit size, off shape and poor appearance
- Low productivity of lands, labour and other inputs due to lack of proper understanding of the used technologies as a package
- Threats from wild animal such as elephants and destruction by monkey, toque macaque and peacock

- Over irrigation by flood irrigation create many problems such as waterlog conditions, poor crop performances and waste of water
- Poor crop management practices and poor sanitation
- Use of weedicide such as 'Roundup'
- Damages from Insects such as fruit flies
- Bacteria impacts during initial stages such as swelling of leaves, plant dies, yellowish leaves, etc
- Poor and inefficient land utilisation pattern
- Fertiliser application is not practice by based on soil and foliar analyses
- No attention for micronutrient fertilisers
- Some brands of fruit covering bags are not giving expected results
- Early fruit harvesting in immature stage
- Poor primary postharvest handling
- Low standards of marketing strategies
- No reliable and specific extension or advisory service

Present problems in big onion cultivation, intercrop of the project.

- Difficulties in finding reliable seed materials in time
- Pest and diseases
- Difficulties in finding labour
- Poor pre and postharvest handling
- Use of over dosages of fertiliser and agro-chemicals
- Drastic price reduction in price during harvesting time
- Over irrigation by flood irrigation and waste of water
- No specific market

### How to obtain continued technical knowhow throughout the cultivation cycle to take products up to suitable quality for export market

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

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

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

### Implementation of field fruit caring practices to protect the mango from damage

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

### Issues bound with flood irrigation system

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

### Failure on export market

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

### Infrastructure development

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

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

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

***Figure 8: Existing condition of Ihala Erewwala and Pahala Erewwala***






Figure 9: Existing condition of Humbasgamuwa

Figure 10: Existing condition of Kumbukkandawala

***Figure 11: Ihala Erewwala and Pahala Erewwala community consultations***

***Figure 12: Wewalawewa community consultations***

***Figure 13: Welangolla community consultations***

***Figure 14: Kumbukkadawala community consultations***

# 8. ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

## 8.1. Screening for potential environmental impacts

| № | Screening question | Yes | No | Significance of effect (low, moderate, high) | Remarks |
|---|---|---|---|---|---|
| 1 | Will construction and operation of the project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.?) | √ | | Low-moderate | Existing land preparation and flood irrigation system will be changed. Land preparation techniques will focus on reducing the effects of flood irrigation. No significant disturbances for any existing land use, or water bodies and no negative impact causes are anticipated |
| 2 | Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health? | √ | | Moderate | • 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<br>• 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.<br>• 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<br>• During the deep well construction, considerable volume of excavated material will be generated. The excavated materials can be reused for mixing with compost during land preparation and embankment construction of rural roads. However, precautions are given in EMP. |
| 4 | Will the project release pollutants or any hazardous, toxic or noxious substances to air? | √ | | Moderate | • Implementation of proposed IPM practices will reduce the use of chemical fertilisers for cultivation of Mango<br>• Pesticides, weedicides will be used and released to the air. Possibility to have significant impacts to other flora and fauna<br>• Further, infrastructure development activities will also create emission of dust during clearing and grubbing, construction, |

| № | Screening question | Yes | No | Significance of effect (low, moderate, high) | Remarks |
|---|---|---|---|---|---|
| | | | | | 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<br>• Similar noise and vibration will create during proposed infrastructure development which will also be mitigated by adhering to EMP |
| 6 | Will the project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater or coastal wasters? | √ | | Moderate | All chemicals used to include pesticides and weedicides during cultivation may contaminate land or water. In addition, pollutants during infrastructure development will have an impact on surface and ground water in surrounding areas if not properly managed |
| 7 | Will the project cause localised flooding and poor drainage during construction?<br>Is the project area located in a flooding location? | | √ | | Flooding locations were not identified during the visit and the project will not cause localised flooding |
| 8 | Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the project? | √ | | Low | No medium and large-scale infrastructure development envisaged and hence, no severe health and safety hazard identified. Better hazard identification and prevention and corrective measures during construction will eliminate the risk associate |
| 9 | Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project? | √ | | Low | • Mango 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<br>• 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? | | √ | | |
| 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? | | √ | | |

| № | Screening question | Yes | No | Significance of effect (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? | √ | | Moderate - High | Kaludiya Pokuna, Kandalama and Welangolla Forest Reserves adjoining to proposed cultivation area. Detailed ecological assessment will be conducted to assess the specific impact on the forest reserves and recommendations will be given to implement |
| 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? | √ | | Moderate - High | Adjoining forest reserves are ideal habitats for fauna. The detailed ecological assessment will explore the level of impacts and recommendations will be given to mitigate |
| 14 | Is the project located in a previously undeveloped area where there will be loss of green field land | | √ | | |
| 15 | Will the project cause the removal of trees in the locality? | √ | | | May require to remove trees in the land proposed for collection centre and compost yard. |
| 16 | Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project? | | √ | | Kaludiya Pokuna Archaeological Important Location is located adjoining to the cultivation lands and there will not be any impact expected |
| 17 | Are there existing land uses on or around the location e.g. home gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project? | √ | | Low | The collection centre will be established on the state land (3/4 acre) which is allocated by Provincial Secretary, Central Province in Wewalwala GND |
| 18 | Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project? | | √ | | |
| 19 | Are there any areas on or around the location which are occupied by sensitive land uses, e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project | | √ | | |
| 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? | | √ | | Even though the area is with high tourism potentials, tourism will not have any impact due to project activities |
| 21 | Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project? | | √ | | There are no areas around the location where legal environmental standards have been exceeded or has been environmentally polluted |

## 8.2. 8b. Environmental management plan

- Mitigating adverse environmental issues raised during agricultural activities

| № | Potential environmental impacts and risk level | Key project activities causing the impact | Mitigation measures proposed and action to be implemented by the contractor |
|---|---|---|---|
| 1 | Public complaints and lack of community support for the project implementation | Information Disclosure among Stakeholders<br>Community Outreach activities including training<br>Institutional development based on farmer organisations | • Strengthen institutional development component and proper awareness and community leadership<br>• Discussions should be conducted with the beneficiary farmers including women, and youth<br>• The beneficiary farmers selection based on the criteria which were developed at stakeholders meeting and identifying of beneficiary farmers were undertaken transparently<br>• Residents in the area will be briefed of the project, purpose and design and outcomes with comprehensive discussion<br>• Communication and training activities focusing women, youth and farmers who are poor in communication<br>• 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<br>• The ISP/ASMP will maintain a log of any grievances/complains and actions taken to resolve them<br>• 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<br>Use of harvesting crates<br>Mechanical scarring and bruising quality defects<br>Cleaning the selected product<br>Storing the harvested product before delivery to the packing facility<br>Selecting the best product for packing<br>Discarding poor quality fruit and other waste organic materials in the field | • Maintain good hygiene and good housekeeping<br>• 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<br>• Harvest maturity index by age and calliper<br>• Use of Discarded poor-quality fruit and other waste organic materials in the field to leave as organic fertiliser or use for compost production<br>• Avoiding mechanical scarring and bruising quality defects<br>• Provide packaging materials and storage facilities<br>• Establishment of temporary packing facilities |
| 3 | Activities related to installation of mini sprinkler irrigation systems | Installation of mini sprinklers systems<br>Fixing water pumps and electricity supply<br>Plumbing works | • Carry out installation works during off cultivation seasons<br>• Solid waste generation during installation should be minimised and disposed generated waste with care<br>• 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:<br>✓ Immediately stop construction activities<br>✓ With the approval of the resident engineer delineate the discovered site area<br>✓ 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 |
|---|---|---|---|
| | | | ✓ Through the Resident engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours<br>✓ 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<br>✓ Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out<br>✓ 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<br>✓ 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<br>Cultivation of Mango | • Provide DOA certified guava variety only to farmers<br>• Good housekeeping<br>• Manual and integrated weed control<br>• Prevent weed spreading via organic manure (Compost) by periodic inspection and manual removal after application |
| 6 | Impact on Forest areas adjoining to cultivation lands specially Flora and Fauna diversity | Vegetation clearing<br>Cultivation of Mango<br>Edge effect | • Detailed ecological assessment should be carried out<br>• Recommendations of the ecological assessment should be properly implemented and monitored |
| 7 | Contamination of water, land and air during usage of chemicals (pesticides, weedicides.) | Land preparation<br>Vegetation clearing<br>Use of fertilisers<br>Use of chemicals for specific requirements | • Adherence to IPM standards of the WB, IPM action plan of ASMP and standards<br>• Introduce technological methods to reduce dosage amounts<br>• Awareness on usage time, handling and storage<br>• Guidance on suitable time for the usage of chemicals<br>• Promote organic fertilisers<br>• Formulation of fertiliser regimes based on complete soil tests and foliar analysis |
| 8 | Impaired water quality | Cultivation of Mango | • Excess water extraction is to be cut down to preserve ground water table<br>• 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 |
| 9 | Solid Waste Disposal | Discarding poor quality fruits organic materials in the field (Bunch clearing, d, de-handing, de-leafing, debudding, bagging, propping and guying) | • Burnt to maintain the farmlands' hygienic condition<br>• Use postharvest waste for compost production<br>• Implement waste minimisation as proposed in pilot activity of minimisation of waste generation, income generation and empowerment |

| № | 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 weed control activities<br>Covering bags | • 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 |
| 10 | Spread of crop related diseases among other flora species | Throughout the cultivation period | • Use of drone technology to conduct disease surveys using infra-red photography<br>• Provide technical guidance on application of chemicals including dosage, suitable time and frequency<br>• Use of chemicals using drone technology<br>• Pest and disease control based on IPM practices and modern spray techniques<br>• Pest population and pest damage surveys to assess pest threshold status for application of pesticides |
| 11 | Health hazard | Use of agrochemicals (fertilisers, pesticides, weedicides etc.)<br>Snake Bites | • Carry out proper hazardous identification and risk assessment of all proposed activities including snake bites related hazards<br>• Training and awareness on safe chemical handling<br>• Use drone technology to spray chemicals<br>• 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)<br>• Availability of first-aid facilities<br>• A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored<br>• 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<br>• Formulation of fertiliser regimes based on complete soil tests and foliar analysis<br>• Pest population and pest damage surveys to assess pest threshold status for application of pesticides |

- Contractor's responsibility for mitigating adverse environmental issues raised during construction of collection centre and Compost yard which should be included in bidding documents

| 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<br>• Community Outreach activities including training | • Discussions should be conducted with the beneficiary farmers including women, and youth<br>• The beneficiary farmers selection based on the criteria which were developed at stakeholders meeting and identifying of beneficiary farmers were undertaken transparently<br>• Residents in the area will be briefed on the project, purpose and design, and outcomes with a comprehensive discussion<br>• Communication and training activities focusing on women, youth, and farmers who are poor in communication |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | | • The contractor 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<br>• The contractor will maintain a log of any grievances/complaints and actions taken to resolve them<br>• A copy of the EMP should be available at all times at the project supervision office on site |
| 2 | Spreading COVID 19 virus | • All activities | • take all necessary precautions to maintain the health and safety of all Staffs including labourers<br>• The contractor must ensure that all workers, including managers, are well trained on COVID 19 safety precautions published by the health ministry.<br>• 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<br>• ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics<br>• 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<br>• Prioritize re-use of excess spoils and materials in the construction works.<br>• Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;<br>• Place storage areas for fuels and lubricants away from any drainage leading to water bodies;<br>• Dispose of any wastes generated by construction activities in designated sites.<br>• Irrigation works must be planned to be carried out during times of lowest flow |
| 4 | Spreading of Invasive Alien Species | • Vegetation clearing<br>• Material transportation<br>• Desilting | • Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done.<br>• Vehicles should be covered during transportation of cleared vegetation to and from the construction site.<br>• 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.<br>• Washing the vehicles should be conducted periodically to prevent carrying any invasive species<br>• The construction site should be inspected periodically to ensure that no invasive species are establishing themselves at the site.<br>• Good housekeeping |
| 5 | Noise Pollution & Vibration that can affect nearby structures | • Operation of equipment and machinery.<br>• Material storage and transport | • Working time for noise/vibration generation activities should be restricted and carried out only from 6.00 am to 6.00 pm. |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | • Use of hammer type pile driving will generate high noise and vibration. | • 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.<br>• Use of mechanically driven saw blades for tree felling will make the noise levels restricted to only a short period of time.<br>• Construction equipment and machinery should be maintained in good condition. The contractor shall submit the list of high noise/vibration generating machinery & equipment to the PE for approval |
| 6 | Air Pollution including dust generation that can affect nearby vegetation and households | • Site Preparation activities setting up of material storage yards, and removal of vegetation<br>• 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.<br>• All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations.<br>• Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.<br>• The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low.<br>• 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.<br>• Regular and proper maintenance of construction vehicles and machinery to avoid air emissions.<br>• There should be no burning of wastes on-site.<br>• 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<br>• Construction waste<br>• Waste from labour resting areas | • The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type.<br>• Any hazardous type of waste shall be dealt with special care and instructions from the LA.<br>• The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations.<br>• 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.<br>• Increased traffic of heavy vehicles for material transportation | **Training**<br>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. |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | • Noise and vibration of construction machinery | **Personal Protective Equipment**<br>2. All workers will be provided with necessary PPEs (basic should include a safety helmet, protective footwear, and high visibility jackets).<br>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.<br>4. A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wearing and monitoring.<br><br>**Site Delineation and Warning Signs**<br>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.<br>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.<br>7. Dangerous warning signs should be raised to inform the public of particular dangers and to keep the public away from such hazards.<br>8. Trenches should be progressively rehabilitated once work is completed.<br>9. Overloading of vehicles with materials should be controlled<br>10. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety.<br>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.<br><br>**Equipment safety**<br>12. Work zone workers use tools, equipment, and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts, and mechanical or electrical problems.<br><br>**Emergency Procedures**<br>13. An emergency aid service must be in place on the worksite.<br>14. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site.<br><br>**Construction camps** |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | | 15. Construction camps should have adequate sanitation facilities for construction workers to control the transmission of infectious diseases.<br>16. Avoid housing workers in camps and provide socio-economic benefits locally by employing local people. If there is no alternative to employing workers from elsewhere, locate accommodation camps away from communities on land acquired from willing sellers. Provide labour camps with adequate sanitation, waste disposal, and health facilities according to labour laws. Clear work campsites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS.<br><br>**Information management**<br>17. Develop and establish the contractor's own procedure for receiving, documenting, and addressing complaints from the affected public and nearby communities.<br>18. Provide advance notice to local communities by way of information boards or leaflets about the schedule of construction activities, interruption to services and access, etc. |
| 9 | Mosquito breeding places and spreading vector borne diseases | • Temporary water ponding due to construction | • Water pocketing should be avoided specially during rainy season<br>• Temporary pond should be filled as soon as possible<br>• 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.<br>• The farmer societies shall document all types and quantities of waste generated and removed from the site and the disposal locations.<br>• 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.<br>• 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<br>• The farmer society shall get recommendation for the efficient machineries by experts<br>• 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<br>• Primary trapping and treatment methods can be followed |

- Contractor's responsibility for mitigating adverse environmental issues raised during Rehabilitation of Rural Roads and Drainage Canals which should be included in bidding documents

| № | Potential environmental impacts and risk level | Key project activities causing the impact | Proposed mitigation measures |
|---|---|---|---|
| 1 | Public complaints and lack of community support for the project implementation | • Information disclosure among stakeholders | • Discussions should be conducted with the surrounding community<br>• Residents in the area should be briefed about the project, purpose, and design, and outcomes via a documented community consultation session: This should be done immediately upon the contractor being mobilised<br>• 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<br>• The contractor will maintain a log of any grievances/complaints and actions are taken to resolve them<br>• Display signage/notices to make public aware to use of alternative road<br>• A copy of the EMP should be available at all times at the project supervision office on-site<br>• Sufficient sign boards, movement controllers, etc should be mobilised as proactive measures |
| 2 | Over extraction of natural resources | • Material Sourcing | • The contractor is required to ensure that sand, aggregates, and other quarry material are sourced from licensed sources. The contractor is required to maintain the necessary licences and environmental clearances for all burrow and quarry material they are sourcing –including soil, fine aggregate, and coarse aggregate<br>• Sourcing of any material from protected areas and/or designated natural areas, including tank beds, is strictly prohibited<br>• If the contractor uses non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed<br>• The contractor should submit in writing all the relevant numbers and relevant details of all pre-requisite licences etc. and report of their status accordingly |
| 3 | Soil Erosion | • Land preparation including clearing | • Shoes drains should be proposed as side drains to avoid water flow on the road surface which will enable to use as carriageway as the road width is low<br>• Slop areas should be protected<br>• Proper culvert arrangement should be there for places where potential water draining over the road<br>• Land clearing/preparation should be avoided during the rainy season and at a time maximum of 250m stretch should be worked and no more than that |
| 4 | Spreading of Invasive Alien Species | • Vegetation clearing<br>• material transportation (especially, e.g. Lantana, | • Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done<br>• Invasive plants species removed should be destructed on-site without transporting to another place |

| № | Potential environmental impacts and risk level | Key project activities causing the impact | Proposed mitigation measures |
|---|---|---|---|
| | | Parthenium hysterophoruss, Yoda Nidikumba) | • Vehicles should be covered during transportation of cleared vegetation to and from the construction site<br>• 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<br>• Washing the vehicles should be conducted periodically to prevent carrying any invasive species<br>• The construction site should be inspected periodically to ensure that no invasive species are establishing |
| 5 | Air Pollution including dust generation that can affect nearby farmlands and households | • Setting up of material storage yards, and removal of vegetation<br>• 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, and vehicle maintenance yards. These dust-emitting sources should be located away from human activity and natural drainage paths as much as possible<br>• All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations<br>• Stockpiled soil and sand shall be covered with tarpaulin during rain and wind<br>• The site should be water sprinkled at least 2-3 times a day during dry weather to suppress dust emission<br>• 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<br>• Regular and proper maintenance of construction vehicles and machinery to avoid air emissions |
| 6 | High Noise & Vibration levels that can affect nearby structures and wildlife | • Operation of equipment and machinery.<br>• Material storage and transport | • Working time for noise/vibration generation activities should be restricted and carried out only from 6.00 am to 6.00 pm<br>• 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, it is necessary to maintain the noise level at below 50 dB<br>• The use of mechanically driven saw blades for tree felling will make the noise levels restricted to only a short period of time<br>• Construction equipment and machinery should be maintained in good condition. The contractor shall submit the list of high noise/vibration generating machinery and equipment to the PE for approval |
| 7 | Solid Waste Disposal | • Asphalt waste<br>• Site clearing<br>• Waste from labour camps | • 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<br>• Any hazardous type of waste shall be dealt with special care and instructions from the LA<br>• Waste Asphalt should be reused as much as possible. Any leftovers should be taken back by the Contractor to the batching plant. Asphalt waste should not be disposed of on-site |

| № | Potential environmental impacts and risk level | Key project activities causing the impact | Proposed mitigation measures |
|---|---|---|---|
| | | | • The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations<br>• 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.<br>• Increased traffic of heavy vehicles for material transportation<br>• Noise and vibration of construction machinery<br>•<br>• Prevention of COVID19 Pandemic spread | • Training<br>• 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<br>• Personal protective equipment<br>• All workers will be provided with necessary PPEs (basic should include safety helmets, protective footwear, and high visibility jackets).<br>• Gloves, ear muffs, goggles, dust masks, safety harnesses, and any other equipment considered necessary should be maintained in stock at the site office.<br>• A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wearing and monitored<br>• Necessary COVID19 safety measures and protocols will be implemented as per Government, WHO, and WB guidelines (Refer Annex 6) by all construction workers.<br>• Proactive measures should be taken to mitigate fall from height, edge collapse, excavation and machinery related hazards during construction<br>• Construction camps<br>• Construction camps should have adequate sanitation facilities for construction workers to control the transmission of infectious diseases<br>• 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 programmes to raise worker awareness of HIV/AIDS |
| 9 | Exposing and damaging of physical cultural resources | • Site preparation work | • Upon discovery of physical cultural material during project implementation work, the following should be carried out;<br>• Immediately stop construction activities<br>• With the approval of the resident engineer delineate the discovered site area<br>• 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<br>• Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology, and local authorities within 24 hours |

| № | Potential environmental impacts and risk level | Key project activities causing the impact | Proposed mitigation measures |
|---|---|---|---|
| | | | • Submit a brief chance to find the 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<br>• Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out<br>• 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<br>• 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 |
| 10 | Mosquito breeding places and spreading vector-borne diseases | • Temporary water ponding due to construction | • Water pocketing should be avoided especially during the rainy season<br>• The temporary pond should be filled as soon as possible<br>• Construction equipment and tanks should be emptied immediately after the construction concluded for the day |
| | • Post construction | | |
| 11 | Clearing/closure of construction Site/ labour camps | | • Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilisation. This also includes burrowing sites and storage yards<br>• 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 |
| 12 | 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<br>• The contractor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and dispose at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP |

- Contractor's responsibility for mitigating adverse environmental issues raised during Construction of Deep Wells which should be included in bidding documents

| 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 | • Discussions should be conducted with the users. |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | | • Residents in the area 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.***<br>• 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.<br>• The contractor will maintain a log of any grievances/complains and actions taken to resolve them.<br>• Obtain Yield test report from WRB and availability of the same at site<br>• 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:<br>• Immediately stop construction activities<br>• With the approval of the resident engineer delineate the discovered site area<br>• 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<br>• Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours<br>• 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<br>• Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out<br>• 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.<br>• 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. |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| 3 | Air Pollution including dust generation that can affect nearby vegetation and households | ▪ Setting up of material storage yards, and removal of vegetation<br>▪ Transport of construction material and storage on site<br>▪ Desilting | • In the construction method statement, the contractor should clearly designate areas for maintaining excavated material stockpiles, Rubbles stockpiles, and Sand. These dust emitting sources should be located away from human activity and natural drainage paths as much as possible.<br>• All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations.<br>• Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.<br>• The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low.<br>• Vehicles transporting soil, sand and other construction materials shall be covered. Limitations to speeds of such vehicles necessary. Transport through densely populated area should be avoided.<br>• Regular and proper maintenance of construction vehicles and machinery to avoid air emissions.<br>• There should be no burning of wastes on site.<br>• Until removal to arranged disposal sites, waste from demolition shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic, local residents. |
| 4 | High Noise and Vibration levels that can affect nearby structures and wildlife | ▪ Operation of equipment and machinery<br>▪ Material storage and transport | • Working time for noise/vibration generation activities such as excavation should be restricted and carried out only from 6.00 am to 6.00 pm.<br>• 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.<br>• Construction equipment and machinery should be maintained in good condition. Contractor shall submit the list of high noise/vibration generating machinery and equipment to the project for approval |
| 5 | Blocking of surface drainage paths leading to localised flooding and ponding of water | ▪ Site Preparation including provision of access roads, material/waste piles<br>▪ Desilting | • Until transported out to arranged disposal sites, debris and waste from site preparation work and desilting shall be stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic and local residents. The contractor shall identify areas for stockpiling material and waste such as excavated materials. |

| SN | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | | • The stockpiles should be suitably covered to minimise wash-offs to nearby waterways.<br>• 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 canal to avoid on site ponding or flooding.<br>• Proper planning to avoid construction during rainy season.<br>• Preventing total blockage of streams/ providing alternative drainage path during construction |
| 6 | Damage to Flora and wildlife Specially impacts to elephants roaming in the area | ▪ Vegetation clearing<br>▪ Excavation of deep wells | Department of Wildlife and Forest Department consents and recommendations should be obtained and incorporated construction before start work.<br>• Speed limits and operating times for the construction vehicles should be imposed.<br>• Due consideration should be given to carefully clearing of vegetation avoiding destruction of habitats of fauna.<br>• The desilted matter shall immediately be disposed of to pre-decided disposal sites.<br>• The contractor will take reasonable precaution to prevent workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.<br>• If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same.<br>• The Engineer will report to the nearby Forest Department /Department of Wild Life Conservation (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.<br>• It is recommended to do the project work day time only.<br>• The contractor should ensure elephant access to water is not blocked during activities.<br>• Excavated wells should be properly fenced and protected |
| 7 | Solid Waste Disposal | ▪ Site clearing<br>▪ Excavation of Wells | • The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type.<br>• Excavated materials should be properly stockpiled at 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 |
|---|---|---|---|
| | | | • Excavated materials should be reused as much as possible for mixing with compost and embankment construction of rural roads<br>• Disposal of unsuitable excavated materials should be done with consultation of LAs<br>• Any hazardous type of waste shall be dealt with special care and instructions from the LA.<br>• The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations.<br>• 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<br>▪ Noise and vibration of construction machinery | **Training**<br>• 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.<br>**Personal Protective Equipment**<br>• All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets).<br>• Gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary should be maintained in stock at the site office.<br>• A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored.<br>**Site Delineation and Warning Signs**<br>• 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.<br>• Dangerous warning signs should be raised to inform public of particular dangers and to keep the public away from such hazards.<br>• Overloading of vehicles with materials should be controlled<br>• Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety.<br>• 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 |
|---|---|---|---|
| | | | **Equipment safety**<br>• 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.<br>**Emergency Procedures**<br>• An emergency aid service must be in place in the work site.<br>• 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.<br>**Information management**<br>• Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities.<br>• Provide advance notice to local communities by way of information boards or leaflet, during village committees about the schedule of construction activities, interruption to services and access etc. |
| | **Post construction phase** | | |
| 9 | Clearing/Closure of Construction Site | | • Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. This includes burrow sites and storage yards as well<br>• On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer |
| 10 | Environmental Enhancement/<br>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<br>• 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 |

- 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**<br>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.<br><br>**Personal Protective Equipment**<br>2. All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets).<br>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.<br>4. A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored.<br><br>**Site Delineation and Warning Signs**<br>5. Precautions for electrocution<br>6. Dangerous warning signs should be raised to inform public of particular dangers and to keep the public away from such hazards.<br>7. Overloading of vehicles with materials should be controlled<br>8. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety.<br>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.<br><br>**Equipment safety**<br>10. Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems.<br><br>**Emergency Procedures**<br>11. An emergency aid service must be in place in the work site.<br>12. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble |

| № | Potential Environmental Impacts and Risk Level | Key project activities causing the impact | Mitigation Measures proposed and action to be implemented by the Contractor |
|---|---|---|---|
| | | | in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site.<br><br>**Information management**<br>13. Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities.<br>14. Provide advance notice to local communities by way of information boards or leaflet about the schedule of construction activities, interruption to services and access etc. |
| 2 | Access restrictions and public inconvenience | ▪ Site Preparation activities<br>▪ Vehicle and machinery movements<br>▪ 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 Maintenance | | • Routine clearance/maintenance of electrical fence corridor<br>• Maintenance 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.<br>• The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP |

## 9. COST OF MITIGATION

| 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 |

## 10. CONCLUSION AND SCREENING DECISION

### 10.1. Summary of environmental effects

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

| Key project activities | Potential environmental effects | Significance of environmental effect with mitigation in place[3] |
|---|---|---|
| **During agricultural activities** | | |
| Land preparation | 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 | Less water consumption, less soil erosion | SP |
| Use of fertilisers and chemicals | Land, water an air contamination | NS |
| Product transportation and storage | No significant impacts | NS |
| Introduction of drone technology | Less agro-chemical contamination on land, water, and air | SP |
| New and improved quality enhancing technologies | Solid waste generation | SN |

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

| Key project activities | Potential environmental effects | Significance of environmental effect with mitigation in place[3] |
|---|---|---|
| Introduction of water conserving and low-pressure drip and mini-sprinkler irrigation systems | No such harm, less use of water and less contamination of agro-chemicals on land, air and water | SP |
| **Operational Stage** | | |
| Operations such as collection, sorting, etc | Disposal of Waste in a haphazard manner<br>Energy Consumption and Greenhouse gas emission | NS<br>SN |
| **Infrastructure activities (renovation of roads, Erection of elephant fence, construction of deep wells, rehabilitation of drainages and construction of collection centre)** | | |
| 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 |

## 11. EMP IMPLEMENTATION RESPONSIBILITIES AND COSTS

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

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

## 12. SCREENING DECISION RECOMMENDATION

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. These potential impacts are temporary in nature. It is recommended to start the project work off-season for upland cultivation and avoid nighttime work. However, it should be noted that establishment of Postharvest Processing Centre related activities are excluded from this report and those project activities will be separately investigated and reported. Main activity wise recommendations are given below for better clarity:

**Land preparation**: Removal of trees are discouraged at the maximum level. In case of removal of trees (above 150mm girth), compensatory tree planting should be carried out in minimum of double the number of trees which will be removed. Required to implement mitigation measures proposed in the EMP properly.

**Watering**: For construction of ground water wells, Water Resources Board yield test report should be obtained in addition to their recommended locations. NO water should be taken from field canals-MASL which are released for paddy cultivation.

**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.

**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 public infrastructures**: Implementation of the Environmental Management Plan is sufficient to mitigate the identified impacts and detailed EMP should be updated with detailed designs of infrastructure improvements.

Table 12: Screening Recommendations for each activity

| Key recommendations | Actions / Approvals to be attended | Time period to attend each action | Responsibility / Remarks |
|---|---|---|---|
| Construction of Deep Wells | Obtain WRB Recommendations with yield test reports | Before mobilise contractors to construct wells | ISP<br>PPMU<br>Engineer-PMU |
| Carry out an ecological assessment | Recommendations should be implemented properly and monitored its effectiveness | Immediately as possible | ISP<br>PPMU<br>Env and Social Specialist - PMU |
| Use of Hurulu Feeder canal water (if any) | Obtain written consent from the MASL | Urgently | ISP<br>PPMU |
| Disposal of Waste (covering bags) | Start collection and segregation of waste<br>Reuse and Recycle<br>Dispose through LAs<br>Implement Waste Minimization Programme | During harvesting<br><br><br><br>During harvesting time | FOs<br>ISP<br>PPMU<br><br>ISP<br>PPMU |
| Integrated Pest Management Practices | Implement IPM activities proposed above at each stage | From land preparation onwards | National and International Agronomist – ISP<br>Agronomist – PPMU |
| Rehabilitation of rural roads | Construction of silt-traps where drains and canals are adjoining which has the potential for siltation | During construction of rural roads | Civil Engineer – ISP<br>PPMU |
| Rehabilitation of Drainage Canals including causeway | Mitigate siltation and degradation of water quality<br>Blockage of drainage path should be mitigated | During construction | Civil Engineer – ISP<br>PPMU |
| Rehabilitation of Elephant fence | Construction or rehabilitation of fence<br>Electrification<br>Maintenance | During construction<br>During Operations | FOs<br>DWLC – Range Office<br>Civil Engineer – ISP<br>PPMU |
| Construction of Collection centre | Construction of Building<br>Fencing of land<br>Landscaping of area<br>Post-harvest operations | During construction<br>Installation of equipments/ machineries<br>During operations | Civil Engineer – ISP<br>Agronomist - ISP<br>PPMU |
| Construction of compost yard | Construction of Building<br>Fencing of land<br>Landscaping of area<br>Drying and sorting of waste<br>Leachate collection<br>Odor control<br>Operations of composting | During construction<br>Installation of machineries<br>During operations | Civil Engineer – ISP<br>Agronomist - ISP<br>PPMU |
| Removal of Trees | Get approval of DS<br>Plant minimum double the number trees removed | During land preparation for Collection centre and compost yard | ISP<br>PPMU<br>Engineer-PMU |

## 13. DETAILS OF PERSONS RESPONSIBLE FOR THE ENVIRONMENTAL SCREENING

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

## Annex 1: References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## Annex 2: List of beneficiaries

| Alakolawewa | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | **GPS location water source** | |
| | **New farmers** | | | | | | | | |
| 1 | H.M Hemasiri Jayantha Herath | 720993996V | 115, Wewala Wewa, Dambulla | 070 – 2860250 | 1.5 | PAT | E475298<br>N874694 | E475360<br>N874680 | CW |
| 2 | E.G. Ekanayake | 702083214V | 85, Alakolawewa, Wewala, Dambulla | 076 – 9364356 | 2 | PAT | E475183<br>N874507 | E475194<br>N874512 | TW |
| 3 | D.M. Karunarathna | 750870520V | Alakolawewa, Wewala, Dambulla | 071 – 0399270 | 1 | D/531/27 | E475213<br>N874332 | E475235<br>N874267 | TW |
| 4 | D.M. Nawarathna | 851523308V | 85, Alakolawewa, Wewala, Dambulla | 071 – 5202087 | 1 | | E475213<br>N874302 | E475235<br>N874267 | TW |
| 5 | D.M. Nalani Adikiri | 826252308V | 91/D, Alakolawewa, Wewala, Dambulla | 070 – 5591698 | 1 | 455/B/CC | E475133<br>N873556 | | |
| 6 | E.M. Saliya Pathmakumara | 872914617V | 91/C, Alakolawewa, Wewala, Dambulla | 071 – 4034563 | 1 | PAT | E475199<br>N873614 | E475219<br>N873611 | TW |
| 7 | J.M. Rasika Kumari Weerakoon | 807190822V | 131, Alakolawewa, Wewala, Dambulla | 076 – 7053492 | 1 | E 455B/CC – 54 | E475163<br>N873454 | E475152<br>N873487 | TW |
| 8 | D.M. Susantha Saman Kumara | 820094999V | 84/1/A, Alakolawewa, Dambulla | 076 – 3467713 | 1 | E455/POL/WABA/17 | E475318<br>N873703 | E475786<br>N873746 | CW |
| 9 | D.M Sampath Dammika Bandara | 832874515V | 84/1, Alakolawewa, Wewalawewa, Dambulla | 077 – 5436216 | 1 | | E476031<br>N873702 | E475786<br>N873746 | CW |
| 10 | Sameera Ruwan Kumara | 872972439V | 84/1/B, Alakolawewa, Wewalawewa, Dambulla | 071 – 5924479 | 1 | | E476063<br>N873696 | E475786<br>N873746 | CW |
| 11 | D.M. Nilantha Pradeep | 893441280V | 130, Alakolawewa, Wewala, Dambulla | 076 – 0947309 | 1 | | E475374<br>N873491 | E475295<br>N873440 | TW |
| 12 | D.M. Senarathna | 620703605V | 130/D, Alakolawewa, Wewala, Dambulla | 077 – 8172323 | 1 | CP/DM/3425/7578 | E475390<br>N873403 | E475321<br>N873437 | TW |
| 13 | H.G.G. Chandana Kumara | 821061580V | 181, Alakolawewa, Wewala, Dambulla | 076 – 8764592 | 1 | | E475373<br>N873260 | E475408<br>N873251 | TW |
| 14 | D.M.D.G. Ariyarathna Bandara | 670352404V | 145, Pahala Arawwala, Dambulla | 077 – 3726384 | 1 | PAT | E475471<br>N873324 | E475362<br>N873328 | |
| 15 | D.M. Upul Bandara Dissanayake | 813434582V | 80, Alakolawewa, Dambulla | 077 – 5191311 | 2 | PAT | E475471<br>N873295 | E475328<br>N873156 | |
| 16 | A.M.J. Abeykoon | 600543750V | Alakolawewa, Wewalawewa, Dambulla | 070 – 1383025 | 2 | 455B/LL09 | E475375<br>N873152 | E475484<br>N873119 | CW |
| 17 | K.G. Senarathne | 772090269V | 88/3, Alakolawewa, Wewala, Dambulla | 077 – 2182369 | 1 | PAT | E475373<br>N873186 | | |

| Alakolawewa | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | **GPS location water source** | |
| 18 | D.M. Dingiri Banda | 520144617V | 91/B, Alakolawewa, Wewala, Dambulla | 071 – 2696841 | 1 | 455/B/CC- 04 | E475361 | | |
| | | | | | | | N873118 | | |
| 19 | D.M. Danushka Chathuranga | 941612458V | 130, Alakolawewa, Wewala, Dambulla | 071 – 1287724 | 1 | E455B/P/1 | E475374 | E475295 | TW |
| | | | | | | | N873491 | N873340 | |
| 20 | A. Ariyamenike | 687591640V | 106, Alakolawewa, Wewala, Dambulla | 072 – 5660313 | 1 | CH/1317/LDO/99H | E475109 | E475117 | TW |
| | | | | | | | N873729 | N873712 | |
| 21 | G. Lanka Chandani Swarnalatha | 787714447V | 129/1, Alakolawewa, Wewala, Dambulla | 076 – 5662388 | 1 | PAT | | | |
| | | | | | | | | | |
| 22 | K.P. Sarath Samarajeewa | 720491648V | 65, Alakolawewa, Humbasgamuwa, Dambulla | 071 – 0787871 | 1 | PAT | E474854 | E474967 | |
| | | | | | | | N872943 | N872918 | |
| 23 | D.M. Ranjith Bandara | 820722680V | 86/A, Alakolawewa, Wewalawewa, Dambulla | 077 – 8462871 | 1.5 | 455B/LL15 | E475103 | E475000 | |
| | | | | | | | N872864 | N872838 | |
| 24 | D.M. Sampath Pathmakumara | 19771570186 | 91/A3, Alakolawewa, Wewalawewa, Dambulla | 071 – 6496456 | 0.5 | PAT | | | |
| | | | | | | | | | |
| 25 | J.M.J. Susantha Weerakoon | 742123154V | Alakolawewa Road, Humbasgamuwa | 071 – 3509960 | 1 | Electricity Bill | | | |
| | | | | | | | | | |
| 26 | K.G. Udeshika Nilmini Rathnayake | 848261394V | Alakolawewa, Wewalawewa, Dambulla | 071 – 1235417 | 1 | Electricity Bill | | | |
| | | | | | | | | | |
| 27 | W.G. Chandrika Krishanthi Wedagedara | 696085242V | Alakolawewa, Wewalawewa, Dambulla | 076 – 4178380 | 1 | Electricity Bill | E474913 | E474938 | |
| | | | | | | | N873220 | N873232 | |
| 28 | K.G. Priyanga Rathnayake | 802570597V | Alakolawewa, Wewalawewa, Dambulla | 077 – 4539464 | 1 | Electricity Bill | | | |
| | | | | | | | | | |
| 29 | U.G. Sugandika Kumari | 886190387V | 163/1, Alakolawewa, Wewalawewa, Dambulla | 071 – 2936869 | 1 | | | | |
| | | | | | | | | | |
| 30 | Weerarathna Malani Jayasooriya | | Alakolawewa, Wewalawewa, Dambulla | | 1 | | | | |
| | | | | | | | | | |
| 31 | D.M.D.M.P.K.D. Bandara | 723051762V | Alakolawewa, Wewalawewa, Dambulla | 077 – 5916273 | 1 | | E475274 | E475289 | TW |
| | | | | | | | N873915 | N873965 | |
| 32 | D.M.V.D. Bandara | 811683663V | Alakolawewa, Wewalawewa, Dambulla | 070 – 1195125 | 1 | | E475282 | E475289 | TW |
| | | | | | | | N873975 | N873965 | |
| 33 | D.M. Hemalatha Disanayaka | 707153890V | Alakolawewa, Wewalawewa | 076-5284497 | 1 | PAT | E474902 | E474941 | |
| | | | | | | | N872730 | N872719 | |
| 34 | S.A. Nimal Jayarathna | 197130110017 | 78/1, Alakolawewa, Wewalawewa | 071-4043217 | 2 | M/P/6141 | E475050 | E475063 | |
| | | | | | | | N873798 | N873751 | |
| 35 | R.M. Jayawardhana | 601182807V | Alakolawewa, Wewalawewa | 077-1274999 | 1 | PAT | | | |
| | | | | | | | | | |
| 36 | A.N.R.G.R. Lakmal | 930514519V | Alakolawewa, Wewalawewa | 077-7096220 | 1 | PAT | | | |

| Alakolawewa | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | **GPS location water source** | |
| | | | | | | | | | |

| Gonawela | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| | **Farmers' list of Matale Project Office** | | | | | | | | | | |
| 1 | K.D.G.S.G. Upathissa | 723333920V | Gonawewa Road, Wewalawewa, Dambulla | 0773121456 | 1 | PAT | 474932 | 868631 | 474921 | 868819 | |
| 2 | S.M. Indika Kumara | 881281007V | 263, Gonawewa Road, Wewalawewa, Dambulla | 0763345088 | 1 | CP/DM/3364-1017 | | | | | |
| 3 | A.M.V.G.A.B. Rathnayake | 197629303802 | Gonawewa Road, Wewalawewa, Dambulla | 076440699 | 1 | CP/DM/3274-879 | | | | | |
| 4 | W.M.S.C. Basnayake | 961593611V | Gonawewa Road, Wewalawewa, Dambulla | 0705292554 | 1 | PAT | 474728 | 869498 | 474700 | 869511 | |
| 5 | W.M. Ananda Basnayake | 733220783V | 227, Gonawewa, Wewalawewa | 0717384677 | 1 | PAT | 474803 | 869496 | 474857 | 869469 | |
| | | | | | | | | | | | |
| | **Farmers' list of Agrarian Services Centre (Govijanasewa Office)** | | | | | | | | | | |
| 6 | J. Sanika Sandalanka Perera | 866802890V | 322, Gonawela, Wewalawewa, Dambulla | 0719624222 | 1 | PAT | | | | | |
| 7 | W.A. Ranjith Gunathilaka | 713298026V | 332, Gonawewa Road, Wewalawewa | 0773482850 | 1 | E447A/101557 | 474910 | 868371 | 474904 | 868435 | |
| | | | | | | | | | | | |
| | **New farmers** | | | | | | | | | | |
| 8 | N.M. Dayarathne | 670965317V | 284, Gonawewa Road, Wewalawewa, Dambulla | 0712656108 | 1 | PAT | | | | | |
| 9 | M.G. Karunarathne | 600682725V | Gonawewa Road, Wewalawewa, Dambulla | 0717221725 | 1 | CP/DM/3280-874 | 474660 | 868569 | 474674 | 868582 | |
| 10 | M.G.V.R. Karunarathne | 871603960V | Gonawewa Road, Wewalawewa, Dambulla | 0717221725 | 1 | | 474206 | 869136 | 474267 | 869092 | |
| 11 | M.G. Sriyani Wasantha | 197577102920 | Gonawewa Road, Wewalawewa, Dambulla | 0717786330 | 1 | E447/A/LL320 | 474206 | 869136 | 474267 | 869092 | |
| 12 | J. Sanika Sandalanka | 866802890V | 322/2, Gonawewa, Wewalawewa, Dambulla | 0719624222 | 1 | PAT | 474671 | 869359 | 474636 | 869419 | |
| 13 | I.M.R. Dayawathi | 196627103444 | 388, Gonawewa Road, Wewalawewa, Dambulla | 0712863762 | 1 | PAT | 474703 | 869410 | 474636 | 869419 | |
| 14 | W.A. Nandasena | 6014031704 | Gonawewa, Wewalawewa, Dambulla | 0719207667 | 1 | PAT | 471877 | 868503 | 474869 | 868503 | |
| 15 | W.M. Tharusha Dilshan | 200222802048 | 227,Gonawewa, Wewalawewa | 0703558826 | 1 | PAT | 474803 | 869496 | 474857 | 869469 | |
| 16 | D.K.G. Upul Pemarathne | 783615444V | 196/2, Gonawewa, Wewalawewa | 0772281625 | 1 | PAT | 474507 | 86940 | | | |
| 17 | N.M. Jayathilake | 571122698V | Gonawewa Road, Wewalawewa | 0703271695 | 1 | CP/DA/3363-1018 | | | | | |
| 18 | A.G. Sheela Kumari | 688581974V | 27, Wewalawewa, Dambulla. | 0754880873 | 1 | PAT | | | | | |
| 19 | K.G. Susantha Kumara | | Dambulu Wadiya, Wewalawewa. | 0763376251 | 1 | E447A/LL303 | 474924 | 869080 | 474926 | 869327 | |
| 20 | K.D. Sirisena | 193931201734 | Gonawewa, Wewalawewa | | 1 | CP/DA/5372 | | | | | |

| Gonawela | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| 21 | E.G.J. Elapatha | 691400794V | Gonawewa, Wewalawewa | 0712584719 | 1 | | | | | | |
| 22 | W.P. Rani | 717672216V | Gonawewa, Wewalawewa | 0771311269 | 1 | | | | | | |
| 23 | D.G.C. Lakshani | 885533892V | Gonawewa, Wewalawewa | 0712798532 | 1 | | | | | | |
| 24 | K.G. Shashikala Maduwanthi | 946422533V | Gonawewa, Wewalawewa | 0715924981 | 1 | | | | | | |
| 25 | R.G. Jayasinghe | 690343835V | Gonawewa, Wewalawewa | 0773415148 | 1 | CP/DA/3537-3443 | 474366 | 869000 | 474316 | 869081 | |
| 26 | M.W. Alegee | 196577102892 | Gonawewa, Wewalawewa | 0712544300 | 1 | PAT | 474832 | 869615 | 474856 | 869601 | |
| 27 | R.M.K.G. Upali Rajapaksha | 196334403769 | Gonawewa, Wewalawewa | 0755717264 | 1 | CP/DA/3499 | 474516 | 868916 | 474410 | 869982 | |
| 28 | D.M. Indukanthi Disanayaka | | Gonawewa, Wewalawewa | 0773912201 | 1 | | | | | | |
| 29 | E.G.C. Gunawardhane | 196473701256 | 284, Gonawewa, Wewalawewa | 0712656108 | 1 | | 474994 | 868273 | 474998 | 868273 | |
| 30 | M.G.S. Ruwan | 852766042V | 268, Wewalawewa | 0776924398 | 1 | E447A/101588 | 474758 | 868594 | 474674 | 868582 | |
| 31 | W.G. Wimalasena | 761323954V | 253/2, Gonawewa, Wewalawewa | 0701194943 | 1 | PAT | 475432 | 868324 | 474469 | 868355 | |

| Hubasgamuwa | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No | Name head of household | NIC | Address | Telephone | Acres | Details of the land | GPS location land | | GPS location water source | | |
| | | | | | | | E | N | E | N | |
| | Farmers' list of Matale Project Office | | | | | | | | | | |
| 1 | K.P. Sujith Wimalaweera | 197780100135 | 67, Alakolawewa, Hubasgamuwa. | 757918626 | 1 | PAT | 474766 | 873065 | 474919 | 873078 | TW |
| | New farmers | | | | | | | | | | |
| 2 | M.A. Priyantha Kumara | 802411883V | 155, Hubasgamuwa, Nikawatuwana | 770328963 | 1 | PAT | 473564 | 870643 | 473644 | 870649 | TW |
| 3 | Y.L.C. Padmakumara | 810935936V | 101, Hubasgamuwa, Nikawatuwana | 782924300 | 1 | LDOD 125/61 | | | | | |
| 4 | K.W. Ariyalatha Fernando | 575203434V | Somarathna Stores, Hubasgamuwa, Nikawatuwana | 774201221 | 1 | PAT | | | | | |
| 5 | D.G. Anura Bandara | | 177, Hubasgamuwa, Nikawatuwana | 777755800 | 1 | | 473820 | 871202 | 473798 | 871226 | TW |
| 6 | R.M. Sunil Shantha | 763545245V | 93, Hubasgamuwa, Nikawatuwana | 703358389 | 1 | PAT | 473827 | 870852 | 473818 | 870843 | TW |
| 7 | H.A. Jayathilaka | 197908204768 | 101/2, Hubasgamuwa, Nikawatuwana | 770328963 | 1 | PAT | 474752 | 872841 | 475055 | 872747 | TW |
| 8 | K.G. Harischandra | 832982245V | 34/1, Wewalawewa, Dambulla | 778528943 | 1 | PAT | 473757 | 871348 | 473759 | 871359 | TW |
| 9 | E.M.G. Kumari | 198076403010 | 112, Wewalawewa, Dambulla | 719221016 | 1 | PAT | 473806 | 871973 | 473757 | 871993 | TW |
| 10 | J.M.K. Jayasinghe | 760210129V | 87/2, Alakolawewa, Wewalawewa | 772632144 | 1 | PAT | 473898 | 872443 | 473925 | 872330 | TW |
| 11 | A.P.W. Upali | 713532541V | 106/5, Alakolawewa, Wewalawewa | 776272175 | 1 | PAT | 474505 | 872851 | 474525 | 872782 | TW |
| 12 | A.P.M.S. Kumara | 822941117V | Alakolawewa, Wewalawewa | 704546042 | 1 | PAT | 474687 | 872801 | 474974 | 872678 | CW |
| 13 | K.P.S. Samanjeewa | 740952293V | 66, Alakolawewa, Wewalawewa | 703066637 | 1 | PAT | 474683 | 872930 | 474967 | 872904 | TW |
| 14 | I.G. Jayantha | 648251777V | Wewalawewa, Dambulla | 713531414 | 1 | CP/DA1536 | 474133 | 870313 | 474120 | 870230 | TW |
| 15 | K.A. Samarakoon | 195229402750 | Wewalawewa, Dambulla | 716211040 | 1 | CP/DA1538 | 474049 | 870331 | 474027 | 870303 | TW |

| Hubasgamuwa | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No | Name head of household | NIC | Address | Telephone | Acres | Details of the land | GPS location land | | GPS location water source | | |
| | | | | | | | E | N | E | N | |
| 16 | P.H. Dilshan | 811863610V | 105/1, Hubasgamuwa, Nikawatuwana. | 768898137 | 1 | PAT | 473755 | 870903 | 473790 | 870904 | TW |
| 17 | A.P.W. Maduwantha | 961683050V | 106/5, Alakolawewa, Wewalawewa | 769105345 | 1 | PAT | 473827 | 870852 | 473818 | 870843 | TW |
| 18 | A.G.S. Sewwandi | 77083079V | 112, Wewalawewa, Dambulla | 719712705 | 1 | PAT | | | | | TW |
| 19 | R.M. Jayawardane | 601182807V | Alakolawewa, Wewalawewa | 771274999 | 1 | PAT | 474803 | 872641 | 474751 | 872675 | TW |
| 20 | M.D.G. Sumith | 822532217V | Arunodayan Road, Wewalawrwa | 77564807 | 1 | PAT | 474673 | 872605 | 474636 | 872641 | TW |

| Ihala Eraula | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | **GPS location water source** | |
| | **Farmers' list of Agrarian Services Centre (Govijanasewa Office)** | | | | | | | | |
| 1 | H.M.W. Muthubanda | 811651001V | Ihala Eraula, Dambulla | 0716787253 | 4 | | E470131<br>N867599 | E470173<br>N867569 | TW |
| 2 | K.G. Kalubanda | 836021037V | 37B, Ihala Eraula, Dambulla | 0705768341 | 1 | E446C/LL/102356 | E471733<br>N867146 | E471713<br>N867135 | CANAL |
| 3 | K.G. Anura Bandara | 802360223V | 37B, Ihala Eraula, Dambulla | 0714960364 | 1 | | E471733<br>N867146 | E471713<br>N867135 | CANAL |
| 4 | K.G. Rathnayaka Banda | 7807664037V | 37B, Ihala Eraula, Dambulla | 0717597166 | 1 | | E471733<br>N867146 | E471713<br>N867135 | CANAL |
| 5 | K.G .Rambanda | 623301451V | Ihala Eraula, Dambulla | 0774424533 | 1 | | E471728<br>N867090 | E471696<br>N877114 | CANAL |
| 6 | B.G. Nandasena Banda | 194918610033 | 34, Ihala Eraula, Dambulla | 0712639130 | 1 | D/511/227 | E470611<br>N867798 | E470613<br>N867811 | TW |
| 7 | B.G.C.M. Nandasena | 833265741V | 34/1, Ihala Eraula, Dambulla | 0778843807 | 1 | LDO 612 | E470545<br>N867664 | E470613<br>N867811 | TW |
| 8 | W.G .Kumaradasa | 591144979V | 47, Ihala Eraula, Dambulla | 0778883367 | 1 | | E470654<br>N867908 | E470708<br>N867880 | TW |
| 9 | K.G. Wiliyam Banda | 580821197V | 30, Ihala Eraula, Dambulla | 0775831897 | 1 | E446C/101962 | | | |
| 10 | P.G.D.K. Pahalagedara | 812232053V | 44/C/1, Ihala Eraula, Dambulla | | 1 | PAT | | | |
| 11 | K.G. Sirwarghana | | | | | | | | |
| 12 | B.G. Piyasena | 422520139V | Ihala Eraula, Dambulla | 0715759100 | 1 | CP/DA/1062 | E471945<br>N867609 | E471992<br>N867597 | |
| 13 | B.G. Punchibanda | 532490278V | Ihala Eraula, Dambulla | 0778484368 | 1 | PAT | | | |

| Ihala Eraula | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | **GPS location water source** | |
| 14 | K.G. Punchibanda | 642970224V | Ihala Eraula, Dambulla | 0778533327 | 1 | E446C/102350 | | | |
| 15 | K.G. Susantha Kumara | 920072828V | Ihala Eraula, Dambulla | 0765681040 | 1 | | E471646<br>N869403 | E471613<br>N869470 | CW |
| 16 | K.G. Rajapaksha | 810890924V | Ihala Eraula, Dambulla | 0773794819 | 1 | | E472138<br>N869592 | E472090<br>N869625 | TW |
| 17 | K.G. Ravial Wimaladarma | 900923864V | 24D, Ihala Eraula, Dambulla | 0711586344 | 1 | | E472614<br>N868914 | E47263<br>N868892 | TW |
| 18 | Ranjan Darmappriya | 822752012V | Ihala Eraula, Dambulla | 0717707971 | 1 | | E472614<br>N868914 | E472639<br>N868892 | TW |
| 19 | K.G. Appuhami | 422200134V | 48/C, Ihala Eraula, Dambulla | | 1 | M8358 | | | |
| 20 | K.G. Gamini Disanayaka | 750860605V | 47/B, Ihala Eraula, Dambulla | 0719158993 | 1 | MP/2592 | | | CW |
| 21 | E.M.S Boyagoda | 830570136V | 75, Ihala Eraula, Dambulla | 0775363665 | 1 | M/16249 | | | |
| 22 | K.G. Dharmasena | 623400603V | Ihala Eraula, Dambulla | 0773592825 | 1 | M/P/2574 | E471957<br>N868545 | E471935<br>N868594 | CW |
| 23 | G.G.P. Sarath Bandara | 762593351V | 23/B/1, Ihala Eraula, Dambulla | 0778463212 | 1 | PAT | E472363<br>N869646 | E472426<br>N869675 | TW |
| 24 | B.G. Malani Herath | 196726902288 | Ihala Eraula, Dambulla | 0761078138 | 1 | DA/E/A/2012/47 | E472003<br>N869894 | E471991<br>N869923 | TW |
| 25 | B.G. Anura Kumara | 670163997V | 6D, Ihala Eraula, Dambulla | 0779301038 | 1 | DA/E/A/2012/31 | E472067<br>N869920 | E471991<br>N869923 | TW |
| 26 | D.M. Nirosha Malkanthi | 768064695V | Ihala Eraula, Dambulla | 0772872079 | 1 | | | | CW |
| 27 | K.G. Premarathna | 660021825V | 26H, Ihala Eraula, Dambulla | 0776218776 | 1 | | | | |
| 28 | K.G. Anura Disanayaka | 693044553V | 47C, Ihala Eraula, Dambulla | 0778472466 | 1 | | E472338<br>N869859 | E472321<br>N869852 | CW |
| 29 | K.G. Ekanayaka | | | | | | | | |
| 30 | K.G. Muthubanda | 511890195V | 123C, Ihala Eraula, Dambulla | 0776495505 | 1 | | E472370<br>N870042 | | CW |
| | **Farmers' list of Matale Project Office** | | | | | | | | |
| 31 | K.G. Jayathilaka Banda | 520625674V | 41, Ihala Eraula, Dambulla | 0719842278 | 1 | | E475274<br>N873915 | E475289<br>N873965 | TW |

| Ihala Eraula | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | **GPS location water source** | |
| | **New farmers** | | | | | | | | |
| 32 | G.G. Udara Danuska | 200219601049 | 23/D, Ihala Eraula, Dambulla | 0785275068 | 1 | PAT | E475282<br>N873975 | E475289<br>N873965 | TW |
| 33 | K.G. Piyasena | 840381889V | 23, Ihala Eraula, Dambulla | 0740926212 | 1 | PAT | | | CW |
| 34 | G.G. Somathilaka | 613502467V | 22B, Ihala Eraula, Dambulla | 0778123560 | 1 | ETI | E472343<br>N869611 | E472339<br>N869612 | TW |
| 35 | K.G.S. Pradeep Kumara | 911151480V | 26F, Ihala Eraula, Dambulla | 0781706113 | 1 | CP/DA/430C/6662/97 | E471982<br>N869858 | E471994<br>N869668 | TW |

| Lenawa | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | |
| | | | | | | | **E** | **N** | **E** | **N** |
| | **New Farmer** | | | | | | | | | |
| 1 | M.G. Chinthaka Watekumara | 852870800V | 26, Govigammanaya, Lenawa, Kimbissa | 0708823284 | 1 | E/448/U/179 | 470443 | 873886 | | |
| 2 | M.A. Darmadasa | 450333352V | 25, Govigammanaya, Lenawa, Kimbissa | 0723411391 | 1 | PAT | 470410 | 873890 | | |
| 3 | L.A. Nishantha | 741733285V | 27, Govigammanaya, Lenawa, Kimbissa | 0711633812 | 1 | PAT | 470364 | 873996 | | |
| 4 | A.G. Gamini Sarath Kumara | 772650019V | 27, Govigammanaya, Lenawa, Kimbissa | 0713063261 | 1 | PAT | 470327 | 873880 | | |
| 5 | H.M. Pathmaselae | 198161900320 | 29, Govigammanaya, Lenawa, Kimbissa | 0716558197 | 1 | PAT | 470306 | 873807 | | |
| 6 | H.M. Thissa Priyantha Bandara | 772844220V | 31, Govigammanaya, Lenawa, Kimbissa | 0723356724 | 1 | PAT | 470201 | 873792 | | |
| 7 | R.M. Subarathne Banda | 562213619V | 60, Govigammanaya, Lenawa, Kimbissa | 0774140638 | 1 | PAT | 470178 | 833701 | 470186 | 873684/TW |
| 8 | P.G. Wimala Kumara | 676771901V | 65, Govigammanaya, Lenawa, Kimbissa | 0774993620 | 1 | PAT | 470155 | 873757 | | |
| 9 | H.M. Aberathne Bandara | 197929501392 | 33, Govigammanaya, Lenawa, Kimbissa | 0719696181 | 1 | PAT | 470080 | 873831 | | |
| 10 | M.C. Siriwardane | 196910304763 | 21, Govigammanaya, Lenawa, Kimbissa | 0788830876 | 1 | PAT | 469998 | 873863 | | |
| 11 | M.M.I.G. Karuna Jayathilake | 683403962V | 34, Govigammanaya, Lenawa, Kimbissa | 0787310444 | 1 | PAT | 470000 | 873798 | | |
| 12 | E.G. Sisira Ariyathissa | 601592509V | 41, Govigammanaya, Lenawa, Kimbissa | 0717035341 | 1 | PAT | 469917 | 873690 | 469920 | 873595/CW |
| 13 | H.M.T.G. Niluka Pathmini Herath | 198479300195 | 56, Govigammanaya, Lenawa, Kimbissa | 0761789837 | 1 | PAT | 469944 | 873577 | 469951 | 873572/CW |
| 14 | H.M.G. Sunil Herath | 772142609V | 40, Govigammanaya, Lenawa, Kimbissa | 0779425975 | 1 | PAT | 469829 | 873629 | 469847 | 873596/CW |
| 15 | M.G. Dammika KumarI | 86943051V | 130, Lenawa, Kimbissa | 0713280600 | 1 | PAT | 470237 | 873586 | | |
| 16 | H.M.E.G.N.M. Kumari Herath | 808583755V | 130, Chanda, Lenawa, Kimbissa | 0717264077 | 1 | | 470158 | 873583 | | |
| 17 | M. Anula Amarasekara | 197559703092 | Govigammanaya, Lenawa, Kimbissa | | 1 | | | | | |
| 18 | D.M.D.K. Dewanayake | 7466104910V | 36, Govigammanaya, Lenawa, Kimbissa | 0711537197 | 1 | E448/LL/102/147 | 470106 | 873587 | | |
| 19 | A.G.N.H. Sumathipala | 726392684V | 47, Govigammanaya, Lenawa, Kimbissa | 0714547145 | 1 | E448/LL/100520 | | | | |

| Lenawa | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | |
| | | | | | | | **E** | **N** | **E** | **N** |
| 20 | K.H.M. Jayathilake Banda | 593255190V | 155/4, Lenawa, Kimbissa | 0754396690 | 1 | E448/LL/100528 | 430296 | 873587 | 470307 | 873624/CW |
| 21 | H.M.P.G. Sunil Bandara Herath | 740842862V | 95/3, Kibukkadawela, Kimbissa | 0717162496 | 1 | PAT | 470339 | 873572 | | |
| 22 | H.M.U.B. Lenawa | 732561145V | Ginera, Lenawa, Kimbissa | 0711096102 | 1 | L 52/59 | 470598 | 873735 | | |
| 23 | H.M.W.G. Jayalika Banda | 622523965V | 17/1, Kubukkawela, Lenawa, Kimbissa | 0756005299 | 1 | | 470577 | 873759 | | |
| 24 | H.M.I.G. Jayasinghe Banda | 61021384V | 155/2, Lenawa, Kimbissa | 0771443589 | 1 | CP/DG/4915/LPC/D/16/26 | 470495 | 873594 | | |
| 25 | H.M.P.G. Anura Bandara Herath | 701701178V | Kubukkawela, Lenawa, Kimbissa | 0721127395 | 1 | | 470304 | 873946 | | |
| 26 | H.M.H. Jayantha Herath | 720993996V | 15, Govigammanaya, Lenawa, Kimbissa | 0702860250 | 1 | PAT | 470298 | 874003 | | |
| 27 | H.G.H.M. Dasanayake | 620680290V | 11, Govigammanaya, Lenawa, Kimbissa | 0767678802 | 1 | PAT | 470323 | 874104 | | |
| 28 | M.G. Nimal Herath | 762794012V | 13, Govigammanaya, Lenawa, Kimbissa | 0772814567 | 1 | E/448/LL/178 | 470398 | 874043 | | |
| 29 | N.G. Nihal Siriwardane | 197331700131 | 42, Govigammanaya, Lenawa, Kimbissa | 0714005657 | 1 | E/448/LL/100509 | 470375 | 874080 | | |
| 30 | A.G. Darmadasa | 653183399V | 46, Govigammanaya, Lenawa, Kimbissa | 0771810834 | 1 | PAT | 470473 | 874098 | 470482 | 874108/TW |
| 31 | H.M.I.G. Samantha | 812444808V | 5, Govigammanaya, Lenawa, Kimbissa | 0789500979 | 1 | E/448/LL/172 | 470249 | 874086 | 470252 | 874096/TW |
| 32 | A.A. Pemaseele | 625270278V | 7, Govigammanaya, Lenawa, Kimbissa | 0774726341 | 1 | PAT | 470298 | 874205 | | |
| 33 | D.M.Tilaka Disanayake | 726720428V | Kubukkadawela, Lenawa, Kimbissa | 0721127285 | 1 | | 470287 | 874291 | | |
| 34 | H.M.I.G. Rathnayake Herath | 721521699V | 19, Govigammanaya, Lenawa, Kimbissa | 0714229572 | 1 | | | | | |
| 35 | A.G. Siril Rajapakse | 853002917V | Govigammanaya, Lenawa, Kimbissa | 0723643903 | 1 | PAT | 470416 | 874206 | | |
| 36 | W.M.W.G.P.B. Wanasekara | 740134035V | 33, Kumbukkawela, Kimbissa | 0775174925 | 1 | E/448/LL/100508 | 470221 | 874060 | | |
| 37 | A.D. Lalith Kumara | 760023891V | 17, Govigammanaya, Lenawa, Kimbissa | 0716128501 | 1 | E448/LL/175 | 470063 | 874058 | | |
| 38 | H.M.P.G. Hesantha Banda Herath | 663641743V | 4, Govigammanaya, Lenawa, Kimbissa | 0775022843 | 1 | E448/LL/174 | 470064 | 874066 | | |
| 39 | Kasun Julajaya Sanarathunga | 973161903V | 3, Govigammanaya, Lenawa, Kimbissa | 0716715376 | 1 | E448/LL/173 | 470045 | 874144 | 470048 | 874136/CW |
| 40 | K. Gayani Sudarsa Laxsekara | 887694150V | 18, Govigammanaya, Lenawa, Kimbissa | 0701020604 | 1 | | 470015 | 874014 | | |
| 41 | H.M.I.G. Samarasinghe Banda | 622893908V | 23, Govigammanaya, Lenawa, Kimbissa | 0715204369 | 1 | PAT | 470054 | 873957 | | |
| 42 | J.G. Indika Pushpakumara | 820674022V | 20, Govigammanaya, Lenawa, Kimbissa | 0788827901 | 1 | PAT | 470008 | 873915 | | |
| 43 | H.M.V.K.K herath | 197252202696 | 22, Kumbukkawela, Kimbissa | 0712057168 | 1 | L42/03 | | | | |
| 44 | H.M.P.G.W. Kumara Herath | 822011560V | 171, Kumbukkawela, Kimbissa | 0775852892 | 4 | PAT | | | | |
| 45 | H.M.I.G. Manel Bandara | 710420742V | 99, Kumbukkawela, Kimbissa | 0770248287 | 1 | M/P 5054 | | | | |
| 46 | H.M.N. Gamini Ekanayaka | 741713993V | 124/3, Kumbukkawela, Kimbissa | 0767364608 | 1 | PAT | | | | |

| Pahala Eraula | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| | **New farmers** | | | | | | | | | | |
| 1 | W.A.M.H. Abeysekara | 581240961V | 76/1, Pahala Eraula, Dambulla | 715473212 | 1 | MA/P/5064/425 | | | | | |
| 2 | H.U.W. Abeysekara | 197429902730 | Wasana, Pahala Eraula, Dambulla | 718387183 | 1 | MA/P/4104/96 | 466684 | 867961 | | | |
| 3 | M.A. Senarath Bandara | 782892207V | 64/C/1, Pahala Eraula, Dambulla | 717361935 | 1 | PAT | | | | | |

| Pahala Eraula | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| 4 | W.A.M.H Anura Abeysekara | 196116004866 | Pahala Eraula, Dambulla | 711660714 | 1 | LDOD 126/21 | | | | | |
| 5 | A.K.K.M.R.B. Somathilaka | 761160524V | 58/B/1, Pahala Eraula, Dambulla | 716459440 | 1 | DB/PE/2012/21 | | | | | |
| 6 | E.M.E. Sampath Bandara | 802844921V | Pahala Eraula, Dambulla | 777198767 | 1 | | | | | | |
| 7 | P.A.G. Sumawathi | | 54, Pahala Eraula, Dambulla | 715797133 | 3 | PAT | 466901 | 868267 | 466840 | 867967 | PW |
| 8 | W.G. Jinadasa | 692411463V | Pahala Eraula, Dambulla | 717597634 | 1 | E446/LL/102323 | 467030 | 868167 | 467082 | 868194 | CW |
| 9 | A.G.P. Sudarshani | 886622864V | 76, Pahala Eraula, Dambulla | 716973313 | 1 | CP/DA4417 | 467796 | 867692 | 467829 | 867724 | CW |

| Welangolla | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| | **Farmers' list of Agrarian Services Centre (Govijanasewa Office)** | | | | | | | | | | |
| 1 | W.M. Sampath Nishantha | 810334100V | 178/1, Welangolla, Wewalawewa | 0718887071 | 1 | PAT | | | | | |
| 2 | H.D.D. Udayananda | 671334167V | Welangolla, Wewalawewa | 0758001579 | 1 | CP/DA/4852 | 473868 | 867405 | 473872 | 867415 | CW |
| 3 | I.G.L. Sampath Dharmadasa | 801341551V | 223/1, Welangolla, Wewalawewa | 0712058808 | 1 | DA/W/2019/11 | 473535 | 869771 | 473997 | 869602 | TW |
| 4 | M.D.G. Somarathna | 610017240V | 175, Welangolla, Wewalawewa | 0758618724 | 1 | PAT | 473605 | 868603 | 473651 | 868561 | CW |
| 5 | W.D. kamani Manel | 197576700615 | 181/2, Welangolla, Wewalawewa | 0719656652 | 1 | DA/W/2019/22 | | | | | TW |
| 6 | W.G. Mahinda Rathna | 651837049V | 257, Welangolla, Wewalawewa | 0765324277 | 1 | GR/5/042997 | 473397 | 869283 | 473406 | 869289 | TW |
| 7 | A.A.N. Premakumari | 756174576V | 182, Kudagona Wewa, Wewalawewa | 0716049260 | 1 | PAT | 474535 | 868745 | 474539 | 868753 | CW |
| 8 | T.G.K.S. Santha Thikarathna | 946002720V | 182, Kudagona Wewa, Wewalawewa | 0711154026 | 1 | PAT | | | | | |
| 9 | H.D. Prasad Buddhika | 199029100751 | 176/7, Kudagona Wewa, Wewalawewa | 0784811856 | 1 | DA/W/2019/28 | 474745 | 868547 | 474766 | 868535 | CW |
| 10 | H.D. Gunasinghe | 571064502V | 176/7, Kudagona Wewa, Wewalawewa | 0712629833 | 1 | PAT | 474687 | 868456 | 474686 | 868479 | CW |
| 11 | A.A. Somasiri | 610073549V | 236/9, Kudagona Wewa, Wewalawewa | 07620489767 | 1 | PAT | 474201 | 868266 | 474211 | 868271 | TW |
| 12 | E.G. Chandra Gunawardana | 196473701256 | 284, Kudagona Wewa, Wewalawewa | 07126576108 | 1 | E446D/101411 | | | | | |
| | **New farmers** | | | | | | | | | | |
| 13 | A.A. Santha Senarathna | 830503579V | 176/1, Kudagona Wewa, Wewalawewa | 0719754123 | 2 | E447D/101429 | 474117 | 868222 | 474121 | 868227 | TW |
| 14 | D.G.L. Saman Kumara | 875253719V | 193/1, Welangolla, Wewalawewa | 0773462296 | 1 | GR/5/041440 | | | | | TW |
| 15 | D.P.C.M. Dasnayaka | 1999334201350 | 165, Welangolla, Wewalawewa | 0771376932 | 1 | PAT | | | | | |
| 16 | G.G. Weerasinghe | 663394193V | 260, Welangolla, Wewalawewa | 0740392599 | 1 | E446/LL118 | | | | | |
| 17 | I.G. Dharmadasa | 491763855V | 223, Welangolla, Wewalawewa | 0717495014 | 1 | PAT | | | | | TW |
| 18 | I.G.D. Jayawickrama | 895572217V | 291/1, Welangolla, Wewalawewa | 0768740036 | 1 | PAT | | | | | CW |
| 19 | R.M. Abesinghe | 702413036V | 224, Welangolla, Wewalawewa | 0766523104 | 1 | PAT | 473769 | 869797 | 473698 | 869816 | TW |
| 20 | M.D.G.S.M. Pushpakumara | 1999225000274 | 175/2, Welangolla, Wewalawewa | 0774428273 | 2 | PAT | | | | | |
| 21 | L.G. Dayananda Jayasena | 731220077V | 126/3, Welangolla, Wewalawewa | 0755997778 | 1 | GR/5/042972 | 473533 | 869442 | 473542 | 869447 | TW |
| 22 | E.K.G.S. Pushpakumara | 770693250V | 190/1, Welangolla, Wewalawewa | 0712167911 | 1 | GR/5/035393 | 473377 | 869619 | 473370 | 869613 | TW |
| 23 | H.M. Kiribanda | 711752498V | 213, Welangolla, Wewalawewa | 0785353140 | 3 | DA/W/2019/65 | 473834 | 867322 | 473839 | 867328 | CW |
| 24 | V. Gunathilaka | 540910103V | Welangolla, Wewalawewa | 0767848919 | 1 | CP/DA/4596 | | | | | TW |

| Welangolla | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| 25 | U.G.P. Ruwan Kumara | 801115926V | 6/2, Welangolla, Wewalawewa | 0774856117 | 1 | PAT | 473736 | 870969 | 473769 | 870060 | TW |
| 26 | U.G. Nihal Indika | 871952787V | 6, Welangolla, Wewalawewa | 0778861110 | 1 | PAT | 474020 | 870203 | 474047 | 870289 | TW |
| 27 | W.G. Janaka Priyanandana | 830534091V | Welangolla, Wewalawewa | 0714626380 | 1 | PAT | 473996 | 870161 | 474047 | 870299 | TW |

| Wewalawewa | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **№** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| | **Farmers' list of Matale Project Office** | | | | | | | | | | |
| 1 | M.L.M. Nadeer | 731044520V | 67, Wewalawewa, Dambulla | 0776249544 | 3 | E 447A/LL1024B | 477066 | 869396 | 477057 | 869383 | CW |
| 2 | D.M.G.R.M Keerthisinghe | 880742809V | 49, Wewalawewa, Dambulla | 0763186963 | 1 | PAT | 474162 | 871722 | 474013 | 871729 | CW |
| 3 | D.M.G.S Kumara Keerthisinghe | 19822783007 | 49, Wewalawewa, Dambulla | 0750409210 | 1 | PAT | 477097 | 871733 | 477013 | 871729 | CW |
| 4 | A.M. Ekanayake Manike | 717670531V | 53, Wewalawewa, Dambulla | 0717031618 | 1 | E 447A/LL/102453 | | | | | |
| 5 | W.M. Herath Banda | 631322239V | Wewalawewa, Dambulla | 0776273063 | 1 | PAT | | | | | |
| | **Farmers' list of Agrarian Services Centre (Govijanasewa Office)** | | | | | | | | | | |
| 6 | K.D.G. Ravindra Gunarathne | 780371749V | 68, Wewalawewa, Dambulla | 0774769775 | 1 | GR/5/016971 | | | | | |
| 7 | D.G. Ashoka Karunathilake | 700062570V | 88, Wewalawewa, Dambulla | 0775847061 | 1 | PAT | 474301 | 871313 | 474315 | 871298 | TW |
| 8 | P.G. Nadeeka Sanjeewani | 886713665V | 161/14, Wewalawewa, Dambulla | 0773428401 | 1 | PAT | | | | | |
| 9 | J.A. Nayani Thakshila | 886033001V | Alakalawa Rd, Dambulla | 0772484303 | 1 | | | | | | |
| 10 | P.G. Achini Priyadarshani | 917194262V | Alakalawa Rd, Wewalawewa, Dambulla | 0762359520 | 1 | PAT | 474875 | 872722 | 474922 | 872558 | TW |
| 11 | R.M. Swarnalatha | 715432927V | 99, Wewalawewa, Dambulla | 078353383 | 1 | PAT | | | | | |
| 12 | W.G. Priyani Herath Manike | 19708630150V | 89, Wewalawewa, Dambulla | 0770653231 | 1 | PAT | | | | | |
| 13 | A.G. Inoka Sudarshani Aberathne | 198454310023 | 76, Wewalawewa, Dambulla | 0770487032 | 1 | | | | | | |
| 14 | K.G. Ariyawathi | 19536380340 | 81, Wewalawewa, Dambulla | 0768394205 | 1 | PAT | | | | | |
| 15 | M.G.S. Disna Kumari | 957470351V | 161/08/01, Wewalawewa, Dambulla | 0779643506 | 1 | A 447A LL-281 | | | | | |
| 16 | R.M.K.S. Rathnayake | 893061460V | 160, Wewalawewa, Dambulla | 0712599278 | 1 | CP/DA/5129 | | | | | |
| | **New farmers** | | | | | | | | | | |
| 17 | J.T.C.M. Premawardane | 876751275V | 61, Wewalawewa, Dambulla | 0710342500 | 1 | PAT | | | | | |
| 18 | M.G. Sanjeewa Ruwan | 852766042V | 268/1, Aberathne stores, Wewalawewa, Dambulla | 0776924398 | 1 | E 447/A/101588 | | | | | |
| 19 | A.M. Piyasena | 197228210021 | 427, Wewalawewa, Dambulla | 0767025539 | 1 | PAT | 426998 | 872391 | 477041 | 872373 | CW |
| 20 | M.M. Mahinda Munasinghe | 720951797V | 26, Wewalawewa, Dambulla | 0765548035 | 1 | PAT | | | | | |

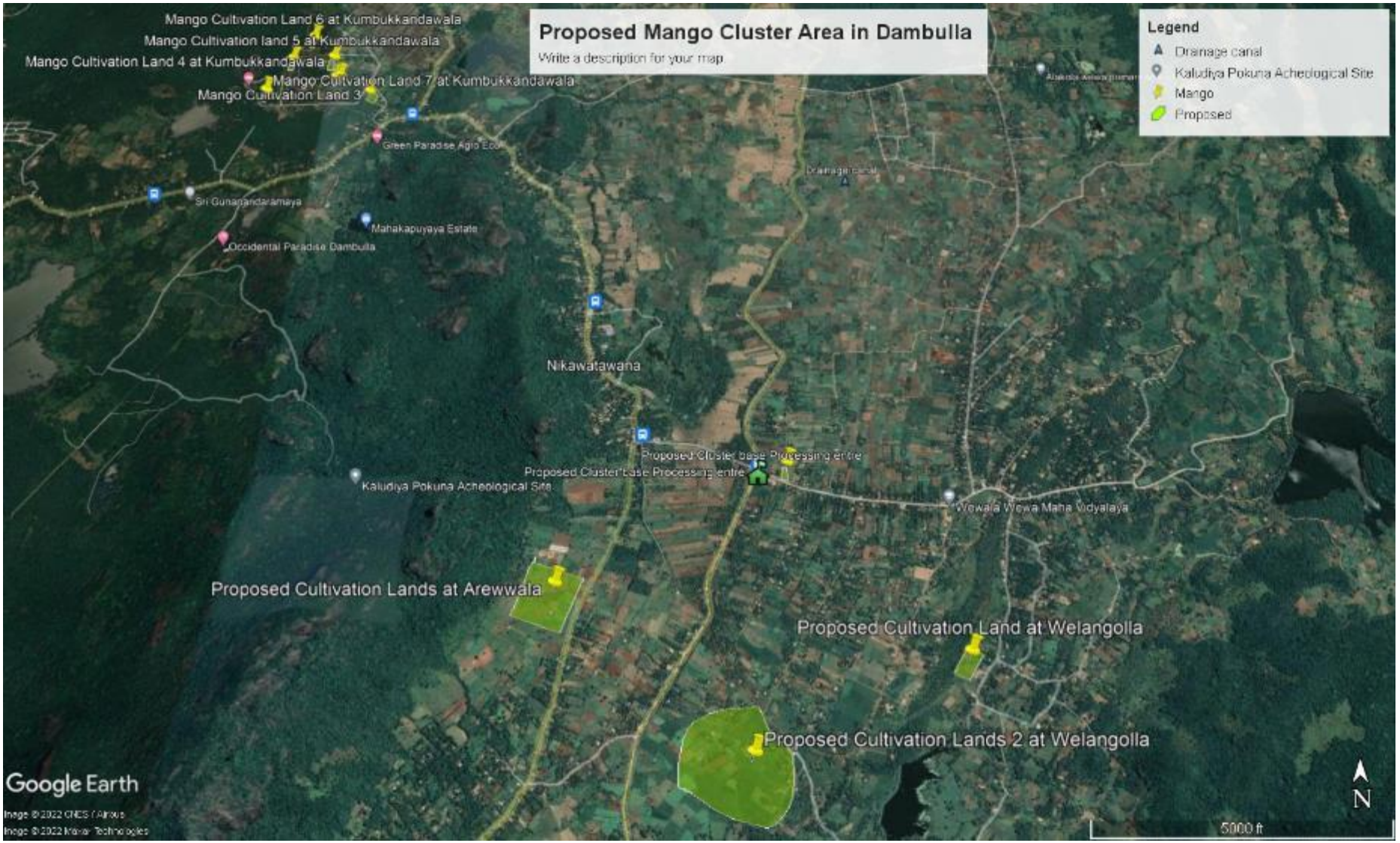
| Wewalawewa | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **№** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| 21 | W.G.N.R.P. Kumarasiri | 197902301538 | 103, Wewalawewa, Dambulla | 0770637414 | 1 | MA/P/7579 | 475488 | 472196 | 475504 | 472156 | TW |
| 22 | S.S. Nandasena | 590124770V | 20, Wewalawewa, Dambulla | 0756966889 | 1 | PAT | 476954 | 872399 | 474962 | 871401 | CW |
| 23 | R.M.P Krishanthi Kumari | 816512450V | 281/1, Wewalawewa, Dambulla | 0703066985 | 1 | PAT | | | | | |
| 24 | R.M.R.G. Wijesiri Rathnayake | 611890702V | 160, Wewalawewa, Dambulla | 0775383095 | 1 | PAT | | | | | |
| 25 | W.A.A. Sandamali Thilakarathne | 827183393V | 322/3, Wewalawewa, Dambulla | 0764803356 | 1 | PAT | | | | | |
| 26 | W.G. Karunawathi | 528390218V | 94, Wewalawewa, Dambulla | 0786505998 | 1 | PAT | | | | | |
| 27 | A.G. Herath Dissanayake | 770083079V | 112, Wewalawewa, Dambulla | 0719712705 | 1 | PAT | | | | | |
| 28 | G.G. Priyantha Kumarasiri | 643611228V | 97, Wewalawewa, Dambulla | 0771434118 | 1 | E 447A/LL 331 | 475283 | 872022 | 475286 | 872008 | TW |
| 29 | A.G. Jayathilake Banda | 610705790V | 28, Wewalawewa, Dambulla | 0778825720 | 1 | PAT | | | | | |
| 30 | M.G.P.N. Sumanasiri | 892851883V | 102, Wewalawewa, Dambulla | 0775330861 | 1 | CD/DA/5127 | 475189 | 871908 | 475182 | 871913 | TW |
| 31 | A.G. Nirosha Sanjeewani | 916004915V | 60, Wewalawewa, Dambulla | 0763066148 | 1 | | | | | | |
| 32 | M.A. Dinusha Sandamali | 858074398V | 293, Wewalawewa, Dambulla | 0702334065 | 1 | | | | | | |
| 33 | H.A. Gunathilake Banda | 763463150V | 318, Wewalawewa, Dambulla | 0778477950 3 | 1 | CP/DA/4255 | | | | | |
| 34 | D.G.S.S. Dissanayake | 805963050V | 109, Wewalawewa, Dambulla | 0773462580 | 1 | PAT | | | | | |
| 35 | H.M. Hemalatha | 597934904V | 46, Wewalawewa, Dambulla | 0776761249 | 1 | PAT | | | | | |
| 36 | W.G. Priyanthi Kumari Subasinghe | 198486100283 | 77, Wewalawewa, Dambulla | 0772812419 | 1 | | | | | | |
| 37 | H.M. Lalitha Priyathi | 197180603388 | 125/2, Alakalawa Rd, Dambulla | 0719852138 | 1 | PAT | 474758 | 872071 | 474831 | 872000 | TW |
| 38 | K.P. Sumith Samanjeewa | 740952293V | 66, Alakolawewa, Wewalawewa, Dambulla | 0703066637 | 1 | PAT | | | | | |
| 39 | M.D.M. Sadun Kumara Dissanayake | 822941117V | Alakolawewa Rd, Dambulla | 0704546042 | 1 | PAT | | | | | |
| 40 | P.G.H. Sandamalee Bandara | 917282234V | 146/2, Wewalawewa, Dambulla | 0783862262 | 1 | PAT | | | | | |
| 41 | L.G Jayanthi Mala | 686922359V | 162, Wewalawewa, Dambulla | 0772460293 | 1 | E447A/LL/383 | 474354 | 870049 | 474350 | 870027 | TW |
| 42 | K.M Samarakoon | 195229402758 | Main Road, Wewalawewa, Dambulla | 0716211040 | 1 | CP/DA/1538 | | | | | |
| 43 | O.W. Athula Kumara | 850724180V | 15, Wewalawewa, Dambulla | 0704546513 | 1 | PAT | | | | | |
| 44 | K.D.G.C.K. Gunarathne | 822841619V | 8, Wewalawewa, Dambulla | 0768022821 | 1 | E447A/101648 | | | | | |
| 45 | K.G. Chaminda Sunil Bandara | 821064864V | 77, Wewalawewa, Dambulla | 0775450326 | 1 | PAT | 474381 | 871196 | 474626 | 871096 | TW |
| 46 | D.G. Sumith Bandara Dissnayake | 83301179V | 109, Wewalawewa, Dambulla | 0713566302 | 1 | PAT | 475445 | 872782 | 475434 | 872807 | TW |
| 47 | D.M. Sugath Bandara | 753183388V | 41, Wewalawewa, Dambulla | 0764783369 | 1 | PAT | 477166 | 869850 | 477095 | 869893 | CW |
| 48 | P.G. Latha Podimanike | 196773901006 | 146/2, Welangolla, Wewalawewa | 0773665374 | 1 | PAT | | | | | |
| 49 | H.M.C.S. Aberathne | 823491166V | Workshop Rd, Wewalawewa, Dambulla | 0778422582 | 1 | DA/WA/2014/04 | 475941 | 870065 | 475926 | 870096 | CW |

| Wewalawewa | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **№** | **Name head of household** | **NIC** | **Address** | **Telephone** | **Acres** | **Details of the land** | **GPS location land** | | **GPS location water source** | | |
| | | | | | | | **E** | **N** | **E** | **N** | |
| 50 | K.Ajith Samarasinghe | 197123404202 | 109, Wewalawewa, Dambulla | 0774651398 | 1 | PAT | 474971 | 873015 | 474980 | 873043 | TW |
| 51 | H.G. Siril | 623441016V | 63, Wewalawewa, Dambulla | 0768841060 | 1 | | 474317 | 871179 | 474326 | 871147 | TW |
| 52 | R.M.V Rathnayake | | 88, Wewalawewa, Dambulla | 077583095 | 1 | | | | | | |
| 53 | W.M. Bandaramenike | 458230153V | Diwlapitiyaya, Wewalawewa, Dambulla | 0717597166 | 1 | DA/WE/2014-1 | 476799 | 874653 | 476817 | 874668 | CANAL |
| 54 | A.G.S. Pathma | 825383883V | 116, Wewalawewa, Dambulla | 0768367253 | 1 | PAT | 474468 | 871396 | 474472 | 871386 | TW |
| 55 | A.G. Ranjith | 753493697V | 97, Wewalawewa, Dambulla | 0771752622 | 1 | PAT | 474177 | 873318 | 474179 | 873303 | TW |
| 56 | H.M.V. Buddhika | 811971731V | Wewalawewa, Dambulla | 076921323 | 1 | PAT | 476124 | 870159 | 476113 | 870118 | TW |
| 57 | R.M. Priyantha | 691591913V | Wewalawewa, Dambulla | 0773329894 | 4 | CP/DA/5473 | 476015 | 870117 | 476042 | 870112 | TW |
| 58 | R.G. Sani | 196606701250 | Wewalawewa, Dambulla | 0756934609 | 1 | E447/A101729 | 477125 | 869026 | 477129 | 869061 | CW |
| 59 | J.M. Dasanayaka | 713651443V | 70, Wewalawewa, Dambulla | 0778472463 | 1 | PAT | 475449 | 872621 | 475508 | 872647 | TW |
| 60 | W.G. Premawathi | 306890936V | 40, Wewalawewa, Dambulla | 0775452967 | 1 | PAT | | | | | CW |
| 61 | M. Pradeep | 840570576V | 107, Wewalawewa, Dambulla | 0754718609 | 1 | PAT | 474472 | 870793 | 474416 | 870795 | TW |
| 62 | J.M.M. Dasanayaka | 965232133V | 129/5, Wewalawewa, Dambulla | 0769785162 | 1 | PAT | 474179 | 871727 | 474194 | 871750 | TW |
| 63 | E.A.N. Edirislnghe | 867383182V | 260/1, Alakolawewa, Dambulla | 0741472498 | 1 | E447A/101608 | 474426 | 871560 | 474486 | 871546 | TW |
| 64 | W.G Jayathilaka | 732940910V | 76, Wewalawewa, Dambulla | 0773035925 | 1 | | 474207 | 871343 | 474220 | 871412 | TW |
| 65 | B.K.G. Chandani | 675334277V | 268, Wewalawewa, Dambulla | 0714859533 | 1 | | 474557 | 871546 | 474486 | 871546 | TW |
| 66 | E.A. Edirisinghe | 926025201V | 392, Wewalawewa, Dambulla | 0769399386 | 1 | | 474495 | 871499 | 474506 | 871502 | TW |

## Annex 3: Institutional roles in Dambulla Mango Cluster

| Agency/committee | Officers responsible | Official functions assigned | Expected role in cluster development programme |
|---|---|---|---|
| Department of Agriculture (Provincial) | Assistant Director (Ext) Dambulla | Provide extension support through field staff and maintain data system | Coordinate all the extension activities on new technology and crop management |
| | 2 Agriculture instructors (Dambulla and KImbissa) | Carry out extension field programmes with Agrarian Research and Productivity Assistants | Implement extension activities on new agricultural technology and crop management |
| Agrarian Development Department | 2 Agrarian development officers for Dambulla and Kimbissa | Administering of Agrarian Research and Productivity Assistants attached to Agrarian Service centre. Agric. Input supplies, manage Paddy land Act and FPO registration under 56A and 56B | Coordinate activities related to input supplies and make the relevant agrarian research and productivity assistants' involvement more active in the programme |
| | Agrarian research and productivity assistants (ARPA). Of the 34 ARPA, 8 are in the cluster area | Assist the Agrarian Development Officer and Agriculture instructors to implement field programmes. Maintain data and information on agriculture and communicate with farmer organisation and farmers on issues | Communicate with farmers' organisations' members including mango farmers and keep records of updates on each. Organise farmer meetings when requested by the agriculture instructors, agriculture development officer or senior officers |
| Divisional Secretariat Dambulla | Divisional secretary/asst. divisional secretary Dambulla | Administrative head of the Secretariat area and Chairman of the Divisional Agriculture Committee holding monthly meetings which all the Divisional Heads, FPO leaders are participating | Extend cooperation to get the involvement of Grama Niladaris, development officers and Samurdhi Niladari in the cluster area. Assist to settle land ownership issues and disputes of mango farmers |
| | Grama Niladari (village officer) | Deal with key functions such as poverty alleviation, conflict resolution at village level and maintain population data of people in his area | Extend village level cooperation to mobilise mango farmers and assist farmers to select their Representatives with good personnel qualities |
| | Land Officer | Land management under Land Development Ordinance in the area | Assistance to settle land tenure issues and encroachments. Proper information on legal land ownership and nominated successors |
| Divisional Agriculture Committee | Members of Divisional Agriculture Committee (DS, AD-Agriculture, Agrarian Development Officer, Land Officer, GNs, Provincial Irrigation Engineer, farmer representatives and other) | Taking up for discussion of all issues related to agriculture, input supplies, seasonal cultivation decisions, pest and diseases and marketing of agriculture produce. Find alternative solutions and assign the responsibilities for remedial actions | Take this forum to discuss the issues related to mango cultivation and get the active involvement of relevant line agency officers |
| Field Crop Research and Development Institute (Maha Illuppallama) | Entomologist, Pathologist and Irrigation Agronomist | Carry out research activities on pest and diseases, new Irrigation systems and cropping systems related to field crops | Provide required research information on mango cultivation and assistance to overcome agronomic issues |

## Annex 4: Project area map



## Annex 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 the quality of organic fertilisers could be considered as one of the most limiting resources in crop production. In this respect compost plays an important role to mitigate and solve the problem of inadequacy of suitable organic fertilisers in crop production.

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

### 2. Integrated plant nutrition system

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

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

Farmers in Sri Lanka are used to apply only chemical fertiliser for their cultivations which has been a contributory factor towards gradual decline of fertility in soil. This situation is adversely affecting crop production in all clusters. Hence, the utilisation of organic fertiliser in addition to the chemical fertiliser is essential for successful crop production in clusters. In this regard, it is necessary to increase the overall organic fertiliser production in all clusters as well as in throughout the country. The objective of this modernisation investment and activity is to encourage farmers to produce total requirement of compost

within the cluster areas because transport of compost from long distance is not economical. Therefore, it is expected to encourage some producers to make large-scale productions on commercial basis.

## 3. Objectives of the compost production programme

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

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

## 4. Site selection

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

## 5. Steps of compost production process

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

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

## 6. Buildings, tools and equipment required for compost production unit (100 t/month)

| No. | Item | Number |
|---|---|---|
| 1. | Shovel | 5 |
| 2. | Pitch fork | 5 |
| 3. | Wheel barrow | 5 |
| 4. | 2-wheel tractor | 1 |
| 5. | Boots | 10 pairs |
| 6. | Water pump 1” | 1 |
| 7. | 1” hose pipes | 200m |
| 8. | Chipper/ Shredder | 1 |
| 9. | Black polythene (gauge 750, 3ft width and double) | 500kg |
| 10. | Compost turner | 1 |
| 11. | Rotary sieve | 1 |
| 12. | Weighing machine up to 100 kg | 1 |
| 13. | Manual bag closer/ stitcher machine | 2 |
| 14. | Small truck (Optional) | 1 |
| 15. | Printed bags 25 kg and 50 kg | 10,000 each |
| 16. | Compost Aerator (optional) | 1 |
| 17. | Compost thermometer (0ptional) | 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 | |

## 7. Heap method of compost production

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

The aerobic composting process starts with the formation of the pile. First, mesophilic organisms multiply rapidly with the temperature of 20 – 45 deg 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 deg C or more continue the process, raising the temperature up to 650C or higher. In many cases, the temperature goes up to 70 – 80 deg 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 a 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 three to four layers of raw materials normally apply sufficient water and compost activator/inoculant. After formation, the pile is covered with black polythene to retain heat and moisture but leave a sufficient space at the bottom for ventilation. The active composting stage is followed by turning stage, and the pile temperature decreases gradually with the time. Therefore, turning/mixing should be done every 3–4 weeks interval to activate the decomposition of raw materials. However, maximum three turning/mixing steps are recommended during the whole period of the composting process due to high labour involvement for this process. At each turning, the material is mixed thoroughly and moistened with water and apply compost activator/inoculant such as Trichoderma fungus. In general, the C/N ratio should be maintained with carbonaceous and nitrogenous materials for successful decomposition. Under such conditions, compost can be typically produced within 8–12 weeks depend on raw materials used. In reasonably mature compost contains a wide range of particle sizes from fine grains to partly decomposed twigs and un-compostable fragments from refuse. Therefore, compost may need sieving by 4 mm sieve before sending to the market. Mature compost should have a crumbly texture, an earthy smell and be dark brown or black in colour.

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

## 8. Management of compost production unit

- Approvals

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

- Management

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

- 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.

- Record keeping

The person or FPO will be responsible to establish and maintain an operating record for the compost facility. Records are needed in relation to: waste acceptance and disposal, validation and on-going

assessment of process monitoring and sample testing, traceability, environmental monitoring and dispatched material.

## 9. Marketing

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

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

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

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

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

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

## 10. Environmental impact

The unit will be established to minimise the environmental impact including measures to minimise odour, dust, leachate, etc. Breakdown of organic matter by aerobic oxidation produces no odours. It is important therefore, to supply sufficient air during the composting process. Another important aspect of some of the materials that can be used in composting is their attractiveness of flies. To avoid the problem, the suggestion is maintaining high temperature. Fly larvae are unlikely to survive if temperature is above 55 deg C. 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.

## Annex 6: World Bank interim guidelines on COVID-19



# 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.

## 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

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### 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