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Agriculture Modernization Project

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Ministry of Agriculture
கமத்தொழில் அமைச்சு

Environmental Screening Report

Strengthening Field Crops Research and Development Institute's (FCRDI) Activities- Improvement of Hybrid and Basic Seed Production in Mahailuppallama

Project Management Unit
Agriculture Sector Modernization Project
January 2022

Table of Contents

FIGURES

TABLES

ABBREVIATIONS

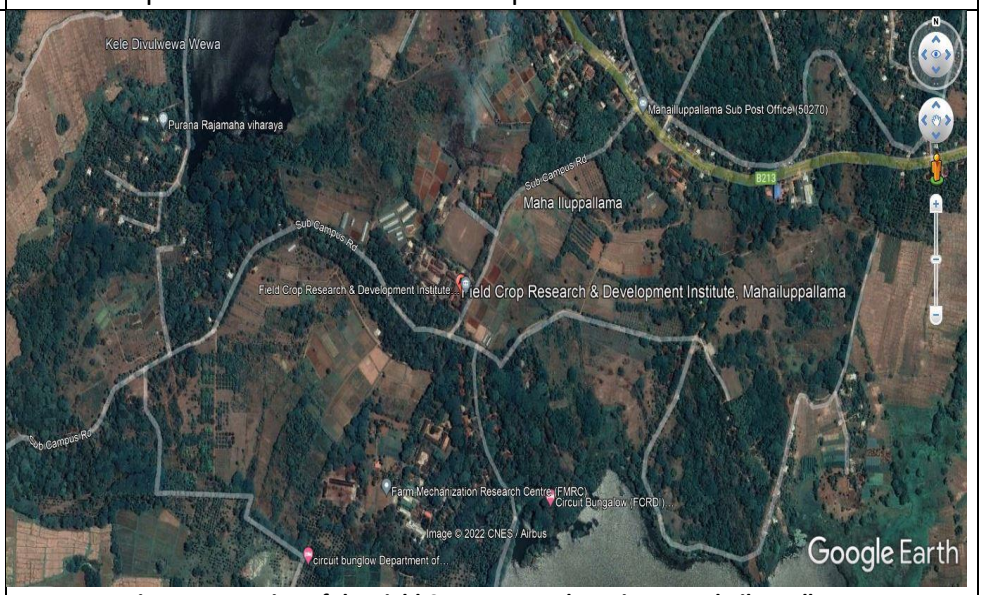
AI	Agriculture Instructor
ASMP	Agriculture Sector Modernization Project
ASC	Agrarian Service Center
ATDP	Agricultural Technology Demonstration Park
CBO	Community-Based Organization
DSD	Divisional Secretary Division
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ESR	Environmental Screening Report
FO	Farmers Organization
FPO	Farmers' Production Organization
GAP	Good Agricultural Practices
GND	Grama Niladhari Division
GoSL	Government of Sri Lanka
IDA	International Development Association
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LGA	Local Government Authority
MOA	Ministry of Agriculture
MOPI	Ministry of Primary Industries
NIRP	National Involuntary Resettlement Policy
NGO	Non-Governmental Organization
OP	Operational Policy
PAP	Project Affected Persons
PCR	Physical Cultural Resources
PMP	Pest Management Plan
PMU	Project Management Unit
SLRs	Sri Lanka Rupees

ENVIRONMENTAL SCREENING REPORT (ESR)

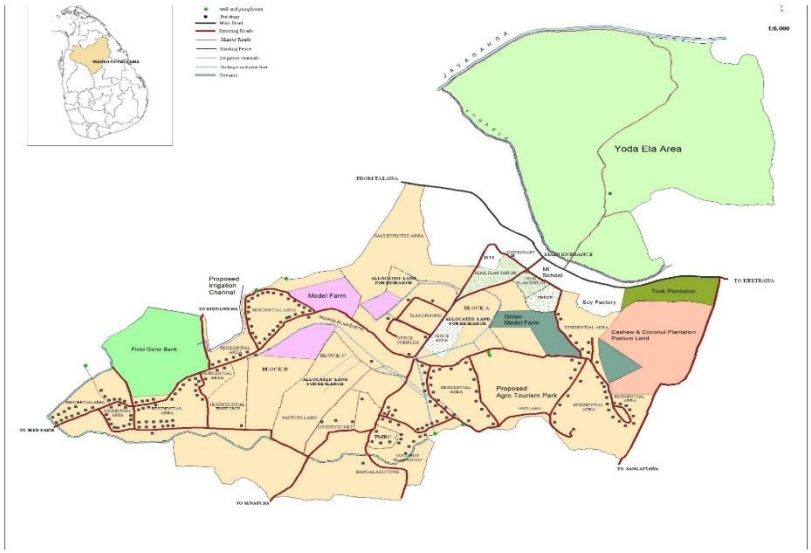
A. THE PROJECT IDENTIFICATION

Project Title	Strengthening Field Crops Research and Development Institute's (FCRDI) Activities- Improvement of Hybrid and Basic Seed Production in Mahailuppallama
Project Proponent	Agriculture Sector Modernization Project (ASMP)
Purpose and scope of ESR	The purpose of the ESR is to provide viable mitigation measures against all identified environmental impacts during the screening process of the subproject. This ESR includes the basic information of the subproject, justification of the subproject selection, anticipated impacts, and environmental condition of the subproject area, and stakeholder consultations and concerns on subproject identification, designing, and implementation, the implementation plan of the viable mitigation measures against the identified environmental impacts.

B. PROJECT LOCATION

Location	The subproject's activities will be mainly implemented in the land belongs to Field Crops Research and Development Institute (FCRDI)- Mahailuppallama. The institute is located at Mahailuppallama 35 km away from Anuradhapura city in Ipalogama DS division of Anuradhapura district in the North Central Province Under this subproject, Development of Hybrid and Basic Seed Production will be implemented. The location maps are annexed as Annex 1.1.
Location (Google Map) 1. Mahailuppallama $8^0$06'42.21" N $80^0$28'01.26" E	 **Figure 1: Location of the Field Crops Research Institute- Mahailuppallama**
Definition of Project Area *(The geographical extent of the*	The research history of Mahailluppallama dates back to the year 1903 in which field experiments were initiated aiming to identify suitable economic crops for dry zone rainfed conditions. Cotton, Sisal, Tobacco, and Groundnut were given more emphasis, however, remoteness and

project & areas affected during construction)	other difficulties led to the close down of the research station in 1919. Research Programs were then operated at Vavuniya and Anuradhapura (1926), Kurundakulama (1938), Relapanawa, Olukaranda and Makalanagama (1949). In 1950 a fully equipped research station was established at Mahailluppallama and many research findings have been reported since then. The station was renamed as Field Crops Research and Development Institute in 1994 and entrusted the responsibility of conducting research programs on field crops There are nine (9) main divisions and six (6) subdivisions come under FCRDI 1. Plant Breeding Divisions Chili Coarse grains Onion Soybean & Cowpea Mungbean & Blackgram Vegetables 2. Agronomy Division 3. Soil & Water Management Division 4. Soil Science Division 5. Biotechnology Division 6. Entomology Division 7. Plant Pathology Division 8. Weed Science Division 9. Horticulture Division.  **Figure 2: Field Crop Research and Development Institute- Mahailuppallama**
Adjacent land and features	The total land extent under FCRDI- Mahailuppalama is about 360ha (890 acres) and it includes research station buildings, staff quarters, and cultivation area. The area where FCRDI is located belongs to Ipologama DS division of the Anuradhapura district in North Central Province. The area belongs to the low country dry zone. This research station mainly aims at development of the field crops since the major portion of the field crop production is generated by the low country dry zone of Sri Lanka. The institute is aiming at developing new technology and facilitating the technology dissemination for enhancement of production and productivity in the field crop sector.

	Field crops include condiments (chili and onions), grain legumes (mungbean, cowpea, black gram, pigeon pea, and chickpea), oilseed crops (groundnut, soybean, sesame, and sunflower) and non-rice cereals (maize, sorghum, finger millet, and other millets). There are no privately owned lands adjacent to FCRDI but it is surrounded by many government institutions. They are; • Government Seed and Planting Material Production Farm-Mahailuppallama • Seed Certification Service- Regional Office • Seed Certification Laboratory • Plant Protection Service Office • Farm Mechanization Research Center- Mahailuppallama • In-Service Training Institute, Department of Agriculture, Mahailuppallama • Veterinary Office • Mahailuppallama Sub Campus (Dry Zone - Teaching, Research, and Outreach) • Mahaweli Block Manager's Office • Mahaweli Community Radio • A Primary Medical Care Unit  **Figure 3: Site map of the FCRDI-Mahailuppallama**

C. PROJECT JUSTIFICATION

Need for the project (What problem is the project going to solve	The ASMP has launched its activities in nine districts of seven provinces of the country. Project Management Unit (PMU) and Provincial Project Management (PPMUs) directly implement the two kinds of subproject activities that mainly consist with Productivity Enhancement and Diversification Demonstrations and the infrastructure development programs. The Department of Agriculture (DOA) acts as the main project

	partner agency of Productivity Enhancement and Diversification Demonstrations. DOA's activities consist with designing of subprojects, training farmers, monitoring subprojects' activities and involving the troubleshooting of the program. The agricultural research stations play remarkable role in ASMP's activities by providing technical inputs, and introducing new hybrid varieties to the farmers. Further, analyzing soil & crop samples of the farmers and giving recommendations for the fertilizer usage, and investigating pest and disease attacks of the crops and giving viable mitigation measures to overcome the issues timely are services provided by the agricultural research stations. The services of the research stations have extended to increase productivity and profitability of other field crops (OFC) farming, make available quality produces and resource conservation, and eco-friendly OFC farming. The main objective of the research and the development activities of these research station are; • To make available demanding OFC varieties for stakeholders • To make available associated technologies for high productivity, profitability, and sustainability with an emphasis on climate change mitigation/adaptation/escape • To minimize post-harvest losses and enhance value addition • To assure the availability of quality seeds for stakeholders The conventional farming techniques and the field crops varieties are not enough to produce the country food requirement. A Major portion of the field crops production except locally grown vegetables are imported to the country to cater the existing demand. Further, a considerable foreign exchange has to be paid by the country annually to import the high yielding hybrid vegetable seeds. This situation makes burdens to the country, one is it threats on the food security and importation of the field crops production requires high foreign exchange while it directly effects on the country's economy. Hence, producing of hybrid crop varieties that are giving high yielding and continues research activities pertaining to the field crop production is essential to ensure the production. The need of this subproject emphasizes that enhancement of hybrid seed production (Chili and Maize) that are implemented under ASMP. These two crops have potential benefits to the country economy. Chili is one of the most important cash crops grown in Sri Lanka and an essential condiment. In 2019, Sri Lanka produced 75,000 t of green chili, meeting about 95% of the national requirement. However, the total requirement for Dry Chili is imported approximately 50,000 t per annum. The national average yield of green chili was stagnated at 4.7 t/ha until the recent past, which could be boosted to 20 t/ha with the introduction of locally-developed Chili hybrids which are moderately resistant to LCC and with associated precision farming technologies. The chili hybrids, MICH HY 01 and MICH HY 02 have the yield potential of over 35 t/ha of green chili. But the limited production of hybrid Chili seeds, fulfilling less than 25% of the demand, is the major constraint to expanding its

	cultivation, which is about 2,000 kg per annum at present. Hence, about 15,000 ha Chili cultivation is still under open-pollinated varieties (OPV). Current efforts by the DOA in collaboration with the farmer organizations, foreign-funded projects, and the private sector to produce Chili hybrid seeds need to be expanded to achieve self-sufficiency in both green and dry chili production. More than 10,000 ha of hybrid Chili cultivation and 8,000 ha of OPV as commercial cultivation as well as a home garden crop is required to meet the demand for green and dry Chili. Hence, the annual hybrid Chili seeds requirement is 6,500 kg. Hence, efforts to strengthen the capacity of seed production of locally developed Chili hybrids at a reasonable price are timely. Maize is the second-largest cereal extent in Sri Lanka, next to rice. Mainly used for animal feed (80% of the production) and the rest is used in the confectionery industry. A low percentage of maize is harvested at the green cob stage for direct consumption as boiled cobs, while the whole maize plants are harvested as fodder for the dairy industry. The demand for maize grains increased over the years and was about 500,000 t in 2019. However, the local production was 391,000 t in 2019 and the rest is imported. Farmers have gradually shifted to the cultivation of hybrid seeds during the last two decades, thus, increasing national productivity. More than 95% of farmers are growing hybrids at present, but about 95% of the total seed requirement is fulfilled by imported maize hybrids. The DOA recently released new maize hybrids i.e., MI Maize HY 3, MI Maize HY 4, and MI Maize HY 5, and these hybrids, are comparable in yields with most of the imported hybrids and moderately resistant to drought. These locally developed hybrids are well adapted to rainfed upland ecosystems in the Dry zone where major maize-growing areas are located. The total hybrid seed requirement is about 1,200– 1,500 tons per annum. The local maize hybrid seed production, a very limited quantity, is still confined to the government sector. With the inadequacy of local production, the price of imported hybrids is increasing annually making them unaffordable to most farmers. Therefore, interventions through public-private-producer partnership to enhance seed production of locally-developed hybrid maize varieties at least to meet at least 25% of the seed demand is essential and timely. The cultivation of locally-produced Chili and Maize hybrids among Sri Lankan farmers is low, which is mainly attributed to the non-availability of their required quantities in local markets. Thus, producing hybrid seeds suitable for local environments and making them available at a reasonable price is a prerequisite for the productivity enhancement of chili and maize crops in Sri Lanka. Private sector has not invested on large scale hybrid seed production but continue their operations in a limited scale. Under the proposed project, the technology for hybrid seed production will be refined with improvement of existing facilities with the DOA aiming at an up-scaling of the involvement of private sector partnerships as the next step. The facilities available for

	the production of high-quality Chili and Maize hybrid seeds is inadequate resulting in some drawbacks such as poor germination and shelf-life, thus failing to meet the demand (in addition to the limited quantities produced by the private sector through private-public partnership). Therefore, strengthening of the facilities available at Mahailuppallama is considered an essential and timely need for Chili and Maize hybrid seed production, which can be utilized by other public and private sector agencies to enhance the hybrid seed production in Sri Lanka But existing seed production facilities of the stations are not enough to cater the farmers and the country requirements. Strengthening infrastructure and Technological/Technical capacities of the Department of Agriculture is an essential need to ensure provision services and follow-up support for the farmer production organization (FPOs) established under Component 2 of the ASMP. This is further to the basic field facilities established for basic seed production of chili and maize (FIELD CROPS CENTER), vegetables including potato vegetable CENTER), and the fruit crops (FRUIT Center), which the centers of excellence of the relevant crop categories established at Mahailuppallama (including Kilinochchi and Aralaganiwila), Gannoruwa/Kundasale/Dondagolla/Seetha Eliya Complex, and Horana, respectively. Therefore, strengthening of the facilities available at Mahailuppallama is considered an essential and timely need for Chili and Maize hybrid seed production, which can be utilized by other public and private sector agencies to enhance the hybrid seed production in Sri Lanka Development of hybrid seed production in FCRDI- Mahailuppallama, will be a sustainable solution for the continuing of modern technologies that are introduced to the farmers by ASMP. Therefore, launching of capacity building program to enhance the hybrid seed production of FCRDI is an essential and mandatory requirement of the agriculture sector modernization.
Purpose of the project (*What is going to be achieved by carrying out the project*)	The project will directly result the development of hybrid seed production at FCRDI- Mahailuppallama. Ultimately, it gives the benefits to the farmers who have engaged in field crop cultivation in the country. The following purposes will be achieved by implementing the subproject. • Improving the hybrid seed production capacity of the FCRDI of Excellence is imperative to achieve the objectives of the ASMP, especially in terms of sustainability through continuous interventions. • Providing basic hybrid seeds to selected farmers and private organizations to promote them for hybrid seeds production. • Providing technical support to the farmers/private organizations to improve crop productivity, especially in the established SL-GAP farms through the services provided by the Centers of Excellence and the Extension and Training arms of the DOA, Provincial

	Departments of Agriculture, and the Mahaweli Authority of Sri Lanka. • Field quality assurance by auditing and issuing of SL-GAP certificate to the GAP farms established through the involvement of the Centers of Excellence and with the assistance of the Seed Certification Service in the DOA, which regulates the auditing of SL-GAP farms. • Support the establishment of productive model farms, including GAP Model Farms, in the project sites through technological intervention from the Centers of Excellence, including the production of Onion, Chili, and Maize. • Continuous laboratory monitoring programs to be carried out island-wide on pesticide residues, contaminants, and pollutants in the agriculture environment comprise of food, soil, and water and monitoring programs for periodic assessment of toxicity of pesticides to pests, natural enemies, and beneficial organisms for maintaining the sustainability of model farms The expected outcomes through the implementation of the subproject are as follows; • Expanded the seed production capacity of available local Chili and Maize hybrids per annum • Chili (F1) Hybrid seeds: One poly tunnel with 400 m2 extent can produce 30- 35 kg of seeds. Therefore, five (5) tunnels will produce 150- 175kg hybrid seeds per annum • Chili parental lines: Parental lines produce 0.5kg of parental seeds from one (1) tunnel and expected parental seeds production is 1.0kg from two (2) tunnels • Conduct Chili Crosses: Number of crosses 150 • Maintain Maize parental lines and produce 2,000 kg of parental seeds • Production of Maize hybrid seeds: 18,000 kg • Conduct Maize Crosses: Number of Crosses 60 and produce 60 kg of seeds The ultimate effort of the ASMP is to establish good agriculture practices (GAP) in the farming activities by introducing new technologies.
Alternatives considered (*Different ways to meet the project need and achieve the project purpose*)	Some farmers use the locally produced seeds for chili and maize cultivation but it is useless effort since the cost of production increases by the low yielding, high pest and diseases attacks. Therefore, enhancement of hybrid seed production is the one and only alternative to cater the national requirements of the both crops. But DOA's research stations have no capacity to produce the whole hybrid seed requirement of the country. Through these initiatives, FCRDI hopes to promote the farmers and private organizations in hybrid seed production industry of the country.

	To achieve this objective, FCRDI will supply the basic seeds for the hybrid seed producers, transfer technology through the training and demonstration programs, conduct continues auditing, and intervenes to solve the issues arisen timely.

D. PROJECT DESCRIPTION

Proposed Start Date (Duration)	March 2022 (03 Months)
Proposed completion Date	May 2022
Estimated total cost	SLRs 100.0 Mn
Present Land Ownership	FCRDI-Mahailuppallama is located on the state land that is under the purview of the DOA. The total land extent belongs to FCRDI is 360ha (890 acres).
Description of the Project (*With supporting material such as maps, drawings etc. attached as required*)	This subproject is mainly focusing to develop the hybrid seed production. The following activities will be implemented as the scope of the subproject. 1. Development of 10 ha (25 Acres) Cultivation land bounded to *Yoda Ela* (Irrigation Canal) to enhance the seeds production (Location map is annexed as Annex 1.2) - Land development (Cleaning, levelling, terracing, drainage improvements) - Establishing sprinkler irrigation system for 10ha (25 acres) 2. Purchase of farm implements: - Four-wheel tractors (2 units) (1 FCRDI, 1 University) - Four-wheel tractor above 55 hp (1 unit) - (With Front loader and Backhoe) - Two-wheel tractors (3 units) - Disc ploughs (2 Furrow) (2 units) - Disc ploughs (3 Furrow) (1 unit) - Harrowers (3 units) - Tine tillers (2 units) - Rotavator (1 unit) - Ridger (1 unit) 3. Strengthening irrigation facilities: Construction of Agro-wells (3 units) 4. Renovation of existing water source (Agro-wells) (1 unit) 5. Construction of Controlled Environment Research Facility – locally-assembled (4 units) 6. Construction of insect-proof environment-controlled poly tunnels (400 m^2 each) with micro irrigation facilities for chili parent/hybrid seed production (5 units) at FCRDI, MI

	7. Construction of insect-proof environment-controlled polytunnels (400 m^2 each) with micro-irrigation facilities for chili parent/hybrid seed production (1 unit) at RARDC, Kilinochchi 8. Construction of insect-proof environment-controlled polytunnels (400 m^2 each) with micro-irrigation facilities for chili parent/hybrid seed production (2 units) for Seed Farm and University unit @ MI The sub-activities with the cost allocation under the subproject are presented in Annex 2. The design drawings of the Agro-wells, insect-proof environment-controlled polytunnel (400 m^2 each) is presented in Annex 3.
Project Management Team	A Project Management Unit (PMU) has been established under the Ministry of Agriculture to implement the proposed project activities. Contact Persons: **Project Director** Agriculture Sector Modernization Project Ministry of Agriculture No. 123/2 Pannipitiya Road, Battaramulla Tel: +94 112 877 550, Fax: +94 112 877 546 Email: projectdirectorasmp2@hotmail.com Web: https://www.asmp.lk/ **Environmental and Social Safeguards Specialist** Agriculture Sector Modernization Project Ministry of Agriculture No. 123/2 Pannipitiya Road, Battaramulla Tel: +94 112 877 550, Fax: +94 112 877 546 Email: sanjayadms@hotmail.com Web: https://www.asmp.lk/ **Nature of Consultations and Inputs Received** Consultations with Environmental and Social Safeguard Specialist/ PMU and field visits to the project site.

F. DESCRIPTION OF PROPOSED SUBPROJECT ACTIVITIES

1. Supplying Equipment to the Laboratories	
Existing Condition of the Facilities	There are nine (9) main divisions and six (6) subdivisions that come under FCRDI- Mahailuppallama. Each division has laboratory facilities within the premises and research activities have been undertaken by the well-experienced & qualified research staff that consists of Director, Additional Director (Research), Deputy Director (Research), Assistant Directors Agriculture (Research), Research Assistants, and Technical Assistants. As the main research divisions, there are 1. Plant Breeding Division that consists of the subdivisions categorized as (i) Chili, (ii) Coarse Grains, (iii) Onion, (iv) Soybean & Cowpea, (v) Mungbean & Blackgram and (vi) Vegetables, (2) Agronomy Division, (3) Soil & Water Management Division,

	(4) Soil Science Division, (5) Biotechnology Division, (6) Entomology Division, (7) Plant Pathology Division, (8) Weed Science Division and (9) Horticulture Division. Apart from these research divisions, FCRDI-Mahailuppallama has six (6) laboratory facilities that have been established to conduct research and experiments. Bio-Technology, Entomology & Plant Pathology, Soil Science, Breeding, Agronomy and Soil & Water Management are the main laboratories that help to FCRDI activities. There are seven (6) research units that come under the heading of RARDC-Kilinochchi. They are; 1. Plant Breeding: Developing new plant varieties suitable for dry and intermediate zones of Sri Lanka. Changing the traits of plants to produce desired characteristics. 2. Plant Pathology: Evaluation of disease samples collected from research and farmers' fields. Detect the causal organism and suggest the possible solution to control the disease. Evaluation and efficacy of bio-control agents for pathogens. 3. Plant Entomology: Management of insect pests of field, fruit, and OFCs. Deliver effective solutions using integrated pest management strategies. 4. Breeder Seed Production 5. Soil and Agronomy 6. Organic Agriculture Major research related activities of RARDC- Kilinochchi are as follows, • Development and release of new plant varieties which suitable for dry and intermediate zones. • Development of High yielding locally preferred and field tolerant crops to major fungal diseases. • Collect and analyze soil and water samples and generating reports with recommendations. • Organic control methods for pest and other insects DOA annually allocates funds for the recurrent expenditures of the laboratories. But existing equipment and the facilities are not enough to expand the labs' services. These labs should be equipped to expand their service to produce hybrid varieties of the crops and other crops related research stations and developments. The FCRDI has established the facilities required for the existing research works, seed production activities and the lab testing program at the request of farmers and the private sector.

Figure 4: A degraded polytunnel

Figure 5: FCRDI's open cultivation land- fallow

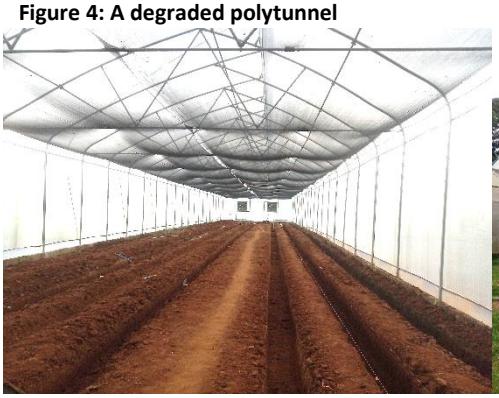


Figure 6: A poly tunnel under preparation for cultivation

Figure 7: A newly constructed poly tunnel

Figure 8: An ongoing cultivation trial

Figure 9: Cultivation trial

2. Other factors	
Solid waste	All the crop residuals and post-harvest waste generated at the research station are burnt to keep the hygienic condition of the farm land. The agrochemical waste and their containers are kept in a separate safe store building established in Mahailuppallama research station. This store premise is arranged to store the chemical wastes of all research stations until properly destroyed. This store is being monitored by the DOA's special audit team timely whether there is quantity and process are going properly. This is a special and important process observed during the screening process. There are no residential houses, staff quarters, offices, sensitive areas (community gathering centers, Tank, waterways, Marshy land, Forest patches...), or any other activity within a 500m radius of this safe store. DOA selects a contractor who has the facilities for the insulation of these waste at higher temperature (through Cement Kiln Co-processing) as approved and appropriate method. Most often, the cement factories have been selected as the qualified contractor for this job. This process is being

	monitored by the DOA's special audit team timely whether there is quantity and process are going properly  **Figure 10: Chemical waste store located at Mahailuppallama research station** All the crop residuals and post-harvest waste are burnt to keep the hygienic condition of the farm lands.

E. DESCRIPTION OF THE EXISTING ENVIRONMENT

1. PHYSICAL FEATURES – ECOSYSTEM COMPONENTS	
Topography and terrain	Geologically, the Mahailuppallama area belongs to the Vanni Complex of Sri Lanka and the elevation is below 113m AMSL. Generally, the area is having a flat to undulating terrain with a low slope (<slope 30%). The project site falls into dry zone low country of Sri Lanka and the features of this area is a combination of DL2 Agro-ecological zones
Climate and Meteorology	Climatically the area belongs to low country dry zone and the average temperature is 27.8ºC and maximum and minimum are 35.1°C and 29.4°C respectively. The average annual rainfall varies from 1,300 mm to 2,416 mm and average 1,400mm. Relative Humidity varies from 70% during the day to 90% at night.
Soil (*type and quality*)	Two main soil groups can be identified; i.e., Reddish Brown Earth and Low Humic Gley Soils are the soil types in this area (Source: soil map of Sri Lanka). The area is not identified as landslide-prone areas as per the Soil Conservation Act of Sri Lanka.
Surface water	Many open water bodies such as tanks and irrigation canals are located within the Ipalogama DSD. Mahailuppallama Tank is located at the southern boundary

(*Sources, distance from the site, local uses and quality*)	of the research station land. And Yoda Ela (Right distribution canal of Kalawewa) runs at Northern boundary of the research station land.  **Figure 11: Open water bodies located within area** **Use**: The main surface water sources of the area are irrigation canals and tanks. The use of surface water for bathing & washing purposes, animals, and agriculture is common. **Quality**: The quality of surface water in the area is moderate
Ground water (*Sources, distance from the site, local uses and quality*)	The groundwater of the area is available. Generally, the groundwater table is located within 3-5m depth and many farmers, institutions have constructed dug wells, agro-wells, and tube wells for the use of domestic, animals, and irrigation purposes. The groundwater table of the areas is recharged with the tanks and the irrigation canal network located within the area. The quality of groundwater present in this area is moderate in condition and use for washing/ bathing activities. Most of the residents of the area use at least domestic level RO[1] (Reverse Osmosis) units to purify the groundwater for drinking purposes. The FCRDI has constructed a rainwater harvesting system using roofs of the research premises buildings. The collected rainwater is mainly used for the washing purposes of the research station.

[1] Reverse Osmosis (RO) is a **water treatment process that removes contaminants from water by using pressure to force water molecules through a semipermeable membrane**. During this process, the contaminants are filtered out and flushed away, leaving clean, delicious drinking water.

	 **Figure 12: Rainwater collection underground tank** **<u>Ground Water Extraction</u>** Under this subproject, it is proposed to construct 3 agro wells and renovation of one existing agro well. The specification of each well as follows; Depth of the well 10m Depth of water column 6m Diameter of the well 9m Volume of one well 380 cubic meters Total extractable/ allowable water volume of 4 wells is about 1,520 cubic meters per day. The total water volume needs for irrigation of new cultivation area is 500 cubic meters (5mm per 10 ha land area). Further, the 4 agro well are proposed to be constructed near to the Yoda Ela (Irrigation canal of Kalawewa-Tank) and ground water table of the area is charged by this irrigation canal.
Air quality (*Any pollution issues*)	Any major pollution source near the three research stations area is not recorded
Noise	No any noise pollution sources in the vicinity of the station.
2 ECOLOGICAL FEATURES – ECOSYSTEM COMPONENTS	
Vegetation (*Trees, ground cover, aquatic vegetation*)	Scrubland and disturbed secondary vegetation type is prominent in the area. In addition, agricultural lands and river associated vegetation are common habitat types present in this area. The whole land belongs to research station except the built-up area is used for the cultivations and to establish the propagation houses (Polytunnels, glass houses, net houses, etc.) The flora such as *Mimosa pudica* (Nidikumba), *Panicum rapens, Paniucum notatum* (Ginigrass), *Ricinious communis*, *Ziziphus oenoplia* (Heen Eraminia), and *Azadirachta indica* (Neem) are commonly observed in the surrounding area of the research station.
Presence of wetlands	No wetlands present in the area adjacent to research station
Fish and fish habitats	Open water bodies such as tanks and irrigation canals are water bodies that are ideal for fish habitat and also found with freshwater fish varieties.
Birds (*waterfowl,*	The research station area is closer to the waterways and agricultural lands and there is a possibility of recording bird species in these habitat types.

migratory birds, others)	The several bird species were observed such as the Crows, Parrots, Eagles and Egrets, Red-Vented Bullbull, Black-headed Ibis, Chestnut Headed, Bee-eater, Pheasant-tailed Jacana Common mynah, Great Cormorant, Lesser Whistling Duck, tailed godwits, Pheasant tailed Jacana. The species were recorded in this habitat are very common for this type of habit
Presence of special habitat areas (*special designations and identified sensitive zones*)	No presence of special habitat areas is reported within a 5 km radius of the research station. According to environment sensitive areas map of CEA, no any environmental sensitive area recorded in the close proximity of the project site
3 OTHER FEATURES	
Residential/Sensitive Areas (*E.g., Hospitals, Schools*)	All labs belonging to the three research stations are located separately from the other institutions and they do not impact sensitive areas such as hospitals, schools, etc..
Archaeological resources (*Recorded or potential to exist)*	The research station is located on DOA owned lands and there is no archaeological or Physical Cultural Resource (PCR) to record or potential to exist.

G. SOCIO-ECONOMIC ENVIRONMENT

1. Stakeholders and Public consultation

Stakeholders' engagements

The Department of Agriculture is the main project partner agency of this subproject. The staff of the research stations jointly prepared their capacity needs and submitted them to the ASMP. Several discussions were undergone to finalize the subproject activities between the research stations' staff and the ASMP. For more transparency, the research stations' staff were represented the technical evaluation committee of this subproject.

The ASMP PMU staff conducted site visits, consultations with DOA's officials during subproject identification and designing stages.

Table 1: Responsible Officers in ASM Project Activities

SN	Name	Designation	Contacts
Mahailuppallama Research Center			
1	Mrs. K.N.C.Gunawardhana	Director	nishanthigun@yahoo.com
2	Dr. R.L.Senanayake	Coordinator	ravisena@gmail.com
3	Dr. K.N. Kannangara	Principal Agriculture Scientist (Breeding)/ Chili Breeder	kannangara65@gmail.com

	4	Dr. M.A.P.W.K. Malaviarachchi	Principal Agriculture Scientist (Agronomy)	wmalavi@yahoo.com
	5	Dr. M.S. Nijamudeen-	Principal Agriculture Scientist (Soil Fertility)	msnija66@yahoo.com
	6	Mr. D.C.M.S.I. Wijewardhana-	Maize Breeder	susantha.indi@gmail.com
	7	Mr. R.A.C.J. Perera-	Soil and Water Management	chamilapere@yahoo.com
	8	Ms. W.M.K. Fernanado	Pathologist	menukrisha@yahoo.com
	9	Mrs. M.A.R.A. Mandanayake-	Entomologist	ra.mandanayake@gmail.com
	10	Mrs. W.A.R. Dhammika	Biotechnology	ra.mandanayake@gmail.com

Stakeholders' consultation

During the social and environmental screening process, the staff of FCRDI-Mahailuppallama, RARDC- were consulted. Meantime ASMP has taken actions to conduct the stakeholders' consultation starting from the subproject identification stage up to finalizing the subproject's design. It was a good tool to maintain transparency among the stakeholders. Due to the impact of the fruitful consultation process undertaken by the ASMP, the research stations' staff are well aware of the subproject activities and their objectives. Meantime, they have negotiated and decided the real requirements that they want to enhance the research facilities of the stations.

Table 2: Consultation outputs

Locations / Sub Units / Fields Visited	Participants with Designations	Matters Discussed
FCRDI-Mahailuppallama on 05.01.2022		
• Director's Office • Pathology Laboratory • Entomology Laboratory • Agronomy Laboratory • Biotechnology Laboratory • Soil Water Management Division • Environment Control Research Unit • Common Stores	• Mrs. K.N.C. Gunawardhana- Director (Research) • Dr.R.L. Senarathna- Agronomist/ Coordinator-ASMP Activities • Ms. W.M.K. Fernanado – Pathologist • Mr. R.A.C.J. Perera- Assistant Director of Agriculture (Research) • Ms.P.I.K. Peris- Store man	• Overall capacity building plan on strengthening laboratory facilities and infrastructure development for hybrid seed production • Routine functions of the labs • Services provided to farmers and other outsiders • Safety precautions that are implemented • Waste disposal • Irrigation, water supply and drainage

H. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS

SN	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
1	Are there any asset(s) that would be affected or acquired due to proposed project interventions such as: Land, Physical structure (Dwelling or commercial), Fruit trees/crops, Community Resource Property etc.?		√		Construction of agro-wells take place on bare land. Establishment of poly tunnels will be located in the area demarcated for the research activities. The construction activities will slightly change the topography and will have an impact on the natural drainage patterns of the locality. The soil and water research division of the institute conducts the all the investigations to identify the locations to construct the agro-wells. And the drainage activities are designed and implementation as an important part of the research work by the FCRDI. Debris/unsuitable excavated or clearing material will be disposed properly.
2	Is the sub-project area adjacent to (less than 500m) or goes through any of the following environmentally sensitive areas such as: Cultural heritage site, protected area and/or of its buffer zone, Conservation Forest, reserve or a sanctuary, Mangrove, Estuarine, Wetland, including paddy fields, water bodies, PCRs, Landslide-prone areas etc.?		√		No such sensitive areas are located in the vicinity of the subproject area
3	Will the project activities involve with Encroachment on historical/cultural areas: disfiguration of landscape by road embankments, cuts, fills and quarries?		√		No such impacts will be anticipated from the proposed civil works of the subproject
4	Will the project interventions involve with encroachment on or impact ecologically sensitive or protected areas?		√		No such impacts will be anticipated from the proposed civil works of the subproject

SN	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
5	Will the project interventions involve with alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√		No such impacts will be anticipated from the proposed civil works of the subproject
6	Will the project interventions involve with deterioration of surface water quality due to silt runoff and sanitary wastes from work-based camps and chemicals used in construction?		√		No such impacts will be anticipated from the proposed civil works of the subproject
7	Will the project intervention involve with Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?		√		No such activities are included as the subproject's activities
8	Will the project interventions involve with noise and vibration due to blasting and other civil works?	√		Low	The use of machines for excavation of agro-wells may create noise and vibrations but those impacts will be mitigated through the implementation of EMP. Further, civil works are taking place at the research station's land away from the residential area. Hence there is no possibility of happening such impacts to the surrounding area.
9	Is there any possibility to create poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations due project interventions?		√		No such impacts are anticipated
10	Will be possible to creation of temporary breeding habitats for mosquito vectors of disease?		√		No such impacts are anticipated
11	Will there be risk of accidents associated with the increased vehicular traffic due to project interventions?		√		The construction area is far away from the residential, commercial or any other occupants' areas. There is no any contact

SN	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
					with the outsiders or activities and civil works.
12	Will the project activities increase the risk of water pollution from oil, greases and fuel spills, and other materials?		√		No such impacts are anticipated
13	Will the project activities involve with additional waste in water canals that may increase floods and waterlogs?		√		No such impacts are anticipated
14	Will the project activities involve with new/restored public areas/ spaces that can be inundated in case of floods?		√		No such impacts are anticipated
15	Project interventions proposed to include Green infrastructure: Does sub-project include any of the following design aspects such as: Sri Lankan Guidelines of Green and Environmentally Friendly Building for the State Institutions (2016), Low energy materials, Reduced water use options, Energy optimization for lights, A/C etc. , Recycling and waste management, Increased human comfort, Enhanced landscaping, exterior or interior design, Site selection considering conservation of vegetation and wildlife?	√			Construction of poly tunnels, the establishment of the sprinkler irrigation systems is included as the civil works of the subproject. While these activities are directly bounded with the hybrid seed production, it indirectly effects on efficient use of water and conserves the water.
16	Will the project interventions increase disaster Risk Management (DRM): such as: Floods, including coastal, Storm surges, Coastal erosion, Landslides, Land subsidence, Soil erosion and sedimentation, Rock falls, Cyclones, Droughts, Earthquakes, Salinization, salinity intrusion into drinking water sources, Forest fires, High winds, tornadoes etc., Epidemic and hazards related to environmental pollution, Vector borne diseases?		√		No such impacts will be resulted by this subproject
17	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	The construction activities slightly effect on changes the topography of the area but proposed civil works have been designed with appropriate drainage improvements. No change on land use and waterbodies by civil works.

SN	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
18	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?		√		No such substances are involved with this subproject
19	Will the Project produce solid wastes during construction and/ or operation?		√		No solid waste is generated due to the subproject. But the crop residuals, organic waste, and agrochemicals will be generated during labs and research activities operation period. The crop residuals will be burnt at field level. The agrochemical waste will safely store in the separate premises with all precautions until the proper discharge. (The process has been explained in report- section F. Description of proposed subproject activities, No.2 Solid waste
20	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?		√		No such emission will be released
21	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	√		Low	Excavation of agro-wells and establishment of polytunnels may cause noise and vibration due to the machinery uses for the activities. Such impacts will be mitigated by implementing EMP. No impacts such as the release of light, heat, energy, or electromagnetic radiation are anticipated as a result of the subproject implementation or operation
22	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters,		√		No such impacts are anticipated

SN	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
	groundwater or coastal wasters?				
23	Will the project cause localized flooding and poor drainage during construction Is the project area located in a flooding location?		√		No such impacts are anticipated
24	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?		√		No such impacts are anticipated. The construction area is a separate area from the other activities and the public.
25	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?		√		No such impacts are anticipated
26	Are there any routes or facilities on or around the location, which are used by the public for access to recreation or other facilities, which could be affected by the project?		√		No such impacts are anticipated
27	Are there any areas or features of high landscape or scenic value on or around the location, which could be affected by the project?		√		No such impacts are anticipated
28	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?		√		No such impacts are anticipated
29	Are there any areas on or around the location, which are used by protected, important or sensitive species of fauna or flora e.g., for breeding, nesting, foraging, resting, migration, which could be affected by the project?		√		No such impacts are anticipated
30	Is the project located in a previously undeveloped area, where there will be loss of green field land		√		No such impacts are anticipated. This land is exclusively allocated for the research station activities
31	Will the project cause the removal of trees in the locality?		√		Tree removal is not required
32	Are there any areas or features of historic or cultural importance on or around the location, which could be affected by the project?		√		No such impacts are anticipated
33	Are there existing land uses in or around the location e.g., home gardens,		√		No such impacts are anticipated

SN	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
	other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?				
34	Are there any areas in or around the location which are densely populated or built-up, which could be affected by the project?		√		No such impacts are anticipated
35	Are there any areas in or around the location, which is occupied by sensitive land uses e.g., hospitals, schools, places of worship, community facilities, which could be affected by the project?		√		No such impacts are anticipated
36	Are there any areas in or around the location, which contain important, high quality or scarce resources e.g., groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?		√		No such impacts are anticipated
37	Are there any areas in 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?		√		No such impacts are anticipated

I. CONCLUSION AND SCREENING DECISION 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 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
Land development (Cleaning, levelling, terracing, drainage	Vegetation loss, dust, Crop damage siltation	NS
Establishing sprinkler irrigation system for 10ha (25 acres)	Vegetation loss, dust, Crop damage siltation	NS
Purchase of farm implements	NA	
Construction of Agro-wells (3 units)	Vegetation loss, dust, Crop damage siltation	NS
Renovation of existing water source (Agro-wells) (1 unit)	Vegetation loss, dust, Crop damage siltation	NS
Construction of Controlled Environment Research Facility – locally assembled (4 units) and insect-proof environment-controlled poly tunnels (400 m2 each) with micro irrigation facilities	Vegetation loss, dust, Crop damage siltation	NS

J. ENVIRONMENTAL MANAGEMENT PLAN

1. Contractor's responsibility for preventing/minimizing/mitigating adverse environmental issues raised during construction activities

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
1	Public complaints and lack of stakeholders' support for the project implementation	• Information Disclosure among Stakeholders	• Discussions should be conducted with the relevant stakeholders to aware the subproject activities • Disseminate the finalized subproject's activity list and implementation arrangement with FCRDI staff and other stakeholders • Timely conduct the progress review meetings with relevant stakeholders to discuss the implementation of subproject activities • The contractor should take note of all impacts, especially temporary issues and safety hazards that will be of concern to the research stations routing activities. All possible negative impacts will be mitigated as stipulated in the EMP to mitigate them • The contractor will maintain a log of any grievances/complaints and actions taken to resolve them and incorporate a summary to the progress reports • A copy of the EMP should be available at all times at the project supervision office on site
2	Spreading COVID 19	• All activities as per health guidelines	• The contractor must ensure that all workers, including managers and other staff, are well trained/make aware on COVID 19 safety precautions/health guidelines published by the health ministry./authorities • All construction activities should follow the 'INTERIM GUIDANCE ON COVID-19 (VERSION 1: APRIL 7, 2020)' recommended by World Bank's Operations Environmental and Social Review Committee
3	Activities related to subproject's civil works	• Develop and implement the soil conservation activities in 10 ha farmland • Construction of 3 agro-wells and rehabilitation of existing one agro-well	• Conduct land preparation activities before next cultivation season • Establishment of soil conservation measures and drainage improvement activities parallel to the land preparation activities • Potential damages to existing pipe system, poly tunnels, glass hoses and other research station's properties should be minimized by burying or covering the pipe distribution

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
		• Installation of sprinkler irrigation systems • Establishment of Controlled Environment Research Facility – locally assembled and insect-proof environment-controlled poly tunnels (400 m2 each) with micro irrigation facilities	
4	Exposing and damaging of physical cultural resources (PCR)	• Site preparatory work • Excavation of agro-wells • Establishment of poly tunnels • Vehicle and machinery movements	• Upon discovery of physical cultural material during project implementation work, the following should be carried out • Immediately stop construction activities • With the approval of the resident engineer delineate the discovered site area. • Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over. • Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology, and local authorities within 24 hours. • Submit a brief chance to find the report, within a specified time period, with the date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR, and temporary protection implemented. • Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. • An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the 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.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			• 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 • Importation of construction materials, organic manure and machinery from outside • Desilting	• Manual and integrated weed control • Prevent weed spreading via construction materials, machinery and organic manure (Compost) by periodic inspection and manual removal after application • Construction materials and organic manure should be supplied only from suppliers having relevant approvals
6	Noise Pollution & Vibration that can affect nearby structures	• Use of tractors/agricultural equipment/ machineries • Transportation of products from outside	• Working time for noise/vibration generation activities should be restricted and carried out only from 6 am to 6 pm. • Noise related to all agricultural improvement activities should not exceed 55 dB (daytime) and 45dB (night time) as practicable as possible. • Equipment and machinery should be maintained in good condition. • It is highly recommended to do transportation during daytime only
7	Air Pollution including dust generation that can affect nearby vegetation and households	• Site Preparation activities setting up of material storage yards, and removal of vegetation • Transport of construction materials 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 settlements and natural drainage paths as much as possible. • All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. • Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. • The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. • Vehicles transporting soil, sand, and other construction materials shall be covered. Limitations to the speeds of such vehicles are necessary. Transport through densely populated areas should be avoided. • Regular and proper maintenance of construction vehicles and machinery to avoid air emissions. • There should be no burning of wastes on-site.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			• 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.
8	Solid Waste Disposal	• Site clearing • Construction waste • Waste from labor resting areas and labor camps	• The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the relevant LA on possible disposal sites for each waste type. • Any hazardous type of waste shall be dealt with special care and instructions from the LA. • The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations. • The contractor shall remove waste from the site each day and dispose of the waste in the LA-approved site/s.
9	Contamination of water, land and air during usage of chemicals (pesticides, weedicides.) Solid Waste Disposal	• Land preparation • Vegetation clearing • Organic materials in the field • Waste from weed control activities	• Awareness of usage time, handling, and storage of chemical waste • Guidance on a suitable time for the usage of chemicals • Enhance the supervision activities • Burnt crop residuals to maintain the farmlands' hygiene • Use post-harvest waste for compost production • Follow the FCRDI guidelines
10	Water Quality	• Cultivation activities during operation	• Excess water extraction is to be cut down to preserve the ground water table • Proper introduction of sprinkler irrigation practices instead of conventional irrigation to preserve water and use of modern techniques to reduce water consumption • Proper irrigation practice to avoid excess water drain back to the canals
11	Spread of crop related diseases among other flora species	• Throughout the cultivation period	• Use FCRDI's directives
12	Health & safety hazard	• Use of agrochemicals (fertilizers, pesticides, weedicides etc.) during research activities and hybrid seed production process	• Carry out proper hazardous identification and risk assessment of all proposed activities • Training and awareness for workers on safe chemical handling

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			• Implement proper health and safety protocols by elimination, substitution, engineering controls, administrative control, and providing personal protective equipment (PPEs). Provide necessary PPEs (basic should include gloves, goggles, masks, and protective clothing) • A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wore and monitored • Pest and disease control according to the international standard and pest management action plan prepared by ASMP • Use FCRDI's directives
13	Temporary loss of livelihood due to civil works	• Develop and implement the soil conservation activities in 10 ha farmland • Construction of 3 agro-wells and rehabilitation of existing one agro-well • Installation of sprinkler irrigation systems • Establishment of Controlled Environment Research Facility – locally assembled and insect-proof environment-controlled poly tunnels (400 m2 each) with micro irrigation facilities	• Since the subproject activities are taken place in research station, no such impacts are anticipated
14	Blocking of surface drainage paths leading to localized flooding and ponding of water	• Site Preparation including provision of access roads, material/waste piles	• Until transport to approved 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.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			• The stockpiles should be suitably covered to minimize wash-offs to nearby waterways during rainy periods and to minimize dust emission during dry weather conditions. • If impacts to surface drainage cannot be avoided leading to ponding of rainwater and inconvenience to people, the contractor must provide an adequate surface drainage system to safely remove water from the site to the canal to avoid on-site ponding or flooding. • Proper planning to avoid construction during the rainy season. • Preventing total blockage of streams / providing alternative drainage paths during construction.
15	Public/occupational safety hazard	• Site clearing, storage of equipment, material etc. • Increased traffic of heavy vehicles for material transportation • Noise and vibration of construction machinery	**Training** 1. The contractor must ensure that all workers, including managers, are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include a safety helmet, protective footwear, and high visibility jackets). 3. In addition, the contractor shall maintain in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness, and any other equipment considered necessary. 4. A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wore and monitoring. **Site Delineation and Warning Signs** 5. The entire construction site should be delineated using devices such as cones, lights, tubular markers, orange and white stripes, and barricades to inform oncoming vehicular traffic and pedestrians in the area about work zones. 6. All digging and installation work items that are not accomplished should be isolated and warned of by signposts and flash lamps in the night-time.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			7. Dangerous warning signs should be raised to inform the public of particular dangers and to keep the public away from such hazards. 8. Trenches should be progressively rehabilitated once work is completed. 9. Overloading of vehicles with materials should be controlled 10. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety. 11. The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned if they are easily identifiable, and whether they are reflective. **Equipment safety** 12. Work zone workers use tools, equipment, and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts, and mechanical or electrical problems. **Emergency Procedures** 13. An emergency aid service must be in place on the worksite. 14. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site. **Construction camps** 15. Construction camps should have adequate sanitation facilities for construction workers to control the transmission of infectious diseases. 16. Avoid housing workers in camps and provide socio-economic benefits locally by employing local people. If there is no alternative to employ workers from elsewhere, locate accommodation camps away from communities on land

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			acquired from willing sellers. Provide labor camps with adequate sanitation, waste disposal, and health facilities according to labor laws. Clear work campsites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS. **Information management** 17. Develop and establish the contractor's own procedure for receiving, documenting, and addressing complaints from the affected public and nearby communities. 18. Provide advance notice to local communities by way of information boards or leaflets about the schedule of construction activities, interruption to services and access, etc.
16	Damages to Flora and Fauna	• Vegetation clearing/site clearing	• Speed limits and operating times for the construction vehicles should be imposed. • Due consideration should be given to carefully clearing of vegetation avoiding the destruction of habitats of fauna. • The de-silted matter shall immediately be disposed of off to pre-decided approved disposal sites. • The contractor will take reasonable precautions to prevent workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. • If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. • The Engineer will report to the nearby Forest Department /Department of Wild Life Conservation (range office or divisional office) and will take appropriate steps/ measures if required in consultation with the forest officials. • It is recommended to do the project work in day time only
17	Soil erosion, sedimentation of nearby waterbodies and low-lying areas	• Construction work • Removal of topsoil • Vegetation clearance	• Soil stockpiles and other construction material should not be placed within the bed or banks of the tanks or canal.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Preventing/Minimizing/Mitigation Measures proposed and actions to be implemented by the Contractor
			• Installing and maintaining permanent erosion and sediment control measures such as silt traps to avoid sediment runoff into the tank and nearby waterways.
18	Access restrictions and public inconvenience	• Material transportation and storage • Noise, vibration, dust and waste piling from demolition and construction	• If any temporary interruptions to house access take place, the contractor should inform the concerned houses prior to breaching access. • Provision of access during designated times of the day or where possible provides temporary access paths for pedestrians on the downstream side of the bund. • If a road is closed completely for a period, signage is to be put up at both ends.
Post construction phase			
19	Clearing/Closure of Construction Site/Labour Accommodations		• Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. This includes burrow sites and storage yards as well • On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.
20	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 FCRDI. • The FCRDI shall remove waste from the site each day and dispose of the waste as appropriate
21	Environmental Enhancement/ Landscaping		• Landscape plantation, including turfing shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. • The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP

K. Cost of mitigation

SN	Environmental mitigation measure	Cost (LKR)	Remarks
1	Information Boards, leaflets	35,000	Diversion of roads, Safety signage, awareness leaflets & COVID 19 sign boards

SN	Environmental mitigation measure	Cost (LKR)	Remarks
2	On site first aid facilities	15,000	
3	Personal Protective Equipment (PPE)	70,000	Basic should include sanitizers, safety helmet, protective footwear and high visibility jackets.
4	Site delineation and barricading material and equipment	15,000	
4	Dust suppression	20,000	Need to be done during road and canal renovation activities
5	Waste removal from site	20,000	Desilted material, waste from vegetation clearing, labour camps (amount is only for construction phase)
6	Training of Farmers and Village level stakeholders on new technological applications	20,000	Should be scheduled to a few sessions

L. EMP IMPLEMENTATION RESPONSIBILITIES AND COST

The overall responsibility of ensuring compliance with safeguard requirements rests with the PMU. The PMU is directly responsible for reviewing the proposed activities are aligned with environmental safeguards compliances. The overall supervision will be carried out by the in-house staff of the PMU supported by the staff in research centers. Any consequent modification or amendments of subproject will be negotiated prior to implementation with ASMP and DOA staff with notification to the WB's office.

Environmental & Social monitoring will be carried out largely through visual observations and compliance monitoring using the checklist provided in the EMF & RPF by the Safeguard Specialist of the PMU and the DOA jointly. The Environmental and Social Safeguards Specialist will need to visit the site quarterly and report on issues and performance on ESMP implementation to the PMU.

M. DETAILS OF PERSON RESPONSIBLE FOR THE ENVIRONMENTAL SCREENING

This project does not require environmental clearance under national environmental regulations. No other approval is required due to the spread and magnitude of the project. The project will have negligible environmental impacts, mostly limited to the operation period and there is a set of activities which needs to manage the negative impacts while enhancing positive impact to the environment. The impacts on the physical and biological environment are virtually none.

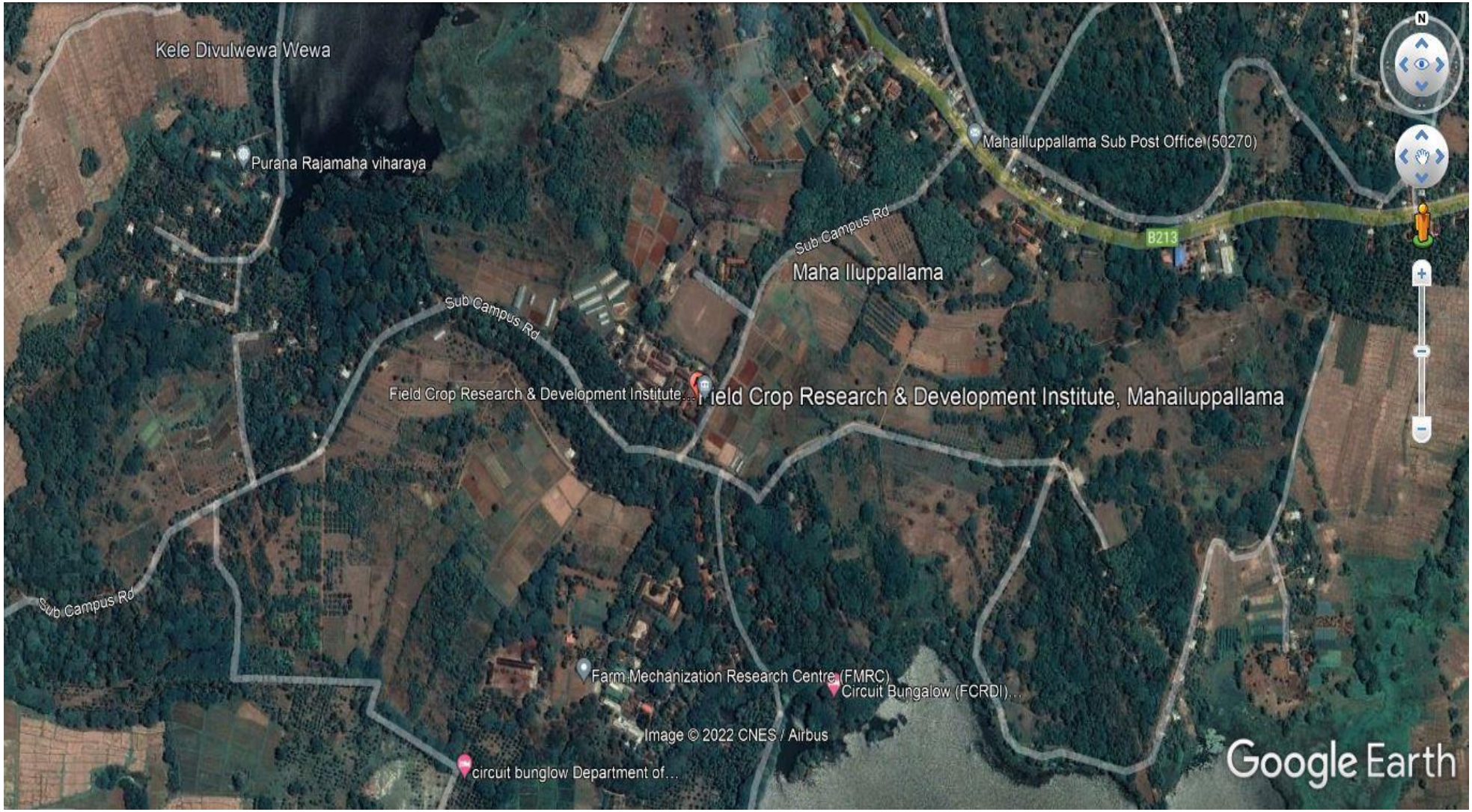
N. DETAILS OF PERSONS RESPONSIBLE FOR THE ENVIRONMENTAL SCREENING

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

O. ANNEXES

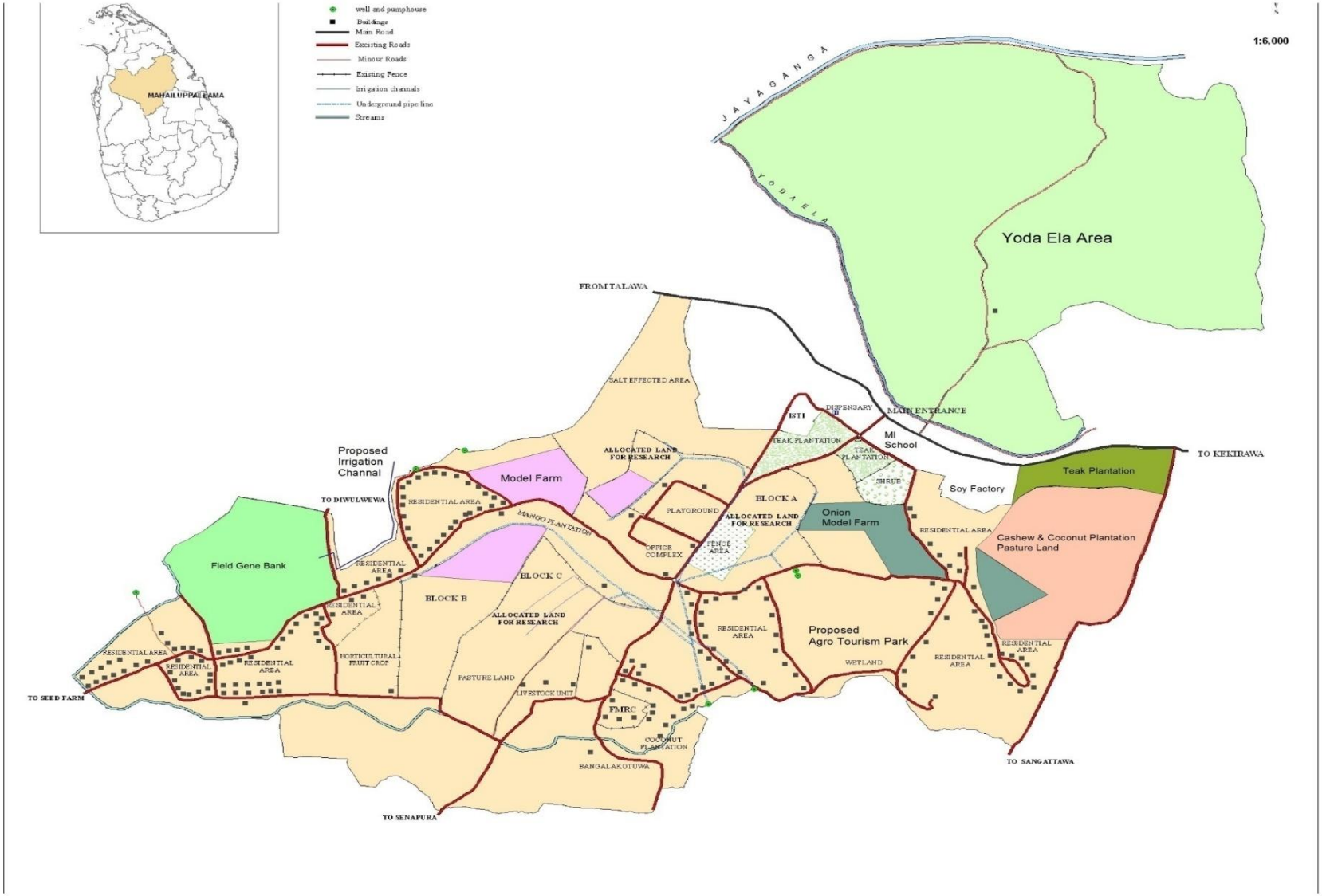
Annex 1: Google Map/ Location Map

1. Field Crops Research and Development Institute at Mahailuppallama



Source: Google Map

2. *Site map of FCRDI-Mahailuppallama*



Source: FCRDI- Mahailuppallama

Annex 2: Description of the subproject activities developed by the FCRDI-MI

(1) Field Crops Center at Mahailuppallama – Strengthening Capacity for Development of Chili and Maize Hybrid and Production of Planting Materials

1.1. Introduction

- The Government of Sri Lanka (GOSL) has launched a national policy framework "Vistas of Prosperity and Splendour", to enhance the living standard of the farming community.
- Recently, a policy decision has been taken by the Cabinet of Ministers to restrict imports of maize and chili, from among many others, which can be produced locally including the required quantities of high-quality planting materials. The GOSAL has also imposed taxes on the maize and dry chili products to create attractive farm gate prices.
- Therefore, increasing the availability of hybrid seeds of chili and maize will be an energizer to boost the production and to reach the anticipated self-sufficiency, while benefitting livelihood of farmers and overall national economy.
- The Agriculture Sector Modernization Project (ASMP) also focuses its activities on enhancing livelihood of farmers and the national economy. The proposed activities have a strong link with the expected outcome of the ASPM. Establishment of Center of Excellence at Mahailuppallama will be an important institutional set up helping further strengthening of cultivation and production of the locally-developed Chili and Maize hybrids, and for the overall sustenance of the ASMP activities, with the participation of the private sector and the practitioners.

1.1.1. *Chili*

- One of the most important cash crops grown in Sri Lanka and an essential condiment
- In 2019, Sri Lanka produced 75,000 t of green chili, meeting about 95% of the national requirement. However, the total requirements Dry Chili is imported approximately 50,000 t per annum.
- The national average yield of green chili was stagnated at 4.7 t/ha until recent past, which could be boosted to 20 t/ha with the introduction of locally-developed Chili hybrids which is moderately resistant to LCC and with associated precision farming technologies. The chili hybrids, MICH HY 01 and MICH HY 02 have the yield potential of over 35 t/ha of green chili.
- But the limited production of hybrid Chili seeds, fulfilling less than 25% of the demand, is the major constraint to expand its cultivation, which is about 2,000 kg per annum as at present. Hence, about 15,000 ha Chili cultivation is still under open-pollinated varieties (OPV).
- Current efforts by the DOA in collaboration with the farmer organizations, foreign-funded projects and private sector to produce Chili hybrid seeds need to be expanded to achieve self-sufficiency in both green and dry chili production
- More than 10,000 ha of hybrid Chili cultivation and 8,000 ha of OPV as commercial cultivation as well as a home garden crop is required to meeting demand green and dry Chili. Hence, the annual hybrid Chili seeds requirement is 6,500 kg.

- Hence, efforts to strengthen the capacity of seed production of locally developed Chili hybrids at a reasonable price are timely.

1.1.2. *Maize*

- The second largest cereal extent in Sri Lanka, next to rice.
- Mainly used for animal feed (80% of the production) and rest is used in confectionary industry. A low percentage of maize is harvested at green cob stage for direct consumption as boiled cobs, while the whole maize plants are harvested as fodder for dairy industry.
- The demand for maize grains increased over the years and was about 500,000 t in 2019. However, the local production was 391,000 t in 2019 and the rest is imported.
- Farmers have gradually shifted to cultivation of hybrid seeds during last two decades, and thus, increasing the national productivity.
- More than 95% of farmers are growing hybrids as at present, but about 95% of total seed requirement is fulfilled by imported maize hybrids.
- The DOA recently released new maize hybrids i.e. MI Maize HY 3, MI Maize HY 4 and MI Maize HY 5 and these hybrids, which are comparable in yields with most of imported hybrids and moderately resistant for drought. These locally developed hybrids are well adapted to rainfed upland ecosystems in the Dry zone where major maize-growing areas are located.
- The total hybrid seed requirement is about 1200 - 1500 t per annum. The local maize hybrid seed production, a very limited quantity, is still confined to government sector. With the inadequacy of the locally production the price of imported hybrids is increasing annually making them unaffordable to most of the farmers.
- Therefore, interventions through public-private-producer partnership to enhance seed production of locally-developed hybrid maize varieties at least to meet at least 25% of the seed demand is essential and timely.

1.2. Rationale

- The cultivation of locally-produced Chili and Maize hybrids among Sri Lankan farmers is low, which is mainly attributed to the non-availability of their required quantities in local markets.
- Thus, producing hybrid seeds suitable for local environments and making them available at a reasonable price is a prerequisite for the productivity enhancement of chili and maize crops in Sri Lanka.
- Private sector has not invested on large scale hybrid seed production but continue their operations in a limited scale.
- Under the proposed project, the technology for hybrid seed production will be refined with improvement of existing facilities with the DOA aiming at an up-scaling of the involvement of private sector partnerships as the next step.
- The facilities available for the production of high-quality Chili and Maize hybrid seeds is inadequate resulting in some drawbacks such as poor germination and shelf-life, thus failing

to meet the demand (in addition to the limited quantities produced by the private sector through private-public partnership).

- Therefore, strengthening of the facilities available at Mahailuppallama is considered an essential and timely need for Chili and Maize hybrid seed production, which can be utilized by other public and private sector agencies to enhance the hybrid seed production in Sri Lanka.

1.3. Description of the activity

Activities	Estimated Cost (Rs Mn)	Expected Outcome (KPIs)	Beneficiaries
		• Expanded the seed production capacity of available local Chili and Maize hybrids per annum **Chili (F1) Hybrid seeds**: 400 m2 tunnel can produce 30 – 35 kg. Therefore @ 5 tunnels 150 to 175 kg hybrid seeds per annum **Chili parental lines**: parental lines produced @ 1 tunnel. 5 kg of parental seeds **Chili Crosses:** Number of crosses 150 and seeds 1 kg @ 2 tunnels **Maize parental lines 2000 kg** **Maize hybrid seeds**: 18,000 kg **Maize Crosses:** Number of Crosses 60 – 60 kg of seeds	• Chili growers: Direct Beneficiary • Maize Growers: Direct Beneficiary • Department of Agriculture: Indirect Beneficiary • Universities: Indirect beneficiary • Private sector: Indirect Beneficiary • General Public: Indirect Beneficiary
Yoda Ela area at Mahailuppallama (25 acres)			
• Land development (Cleaning, levelling, terracing, drainage improvements)	10.0		
• Purchase of farm implements:	22.0		
- Four-wheel tractors (2 units) (1 FCRDI, 1 University)			
- Four-wheel tractor above 55 hp (1 unit)			
- (With Front loader and Backhoe)			
- Two- wheel tractors (3 units)			
- Disc ploughs (2 Furrow) (2 units)			
- Disc ploughs (3 Furrow) (1 unit)			
- Harrowers (3 units)			
- Tine tillers (2 units)			
- Rotavator (1 unit)			
- Ridger (1 unit)			
• Strengthening irrigation facilities:			
- Construction of Agro-wells (3 units)	10.0		
- Renovation of existing water source (Agro-well) (1 unit)	3.0		
- Purchasing of items for sprinkler irrigation system for 25 acres at Yoda Ela area	10.0		
• Construction of Controlled Environment Research Facility – locally assembled (4 units)	16.76		

Activities	Estimated Cost (Rs Mn)	Expected Outcome (KPIs)	Beneficiaries
Research premises			
• Construction of insect-proof environment-controlled poly tunnels (400 m^2 each) with micro irrigation facilities for chili parent/hybrid seed production (5 units) at FCRDI, MI	17.65		
• Construction of insect-proof environment-controlled poly tunnels (400 m^2 each) with micro irrigation facilities for chili parent/hybrid seed production (1 unit) at RARDC, Kilinochchi	3.53		
Seed farm and University unit Mahailluppallama			
• Construction of insect-proof environment-controlled poly tunnels (400 m^2 each) with micro irrigation facilities for chili parent/hybrid seed production (2 units)	7.06	• Developed cost effective technology packages for hybrid seed production • IOT-based infrastructure facilities for future research & development activities • Novel land preparation and development technologies • Plant protection diagnostics - Effective diagnosis of diseases and thereby managing diseases- • Quick identification of samples • Microbial arrays – Number of samples	

1.4. Implementation arrangements:

- Implementation arrangements will be done by Field Crops Research and Development Institute (FCRDI), Mahailluppallama in collaboration with Seeds and Planting Material Development Center (SPMDC).
- Technical specifications for procurement items will be prepared by the ASMP and FCRDI. Procurement will be done by the Ministry of Agriculture.

1.5. Operations

- The activities will be operationalized by the research and technical staff of respective institutes under the Ministry of Agriculture.
- Field activities will be conducted under the supervision of technical staff. Additional labor will be hired to complete project activities on timely manner.

1.6. **Expected Contribution from each party**:

1.6.1. ASMP: Financial support for the capital expenditure

1.6.2. DOA: Man power, existing infrastructure facilities, land, water and other resources

1.6.3. ISP: designing and implementation planning

1.6.4. Other (e.g., University) Operational support

1.7. Financial Analysis (Overall):

1.7.1. Total Project Cost: Rs. 250 Mn

1.7.2. Cost borne by the ASMP: Rs. 200 Mn

1.7.3. Cost borne by the DOA per year: 50 Mn

1.7.4. Financial Analysis: Cost benefits

- Discount rate is 7.5% for 5-year time period.
- Net present value is Rs. 5,142,386 and benefit cost ratio is 1.02
- Unit price for all the inputs and outputs are used based on present market values.
- Infrastructure facilities will be used for other research purposes. Above values were calculated excluding other benefits.
- The project is economically viable considering the positive net present value and benefit cost ratio

1.8. Risk and mitigation

Risk anticipated	Proposed mitigation measures
High pest and diseases incidences for Chili and Maize crops due to adverse weather conditions	Integrated pest management approaches coupled with fixing date of planting according to the weather forecasts of the DOA

1.9. Environment safeguard & social safeguard concerns: (including gender)

- Representation of both genders in each and every activity of the project will be ensured. Some activities preferred by female field workers such as hand pollination in Chili hybrid seed production, etc. will be entrusted specifically to them, as more efficient outputs can be expected.
- Standard cultivation practices including recommended agro-chemicals for pest (insect pests and weeds) and disease control, and recommended fertilizer application will be practiced while minimizing the negative impacts on environment, including soil and water pollution.

1.10. Sustainability

- After completion of the project implementation in the first year, the recurrent cost and maintenance costs for the facilities will be borne by the DOA through the annual budget allocations.

Annex 3: Design drawings of the subproject activities

1. **Specification and the estimation of the agro-wells construction**

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பிரதேச பொறியியலாளர் அலுவலகம் - மஹஇலுப்பள்ளம.
Divisional Engineer's Office - Mahaillupppallama.

NCP/MI/DE/02/02/03/05(2021)

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Provincial Engineering Department - NCP

BOQ FOR

Estimate for the Construction of 3 nos of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Maha Illuppallama

Divisional Engineer's Office
Provincial Engineering Department-NCP
Mahailluppallama.

Estimate for the Construction of 3 nos of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Maha Illuppallama

Description	No	Item	Amount
This estimate provide for all the cost of labour, materials,tools, transport and overhead etc. All as per detail in the body of the estimate and attached B.O.Q	1.0	Estimate cost	8,463,779.40
	2.0	Physical contigencies 10%	846,377.94
	3.0	Financial Contingencies 0.02%	169,275.59
	4.0	Engineering Consultancy fee 5%	423,188.97
		VAT - 8%	677,102.35
		Total Cost	10,579,724.25

Prepared By:

Signature

Name : E.N.S. EDIRISINGHE

Designation :

E.N.S. EDIRISINGHE
Sri Lanka Technological Service
Class II'B'(Technical Officer
Divisional Engineer's Office
Mahailluppallama

Checked & Recommended By :

(D.A.)

Signature

Name : U.L.R.G. WERAGODA

Designation :

U.L.R.G. WERAGODA
DIVISIONAL ASSISTANT
Divisional Engineer's Office
Mahailluppallama

Approved By:

(D.E.)

Signature

Name : H.M.R.M. ABERATHNA

Designation :

Eng.H.M.R.M. ABERATHNE
DIVISIONAL ENGINEER
Divisional Engineer's Office
Mahailluppallama

Estimate for the Construction of 3 nos of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Mahailluppallama

ITEM NO	DESCRIPTION	AMOUNT
1	PREUMINARY	205,000.00
2	EXCAVATION & EARTHWORK	544,014.10
3	MASON	1,546,004.00
4	CONCRETOR	92,466.70
5	BRICK LAYER	78,420.00
6	PLASTERER	89,355.00
7	MISCELLANEOUS	270,000.00
	TOTAL CIVIL COST	2,821,259.80

ITEM NO	DESCRIPTION	AMOUNT
1	For One Well	2,821,259.80
2	For 3 Nos Well	8,463,779.40

Estimate for the Construction of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Maha Iluppallama

1 PRELIMINARY

Instructions

(a) As per the instruction given by the Engineer following works should be complete.

Item No	Description	Unit	Quantity	Rate	Amount
1.1	Construct & maintain temporary building for consultancy site office (size not less than 10'X10') with cement paving & required facilities(Minimum facilities are Table, Chair, 4'x3' notice board, drinking water) as per the instruction given by Engineer.	Item Allow			50,000.00
1.2	Allow for Environmental Mitigation Measures	Provisional Sum			40,000.00
1.3	Allow for Supplying and erecting Project Sign Board - 01Nos (1800mm X 1200mm) as per plan and directed by Engineer / TO	Provisional Sum			30,000.00
1.4	Conducting Hydro Geological investigation to find suitable locations and submittion of report per each well including; a. Results of Geophysical investigation (Number of tested locations and most promising locations) b. Obtaining Water resource Board approval	Provisional Sum			30,000.00
1.5	Allow for Bank charges for Providing Security Bonds.	Provisional Sum			25,000.00
1.6	Allow for Premium of insurance for property materials at site, injures cause to workmen etc.	Provisional Sum			30,000.00
	Sub Total				205,000.00

2 EXCAVATION & EARTHWORK

Rates for Excavation and Earthwork shall include for:

(a) Trimming sides, keeping clean, leveling, grading and consolidating bottom of bases and trenches etc.

(b) Leveling and consolidating where required under slabs or sub-floor layers.

(c) Back filling and well ramming around foundation.

(d) Keeping all excavations free from storm or percolating water to keep excavation dry at all stages of construction.

(e) Any necessary additional excavation for working spaces, planking and strutting etc.

(f) Providing shoring work where necessary.

(g) Approval for constituent materials and test reports for properties of soil should be taken from Quality Control Engineer, Quality Control lab - Kekirawa with contractor's expense as request by the Engineer.

(h) Minimum one compaction test should be done for each and every 50 m3 or request by the Engineer, from Quality Control Engineer, Quality Control lab - Kekirawa

Item No	Description	Unit	Quantity	Rate	Amount
2.1	Earth Excavation in Sinking well from ground to 3m deep in any materials except rock requiring part return filling rammed and surplus disposed of with in site as directed	cum	158.1	986.00	155,886.60
2.2	Excavation in well in soft disintegrated rock (Not requiring Blasting) up to depth of 3.00m - 9.00m & depositing excavated materials to not Exceeding 3.00m	cum	244.3	1,425.00	348,127.50

2.3	Allow for Additional works of site clearing, Back filling For Consolidated As directed, Leveling Site Area & make clear for unloading construction materials arround the working area of well and make necessary drains & tyding up site as instruction given by engineer	Item allow	1	40,000.00	40,000.00
	Sub Total				**544,014.10**

3 MASON

Rates for Masonry work shall include for:

(a) All joggles, clamps, dowels, ties, and templates.
(b) Rough and fair cutting forming splays.
(c) Angles, reveals and returns.

Instructions :

(a) Cement used should be relevent SLS Certified Products for Masonry work or Engineer's instruction.
(b) Average crushing strength of 10 blocks shall be not less than 2.8 N/mm2 .
(c) One compressive strength, physical properties and water absorbtion test should be done for each and every 1000 units of blocks.

Item No	Description	Unit	Quantity	Rate	Amount
3.1	150-225mm Random Rubble Masonry in cement mortar 1:5 (Buttom up to 1.5 m)	cum	19	16,186.00	307,534.00
3.2	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 1.50m up to 3.00 m)	cum	19	16,995.00	322,905.00
3.3	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 3.00m up to 4.50 m)	cum	14	18,185.00	254,590.00
3.4	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 4.50m up to 6.00 m)	cum	14	19,458.00	272,412.00
3.5	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 6.00m up to 7.50 m)	cum	10.5	20,820.00	218,610.00
3.6	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 7.50m up to 9.00 m)	cum	10.5	16,186.00	169,953.00
	Sub Total				**1,546,004.00**

4 CONCRETOR

Grade of concrete used in the construction and recommended mixes as follows.

(a) Grade C20/25 Recommended Mix 1 : 1 ½ : 3 (20mm)
(b) Grade C16/20 Recommended Mix 1 : 2 : 4 (20mm)
(c) Grade C12/15 Recommended Mix 1 : 3: 6 (40mm)

Rate shall include,

(a) Mixing, hoisting, placing and compacting on the surfaces of any material or on formwork.
(b) Forming any construction joint and before concreting edge should be chipped and cleaned.
(c) Vibrating, curing and protecting concrete surfaces from harmful weather conditions.
(d) Forming slope on upper surfaces where required.
(e) Maximum water Cement ratio 0.55
(f) Making good after removal of form work.
(g) Curing should be done.

Instructions

(a) Prior approval for any concrete work should be taken from the Engineer.
(b) The sieve analysis test, silt content test, ect, reports should be submitted for approval of sand and aggregate, if concrete quantity exceed 50 m3, from Quality Control Engineer, Quality Control lab - Kekirawa with contractor's expense, otherwise approval should be taken from the Engineer.
(c) Cement used should be relevent SLS certified products approved for concrete or Engineer's instruction.
(d) Reinforcement and formwork paid separately where not mentioned.

(e) Any mix design should be approved from material testing laboratory - Kekirawa.

(f) One cube test report for properties of concrete should be taken for each and every 5 m3 of concrete, from Quality Control Engineer, Quality Control lab, Kekirawa

Item No	Description	Unit	Quantity	Rate	Amount
4.1	600X225 mm wall rings in R/F Cement con. 1:2:4 (20mm) With 4 nos of 12mm Tor- steel roads & 10mm Tor-steel Stirrup at 450mm c/c including formwork.	cum	3.7	24,981.00	92,466.70
	Sub Total				**92,466.70**

5 BRICK LAYER

Rates for Brickwork shall include for:

(a) Wetting well all the surfaces of the bricks before using.

(b) Plumbing angles.

(c) Normal straight cuttings.

(d) Ranking of joints for plastering.

(e) All the necessary scaffolding.

(f) Ranking of joints for plastering.

Instructions :

(a) Cement used should be relevant SLS Certified Products for Masonry work or Engineer's Instruction.

(b) Average crushing strength of bricks shall be not less than 4.8 N/mm2 .

(c) One compressive strength, physical properties and water absorbtion test should be done for each and every 50,000 units of bricks.

Item No	Description	Unit	Quantity	Rate	Amount
5.1	225mm thick brick work in cement - sand mortar 1:8 (up to first floor level)	cum	4	19,605.00	78,420.00
	Sub Total				78,420.00

6 PLASTERER

Rates for wall finishing shall include for:

(a) Temporary rules, screeds, ground etc.

(b) Ranking out joints of brickwork and backing concrete surface for forming key.

(c) Joints between different surfaces should be formed with chicken mesh or suitable bonding method.

(d) Forming arises and stopping against joinery work, metal work etc.

(e) Making good around pipes, sanitary fittings and fixtures.

(f) Straight cutting and raking cutting holes, notching and other sundries Labour of a like nature.

(g) Preparing sample panel of different finishes described below for the approval of the Engineer or Architect. Each panel not less than 0.5 m2 in area.

(h) Plastered area to be protected from sunlight to avoid cracking.

(i) Cement used should be relevant SLS Certified Products or Engineer's Instruction.

(j) The approval for sand should be taken from the Engineer.

Item No	Description	Unit	Quantity	Rate	Amount
6.1	20mm thick plinth plastering to circular wall in 1:3 cement - sand mortar finished smooth with neat cement floating	sqm	79.4	1,075.00	85,355.00
	Sub Total				**85,355.00**

7 MISCELLANEOUS

Instructions

(a) Prior approval for the type of barbed wire should be taken from the Engineer before using.

(b) Concrete post should be in grade 20 concrete

(c) Test should be done anytime request by the Engineer, from Quality Control Engineer, Quality Control Lab - Kokinawa, with contractor's expense

Item No	Description	Unit	Quantity	Rate	Amount
7.1	DeWatering (Pump outlet - 2 " or above)	Hour	400	675.00	270,000.00
	Sub Total				**270,000.00**

Provincial Engineering Department - NCP

BOQ FOR

Estimate for the Balance works of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Maha Illuppallama

Divisional Engineer's Office
Provincial Engineering Department-NCP
Mahailluppallama.

Estimate for the Balance works of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Maha Iluppallama

Description	No	Item	Amount
This estimate provide for all the cost of labour, materials,tools, transport and overhead etc. All as per detail in the body of the estimate and attached B.O.Q	1.0	Estimate cost	2,613,801.70
	2.0	Physical contigencies 10%	261,380.17
	3.0	Financial Contingencies 0.02%	52,276.03
	4.0	Engineering Consultancy fee 5%	130,690.09
		VAT - 8%	209,104.14
		Total Cost	3,267,252.13

Prepared By:

E.N.S. EDIRISINGHE
Technological Service
Technical Officer
Divisional Engineer's Office
Mahailuppallama

Signature

Name : E.N.S. EDIRISINGHE
Designation :

Checked & Recommended By :

(D.A.)

U.L.R.G. WERAGODA
DIVISIONAL ASSISTANT
Divisional Engineer's Office
Mahailuppallama

Signature

Name : U.L.R.G. WERAGODA
Designation :

Approved By:

(D.E.)

Signature

Name : H.M.R.M. ABERATHNA
Designation :

Eng.H.M.R.M. ABERATHNE
DIVISIONAL ENGINEER
Divisional Engineer's Office
Mahailuppallama

Estimate for the Balance works of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of PCRDI - Maha Illuppallama

ITEM NO	DESCRIPTION	AMOUNT
1	PRELIMINARY	205,000.00
2	EXCAVATION & EARTHWORK	336,556.00
3	MASON	1,546,004.00
4	CONCRETOR	92,466.70
5	BRICK LAYER	78,420.00
6	PLASTERER	85,355.00
7	MISCELLANEOUS	270,000.00
	TOTAL CIVIL COST	2,613,801.70

Estimate for the Balance works of Agriculture well (dia. 20', depth 30') at Yoda Ela Feild Area of FCRDI - Maha Illuppallama

1 **PRELIMINARY**

Instructions

(a) As per the instruction given by the Engineer following works should be complete.

Item No	Description	Unit	Quantity	Rate	Amount
1.1	Construct & maintain temporary building for consultancy site office (size not less than 10'X10') with cement paving & required facilities(Minimum facilities are Table, Chair, 4'x3' notice board, drinking water) as per the instruction given by Engineer.	Item Allow			50,000.00
1.2	Allow for Environmental Mitigation Measures	Provisional Sum			40,000.00
1.3	Allow for Supplying and erecting Project Sign Board (1800mm x 1200mm) as per plan and directed by Engineer / TO	Provisional Sum			30,000.00
1.4	Conducting Hydro Geological investigation to find suitable locations and submittion of report per each well including; a. Results of Geophysical investigation (Number of tested locations and most promising locations) b. Obtaining Water resource Board approval	Provisional Sum			30,000.00
1.5	Allow for Bank charges for Providing Security Bonds.	Provisional Sum			25,000.00
1.6	Allow for Premium of insurance for property materials at site, injures cause to workmen etc.	Provisional Sum			30,000.00
	Sub Total				205,000.00

2 **EXCAVATION & EARTHWORK**

Rates for Excavation and Earthwork shall include for:

(a) Trimming sides, keeping clean, leveling, grading and consolidating bottom of bases and trenches etc.

(b) Leveling and consolidating where required under slabs or sub-floor layers.

(c) Back filling and well ramming around foundation

(d) Keeping all excavations free from storm or percolating water to keep excavation dry at all stages of construction.

(e) Any necessary additional excavation for working spaces, planking and strutting etc.

(f) Providing shoring work where necessary.

(g) Approval for constituent materials and test reports for properties of soil should be taken from Quality Control Engineer, Quality Control lab - Kekirawa with contractor's expense as request by the Engineer.

(h) Minimum one compaction test should be done for each and every 50 m3 or request by the Engineer, from Quality Control Engineer, Quality Control lab - Kekirawa

Item No	Description	Unit	Quantity	Rate	Amount
2.1	Earth Excavation in Sinking well from ground to 3m deep in any metirials except rock requiring part return filling rammed and surplus disposed of with in site as directed	cum	36	986.00	35,496.00
2.2	Excavation in well in soft disintegrated rock (Not requiring Blasting) up to depth of 3.00m - 9.00m & depositing excavated materials to not Exceding 3.00m	cum	183.2	1,425.00	261,060.00

2.3	Allow for Additional works of site clearing, Back filling For Consolidated As directed; Leveling Site Area & make clear for unloading construction matirials arround the working area of well and make necessary drains & tyding up site as instruction given by engineer	item allow	1	40,000.00	40,000.00
	Sub Total				**936,956.00**

3 MASON

Rates for Masonry work shall include for:

(a) All joggles, clamps, dowels, ties, and templates.

(b) Rough and fair cutting forming splays.

(c) Angles, reveals and returns.

Instructions :

(a) Cement used should be relevent SLS Certified Products for Masonry work or Engineer's instruction.

(b) Average crushing strength of 10 blocks shall be not less than 2.8 N/mm2 .

(c) One compressive strength, physical properties and water absorbtion test should be done for each and every 1000 units of blocks.

Item No	Description	Unit	Quantity	Rate	Amount
3.1	150-225mm Random Rubble Masonry in cement mortar 1:5 (Buttom up to 1.5 m)	cum	19	16,186.00	307,534.00
3.2	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 1.50m up to 3.00 m)	cum	19	16,995.00	322,905.00
3.3	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 3.00m up to 4.50 m)	cum	14	18,185.00	254,590.00
3.4	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 4.50m up to 6.00 m)	cum	14	19,458.00	272,412.00
3.5	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 6.00m up to 7.50 m)	cum	10.5	20,820.00	218,610.00
3.6	150-225mm Random Rubble Masonry in cement mortar 1:5 (since to bottem 7.50m up to 9.00 m)	cum	10.5	16,186.00	169,953.00
	Sub Total				**1,546,004.00**

4 CONCRETOR

Grade of concrete used in the construction and recommended mixes as follows.

(a) Grade C20/25 Recommended Mix 1 : 1 ½ : 3 (20mm)

(b) Grade C18/20 Recommended Mix 1 : 2 : 4 (20mm)

(c) Grade C12/15 Recommended Mix 1 : 3: 6 (40mm)

Rate shall include,

(a) Mixing, hoisting, placing and compacting on the surfaces of any material or on formwork.

(b) Forming any construction joint and before concreting edge should be chipped and cleaned.

(c) Vibrating, curing and protecting concrete surfaces from harmful weather conditions.

(d) Forming slope on upper surfaces where required.

(e) Maximum water Cement ratio 0.55

(f) Making good after removal of form work.

(g) Curing should be done.

Instructions

(a) Prior approval for any concrete work should be taken from the Engineer.

(b) The sieve analysis test, silt content test, ect. reports should be submitted for approval of sand and aggregate, if concrete quantity exceed 50 m3, from Quality Control Engineer, Quality Control lab - Kelaniawa with contractor's expense, otherwise approval should be taken from the Engineer.

(c) Cement used should be relevent SLS certified products approved for concrete or Engineer's instruction.

(d) Reinforcement and formwork paid separately where not mentioned.

(e) Any mix design should be approved from material testing laboratory - Kelaniawa.

(f) One cube test report for properties of concrete should be taken for each and every 5 m3 of concrete, from Quality Control Engineer, Quality Control lab, Kelaniawa

Item No	Description	Unit	Quantity	Rate	Amount
4.1	600X225 mm well rings in R/f Cement con. 1:2:4 (20mm) With 4 nos of 12mm Tor- steel roads & 10mm Tor-steel Stirrup at 450mm c/c including formwork.	cum	3.7	24,991.00	92,466.70
	Sub Total				92,466.70

5 BRICK LAYER

Rates for Brickwork shall include for:

(a) Wetting well all the surfaces of the bricks before using

(b) Plumbing angles.

(c) Normal straight cuttings.

(d) Ranking of joints for plastering.

(e) All the necessary scaffolding.

(f) Ranking of joints for plastering.

Instructions :

(a) Cement used should be relevent SLS Certified Products for Masonry work or Engineer's Instruction.

(b) Average crushing strength of bricks shall be not less than 4.8 N/mm2.

(c) One compressive strength, physical properties and water absorbtion test should be done for each and every 50,000 units of bricks.

Item No	Description	Unit	Quantity	Rate	Amount
5.1	225mm thick brick work in cement - sand mortar 1:8 (up to first floor level)	cum	4	19,605.00	78,420.00
	Sub Total				78,420.00

6 PLASTERER

Rates for wall finishing shall include for:

(a) Temporary rules, screeds, ground etc.

(b) Ranking out joints of brickwork and backing concrete surface for forming key.

(c) Joints between different surfaces should be formed with chicken mesh or suitable bonding method.

(d) Forming arises and stopping against joinery work, metal work etc.

(e) Making good around pipes, sanitary fittings and fixtures.

(f) Straight cutting and raking cutting holes, notching and other sundries Labour of a like nature.

(g) Preparing sample panel of different finishes described below for the approval of the Engineer or Architect. Each panel not less than 0.5 m2 in area.

(h) Plastered area to be protected from sunlight to avoid cracking.

(i) Cement used should be relevent SLS Certified Products or Engineer's Instruction.

(j) The approval for sand should be taken from the Engineer.

Item No	Description	Unit	Quantity	Rate	Amount
6.1	20mm thick plinth plastering to circular wall in 1:3 cement - sand mortar finished smooth with neat cement floating	sqm	79.4	1,075.00	85,355.00
	Sub Total				85,355.00

7 MISCELLANEOUS

Instructions

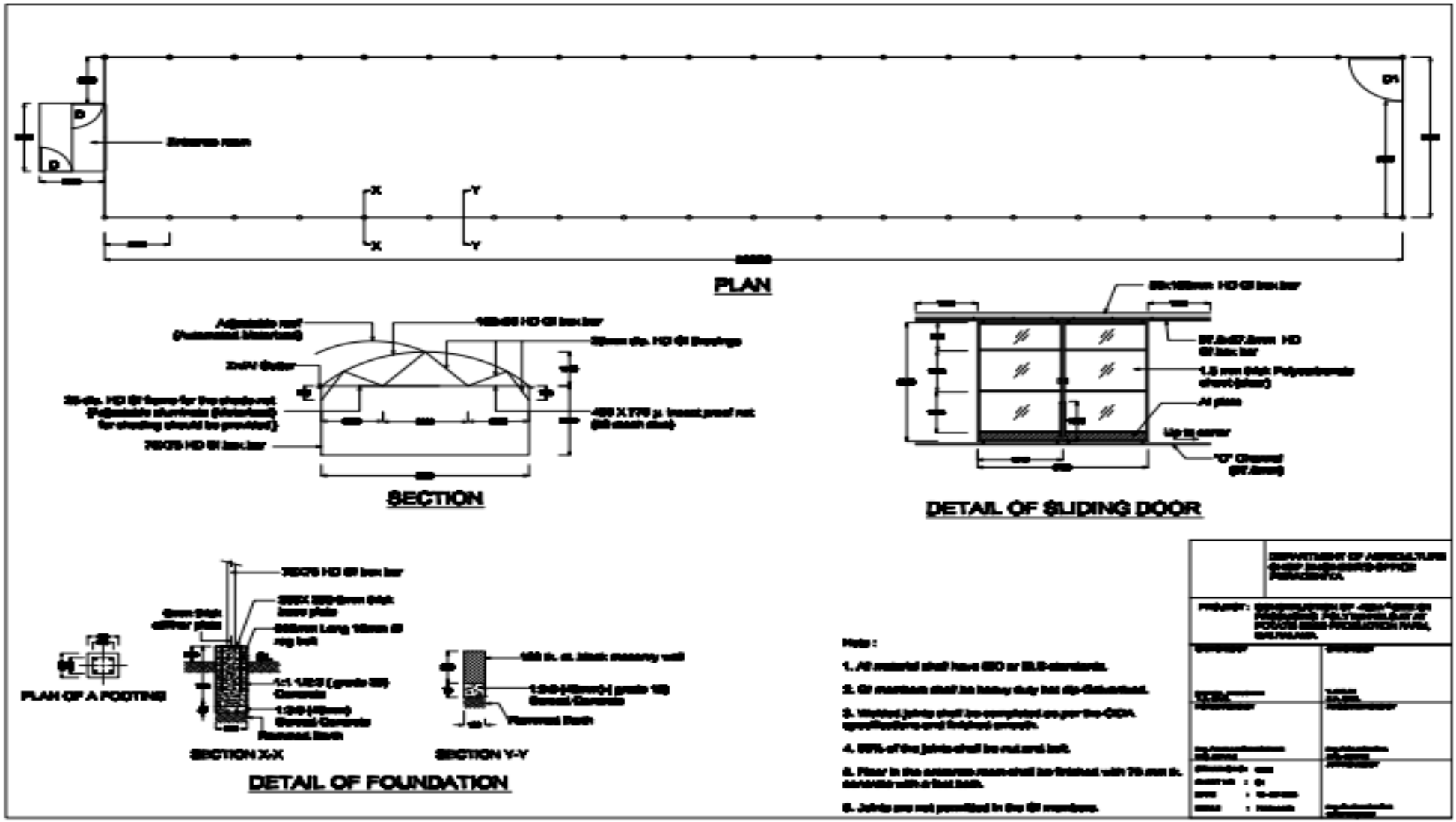
(a) Prior approval for the type of barbed wire should be taken from the Engineer before using.

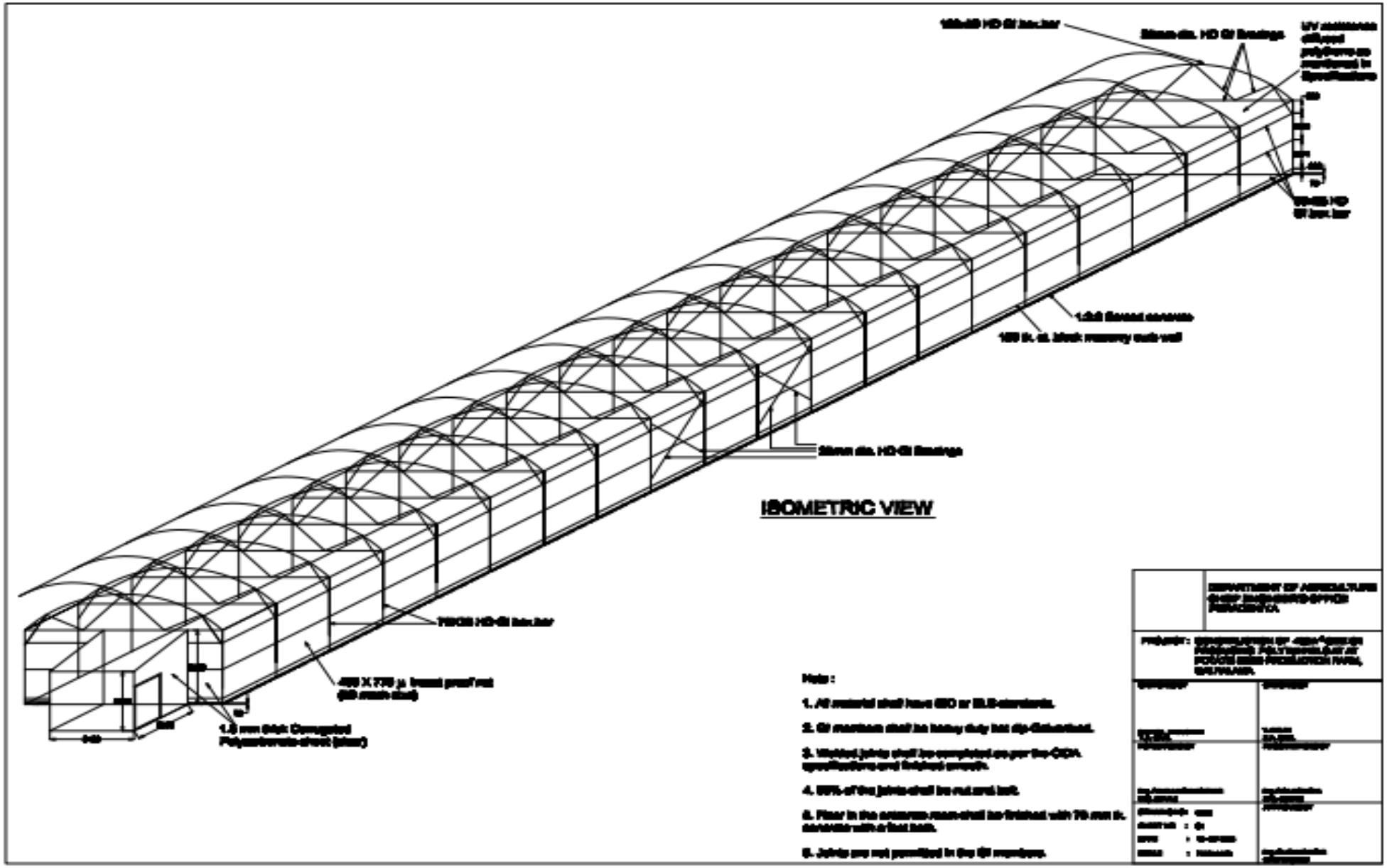
(b) Concrete post should be in grade 20 concrete

(c) Test should be done anytime request by the Engineer, from Quality Control Engineer, Quality Control Lab - Kakamega, with contractor's expense.

Item No	Description	Unit	Quantity	Rate	Amount
7.1	De-Watering (Pump outlet - 2" or above)	Hour	400	675.00	270,000.00
	Sub Total				**270,000.00**

2. Designs of Controlled environment polytunnels




ISOMETRIC VIEW
Note :
1. All material shall have ISO or BIS standards.
2. GI members shall be heavy duty hot dip Galvanized.
4. 100% of the joints shall be nut and bolt.
6. Joints are not permitted in the GI members.

Annex 4: Interim Guidelines on COVID-19 of World Bank

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

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

1. INTRODUCTION

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

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

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

2. CHALLENGES WITH CONSTRUCTION/CIVIL WORKS

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

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

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

3. DOES THE CONSTRUCTION CONTRACT COVER THIS SITUATION?

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

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

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

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

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

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

4. WHAT PLANNING SHOULD THE BORROWER BE DOING?

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

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

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

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

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

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

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

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

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

5. WHAT SHOULD THE CONTRACTOR COVER?

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

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

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

(a) ASSESSING WORKFORCE CHARACTERISTICS

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

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

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

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

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

(c) GENERAL HYGIENE

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

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

(d) CLEANING AND WASTE DISPOSAL

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

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

(e) ADJUSTING WORK PRACTICES

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

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

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

(f) PROJECT MEDICAL SERVICES

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

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

(g) LOCAL MEDICAL AND OTHER SERVICES

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

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

(h) INSTANCES OR SPREAD OF THE VIRUS

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

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

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

(i) CONTINUITY OF SUPPLIES AND PROJECT ACTIVITIES

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

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

(j) TRAINING AND COMMUNICATION WITH WORKERS

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

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

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

(k) COMMUNICATION AND CONTACT WITH THE COMMUNITY

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

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

6. EMERGENCY POWERS AND LEGISLATION

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

- Declaring a public health emergency

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

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

ANNEX

WHO Guidance

Advice for the public

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

Technical guidance

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

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

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

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

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

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

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

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

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

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

ILO GUIDANCE

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

MFI GUIDANCE

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

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

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