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விவசாய நவீனமயமாக்கல் திட்டம்
Agriculture Modernization Project

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Sri Lanka Agriculture Sector Modernisation Project (ASMP)

ENVIRONMENTAL SCREENING REPORT

FOR

CLUSTER DEVELOPMENT PLAN FOR HYBRID MAIZE SEED PRODUCTION IN VAVUNIYA

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

Submitted: 3 December 2022

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Abbreviations

AEZ.....Agroecological zone
ASD .....Agrarian Services Department
AQI .....Air Quality Index
ASMP .....Agriculture Sector Modernisation Project
ATDP .....Agriculture Technology Demonstration Parks
CDP .....Cluster Development Plan
CEA .....Central Environmental Authority
DCO.....Distributary Canal Organisation
DoA.....Department of Agriculture
DS.....Divisional Secretary
DWLC .....Department of Wildlife Conservation
EPL.....Environmental Protection License
EU.....European Union
FO.....Farmers' organisation
FPO .....Farmer Producer Organisation
GAP .....Good Agricultural Practices
GN .....Grama Niladhari
IPM .....Integrated pest management
IPNS .....Integrated Plant Nutrition System
LA .....Local Authority
LKR.....Sri Lankan Rupee
MoA .....Ministry of Agriculture
MoH .....Medical Officer of Health
O&M .....Operation and maintenance
OFC .....Other food crops
PCR .....Physical Cultural Resource
PMP .....Pest management plan
PMU.....Project Management Unit
PPMU .....Provincial Project Management Unit
RDA .....Roads Development Authority
RPM.....Resident Project Manager
SMP .....Social Management Plan
UP.....Uva Province
WB.....World Bank
WHO.....World Health Organisation

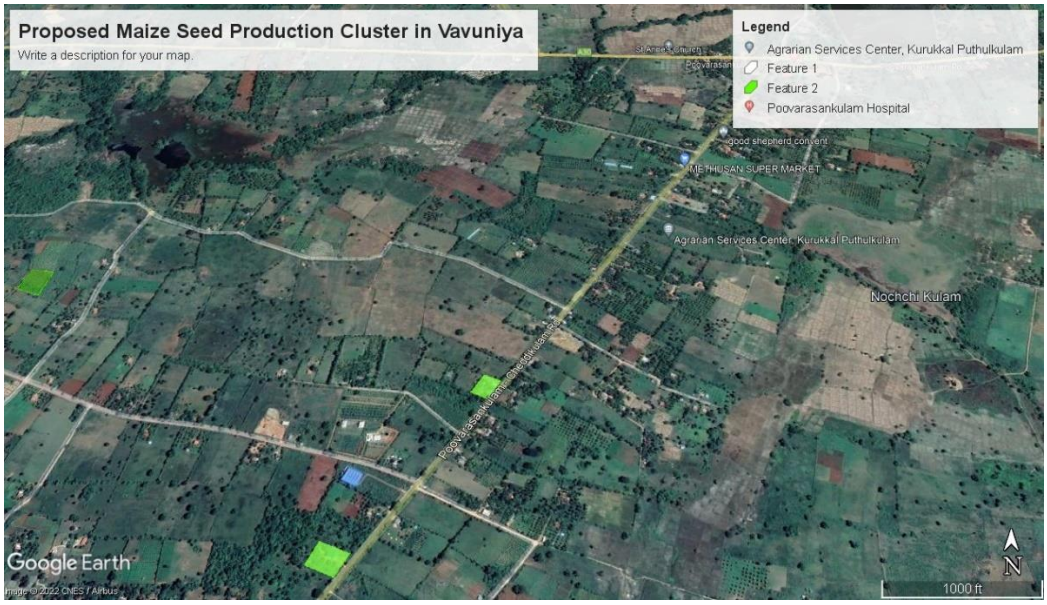
ASMP

ENVIRONMENTAL SCREENING REPORT

1. PROJECT IDENTIFICATION

Project title	Hybrid Maize Seed Production Cluster in Vavuniya District (Vavuniya and Vengadachettikulam DSDs)
Project proponent	Project Management Unit, ASMP, MoA

2. PROJECT LOCATION

Location *(Relative to the nearest town, highway)*	Hybrid Maize Seed Production Cluster in Vavuniya district will be implemented in Vavuniya and Vengadachettikulam Divisional Secretariat Divisions. According to the feasibility study conducted, this area has been recognised as the most feasible areas in Vavuniya District. The location of Vavuniya between 5° 55' to 9° 51' North latitude and between 79° 42' to 81° 53' East longitude. In the initial stage cluster will be formed in Poovarasamkulam GND in Vevuniya and Kurukkalputhukkulam GND in Vengadachettikulam DSDs (Figure 1) and from next season onwards the area will be spread within the said DSDs to get about 300 farmers. 

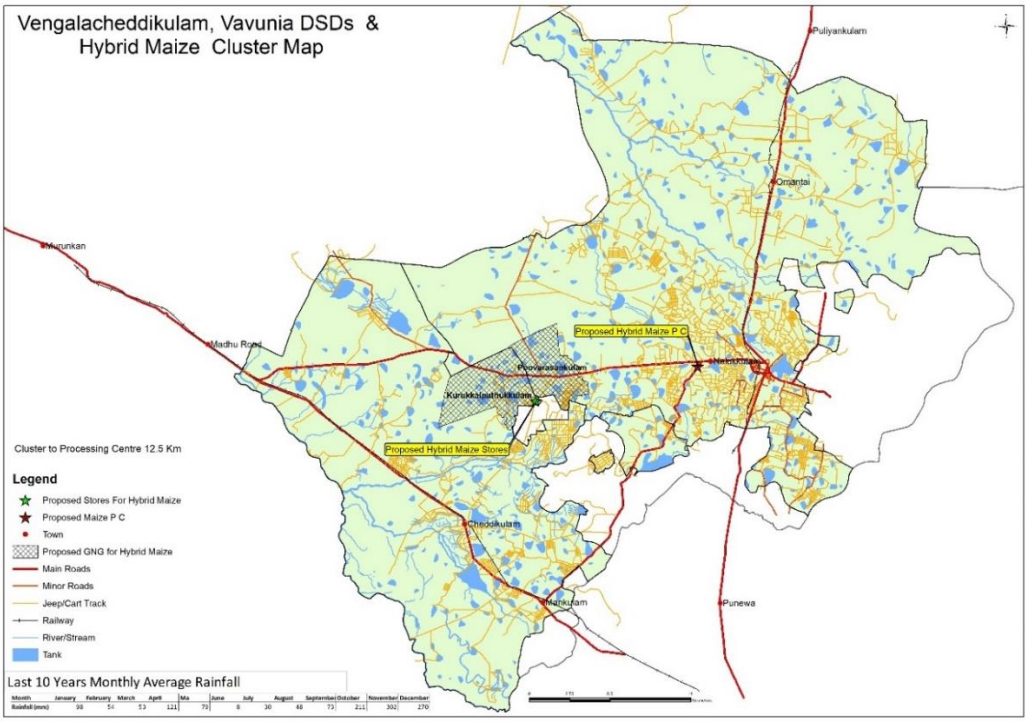


Figure 1: Proposed Maize Seed Production area in Vavuniya

Particularly these two GNDs are located adjoining to each other. These two GNDs are located along A30 Vavuniya-Mannar road at the chainage 15+km where Poovarasamkulam-Cheddikulam road starts. Poovarasamkulam-Cheddikulam road separates the two GNDs and two DSDs. There is about 8km to Cheddikulam.

Definition of cluster area

(*The geographical area of the project and areas affected during construction)*

Vavuniya and Vengadachettikulam Divisional Secretariats are located in Vavuniya district where it is bordering to Madu, Medawachchiya, Welioya, Vavuniya North, and Vavuniya South. Vavuniya DS Division consist of 42 GNDs and Vengadachettikulam DS division is consisted of 20 GN Divisions. Vavuniya DSD extent is about 640.86 sq.km and Vengadachettikulam extent is about 412.98 sq.km. This Maha-2022 season will only target for 50 Acres (50 farmers) from both Kurukkalputhukkulam and Poovarasamkulam GNDs. Due to the limitation of planting material 50 leading farmers with 50 acres have been selected for collective production under the cluster to contribute to the needs of the country in Maha season. Most suitable areas with maximum number of farmers in the same area with the size of 1.0 acre each plot have already been chosen. Next season, Yala – 2023, will expand the cluster area to entire both GNDs for 300 Acres (300 farmers).

Further, there are rural roads in both GNDs and processing centre location in Nelukkulam and Poovarasamkulam identified for improvement which will be assessing separately.

Adjacent land and features

Vavuniya and Vengadachettikulam Divisional Secretariats are located in Vavuniya district where it is bordering to Madu, Medawachchiya, Welioya, Vavuniya North, and Vavuniya South. Vavuniya DS Division consist of 42 GNDs and Vengadachettikulam DS division is consisted of 20 GN Divisions. Vavuniya DSD extent is about 640.86 sq.km and Vengadachettikulam extent is about 412.98 sq.km.

In Vengadachettikulam, there is 11,510 Ha under dense forest which is nearly 29 % of the total land area of this division. Open forest accounts 3.2 and there is no forest reserved in this area. In Vavuniya, the land area can be divided into 32280.3 Ha and 30876.1 Ha belongs to government and private land owners respectively. Out of the total land area of Vavuniya 51.11% are Government land and the

remaining 48.89% are belongs to private land owners. 36.41% of the land of the Vavuniya division is forest area. There are eight minor tanks and one major tank located within the selected cluster area.

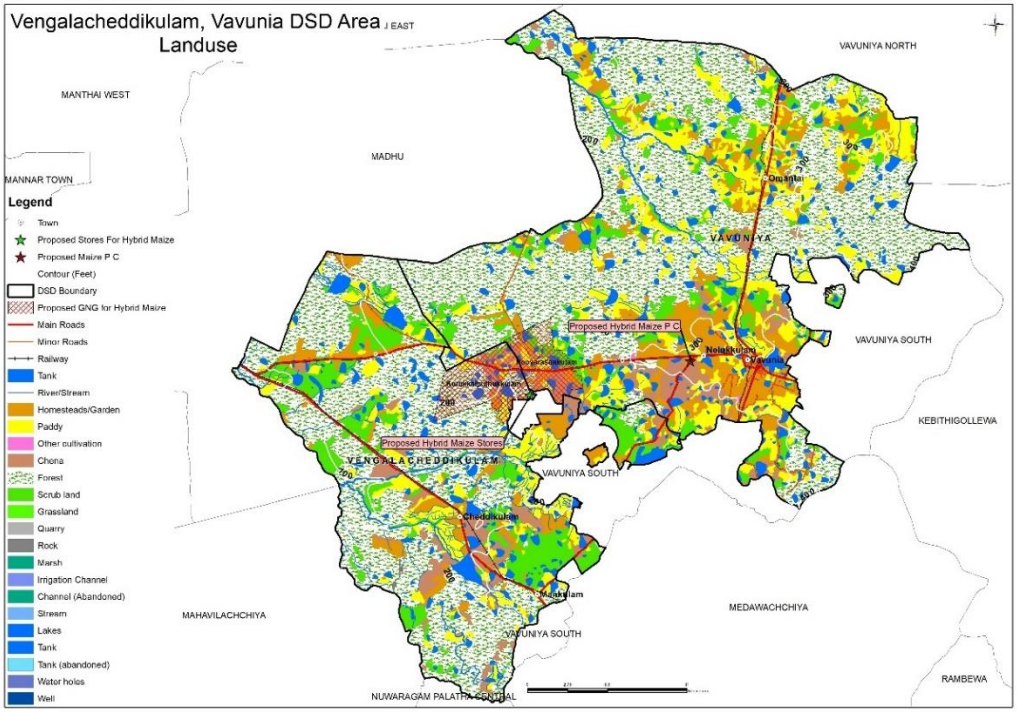


Figure 2: Land Use Pattern of Padiyathalawa

Main economic base of the people living in the area is Agriculture and mostly Mung, Black grame, green grame, Cowpea, Paddy, other fruit crops and chena cultivations are prominent. Further, livestock industry is prominent in the area. The land use pattern of these two DSDs are given below:

Table 1: Land Use Pattern in Cluster area

	Area (Ha)	
Land Use Type	**Vavuniya**	**Vengadachettikulam**
Paddy	10501.01	4,614.00
Chena	2680.34	3,593.00
Homesteads/Garden	7996.29	4,618.00
Builtup areas		140.00
Other cultivation	30.28	336.00
Forest	31254.58	20,761.00
Scrub land	5321.42	3,316.00
Barelands		136.00
Rock		34.00
Marsh	5.90	5.00
Waterbodies	3930.05	3246.00
Total Area	**61719.88**	**40,798.00**

Source: Resource Profile, 2021

There are eight minor tanks and one major tank located within the cluster area namely Poovarasamkulam, Kurukkalputhukkulam, Maniar kulam, Helambagas wewa, Pemaduwa kulam, Salambai kulam and many more small tanks. There are no major irrigation systems within the cluster area. These tanks are small tanks belongs to Agrarian Services Department.

	Kurukkalputhukkulam proposed forest area is within selected GNDs and there are few more forest patches located in Poovarasamkulam and Kurukkalputhukkulam GNDs.

3. PROJECT JUSTIFICATION

Need for the project *(What problem is the project going to solve)*	Maize second main important cereal crop which mainly provide essential ingredient to animal feed processing industry while catering to the countable number of value-added human food. Food and nutrition security of the country, especially protein market of the country heavily depends on availability of maize as key feed ingredient. Extent of cultivation and volume production trend shows positive increasing trend over the last decades. Entire industry collapsed due to the recent government policy on organic agriculture along with import ban of fertilizer and agro-chemicals. On the other hand, restrict maize imports as a fiscal management policy badly affected on animal feed production industry of the country. Therefore, re-establish the crippled maize production industry is essential to cater the crying need of the animal feed industry. When hybrid maize production in Badulla, Vavuniya, Ampara and Kilinochchi districts are considered, the Badulla and Ampara districts have recorded higher yield than that of other two districts in Yala and Maha seasons. Maize production in Vavuniya and Kilinochchi districts is not very popular and they cultivate other crops instead of maize. Maize seed requirement of Sri Lanka is largely fulfilled by the imports. Apart from seed imports, maize and related products are also imported to Sri Lanka. Although Sri Lanka imports more than 100000 MT of maize in 2019, it has sharply dropped to 28000 tons in 2020. Surprisingly, in 2020, Sri Lanka allowed importing wheat grains for animal feed and introduced it as an import quota of 185,000 MT of wheat grains. This initiative was made by the government to compensate the local corn production shortfall eventually filling 170,000 MT of the authorized quota volume. Sri Lanka also authorized subsequently an additional import quota of 100,000 MT for the April 15 through July 31, 2021, period. Import quota for wheat grains was said to be introduced as domestic corn production is unlikely to increase quickly enough in the short-term to meet the animal feed milling industry's demand. According to FAO (2021), annual growth rate of maize is around 16.73 percent. However, the overall productivity of maize is not in a satisfactory condition and has not been adequate to meet the increasing local demand. As a result, maize imports have been taking place. FAO (2021) further shows that approximately 98 to 99 percent of the hybrid maize seeds widely used by farmers for cultivation are imported. Although the Department of Agriculture (DoA) has already developed four local hybrids of which characters and yield parameters are comparable with imported hybrids, the use of local hybrid seeds among farmers are low as a result of the non-availability of local hybrid seed materials in required quantities in the local markets. The yield of local hybrid varieties is in par with those of imported varieties and average yield is around 5.5-6.5 metric tons per hectare. And the potential yield has been estimated to be 7.5-8.5 metric tons per hectare. Those hybrid varieties have been named as MI (III), MI (IV) and MI (V). In 2020, Sri Lanka has imported more than 1600 metric tons of maize seeds. Therefore, country like Sri Lanka should now turn to import substitution and save the foreign exchange. In this process, local hybrid seed production has important implications towards Sri Lankan economy. As a result, the Agriculture Sector Modernization Project intends to introduce hybrid maize seed production choosing 150 farmers from Badulla, Vavuniya, and Kilinochchi. Through this initiative above 150 acres of land are to be allocated for seed production. The

	expected seed yield from 150 farmers would be about 100 metric tons. Therefore, ASMP expects to check the feasibility of seed production in these 3 districts through data collected from the relevant stakeholders and secondary sources.
Purpose of the project *(What is going to be achieved by carrying out the project)*	According to the above scenario, government of sri lanka want primarily to substitute importation of maize seed. However, DOA has parental material for 150 acres at the moment. Therefore, ASMP under this cluster plan to start maize seed production cluster initially with 150 Acres and next season with multiplied seeds extend the cluster up to 1500 acres. Accordingly, followings can be achieved through the cluster: 1. Substitution of importation of Maize Seed 2. Save foreign exchange 3. Boost the animal feed industry in Sri Lanka 4. Increase the protein sources of poors and increase access to protein of sri lankans 5. Introduced modern technologies for post-harvest practices with intention of sustainability (water, energy, etc) 6. Capacity build of Maize Farmers specially with deep technical training on seed production and close monitoring 7. Develop the farmers into established business focussing seed production
Justifications and Alternatives considered *(Different ways to meet the project need and achieve the project purpose)*	Cultivation of Hybrid Maize for seed production will help to upgrade their living standard up to a certain extent. Small land sizes are not enough to sustain. Minimum land extent of one acre needs for seed cultivation, in the same time they have to continue the other vegetable seed production also (about ¼ an acre of land extent). It is essential to shift to higher value crops with value addition to ensure the large-scale income. Soil type, Rainfall, Relative Humidity, land availability, farmers' experience and willingness of farmers have been considered as selection criteria. Different soil types in one divisional secretary division available and couldn't find the soil types relevant Grama Niladhari divisions and Rain fall also the same. Farmers' experience and willing ness identified through the rapid discussions with farmers. Considering three main categories namely Soil type, Rainfall and farmer willingness and experience most suitable, suitable and not suitable areas identified and mentioned in above table. Vavuniya and Vengadachettikulam are most suitable areas for Maize seeds cultivation. However, Vavuniya district has more than 40% of Forest Cover in total, which needs to be considered during selection of lands and farmers. Selected GNDs would be ideal in terms of agronomy as Maize Seed cultivation should maintain an isolation distance of minimum about 600m as long as forest areas are not distrubed. Water resources in the district has severe stress and therefore, water conserving methods should be introduced in terms of using water resources in a sustainable manner. Introduction of sprinkler irrigation system will reduce the amount of water required. Use of precision methods will reduce the wastage. Selection of farmers in this area should be carefully and transparently carried out to reduce the biasness which will lead to issues in social cohesiveness. In addition, human-elephant conflict and damages to cultivations are higher in Vavuniya South, Vavuniya and some parts of Vavuniya. Hence, proactive measures should be arranged.

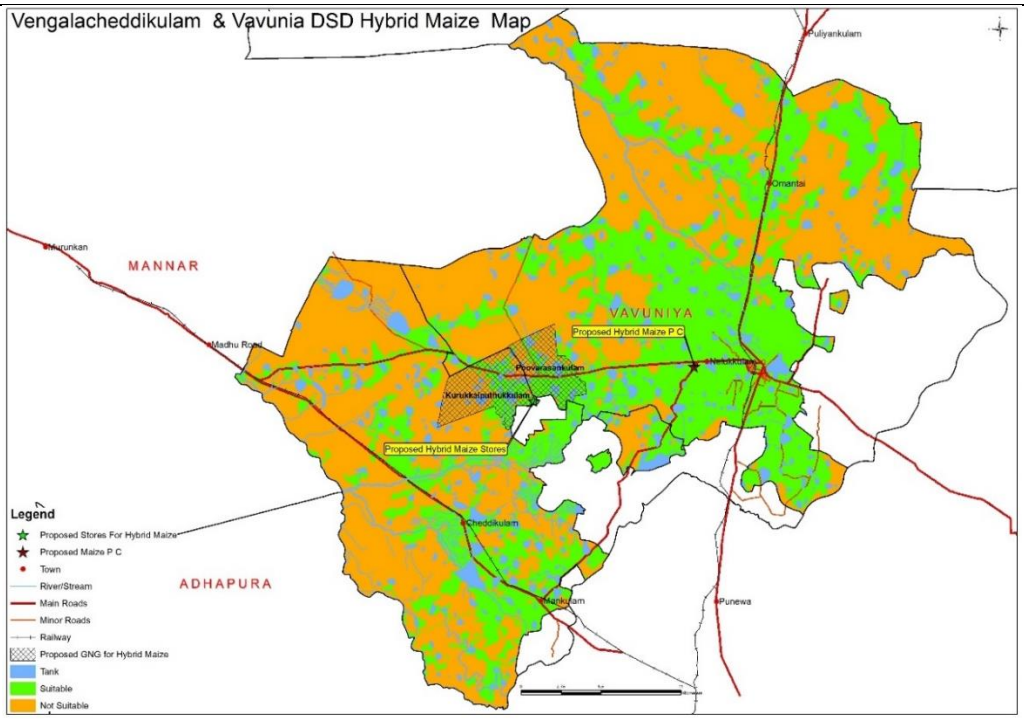


Figure 3 : Suitability Map of Vavuniya and Vengadachettikulam

Table 2: Suitability chart

Area	Soil type			Rainfall			Farmers experience			Environmental			Social			Overall Suitability
	Most suitable	Suitable	Not suitable	Most suitable	Suitable	Not suitable	Most suitable	Suitable	Not suitable	Most suitable	Suitable	Not suitable	Most suitable	Suitable	Not suitable	
Vavuniya	√			√			√				√		√			**Most suitable**

Table 3: Comparative Assessment - Available Infrastructure & Processing Facilities

Interested Area	Vavuniya	Derived on
Sample Size - No of farmers	17	Participants
Infrastructure Availability		
Field Access Road Condition	2	Nos.
Availability of national grid Connection	1	Nos.
Availability of Water Sources	2	Nos.
Conclusion	Less Favorable	
Availability of Own Maize Farming Machineries		

	Tractors - 4 Wheel	4	Nos.
	Maize Seeders	2	Nos.
	Weeding Machines	2	Nos.
	Chemical Sprayers	3	Nos.
	Water Pumps	4	Nos.
	Conclusion	Favorable	
	Availability of Hire-out Maize Seed processing machineries and lab testing facilities		
	Shelling Machines	2	Nos. & Distance
	Grader (Paddy Grader Machine)	4	Nos. & Distance
	Seed Coating Machine	3	Nos. & Distance
	Lab Facilities	1	Nos. & Distance
	Conclusion	Less Favorable	
	Availability of abandoned government buildings for processing and storing facilities	Least Favorable	Distance & Required rehabilitation works
	Technical Know-how on Agri Machineries	Less Favorable	Nos.

Legal framework and WB Safeguards Policies

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

#	Permit/ Clearance	YES	NO	TBD	Remarks
1	The National Environmental Act. No. 47 of 1980 & its amendments		√		None of the proposed activities are coming under prescribed activities
2	Agrarian Service Department Act No. 58 of 1979	√			Use of water from minor irrigation systems should be with the approval of ASD
3	Forest Ordinance including Amendments	√			Including Kurukkalputhukkulam Proposed Forest reserve, there are few forest areas within the cluster area. Forest area should be avoided including buffer zones during land selection. FD consultation should be conducted.
4	Soil Conservation (Amendment) Act No. 24 of 1996	√			Any activity which increases the erosion of soil or potentials for activate erosion potential need to take maximum mitigation measures to control soil erosion and apply soil conservation measures wherever applicable

World Bank safeguards policies triggered by the project

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

4. PROJECT DESCRIPTION

Proposed start date	October 2022
Proposed completion date	December 2024
Estimated total cost	LKR 397,100,000
Present land ownership	Private Lands with Deeds, Permits and Leased Processing Centre – Department of Agriculture
Description of the project *(With supporting material such as maps, drawings etc attached as required)*	Once the Farmer Company is established the farmers are entitled to receive some benefits under the financing and service program of ASMP.

Table 4: Agriculture Productivity Improvement Measures

Draw backs	Reasons for drawbacks	Remedies to overcome drawbacks
Low yields against potential	Poor land utilization	Introduce systematic training program. Proper monitoring methodology. Introduce methods to test soils and manage the soil. Should be addressed to the all deficiencies of the soil. Introduce new chemical packages to increase photosynthesis and get more yield. Introduce proper land preparation, fertigation, weeding, watering with modern technology. Introduce organic fertilizer preparation unit. IPM practices.
	Poor fertilizer usage	
	Poor water usage	
	Poor land preparation practices	
	Poor crop maintenance	
	Poor weed control	
	Poor pest and disease management	
	Poor soil management	

	Inefficient labour management	Modern and appropriate technology to minimize the labour usage.
Quality of the product	Poor knowledge about the markets and demand	Properly train them as a company, how to link with market, how to build rapport and continue. New technology introduces with relevant implements like computers, Apps etc.
	No idea about the customer expectation	After having understanding with buyers, the FC can have buyers' all the expectation and work accordingly. We should facilitate for this.
	Poor knowledge about the quality and improvement	
Less adoptability to modern technology.	Poor knowledge about the modern technology	Improve the quality of training using different videos, exposure visits etc.
	Scarcity of capital	The project can help to the FCs on this matter. Local manufacturers can be introduced to FCs. If locally not available the project can import those
	Purchasing difficulties	
	Not appropriate technology	

Seeding for Maha 2022 will be started before end of October 2022.

Table 5: Training and Capacity building

Training number	Target group	Areas to be considered ***
01	Farmers and relevant officers.	Improve the awareness of the project and the product going to be produced.
02	Relevant Officers in the selected area.	All advanced technical points of product as well as the process.
03	Selected farmers for the cluster.	Soil, soil structure, soil conservation, and importance of the organic matter. IPM practices. Record keeping.
04	Selected farmers for the cluster.	Land preparation and depth of LP. Organic matter and basal fertilizer application. Importance of the high-quality seeds, seeding and importance of the seed treatment etc.

			Watering and why we water.
	05	Selected farmers for the cluster.	Weeds and weeding, Top dressings of fertilizer, relationship watering and fertigation. Guiding of plants (removing male flowers of female plants). Sunshine and Photosynthesis.
	06	Selected farmers for the cluster.	Pest and disease management, harvesting drying and transport.
	07	Discussion of success stories.	Effectiveness of correct implementing of technical things.

***Trainers from the DOA under MOA (Breeders, Crop leaders, IPM specialists, Soil and nutrient specialist)

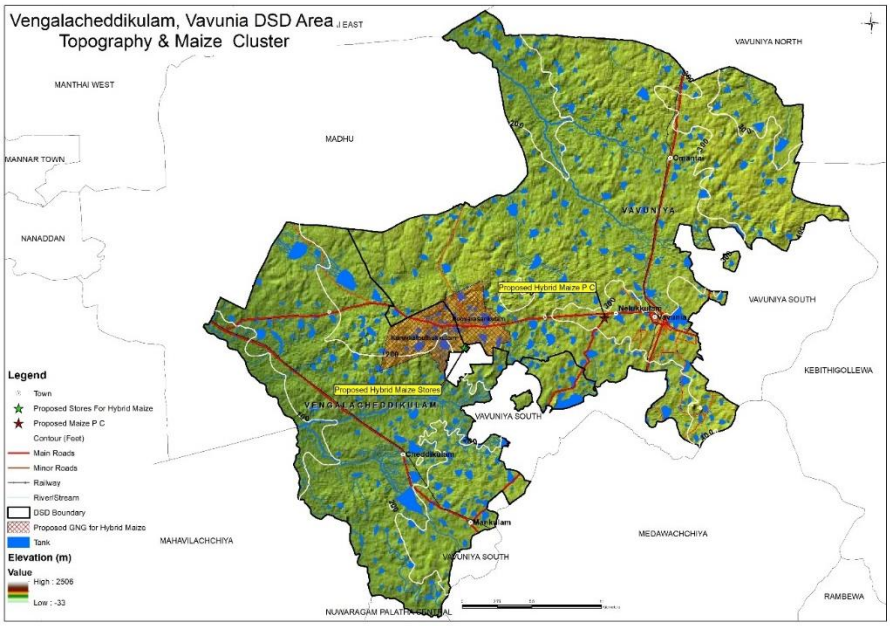
No agro-wells and tube wells proposed in the cluster.

In addition to agriculture improvements, establishment of Public Unlisted Company for the cluster farmers to ensure the sustainability of the cluster, Value chain development, farmer mechanization with modern technology, introduction of modern irrigation systems, improvements of selected rural roads and maize seed processing centre. Environmental screening for all infrastructure developments will be undertaken separately.

Project Management Team	A PMU was established under the MOA to implement proposed project activities. Contact Persons Project Director ASMP, MOA 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/ Deputy Project Director – Northern Province No. 340, Point Pedro Road, Anaipanthy, Jaffna. Environmental and Social Safeguards Specialist ASMP, MOA 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 Consultations had with DD-DOA, AI, and Farmer Organizations' leaders. In terms of developing the Hybrid Maize Seed Production Cluster, required all services and related implications were discussed. DOA-AIs will support in selection of farmers for Maize Seed Production. FD should be consulted in terms of Kurukkalputhukkulam proposed forest reserve. In addition, discussed the way of implementing the activities environmentally and socially accepted manner. DOA, was fully appreciated the initiatives and their fullest cooperation agreed to provide.

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 Physical features	
Topography and terrain	The location of Vavuniya between 5° 55' to 9° 51' North latitude and between 79° 42' to 81° 53' East longitude. It is located 90m above the sea Level. The relief of the district varies from 100 – 200m above MSL. Generally, the area comprises flat terrain with small scattered hillocks present as inselbergs. The topography becomes more pronounced in SE sector while a flat terrain is identified in rest of the areas within the district.  Figure 4: Topography of Vavuniya and Vengadachettikulam
Soil (type and quality)	Vavuniya and Vengadacheddikulam DS divisions (In Vavuniya district) falls under Agro – ecological zones of Dry Zone Low country (DL1b, DL1e, DL1f and DL3). Total land area of the DSD is 21,084 ha and out of that 17,870 ha (85%), 3,213 ha (15%) fall under DL1b, Dl1e respectively.

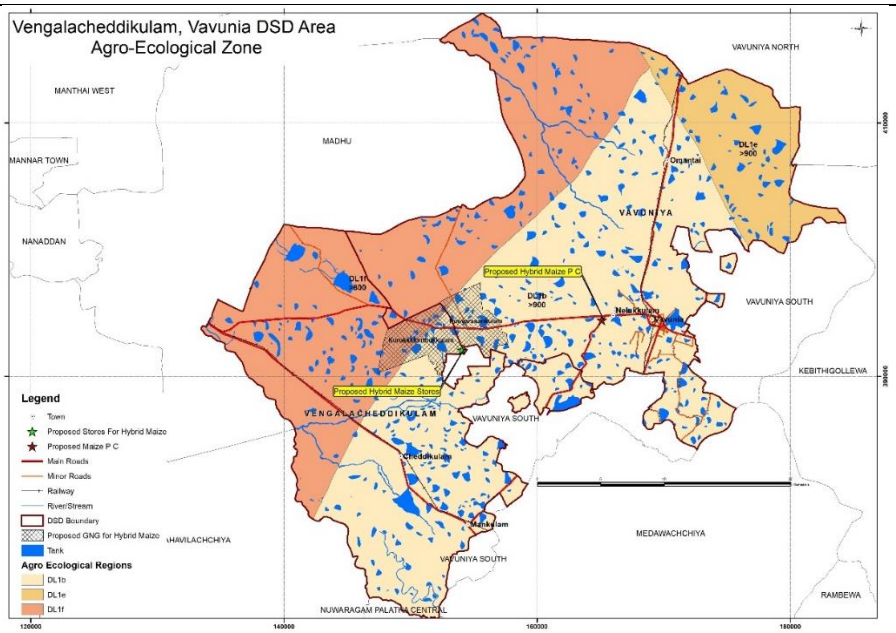


Figure 5: Agro-ecological Regions of Vavuniya and Vengadachettikulam

Soil types and land Terrain also differ according to the Ecological region and Table 6 & 7 expresses that clearly.

Table 6: Soil types in Vavuniya DSD

Agro – Ecological region	Soil types
DL1b	RBE, LHG
DL 1e	RBE, LHG
DL1f	RBE, Low Humic Regosol

Table 7: Soil types in Vengadachettikulam DSD

Agro – Ecological region	Soil types
DL1b	RBE, LHG
DL1f	RBE, LHG, Grumusol
DL3	RYL, Regosol

Due to periodical high ground water of this area, that develops on an impermeable stratum during the rainy season. The base saturation in the sub soil is in the range of 90 – 100% and free carbonates are present at varying depths of sub soil; soil reaction is thus moderately alkaline. The water holding capacity of the soil is high because of the presence of smectite clay minerals (Panabokke, 1996). The LHG soils occupy the lower parts of the slope and valley bottom.

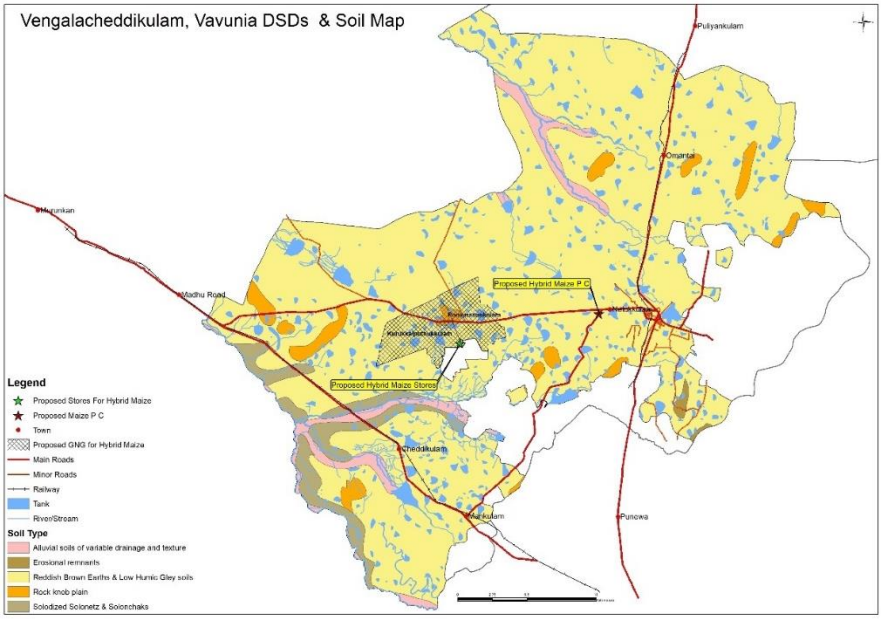


Figure 6: Soil Map of Padiyathalawa

Climate and Meteorology

The area covered by Vavuniya district falls within the Dry Zone of Sri Lanka, where tropical dry climate is prevalent. Rainfall The area covered by the district receives somewhat low rainfall within a year. Annual rainfall figures in the district vary from 1000 – 1500mm. The area experiences heavy rain from October to December, during NE monsoonal season. In comparison, amount of rainfall receives during the rest of the year is considerably low. Monthly Average Temperatures The highest average monthly temperature is recorded in the months of June, July & August (36^0C) while the lowest average monthly temperature is encountered in the months of January and December (25^0C). The mean annual temperature is about 34^0C.

Table 8: Daily average rainfall on monthly basis

Month/ Year	2017	2018	2019	2020	2021
Jan	3.26	0.42	0.06	1.80	5.96
Feb	0.62	0.22	1.82	0.43	1.99
Mar	8.27	1.75	0.00	0.00	0.44
Apr	0.98	0.00	1.23	1.81	3.08
May	0.73	7.63	0.27	3.49	1.60
Jun	0.46	0.00	0.00	1.02	3.39
Jul	0.69	1.88	0.31	3.27	1.64
Aug	1.86	0.02	0.30	0.85	0.65
Sep	3.23	2.57	3.82	0.22	7.04
Oct	7.23	11.18	9.73	0.35	14.62
Nov	10.86	13.26	11.94	10.90	15.50
Dec	4.26	15.13	14.95	21.21	1.82

According to the table 8, receives only minimum rain fall on February and March. That means there is no adverse effect to Hybrid Maize seed production.

Table 9: Maximum temperature daily average on Monthly basis

Month	2017	2018	2019	2020	2021
Jan	28.8	29.0	29.2	30.4	29.5
Feb	29.9	30.4	31.6	32.7	30.5
Mar	32.4	32.8	34.3	34.2	32.8

Apr	35.4	35.3	35.8	35.9	34.3
May	34.7	33.4	36.1	34.5	33.8
Jun	34.4	32.7	35.2	35.0	33.4
Jul	35.0	34.0	34.8	33.3	33.9
Aug	34.1	33.9	34.3	34.1	34.3
Sep	32.6	34.3	33.6	33.1	34.2
Oct	32.8	30.8	31.6	33.6	31.7
Nov	30.0	29.6	31.2	30.9	30.0
Dec	29.5	28.9	29.6	28.7	30.2

According to the data in above table 9, the temperatures in pollination period little bit higher. Although the temperature little bit higher our irrigation system (Sprinkler) gives the support to control the effect of high temperatures at pollination period.

Surface water

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

There are eight minor tanks and one major tank located within the cluster area namely Poovarasamkulam, Kurukkalputhukkulam, Maniar kulam, Helambagas wewa, Pemaduwa kulam, Salambai kulam and many more small tanks. There are no major irrigation systems within the cluster area. These tanks are small tanks belongs to Agrarian Services Department.

Ground water

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

There are wells in the household level. There are agro-wells, tube wells and domestic wells in the area. Mostly, people cultivate using rain water during Maha. Majority of farmers cultivate during Yala using well water.

In general, ground water levels are very deeper and year-round water availability is very sketcy.

Table 10: Water Supply in the Area

DSD	Water Supply Scheme	Protected Open dug well	Tube well	unprotected well Open dug well
Vavuniya	1876	16873	96226	988
Vengadachettikulam	ND	3514	304	ND

ND: No Data
Source: Resource Profiles, Divisional Secretariats, 2021

In Vengadachettikulam DSD, 275 common dug wells and 3239 individual wells accounts to a total of 3514 protected dug wells are present. Water level of these wells are very low during dry season. In Vavuniya DSD, main drinking water source is tube wells however, water from several water supply schemes including Vavuniya water supply scheme, Dry Zone Urban Water and Sanitation Project, are being used by the people in the area.

Air quality

*(*Any pollution issues*)*

Any major air pollution sources in the vicinity of the project site are not recorded. Small-scale industries and traffic may cause air pollution within the area. However, Check the Air Quality in Poovarasamkulam, Sri Lanka - BreezoMeter shows that the Air Quality Index (AQI) of Poovarasamkulam is 53/500 and $PM_{2.5}$ is the dominant pollutant while O_3, PM_{10} and CO are having lower concentration than $PM_{2.5.}$

5.2 Ecological features – Ecosystem components

Vegetation

*(*Trees, ground cover, aquatic vegetation*)*

Following list of flora species observed ithin the project sites selected for Maize during screening:

Table 11: List of Flora Species recorded within cluster lands

	<table><tr><th>Scientific Name</th><th>Common English Name</th><th>Conservation status according to the National red list 2012</th></tr><tr><td>*Anacardium occidentale*</td><td>Cashew</td><td></td></tr><tr><td>*Artocarpus heterophyllus*</td><td>Jackfruit</td><td></td></tr><tr><td>*Asclepias gigantea L.*</td><td>Ela Wara</td><td></td></tr><tr><td>*Azadirachta indica*</td><td>Neem/Kohomba</td><td></td></tr><tr><td>*Bauhinia racemosa*</td><td>Maila</td><td>LC</td></tr><tr><td>*Borassus flabellifer*</td><td>Palmyra</td><td></td></tr><tr><td>*Cactaceae*</td><td>Cactus</td><td></td></tr><tr><td>*Calamus rotang*</td><td>Heen Wewel</td><td>NT</td></tr><tr><td>*Carica papaya*</td><td>Papaya</td><td></td></tr><tr><td>*Casuarina equisetifolia L.*</td><td>Whistling Pine/ Kasa</td><td></td></tr><tr><td>*Cocos nucifera*</td><td>Coconut</td><td></td></tr><tr><td>*Cordia dichotoma*</td><td>Indian cherry/ Lolu</td><td></td></tr><tr><td>*Ficus benghalensis*</td><td>Banyan Tree/ Maha Nuga</td><td></td></tr><tr><td>*Flueggea leucopyrus willd.*</td><td>Heen Katupila</td><td>LC</td></tr><tr><td>*Gliricidia sepium*</td><td>Gliricidia</td><td></td></tr><tr><td>*Jatropha curcas L.*</td><td>Jatropha/ Wata edaru</td><td></td></tr><tr><td>*Manilkara hexandra*</td><td>Palu</td><td></td></tr><tr><td>*Justicia adhatoda L.*</td><td>Adathoda</td><td></td></tr><tr><td>*Lantana camara*</td><td>Gandapana</td><td></td></tr><tr><td>*Leucaena leucocephala*</td><td>Ipil Ipil</td><td></td></tr><tr><td>*Manihot esculenta*</td><td>Manioc</td><td></td></tr><tr><td>*Morinda citrifolia*</td><td>Indian Mulberry/ Ahu</td><td>LC</td></tr><tr><td>*Moringa oleifera*</td><td>Moringa</td><td></td></tr><tr><td>Nauclea orientalis</td><td>Bakmee</td><td>LC</td></tr><tr><td>Rhipsalis baccifera</td><td>Wal Nawahandi</td><td>VU</td></tr><tr><td>*Solanum melongena*</td><td>Brinjal</td><td></td></tr><tr><td>*Sonneratia caseolaris*</td><td>Apple Mangrove/ Kirala</td><td>LC</td></tr><tr><td>*Terminalia arjuna*</td><td>Arjun Tree/ Kumbuk</td><td>LC</td></tr><tr><td>*Terminalia catappa*</td><td>Tropical Almond/ Kottamba</td><td></td></tr></table> LC – Least Concern/ NT – Near Threaten/ EN – Endangered/ CR – Critically Endangered
Presence of wetlands	There are no wetlands observed within the cluster area. However, it is noted that there is about 5 ha area of wetlands within Vengadachettikulam DSD.
Fish and fish habitats	There are many freshwater fish habitats such as Poovarasamkulam, Kurukkalputhukkulam, Maniar kulam, Helambagas wewa, Pemaduwa kulam, Salambai kulam and many more small tanks. There are no major irrigation systems within the cluster area. Vavuniya has a significant contribution on aqua-culture industry.
Birds (Waterfowl, migratory birds, others)	Kurukkalputhukkulam proposed forest area is within the cluster area and there are few more forest patches located in Poovarasamkulam and Kurukkalputhukkulam GNDs. All of these areas are good habitats for fauna including birds. Presence of surface waterbodies within the cluster area creates a favourable ground for birds and its habitats. Since, migratory birds' pathway is via Mannar, during migratory season, the diversity of birds will be higher. There are literatures shows a diverse species of birds in Vavuniya. There are records of Woolly-necked Stork, Spotted Dove, Green Imperial-Pigeon, Asian Openbill, Common Myna, Purple Heron, Indian Peafowl, and Rock Pigeon recorded in the cluster area in Vavuniya.
Presence of special habitat areas (special designations and identified sensitive zones)	Kurukkalputhukkulam proposed forest area located within the cluster area as special habitat. Figure 8 provides more details of sensitive areas identified by CEA.

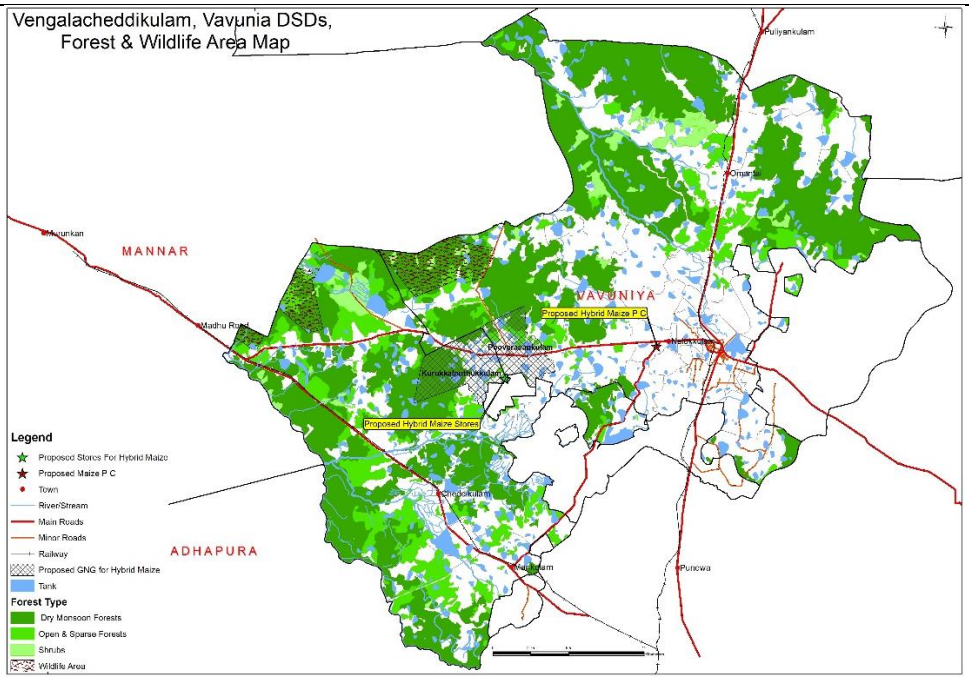
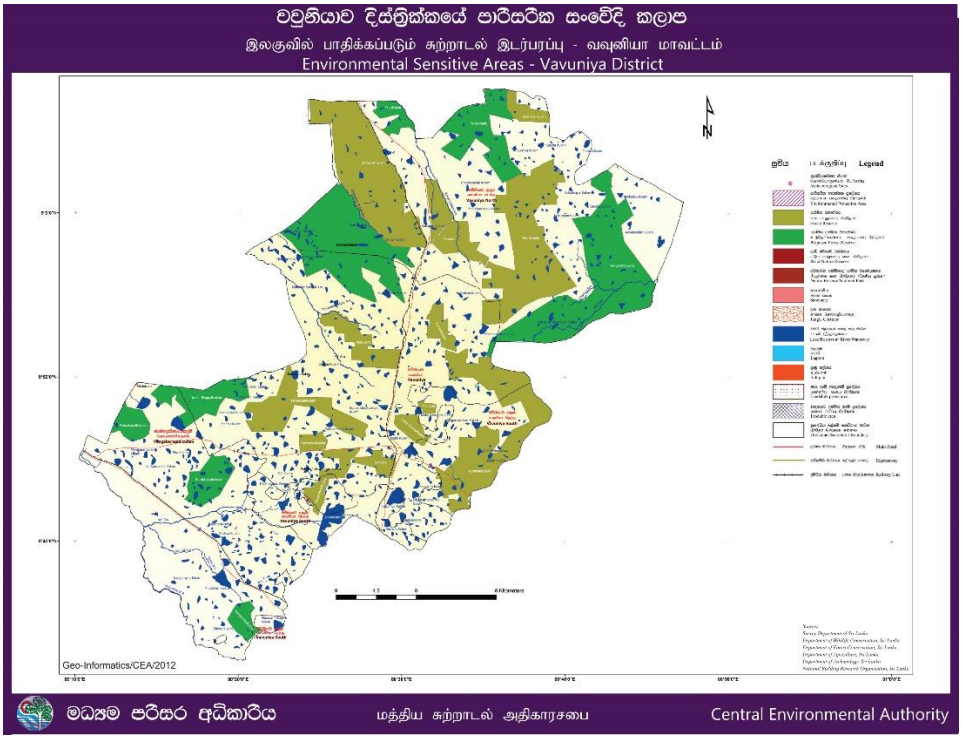


Figure 7: Wildlife and Forest Protected Areas within cluster area



Source: CEA

Figure 8: Environmental Sensitive Areas in Vavuniya District

Other features	
Residential/sensitive areas (E.g., Hospitals, Schools)	In Kurukkalputhukulam GND, one type II and one type III provincial schools are available. However, in Vengadachettikulam DSD, three 1 AB schools, four 1C schools, seven type II schools and twenty type III schools are present. There are 92 schools in the Vavuniya DS Division. Among these 92 schools, 5 are Muslim schools and other 87 are Tamil schools. There are ten 1AB type schools, eight 1 C schools, thirty type II schools, and forty-four type III schools present in the DSD. Basic facilities such as healthcare is available for people in the area. There are four government healthcare institutions i.e General Hospital-Vavuniya,

	Divisional Hospital - Poovarasankulam, Divisional Hospital-Sithamparapuram and PMCU-Omanthai. And the area falls under Vavuniya MOH office. Base Hospital Cheddikulam, Divisional Hospital Pavatkulam, Divisional Hospital Neriyakulam. PMCU Sooduventhapulavu are main healthcare institutions within Vengalacheddikulam DS Division.
Traditional, economic and cultural activities	Maize Seed Production Cluster in Vavuniya district planned to be implemented in Vavuniya and Vengadachettikulam DSDs. Vavuniya DS division is consisted of 42 GN Divisions and accounts to a total population of 122,170 while Vengadachettikulam consist 20 GNDs and accounts to a total of 27,219 population. Vavuniya DSD extent is about 640.86 sq.km and Vengadachettikulam extent is about 412.98 sq.km. There are 35,059 families in Vavuniya DS division. In the meantime, 8079 families in Vengadachettikulam. Maize Seed Production Cluster in Vavuniya district will mainly limited to Poovarasamkulam in Vavuniya DS and Kurukkalputhukkulam in Vengadachettikulam. Accordingly, Poovarasamkulam GND accounts for 1613 population and 498 number of families whereas 1333 population and 440 number families in Kurukkalputhukkulam. Social characteristics of the selected cluster are shown in Table 12. In both DSDs, majority of people are Tamil, however in Vengadachettikulam DSD, there is considerably high percentage of Muslims as well.

Table 12: Social characteristics of the cluster

Characteristic	Description	Percentages	
		Vavuniya	Vengadachettikulam
Gender	Male	48.7	49.4
	Female	51.3	50.6
Age	Below 18 years	27.8	30.9
	19 - 59	60.8	57.6
	Above 60 years	11.4	11.5
Ethnicity	Sinhala	0.05	0.1
	Tamil	99.8	66.7
	Muslim	0.15	33.2
Religion	Hindus	99.7	53.4
	Christian	0.1	13.4
	Islam	0.2	33.4

Source: Resource profile, Divisional Secretariats, 2021

The employment level of the people in the area is given in Table 13.

Table 13: Employment and Unemployment in the Area

DSD	Gvt	Private	Farmers	Skilled labors	Un skilled labors	Other
Vavuniya	9183	6050	7663	5041	11700	6593
Vengadachettikulam	638	186	3155	1481	3973	814
Total in DSD	**9821**	**6236**	**10,818**	**6522**	**15673**	**7407**

Source: Resource Profiles, Divisional Secretariats, 2020

In Vavuniya DSD, 18.14% of the population is Farmers. 0.69 % are Fishermen, 27.70% are engaged in Labour (Cooli) works. This indicates only 42.9% is only engaged in earning, balance is idling or not aware about the access for income generating activities. In Vengadachettikulam DSD also, majority of people are unskilled labors and only a few percentages of government and private employers. Therefore, new income generation activities should be promoted in the area. Most of the small and medium scale industries found in the division are based on local resources such as

Coconut, Milk, and grains products. Small and medium cottage industries such as handicrafts, batik, paper production, agriculture-based products etc are common in the area. In addition, there are eight vocational training centers in Vavuniya DSD.

There are no published Household Income and Expenditure details specific to crop or agricultural farmers in the selected areas. However, according to the 2019 HIES survey, mean household monthly income of Vavuniya district is about LKR 68,859 whereas mean household monthly income of Sri Lanka is LKR 76,414. The mean household expenditure per month of Vavuniya district was LKR 56,086 whereas for Sri Lanka the value was LKR 63,130 for the year 2019 (Department of Census & Statistics, 2019). Estimated head count index (2012/13) under Sri Lanka's official poverty line is 13.9 in Vavuniya District and 12.1% of population in Vavuniya are under poverty line. Per-capita monthly income in Vavuniya is LKR 18,320 whereas per-capita monthly expenditure is LKR 14,922. However, as per the Resources Profile of Vengadachettikulam (2020) income of 1,090 families is below in Rs. 2500/= per month which is 13.01% of the total Families. These families are depending on Samurdhi and other livelihood assistance.

Table 14: No of Samurdhi Recipients

DSD	Samurdhi	
	No of Families	%
Vavuniya	ND	ND
Vengadachettikulam	2009	24

Source: Resource Profiles, Divisional Secretariats, 2021

Though there are no details on Samurdhi beneficiaries of Vavuniya DSD, 23,537 Samurdhi beneficiaries in Vavuniya district was recorded in April 2022, which is 19% of total population of the district. In Vengadachettikulam also, 24% of families in the DSD are Samurdhi beneficiaries.

Archaeological resources

(Recorded or potential to exist)

There are archaeologically important locations identified from Vavuniya and Vengadachettikulam. Kudiyiruppu Pillayar Kovil and Rankethgama Ancient Stupas are within the cluster area. Proposed mitigation measures in EMP will avoid such locations or impact due to cluster activities on archaeological places.

6. DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES

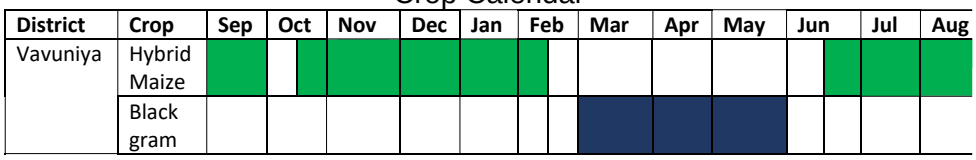
6.1 CULTIVATION

Existing condition of the crop

Maize is a very important cereal crop cultivated in many districts in Sri Lanka. Due to its high yield potential and variety of uses, it has become popular among farmers. It has further gained its popularity due to availability of hybrid seeds which produce higher yield than other cereals. Maize occupies around 6% of cereal cropped area in Sri Lanka. As a result of hybrid maize varieties, the total area under maize has increased by 73% while its production has increased by 258% (FAOSTAT, 2014). Maize is considered to be one of the most important inputs in poultry industry in Sri Lanka while it is used for producing food items such as Samaphosha and Thriposha. Boiled popcorn and fried popcorn also have been popular among Sri Lankans.

Maize seed requirement of Sri Lanka is largely fulfilled by the imports. Apart from seed imports, maize and related products are also imported to Sri Lanka. Although Sri Lanka imports more than 100000 MT of maize in 2019,

	it has sharply dropped to 28000 tons in 2020. Surprisingly, in 2020, Sri Lanka allowed importing wheat grains for animal feed and introduced it as an import quota of 185,000 MT of wheat grains. This initiative was made by the government to compensate the local corn production shortfall eventually filling 170,000 MT of the authorized quota volume. Sri Lanka also authorized subsequently an additional import quota of 100,000 MT for the April 15 through July 31, 2021, period. Import quota for wheat grains was said to be introduced as domestic corn production is unlikely to increase quickly enough in the short-term to meet the animal feed milling industry's demand. According to FAO (2021), annual growth rate of maize is around 16.73 percent. However, the overall productivity of maize is not in a satisfactory condition and has not been adequate to meet the increasing local demand. As a result, maize imports have been taking place. FAO (2021) further shows that approximately 98 to 99 percent of the hybrid maize seeds widely used by farmers for cultivation are imported. Although the Department of Agriculture (DoA) has already developed four local hybrids of which characters and yield parameters are comparable with imported hybrids, the use of local hybrid seeds among farmers are low as a result of the non-availability of local hybrid seed materials in required quantities in the local markets. The yield of local hybrid varieties is in par with those of imported varieties and average yield is around 5.5-6.5 metric tons per hectare. And the potential yield has been estimated to be 7.5-8.5 metric tons per hectare. Those hybrid varieties have been named as MI (III), MI (IV) and MI (V). In 2020, Sri Lanka has imported more than 1600 metric tons of maize seeds. Therefore, country like Sri Lanka should now turn to import substitution and save the foreign exchange. In this process, local hybrid seed production has important implications towards Sri Lankan economy.
Polluting Processes (point source)	
In cultivation some key polluting steps, although limited, takes place; mainly in the cultivating and post harvesting phases.	
Land Preparation for cultivation	Land preparation can be either by minimum tillage or conventional tillage. Herbicide use is necessary for minimum tillage. In the case of conventional tillage, land preparation may start after a good rain. Either ridge or flat land prepation can be used. In water logged soils, maize should be planted on ridge tops as maize is very susceptible to water logging. We recommend to maintain the tillage up to 9 inches. Follow the ridge and furrow system. • Isolation – the field must be sufficiently isolated from contaminant maize crops by the required distance or time. Minimum of isolation requirement of 600m radius will be maintained. Isolation radius minimum 600 m and time isolation is 3 weeks before or after. **Planting** Date of fermile and male planting should be followed according to specific instructions provided by the seed production specialist. Both parents can be either planted at the same date or at different dates. Planting after 2days of basal fertilizer application. Not recommend rain fed cultivation. After two good rains in the rainy season, planting can start. Spacing: 75 x 20 crn (flat) or 90 x 17 cm (ridge); marked rope lines can be used for manual planting. One seed/ hill will be dropped (5-7cm depth), and seed should be covered well with soil and pressed. Soil should not be pressed when moisture ishigh. The seed parent (female) and the pollen

	parent (male) should be planted in a regular alternating pattern with 2 rows female and I row male. Plant alternating 4 female and two male. All land must be covered by 2male rows. One male row is planted after 3days of the other plantings. **NB:** Additional male rows could be planted along the end of the field to protect the female from foreign pollen and also to provide more pollen to the female seed parent. It is also advisable to plant additional male seeds (about 2% of total male seeds) in about 5-7 days after first male p'an tin g. *Bird protection may be necessary in the bird-prone areas (during seedling emergence). **Detasseling**: Detasseling is the removal of tassel from female parent. Detasseling is done when the tassel emerged out of the boot leaf, but before anthesis has shed pollen. Anthers take 2-4 days to dehisce after complete emergence. Only in few cases, the anthers start dehisces before its complete emergence. In such case detasseling should be done earlier. Detasseling is done daily till all the seed parents get detaselled. **Roguing**: should be done periodically based on position of cob, colour of silk, arrangements of seeds in cob, leaves etc. Shedding tassels are to be removed in roguing. It refers to the tassels in female parents' rows, shedding pollen or that has shed pollen in hybrid maize plots. During field inspection a tassel whose main spike or any side branch or both have shed pollen or shedding pollen in more than 5 cm of branch length is counted as a shedding tassel during inspection the shedding tassels are taken into count for acceptance or rejection of production plot. Crop Calendar 
Water requirement	Hybrid Maize produces very high yields under irrigation. It is therefore one of the most efficient grain crops in terms of water utilization. It is strongly recommended that maize hybrid seed be produced under full irrigation in order to obtain the highest yields. Maize grows best where total seasonal rainfall exceeds 500 mm. All areas which have been selected get more than 800 mm rain fall annually. Maize is susceptible to both drought and waterlogging. Drought during the four-week period spanning flowering (silking and tasseling) can cause serious yield losses, especially in the drier areas. Maize needs 500 to 800 mm of water per growing period, depending on the maturity period in the Forest and Transitional agro-ecological zones. In the Savannahs in the north, maize needs 600 – 900 mm of water per growing period.
Use of fertiliser and pesticides and weedicides	Fertilizer levels are variable depending on the soil fertility of site selected. General dosage of fertilizers are approximately 150 kg Nitrogen(N) 100 kg Phosphate (P205) and 70 kg Potassium(K) per hectare. About 60% of N, and all Phosphate and Potassium fertilizer should be broadcast during land preparation. Ten bags of 15-15-15 (NPK) compound fertilizers (500 kg) can be applied at land preparation. Additional 6 bags (300 kg) of Calcium Amonium Nitrate (CAN) should be applied near the maize plants (at least 5 cm apart) at knee-high stage (side dressing). A total of 3D to 50 kg of (MgSO4) and 5 kg of zinc (ZnSO4) can be applied in Magnesium and Zinc

	deficient areas. Depends on the current nutrient availability. In addition to the soil application, folio one is recommended especially for micro nutrient. <u>NE: Fertilizer Deficiency Symptoms</u> Nitrogen: Yellow middle at the tip anid along the of leaves, Phosphate: Reddish purple leaves particularly on young plants. Potash: Appears as a firing or during along the tip and edges of lowest leaves. Magiesium: Whitish stripes along the veins and often a purplish colour in the underside of the lower leaves. **Weed Control** a. Hand weeding method could be adopted if conventional tillage ispractised. First weeding takes place 2-3 weeks after planting. Second weeding isaccomplished 6 weeks aftxer planting. b. Herbicide application - adequate level of soil moisture isprerequisite for herbicide spraying. Gramoxone plus primextra are used as pre-mergence herbicides at the rate of 5 litres each per hectare. Pre-emergence herbicides cannot be sprayed later than two days after planting. Post-emergence herbicides such as Gramoxone may also be sprayed, between the maize rows around 6 weeks after planting (4 lit./ha). Never spray Gramoxone onto the maize plants. N.B. Too much weed can affect maize seed yield significantly. The seed production field should be clean from weeds up to flowering time.
Harvesting	Seed germination rate and vigor (i.e., viability), improves from fertilization of the embryo to physiological maturity, when it will reach a maximum. The absolute or maximum quality of the seed at physiological maturity will have been determined by the growing conditions during seed development, but whatever this quality is at physiological maturity, it will be the maximum the seed can attain. From this point onwards, no improvement is possible in seed viability. All operations from harvesting onwards therefore have to be done so as to cause the least deterioration in seed viability, while ensuring that the healthy seed is separated from inferior seed and impurities (extraneous matter and weed seeds) to achieve a specified standard of seed purity. At physiological maturity of the crop, seed moisture content is between 30 and 35% and the crop will still have some vestiges of green in the stems and leaves. From physiological maturity onwards, the seed dries as the environment allows. The drier and warmer the environment and the greater the exposure of the seed to the air, the faster seed moisture will decrease. The rate of field dry-down will also be increased in cases where the cobs have few husk leaves, the cobs are poorly covered by loose husks or the cob diameter is small. Seed quality will remain relatively high and only decrease slightly, as long as environmental conditions are favorable and grain-eating pests are absent. Generally, in Maha seasons harvesting is done at 110 days of age (optimum maturity) but in Yala seasons at the age of 95 days (keeping quality is poor, therefore use in following Maha season) to protect from rains.
Postharvest storage and transportation	**Shelling** For maintenance of high seed quality, hand shelling is ideal but not always economically feasible. Many types of mechanical shellers are available for crop seeds, but these vary in their impact on seed quality. Aggressive, high-speed shellers or combines will chip or break seed. Mechanical damage to seed is due to abrasion and impact. Abrasion damage mainly affects the seed coat and results from seed rubbing against rough surfaces. Impact damage may affect the entire seed and is a function of the force applied to the seed. Thus, mechanical shellers need to be operated at low speeds and adjusted to minimize seed damage. Contact edges in the threshing drum

	should be rounded off and smoothed to minimize pounding of the grain. The seed should preferably be rubbed off the cobs to reduce damage. If possible, mechanical shellers should also be used to separate the seed from extraneous matter, such as cobs and sheaths. Proposed to do Machine shelling. **Drying:** Seeds are dried to 12% moisture content. Brings down to 10%. **Grading:** Grade the seeds using 18/64" (7.28 mm) sieve. **Seed treatment** Maize seed should be treated with a fungicide or a combination of fungicide and insecticide to protect the seed and developing seedlings from diseases and to give short-term protection against storage insects. Fungicides are particularly helpful when sowing in conditions where soils are clayey, crusted and/or cold and wet at sowing. Seed treatment chemicals may also help offset vulnerability to disease in seeds that have been chipped or cracked during harvest or conditioning operations. The fungicides and insecticides are commonly mixed into a slurry and applied to the seed using a seed treater device. Colored dye is often added to the slurry to impart a distinctive color and thereby clearly identify treated seed. A uniform coverage of the seed with the correct dosage of chemical(s) is critical in the treatment operation. Different fungicides and insecticides are available for seed treatment. The locally registered chemicals can be used. Recommend to do here for maintaining high quality standards of seeds. **Seed storage** Once shelled, the raw seed may be stored until delivery to the seed company factory. Raw seed may be stored in bags or bulk but no seed should be stored unless it is at a moisture content low enough to maintain seed quality, which is less than 13%. However, the length of time that seed may be safely stored even at low moisture content depends on the air temperature and relative humidity. The lower the air temperature and relative humidity, the longer the seed can be stored with minimal deterioration. As a rule, if the relative humidity of the air is above 60%, seed deterioration is likely to be rapid; such conditions will increase the moisture content of the seed and foster the development of diseases and storage pests. Ideally, seed should be stored in a shed to protect it from rain and heat, while providing security.
Other factors	
Solid waste	The solid organic waste is generated as crop residuals and at postharvest period and all are biodegradable. However, compost production unit (See Annexure 4: Compost Plant Proposal) will be implemented to produce compost using solid waste generated from post harvesting processing centre and these organic fertilisers will be used at land preparation stage. Most of the waste generated can be used as an animal feed. Screening report and relevant EMP and Social Management Plan (SMP) reports of post harvesting processing centre will be developed separately. Recommend to commence Compost manufacturing in every clusters.
Wastewater	Surface run off will carry the fertilisers and applicable chemicals (pesticides, weedicides etc.) and impact is higher due to flood irrigation system. This will minimise by introducing water conservation techniques. Further, due to application of IPM mechanism, soil and ground/surface water pollution will

	be minimalised. ASMP will conduct the awareness creation and training programmes for both farmers as well as the officers regarding the IPM as per the PMP. Proposed application IPM during cluster given in table 15. Water supply is controlled by micro irrigation system. So, the wastages will be minimized.

Table 15: Application of IPM for the development of CDP for Hybrid Maize Seed Production

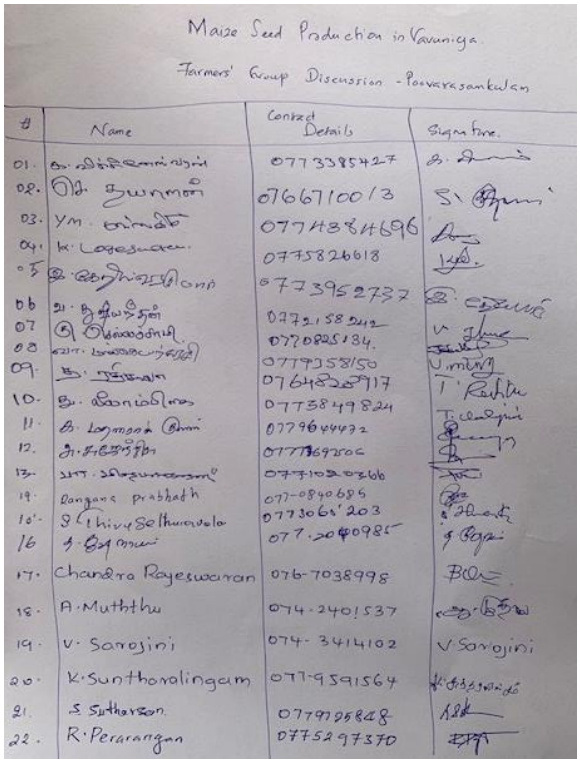
Stage	IPM Practices	Impacts of Implementation	Benefit for farmers
Pre land preparation	Remove all crop debri and burn. Introduce proper training package on IPM.	Destroy all stages of insects. Wipe out all the stages of all pathogens.	Improve the sanitation of new crop. Minimize the risk of infestation of Pathogens.
		• Identification of pests / beneficial organisms in the field. • Knowledge of the damage and life cycles of pests. • Suitable & possible management techniques. • Manipulation of pest management techniques for the success of crop. Farmers can easily distinguish Insect attack and Diseases. • Easy identification of Insects and their natural enemies.	Improve the natural enemy's population means there is a proper natural control of insects. Save the pesticide cost as well as the environment.
Soil testing	Micro nutrient requirement can be identified.	Plant vigour can be improved.	Vigorous plant gives higher yields with minimum pest and disease attacks.
Land preparation	First plough up to minimum9 inches by using Disc plough or Mould board plough. Compost application.	Destroy all aerobic and non aerobic pathogens due to converting the soil up side down. All weeds get destroy. Improve soil structure and add micronutrient as well as the microorganism to the soil.	Minimize the risk of pathogens and reduce the cost for pesticides. Weeding cost can be delayed for the period of two weeks. Effect of Pathogens may decrease due to Microorganism and micronutrients (increase the pland vigour)
Pre seeding.	Seed treatment with fungicides and Insecticides.	For the period of minimum two weeks, the crop can be secured from different pest and diseases.	Time and labour can be saved for the period of two weeks. For the seed treatment, agro chemical requirement is very low. That also a huge benefit. Less harm to environment.
Weeding	Use inter cultivator.	Removing weeds and earthing up happened simultanously.	Labour and cash for weedicides are saved. Negative impact to the environment also minimized.

Vegetative phase of the crop.	Apply neem extraction in 14 days interval.	Neem extraction is very good insect repellent.	Minimum insect problems and cost for insecticde can be minimized. Safe environment can be assured.
Reproductive phase and Harvesting	Introduce Biological controls and minimum usage usage of Pesticide application.	Close supervision and biologically remove pathogens. Chemical application only to borders (neem application) or spot application. Colour traps and Pheromone traps.	Significant reduce of agro chemical cost. Remarkably protect the environment. Chemical residuals can be minimized.

7. PUBLIC CONSULTATION

Consultations conducted with potential farmers of the selected areas in Poovrasamkulam and Kurukkalputhukkulam, DD-DOA, Agriculture Instructors, District and Cluster Coordinators. Focus Groups Discussions held with Farmers and Key Informant Interviews carried out with Key Officials. Outcomes of the discussions are summarised below:

Figure 9: Stakeholder Consultation in Vavuniya



Maize Seed Production in Vavuniya

Farmers' Group Discussion - Poovarasamkulam

#	Name	Contact Details	Signature
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04.	K. Logeswaran	0775826618	
05.	[illegible]	0773952737	
06.	[illegible]	0772158243	
07.	[illegible]	0770825134	
08.	[illegible]	0779358150	
09.	[illegible]	0764822917	
10.	[illegible]	0773849821	
11.	[illegible]	0779644472	
12.	[illegible]	0777697806	
13.	[illegible]	0771020366	
14.	Dangane prabhath	077-0840685	
15.	S Thiviyselthurvala	0773061203	
16	[illegible]	077.2040985	
17.	Chandra Rajeswaran	076-7038998	
18.	A. Muththu	074-2401537	
19.	V. Sarojini	074-3414102	V Sarojini
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21.	S. Sutharsan.	0779795848	
22.	R. Pararangan	0775297370	

Figure 10: Attendance Sheets of Public Consultation

- Existing crop related issues

Proposed Poovrasamkulam and Kurukkalputhukkulam 50 farmers with minimum of 50 acres lands have been cultivating for years with rainwater in Maha and well water in Yala. Technically, this land is ideal for Maize Seed Cultivation as there are no other maize cultivation in the surrounding area. These farmers have cultivated black gram, green gram, cowpea, etc for years in addition to Paddy. Dry zone vegetation can be seen. There area Farmers Organization in Poovrasamkulam and Kurukkalputhukkulam and there is well established farmer organization for Seed Production called WESPO Seed Producers in vavuniya. These villages are located about 15km away from Vavuniya twonship along Mannar road.

Following concerns were raised by the farmers during the consultations:

1. There are more than 50 acres in the area and it will be easy to find about 300 farmers with 300 acres for cluster expansion
2. Pest attacks such as Sena Catapillar, Birds, etc
3. Peacock, monkey, and elephants' damages to crops
4. Fertiliser application is not practised by based on soil and foliar analyses
5. No attention for micronutrient fertilisers
6. Poor primary post- harvest handling and high wastage
7. Low quality standards for marketing
8. High technical know-how requires for Maize Seed production where farmers are lack with and isolation requirements to be adhered
9. Continuity of Seed Clusters as business entity
10. Establishment of irrigation system due to site conditions and prevailing conditions in the country
11. Stable market for production and price
12. There are existing buildings which can be used for stores, and processing units with minimum improvements

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

Farmers have less experience in maize cultivation, but experienced Seed production including vegetable seeds. However, understading basics of maize cultivation, availability of lands with

sufficient isolation requirements, availability of water throughout the year, farmer leadership and positive attitudes, farmers willingness, etc can be recognised as positives in establishing the cluster. Required technical know-how specially on Hybrid Maize Seed Production will be given very initially to all potential farmers before starting even land preparation. As this is a Hybrid Maize Seed Production cluster, adhering to the technical requirements are very much essential to ensure the quality of the seeds produced and for certification purpose. Seed certification team will be following up with farmers continuously to ensure the required standard is maintained. First season will be somewhat difficult but later on with the experience, farmers will be able to go ahead. DOA staff is very keen on this program and their support will be immense to get this successful.

Farmer mechanization such as seeding and weeding will be arranged as a technological improvement. This will save both time and money. Land preparation assistance will also be provided by the project to the Farmer Company. Farmer Company will have to allocate the available machineries to each farmer. However, initial land preparation will be critical as these lands are not properly ploughed previously.

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

Hygienic and moisture conditions of the Seeds are vital factors. All technical requirements will be trained for farmers and follow up closely by the team and AIs and SPMDC Staffs. Harvesting time, post-harvest practices, treatment, by-products, etc will have greater importance here.

- Infrastructure development

Mainly, irrigation system for each farmer with required water sources improvement, market access road improvements, improvements to drainage canals, establishment of sump, etc will be provided. Further, processing centre with central access to the entire cluster and with required facilities such as shelling, drying, seed cleaning & grading, packing & storing, etc will be provided by the project.

Figure 11: Community Mapping at Poovarasankulam and Kurukkalputhukkulam

Figure 12: Public Consultation at Poovarasankulam and Kurukkalputhukkulam

Figure 13: Existing Condition of the Selected Lands at Poovarasankulam and Kurukkalputhukkulam

Figure 14: Existing Irrigation methods

8. ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

8A. SCREENING FOR POTENTIAL ENVIRONMENTAL IMPACTS

Table 16: Checklist for screening for possible environmental impact (Infrastructure development not considered here)

№	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
1	Will construction and operation of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.?)	√		Low	Existing land preparation and irrigation system will be changed. Land preparation techniques will focus on reducing the effects of flood irrigation. Slight physical changes will be made during land prepration to accommodate modern technology applications
2	Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	√		Moderate	Proposed techniques will reduce the amount of chemicals and fertilisers use and modern techniques/ methods will be introduced to increase the productivity by other means. Due to implementation of IPM, use of chemicals will be drastically reduced and project will not assist for purchasing of chemicals.
3	Will the Project produce solid wastes during construction or operation?	√		Low	During the operation solid organic waste will be produced as crop residuals. Crop residual will be used for the compost production unit. Most parts of the Maize crop residue will be able to use as animal feed or any other including cob
4	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	√		Moderate	Pesticides, weedicides will be used and released to the air. Possibility to have significant impacts to other flora and fauna.
5	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	√		Low	Land preparation, and transportation may create noise and vibration impacts and it can be mitigated through proper implementation of EMP.
6	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater or coastal wasters?	√		Low	All chemicals used to include pesticides and weedicides during cultivation may contaminate land or water. Due to use of Sprinkler system, wastage which will be leading to major contaminations will be low
7	Will the project cause localised flooding and poor drainage during construction? Is the project area located in a flooding location?		√		Flooding locations were not identified during the visit and the project will not cause localised flooding. However, natural low elevated areas can be flooded during rain. During land preparation, proper drainage patterns will be established and ensure the smooth draining
8	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?	√		Low	No medium and large-scale infrastructure development envisaged and hence, no severe health and safety hazard identified. Better hazard identification and prevention and corrective measures during construction will eliminate the risk associate. Snake bike bites and exposure to chemicals are possible hazards during agriculture activities.

№	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
9	Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?	√		Low	Hybrid Maize Seed transportation from cultivated lands to post harvest storages and transportation from post harvesting storages to shipments/or any other location will be taken place. No creation of significant environmental problems.
10	Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?		√		No recreational or other facilities will be disturbed
11	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?		√		There are no areas or features with high landscape or scenic value on or around the location.
12	Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests which could be affected by the project?	√		Moderate - High	Kurukkalputhukkulam Proposed Forest Area and few more forest areas which are located within the cluster area which will have direct and indirect impact due to proposed cultivation activities.
13	Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, migration, which could be affected by the project?	√		Moderate - High	Kurukkalputhukkulam Proposed Forest Area and few more forest areas are within the cluster area. Therefore, edge effect and disturbances due to project activities may arise
14	Is the project located in a previously undeveloped area where there will be loss of green field land		√		No new lands will be used for cultivation and only existing cultivated lands will be used.
15	Will the project cause the removal of trees in the locality?		√		Removal of trees will not be required as all these lands are existing cultivating lands
16	Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?		√		No features of historic importance have been identified within the study area
17	Are there existing land uses on or around the location e.g. home gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?		√		
18	Are there any areas on or around the location which are densely populated or built up, which could be affected by the project?		√		Densely populated or built-up areas will not be affected by the project.

№	Screening question	Yes	No	Significance of the effect (Low, moderate, high)	Remarks
19	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project		√		
20	Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?		√		Existing agricultural practices will be improved by the subproject activities and no negative impacts are anticipated.
21	Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?		√		There are no areas around the location where legal environmental standards have been exceeded or has been environmentally polluted.

8B. ENVIRONMENTAL MANAGEMENT PLANS

Table 17: Contractor's responsibility for mitigating adverse environmental issues raised during agricultural activities

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
1	Public complaints and lack of community support for the project implementation	Information Disclosure among Stakeholders Community Outreach activities including training Institutional development based on farmer organisations	• Strengthen institutional development component and proper awareness and community leadership • Obtain continuous institutional support from DD-DOA and AIs in the area • Land selection should be considered the Kurukkalputhukkulam and other forest areas and avoid such sensitive locations including minimum of 100 buffer zone • Farmers should possess legally acceptable ownership document for each selected land and should not have conflicts • Farmers should be made aware to avoid open burning as it can lead to wild fires • Discussions should be conducted with the beneficiary farmers including women, and youth • The beneficiary farmers selection based on the criteria which were developed at stakeholders meeting and identifying of beneficiary farmers were undertaken transparently • Residents in the area will be briefed of the project, purpose and design and outcomes with comprehensive discussion

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• Communication and training activities focusing women, youth and farmers who are poor in communication • Take note of all impacts, especially temporary issues and safety hazards that will be of concern to the cropping pattern of the farmers. All possible impacts will be mitigated as stipulated in the EMP to mitigate them • Maintain a log of any grievances/complains and actions taken to resolve them • A copy of the EMP should be available at all times at the project supervision office on site
2	Lack of knowledge on Seed production technology, basic harvest and postharvest practices lead to low quality of product and high amount of waste	Land selection Land preparation Seeding Shelling, and Drying Sorting and packaging Storing the harvested product before delivery to the packing facility Better use of parts of the Maize plant such as tree, cob, etc	• Initial technical training on Seed production to all Farmers and Officers • Maintain good hygiene and good housekeeping • Practical training for the selected farmers on basic harvest and postharvest practices to protect the quality of the product and to assure the packing facility receives only clean and viable product • Use of Discarded poor-quality ones and other waste organic materials in the field to leave as organic fertiliser or use for compost production • Avoiding mechanical scarring and bruising quality defects • Provide packaging materials and storage facilities • Establishment of temporary packing facilities • Introduce methods of using bi-products
3	Activities related to installation of irrigation systems (Adustable Sprinklers) with Sump	Installation of irrigation systems Fixing water pumps and electricity supply Plumbing works	• Carry out installation works during off cultivation seasons • Solid waste generation during installation should be minimised and disposed generated waste with care • Potential damages to pipe system should be minimised by burying or covering the pipe distribution

4	Exposing and damaging of physical cultural resources (PCR)	Site preparatory work
		Land preparations
			• 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
			  • Notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours
			  • Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented
			  • Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve onsite, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days • Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed
5	Spreading of Invasive Alien Species	Vegetation clearing Planting of Maize	• Provide DoA approved parental lines or certified seed variety only to farmers for nurseries • Good housekeeping • Manual and integrated weed control • Prevent weed spreading via organic manure (Compost) by periodic inspection and manual removal after application
6	Soil erosion due to lossen of topsoil and undulating terrain which will lead to many drainage issues and siltation of waterbodies	Land preparation	• Establish a proper dranage system during land preration • Construct catchpits, silt-traps at appropriate places on the cultivation area to avoid silt been carried to adjoining waterbodies including drains • Regular cleaning of catch pits, sil-traps and drains
7	Contamination of water, land and air during usage of chemicals (pesticides, weedicides.)	Land preparation Vegetation clearing Use of fertilisers Use of chemicals for specific requirements Soil erosion	• Adherence to IPM standards of the WB, IPM action plan of ASMP and standards and IPM action plan proposed above • Introduce technological methods to reduce dosage amounts • Awareness on usage time, handling and storage • Guidance on suitable time for the usage of chemicals • Promote organic fertilisers • Formulation of fertiliser regimes based on complete soil tests and foliar analysis • Introduction of proper drainage system including catch-pits and silt-traps to avoid silt and other particles been carried by the drainage water out of the site
8	Impaired water quality	Cultivation of Maize	• Excess water extraction is to be cut down to preserve water • Proper introduction of sprinkler irrigation practices instead of flood irrigation to preserve water and use of modern techniques as discussed in the CDP for reduce water consumption
9	Solid Waste Disposal	Discarding poor quality organic materials in the field Waste from weed control activities	• Burnt to maintain the farmlands' hygienic condition • Use postharvest waste for compost production • Use organic waste generating from the Maize plants for compost, animal feed, mushroom making, etc
10	Spread of crop related pests and diseases (Sena Catapillar)	Throughout the cultivation period	• Provide technical guidance on application of chemicals including dosage, suitable time and frequency • Pest and disease control based on IPM practices and modern spray techniques

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• Pest population and pest damage surveys to assess pest threshold status for application of pesticides
11	Spreading COVID 19 virus	All activities	• The Farmers must ensure that all workers are well trained on COVID-19 safety precautions published by health ministry • Make required precautionary measures at the site level to take care of COVID -19 infected person
12	Health hazard	Use of agrochemicals (fertilisers, pesticides, weedicides etc.) Snake Bite Exposure to Chemicals	• Carry out proper hazardous identification and risk assessment of all proposed activities • Training and awareness on safe chemical handling • Use modern technology to spray chemicals • Availability of First-aid kits • Training on first-aid and carry out mocks • Implement proper health and safety protocols by elimination, substitution, engineering controls, administrative control and provide Personal Protective Equipment (PPE). Provide necessary PPE (*basics should include gloves, googles, masks and protective clothing*) • A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored • Pest and disease control according to the international standard including IPM frame work of the world bank and pest management action plan prepared by ASMP • Formulation of fertiliser regimes based on complete soil tests and foliar analysis

9. COST OF MITIGATION

Table 18: Cost Estimate for Implementation of EMP/SMP

№	Environmental mitigation measure	Cost (LKR)	Remarks
1	Information Boards, leaflets	500,000	Project Name board, Awareness leaflets including Project benefits, GRM and IPM
2	On site first aid facilities	500,000	Including first-aid box and allocation for any emergency treatment
3	Safety equipment's including COVID-19	1,050,000	Gum boots, Gloves and masks for all farmers
4	Soil erosion control measures	500,000	Wherever necessary EMP mitigation measures can be implemented
5	Provision of overall kit for farmers	1,050,000	3500*300
	Total	**3,600,000**	

NB: Cost of mitigation given only for cultivation related activities and its impacts

10. CONCLUSION AND SCREENING DECISION

Table 19: Summary of environmental effects

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

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
During Agricultural activities		
Land preparation	Solid waste generation Edge effects on the forest areas closeby	SN
Introduction of basic flood prevention and drainage field techniques	Less water consumption, less soil erosion	SP
Use of fertilisers and chemicals	Land, water an air contamination	NS
Manual weed control	Solid waste generation	NS
New and improved quality enhancing technologies	No such harm, less use of water and Less contamination of agrochemicals on Land, air and water Less insect impact	SP

Note: NS - Effect not significant, or can be rendered insignificant with mitigation, SP - Significant positive effect, SN - Significant negative effect
U - Outcome unknown or cannot be predicted, even with mitigation

11. EMP IMPLEMENTATION RESPONSIBILITIES AND COSTS

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

Environmental monitoring will be carried out mainly through visual observations and compliance monitoring using the checklist provided in the Environmental Assessment and Management Framework (EAMF) by the Environmental and Social Safeguards Specialist of ASMP and Provincial Deputy Project Director's Office of the PMU and the contractor jointly. The Consultant Environmental and Social Safeguards of EU Consultants' team will need to visit the site on a monthly or quarterly and report on issues and performance on EMP implementation to the PMU. The Cost of Environmental compliance monitoring would be borne by the ASMP project implementation cost. However, cost of mitigation proposed under section 9, considered only cultivation related activities and its impacts. Infrastructure improvements will be considered separately.

12. SCREENING DECISION RECOMMENDATION

Majority of the potential adverse effects can be classified as general agricultural activities related impacts and can be mitigated on site with good practices. These potential impacts are temporary in nature. However, it should be noted that establishment of Processing Centre and Infrastructure development related activities are excluded from this report and those project activities will be separately investigated and reported. Main activity wise recommendations are given below for better clarity:

Selection of Lands: Selection of farmers from the proposed area should be complied with basic ownership to the selected lands. Minimum of Permits or leased lands should be considered in case farmers do not possess deeds. Selection of farmlands must be considered protected areas such as Forest Reserves or Proposed Forest Reserves including their buffer zones of minimum 100m and avoid farmers within the said areas. NO open burning of vegetation which could lead to wildfires.

Land Preparation: Soil erosion will be a significant impact for which mitigation measures are provided in the EMP. Following of such mitigation measures will be important

Watering: In case of considering water from minor irrigation tanks, prior consent should be obtained from Agrarian Services Department.

Table 20: Screening Recommendations for each activity

Key recommendations	Actions / Approvals to be attended	Time period to attend each action	Responsibility / Remarks
Land Selection	Ownership should be proven and should not have conflicts Avoid forest areas including buffer zones	Before land preparation	PPMU DD-DOA EU Consultants PMU

Drainage within cultivation sites	Construct silt-traps, catch pits and other proposed methods to control soil erosion and sedimentation of adjoining waterbodies including drains	During land preparation for cultivation	EU Consultants PPMU
Use of Minor Irrigation tank water	Obtain consent from ASD for use of water for Maize Seed cultivation	Thrugh out the project	EU Consultants PPMU ASD
Consultation with FD	No objection should be seeked	Before starting	PPMU DD-DOA EU Consultants PMU
Integrated Pest Management Practices	Implement IPM activities proposed above at each stage	From land preparation onwards	Agronomist – EU team Agronomist – PPMU AIs- DOA

13. DETAILS OF PERSONS RESPONSIBLE FOR THE ENVIRONMENTAL SCREENING

Screening report completed by **J.A.P. Jayaweera** Consultant Environmental and Social Safeguards EU/ASMP ***Name/Designation/Contact information***	**Date** December 2022 ***Signature***
Screening report reviewed by **D.M. Sanjaya Bandara** Environment and Social Safeguard Specialist Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** December 2022 ***Signature***
Screening report Approved by **Dr. Rohan Wijekoon** Project Director Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** December 2022 ***Signature***

ANNEX 1: LIST OF REFERENCES

Census and Statistics, 2016

Resource profile of Vavuniya DS Division, 2021

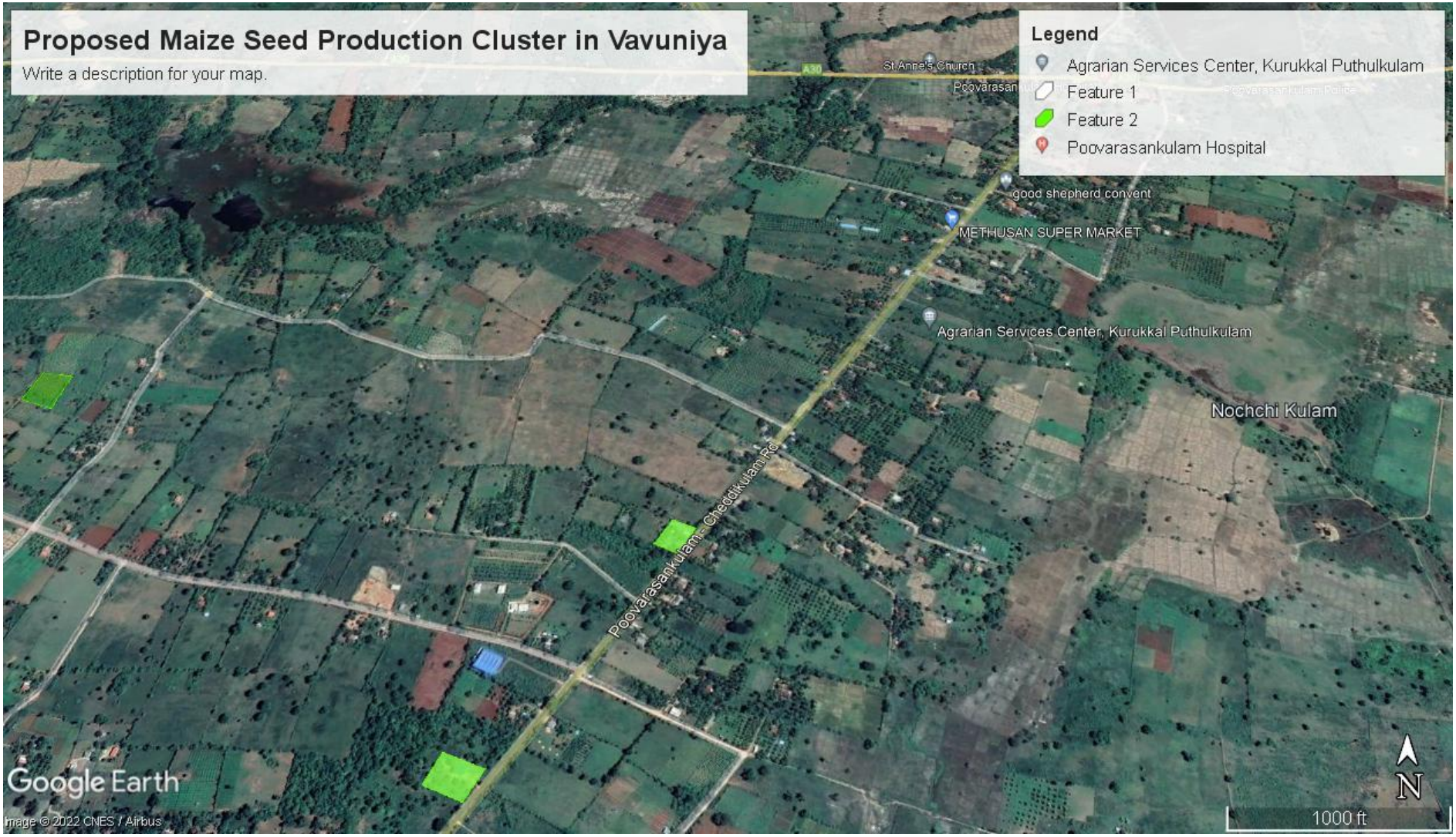
Resource profile of Vengadachettikulam DS Division, 2021

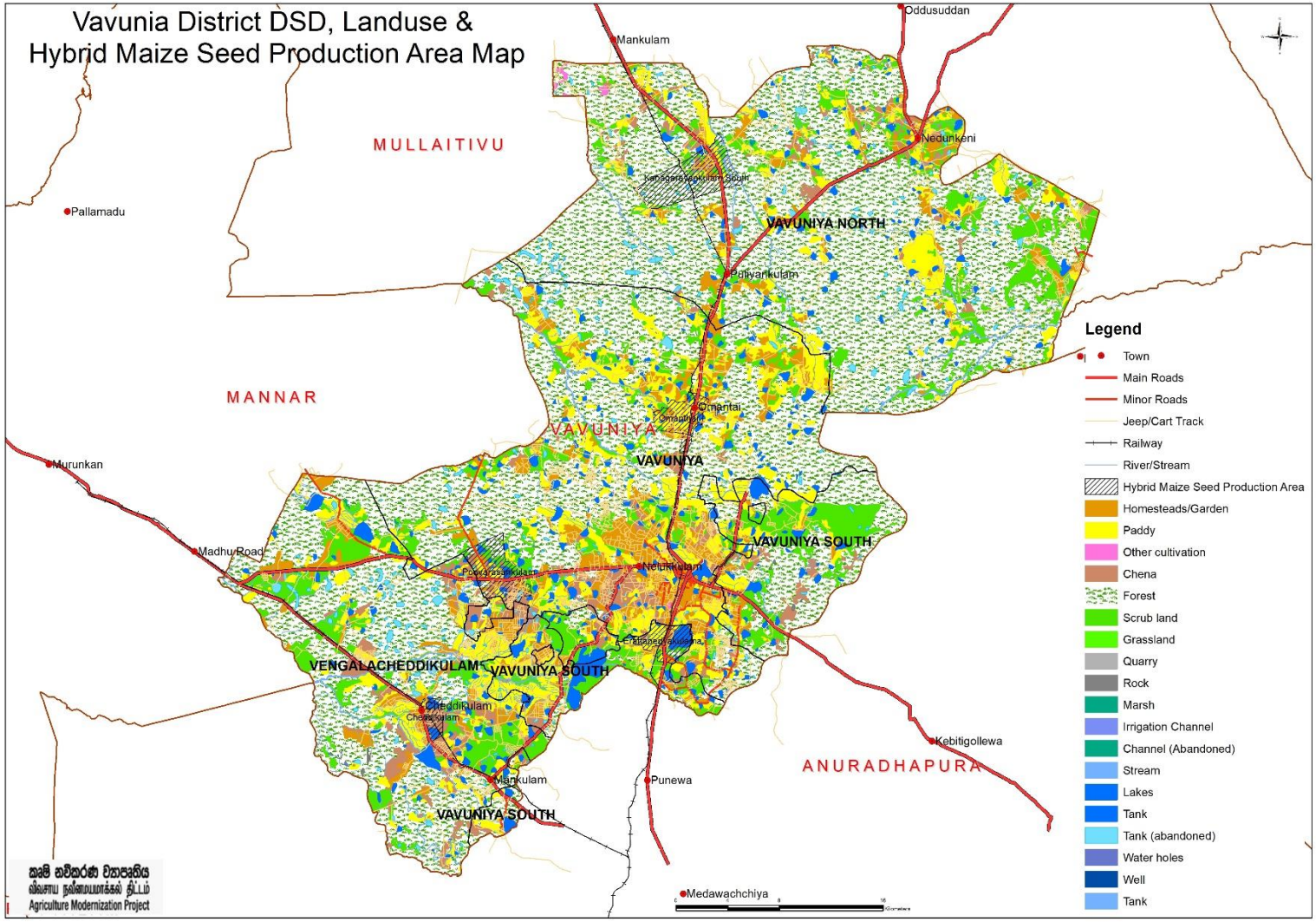
Census of Population and Housing, 2016

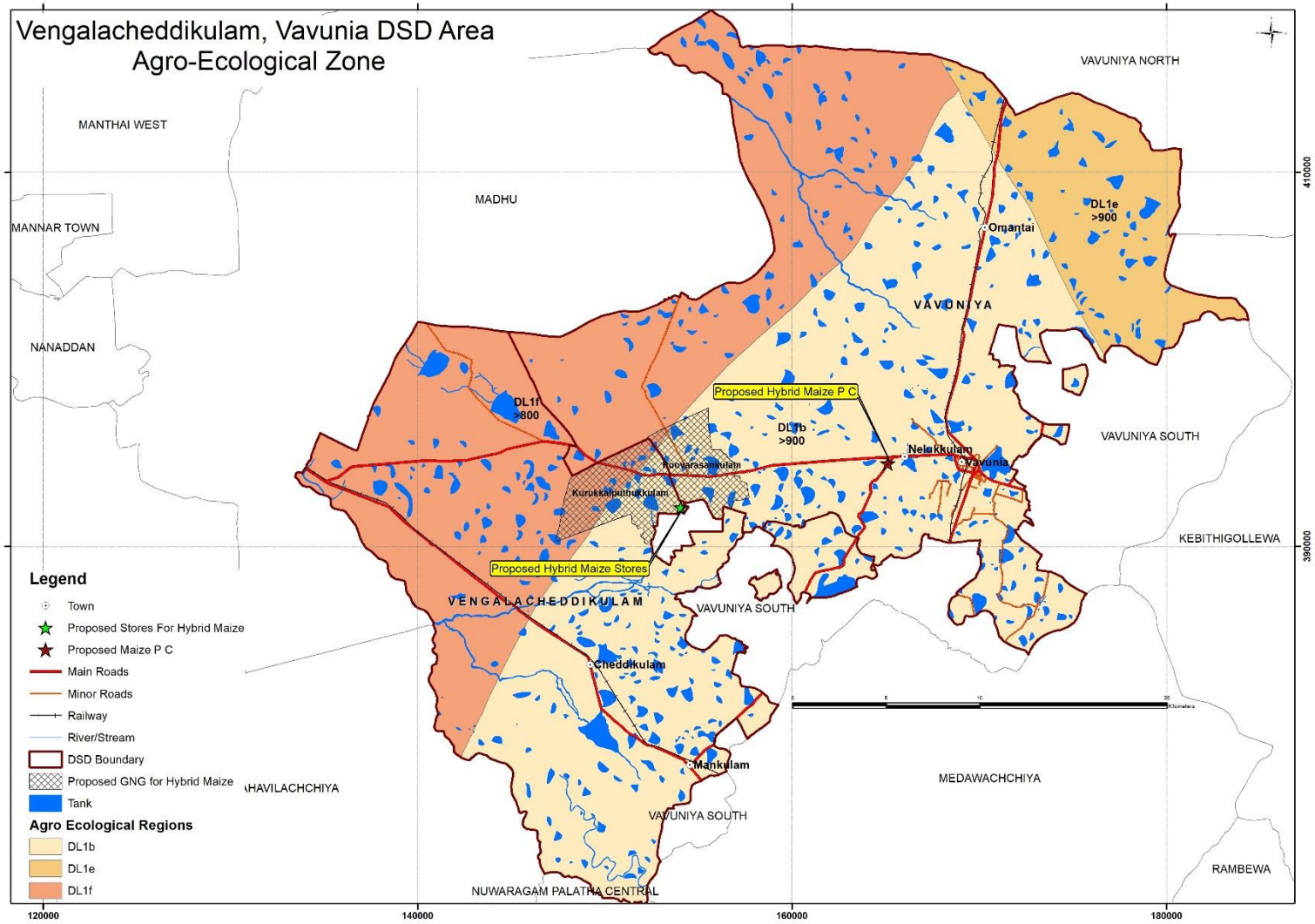
Environmental Assessment and Management Framework, ASMP

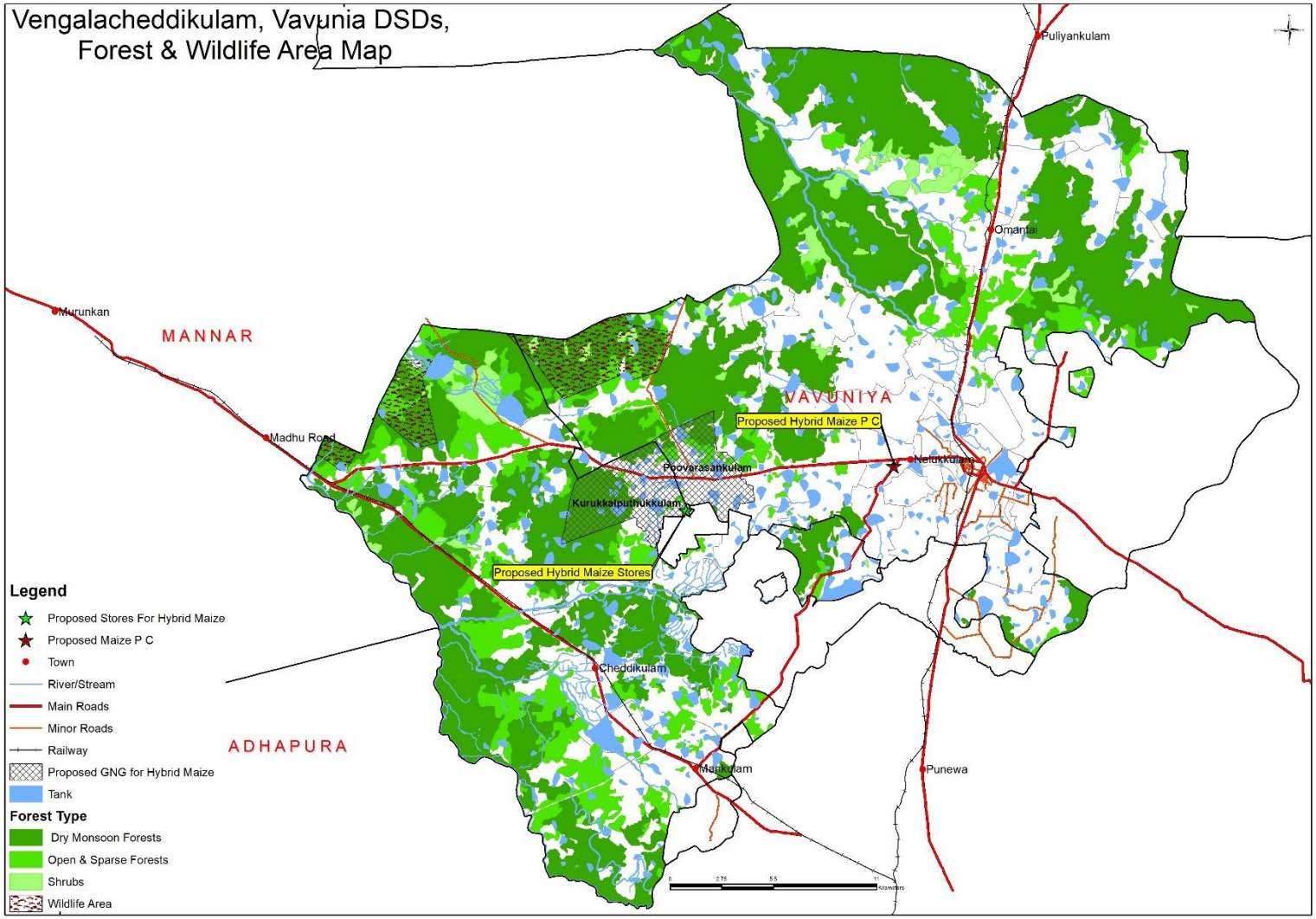
Feasibility Report for Maize Seed Production in Badulla, Ampara, Vavuniya and Kilinochchi, 2022

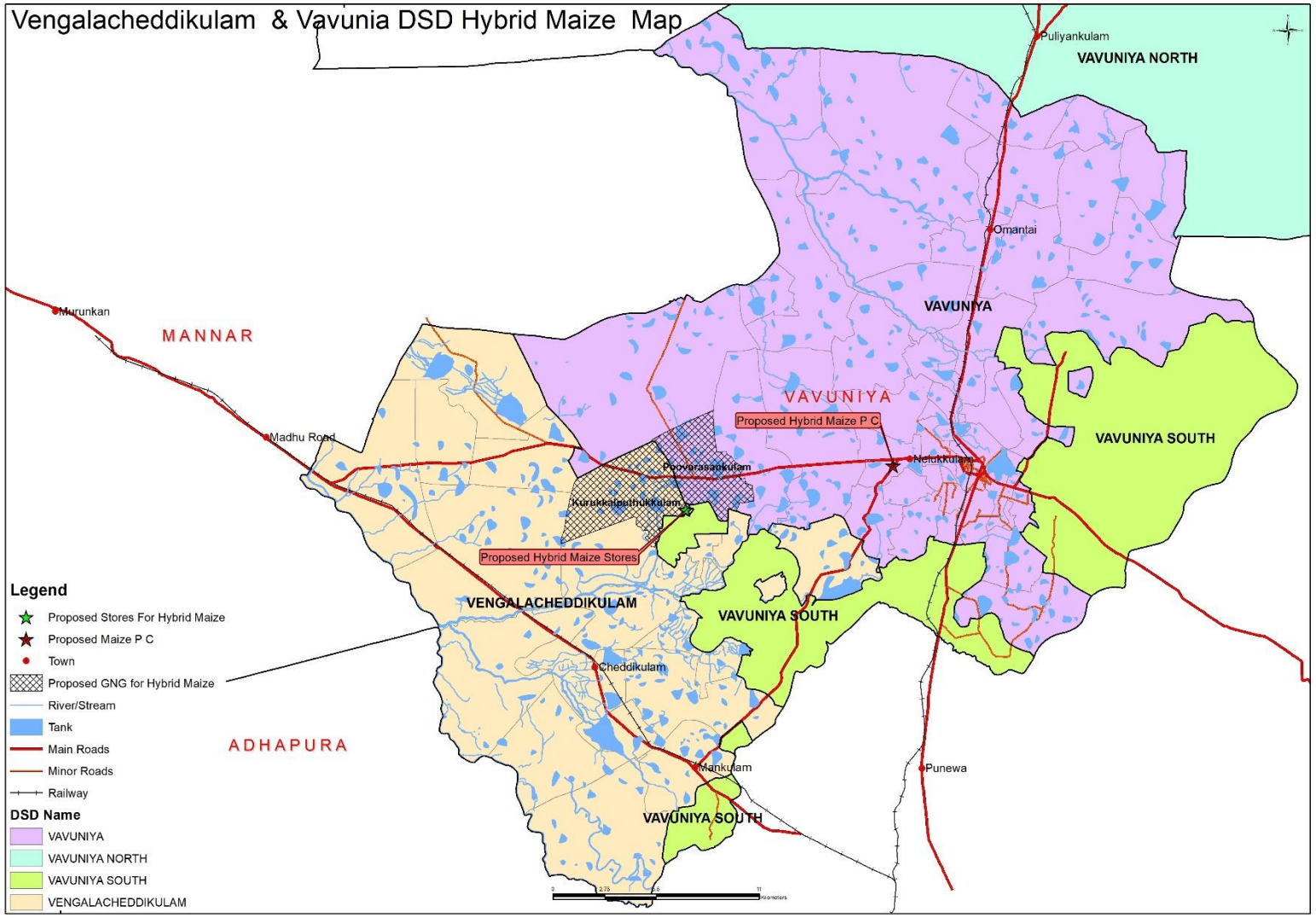
ANNEX 2: PROJECT AREA MAP

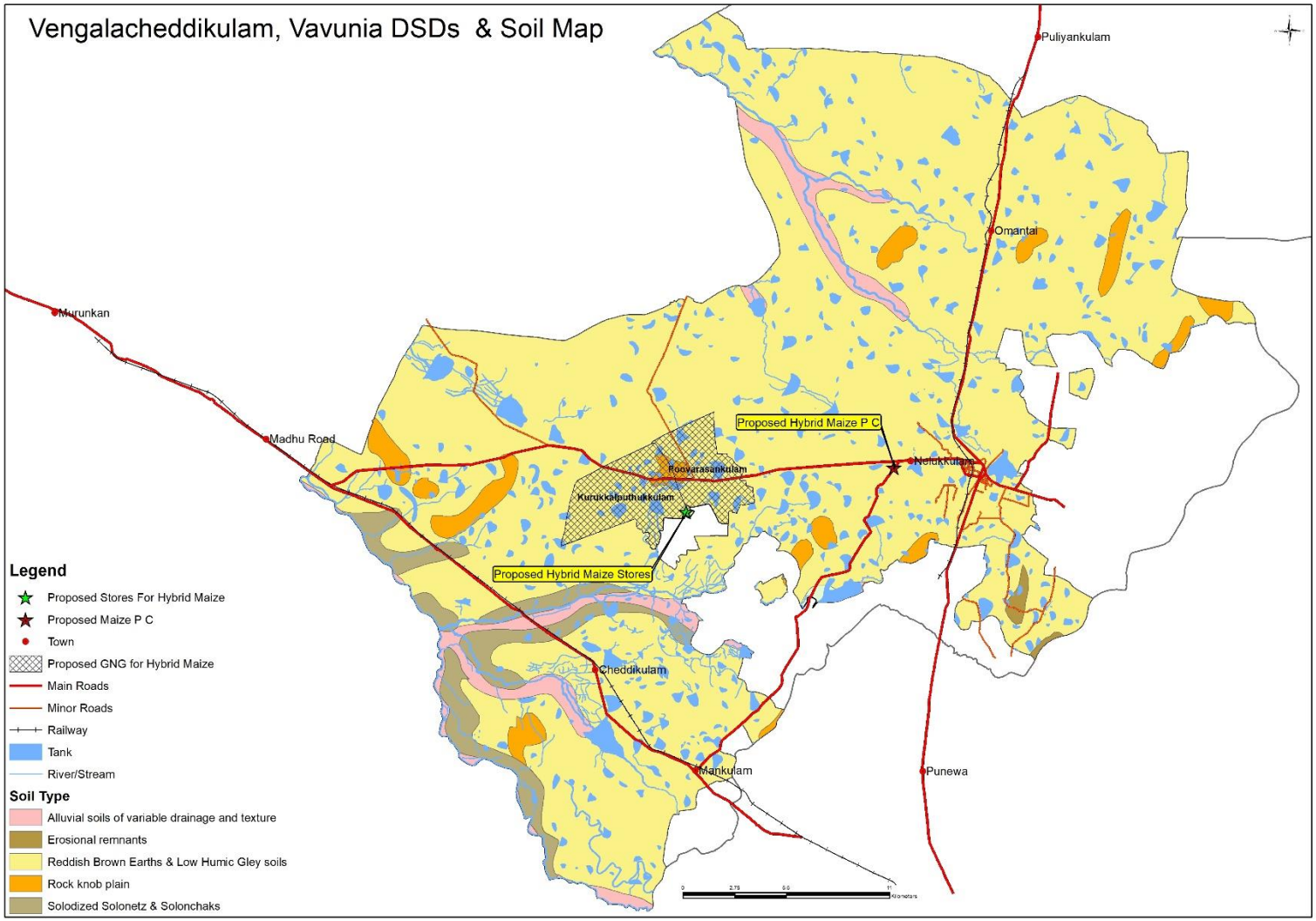


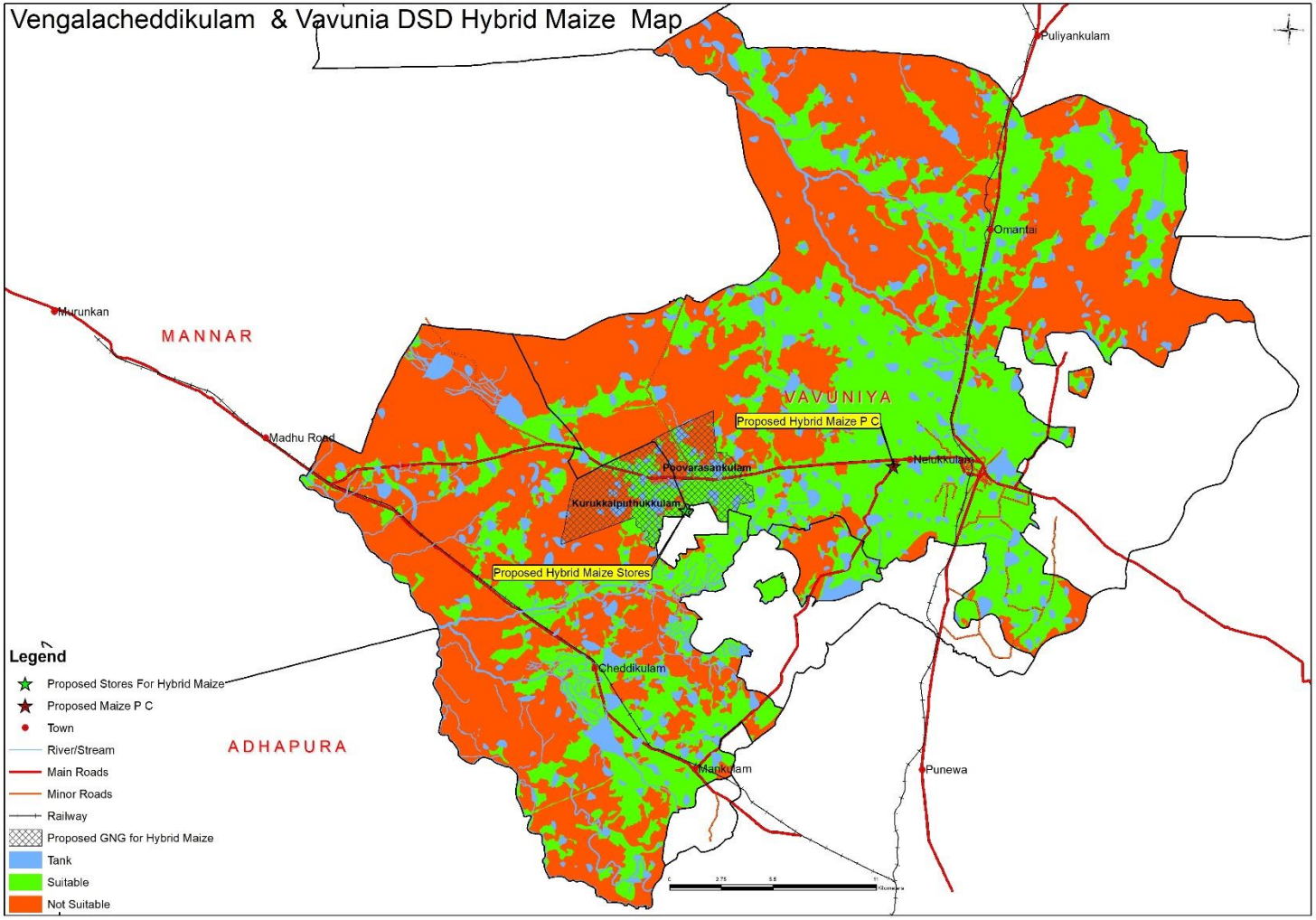

Vavunia District DSD, Landuse &
Hybrid Maize Seed Production Area Map
MULLAITIVU
MANNAR
ANURADHAPURA
VAVUNIYA
VAVUNIYA NORTH
VAVUNIYA SOUTH
VENGALACHEDDIKULAM
Mankulam
Oddusuddan
Nedunkeni
Pallamadu
Puliyankulam
Omanthai
Murunkan
Madhu Road
Nelukkulam
Kebitigollewa
Punewa
Medawachchiya
Legend
Town
Main Roads
Minor Roads
Jeep/Cart Track
Railway
River/Stream
Hybrid Maize Seed Production Area
Homesteads/Garden
Paddy
Other cultivation
Chena
Forest
Scrub land
Grassland
Quarry
Rock
Marsh
Irrigation Channel
Channel (Abandoned)
Stream
Lakes
Tank
Tank (abandoned)
Water holes
Well
Tank
Agriculture Modernization Project

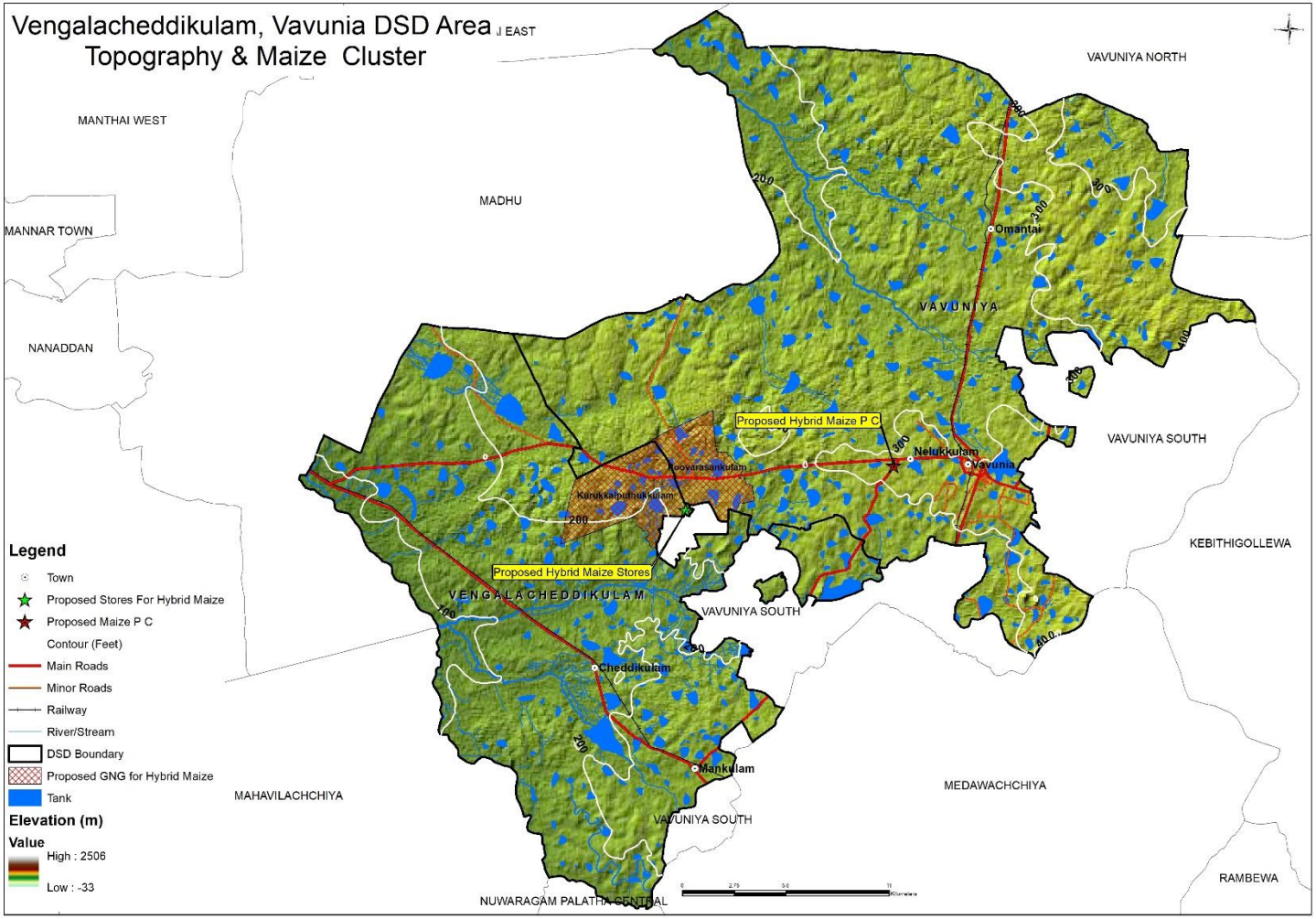

Vengalacheddikulam, Vavunia DSD Area
Agro-Ecological Zone
MANTHAI WEST
MANNAR TOWN
NANADDAN
MADHU
VAVUNIYA NORTH
Omantai
DL1e
>900
VAVUNIYA
DL1f
>800
Proposed Hybrid Maize P C
DL1b
>900
Nelukkulam
Vavunia
Poovarasankulam
Kurukkalputhukkulam
VAVUNIYA SOUTH
KEBITHIGOLLEWA
Proposed Hybrid Maize Stores
VENGALACHEDDIKULAM
VAVUNIYA SOUTH
Cheddikulam
Mankulam
MEDAWACHCHIYA
VAVUNIYA SOUTH
RAMBEWA
NUWARAGAM PALATHA CENTRAL
Legend
Town
Proposed Stores For Hybrid Maize
Proposed Maize P C
Main Roads
Minor Roads
Railway
River/Stream
DSD Boundary
Proposed GNG for Hybrid Maize
Tank
Agro Ecological Regions
DL1b
DL1e
DL1f
120000
140000
160000
180000
410000
390000


Vengalacheddikulam, Vavunia DSDs,
Forest & Wildlife Area Map
Puliyankulam
Omantai
Murunkan
MANNAR
VAVUNIYA
Madhu Road
Proposed Hybrid Maize P C
Nelukkulam
Poovarasankulam
Kurukkalputhukkulam
Proposed Hybrid Maize Stores
Cheddikulam
ADHAPURA
Mankulam
Punewa
Legend
Proposed Stores For Hybrid Maize
Proposed Maize P C
Town
River/Stream
Main Roads
Minor Roads
Railway
Proposed GNG for Hybrid Maize
Tank
Forest Type
Dry Monsoon Forests
Open & Sparse Forests
Shrubs
Wildlife Area


Vengalacheddikulam & Vavunia DSD Hybrid Maize Map
Puliyankulam
VAVUNIYA NORTH
Omantai
VAVUNIYA
Murunkan
MANNAR
VAVUNIYA
Proposed Hybrid Maize P C
Madhu Road
Nelukkulam
Poovarasankulam
VAVUNIYA SOUTH
Kurukkalputhukkulam
Proposed Hybrid Maize Stores
VENGALACHEDDIKULAM
VAVUNIYA SOUTH
Cheddikulam
ADHAPURA
Mankulam
Punewa
VAVUNIYA SOUTH
Legend
Proposed Stores For Hybrid Maize
Proposed Maize P C
Town
Proposed GNG for Hybrid Maize
River/Stream
Tank
Main Roads
Minor Roads
Railway
DSD Name
VAVUNIYA
VAVUNIYA NORTH
VAVUNIYA SOUTH
VENGALACHEDDIKULAM


Vengalacheddikulam, Vavunia DSDs & Soil Map
Puliyankulam
Omantai
Murunkan
Madhu Road
Proposed Hybrid Maize P C
Nelukkulam
Kurukkalputhukkulam
Proposed Hybrid Maize Stores
Cheddikulam
Mankulam
Punewa
Legend
Proposed Stores For Hybrid Maize
Proposed Maize P C
Town
Proposed GNG for Hybrid Maize
Main Roads
Minor Roads
Railway
Tank
River/Stream
Soil Type
Alluvial soils of variable drainage and texture
Erosional remnants
Reddish Brown Earths & Low Humic Gley soils
Rock knob plain
Solodized Solonetz & Solonchaks


Vengalacheddikulam & Vavunia DSD Hybrid Maize Map
Puliyankulam
Omanthai
Murunkan
MANNAR
VAVUNIYA
Proposed Hybrid Maize P C
Madhu Road
Poovarasankulam
Nelukkulam
Kurukkalputhukkulam
Proposed Hybrid Maize Stores
Cheddikulam
ADHAPURA
Mankulam
Punewa
Legend
Proposed Stores For Hybrid Maize
Proposed Maize P C
Town
River/Stream
Main Roads
Minor Roads
Railway
Proposed GNG for Hybrid Maize
Tank
Suitable
Not Suitable


Vengalacheddikulam, Vavunia DSD Area
Topography & Maize Cluster
MANTHAI WEST
MANNAR TOWN
NANADDAN
MADHU
VAVUNIYA NORTH
VAVUNIYA
VAVUNIYA SOUTH
KEBITHIGOLLEWA
VENGALACHEDDIKULAM
MAHAVILACHCHIYA
MEDAWACHCHIYA
NUWARAGAM PALATHA CENTRAL
RAMBEWA
Omantai
Nelukkulam
Vavunia
Cheddikulam
Mankulam
Proposed Hybrid Maize P C
Proposed Hybrid Maize Stores
Legend
Town
Proposed Stores For Hybrid Maize
Proposed Maize P C
Contour (Feet)
Main Roads
Minor Roads
Railway
River/Stream
DSD Boundary
Proposed GNG for Hybrid Maize
Tank
Elevation (m)
Value
High : 2506
Low : -33

ANNEX 3: BENEFICIARY LIST FOR HYBRID MAIZE SEED PRODUCTION CLUSTER, AMPARA

Maize- Hybrid Seed Production - ASMP Project

Beneficiaries Selection List

District: Vavuniya **Location: Kurukkalputhukkulam GN & Poovarasankulam GN**

S.N	Full Name	Gender	Civil status	Address	NIC	Contact No	Land Avail	Land Ownership type	Water Source	Type of Motor (currently using)	HP
1	Sethukavalar Thirusethukavalar	M	Married	Ramayankal, Poovarasankulam, Vavuniya.	1961 26505162	773065203	1 Acr	Permit	Agro well	Electric 2"	1 1/2
2	Chandrakumary Rajeswaran	F	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	1990 77403080	767038998	1 Acr	Permit	Agro well	Kerosine 2"	2
3	Kanthasamy Vigneswaran	M	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	751892853v	773385427	1 Acr	Permit	Agro well	Submersible 2"	1 1/2
4	Sivapatham Sivaramu	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	752580987V	771995907	1 Acr	Permit	Agro well	Electric 2"	2
5	Yapa Mudhiyanselage Rathnasiri	M	Married	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	790175468v	774384696	1 Acr	Deed	Agro well	Electric 2"	1 1/2
6	Thusyanthan Leelampikai	F	Married	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	1984 81401453	773849824	1 Acr	Deed	Agro well	Electric 2"	1 1/2
7	Rasathurai Keetheshwarakumar	M	Married	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	701044240v	773952737	1 Acr	Permit	Agro well	Electric 2"	2
8	Rathnasiri Nuwan Prasanna	M	Single	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	2000 33002585	772214006	1 Acr	Deed	Agro well	Electric 2"	1 1/2

9	Kanthasamy Suntharalingam	M	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	613244433v	779591564	1 Acr	Permit	Agro well	Electric 2"	1 1/2
10	Thevathash Pathuvai Niksan	M	Married	Cheddikulam Rd, Erukkalamkal, Poovarasankulam, Vavuniya.	813380480v	775284649	1 Acr	Permit	Agro well	Submersible 2"	1 1/2
11	Vijayakanth Sarojini	F	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	885734227v	743414102	1 Acr	Permit	Agro well	Kerosine 2"	2
12	Kanthasamy Logeswaran	M	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	803003807v	775826618	1 Acr	Permit	Agro well	Electric 2"	2
13	Yogarasa Rishikaran	M	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	891942265v	768715639	1 Acr	Permit	Agro well	Electric 2"	1 1/2
14	Ganeshan Tharmabala	M	Married	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	780701889v	776673664	1 Acr	Permit	Agro well	Electric 2"	2
15	Kulanthaivadivel Sellachchamy	M	Married	Pulavanaaroor, Poovarasankulam, Vavuniya.	620492124v	770825134	1 Acr	Permit	Agro well	Electric 2"	1 1/2
16	Balachandran Sanjeevan	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	943562296V	779370850	1 Acr	Permit	Agro well	Kerosine 2"	2
17	Kasinathar Balasubramaniyam	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	572623106V	743573669	1 Acr	Deed	Agro well	Electric 2"	1 1/2
18	Rasaiya Fransispillai	M	Married	Puliyankulam, Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	880303474V	7779832908	1 Acr	Permit	Agro well	Electric 2"	1 1/2
19	Ganeshamoorthy Piratheepan	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	743390398	743390398	1 Acr	Permit	Agro well	Electric 2"	2
20	Sithamparanathan Puvanendran	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	722610741v	765282186	1 Acr	Permit	Agro well	Electric 2"	2
21	Vimalachandran Dineshan	M	Single	Maniyarkulam, Poovarasankulam, Vavuniya.	950754133v	770785135	1 Acr	Deed	Agro well	Electric 2"	1 1/2

22	Gunabalasingam Niththiyananthan	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	832774189v	778991605v	1 Acr	Permit	Agro well	Electric 2"	2
23	Kanthasami Anantharasa	M	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	581835760V	767374974	1 Acr	Permit	Agro well	Electric 2"	1 1/2
24	Palani Aarumugam	M	Married	Nithiyanagar, Maniyarkulam, Poovarasankulam, Vavuniya.	642953672v	771336432	1 Acr	Permit	Agro well	Electric 2"	1 1/2
25	Kanthasamy Thavakkumar	M	Married	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	813620987v	770085381	1 Acr	Permit	Agro well	Electric 2"	2
26	Vijayareththinam Jeyanthini	F	Married	Puliyankulam, Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	787133983v	775165343	1 Acr	Permit	Agro well	Electric 2"	1 1/2
27	Rasalingam Thayaparan	M	Married	Puliyankulam, Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	1965 35404340	776275140	1 Acr	Permit	Agro well	Electric 2"	1 1/2
28	Rasalingam Thaventhiran	M	Married	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	682430131v	769130841	1 Acr	Permit	Agro well	Electric 2"	1 1/2
29	Aarumugam Sevendran	M	Married	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	743004345V	778374524	1 Acr	Permit	Agro well	Electric 2"	1 1/2
30	Murugesu Jeyatheepan	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	850105405v	768714526	1 Acr	Permit	Agro well	Electric 2"	1 1/2
31	Alberd Varathakumar	M	Married	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	590502782v	763453397	1 Acr	Permit	Agro well	Electric 2"	1 1/2
32	Muththurasa Balamurali	M	Single	Erukkalamkal, Poovarasankulam, Vavuniya.	931502603v	775660997	1 Acr	Permit	Agro well	Electric 2"	1 1/2
33	Naarayanan Kanthavel	M	Married	Pulavanaaroor, Poovarasankulam, Vavuniya.	511904374v	769089071	1 Acr	Permit	Agro well	Electric 2"	2
34	Muththu Thananjayan	M	Married	Ramayankal, Poovarasankulam, Vavuniya.	902512667v	762642533	1 Acr	Permit	Agro well	Kerosine 2"	1 1/2

35	Kanapathippillai Amirthalingam	M	Married	Poovarasankulam, Vavuniya.	1961 32603080	776006472	1 Acr	Permit	Agro well	Electric 2"	2
36	Palaniyappan Santhirachchelvan	M	Married	Erukkalamkal, Poovarasankulam, Vavuniya.	682042591v	766564778	1 Acr	Permit	Agro well	Electric 2"	1 1/2
37	Ganeshan Rameshwaran	M	Single	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	871641323v	775622187	1 Acr	Permit	Agro well	Submersible 2"	2
38	Sokkalingam Sivarasa	M	Married	Ramayankal, Poovarasankulam, Vavuniya.	790020138v	766380010	1 Acr	Permit	Agro well	Electric 2"	1 1/2
39	Sinnaththampi Sithamparanathan	M	Married	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	1976 34404341	771470737	1 Acr	Permit	Agro well	Submersible 2"	2
40	John Makendran	M	Married	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	682903198v	779590753	1 Acr	Permit	Agro well	Electric 2"	1 1/2
41	Kathiresu Jegatheesan	M	Married	Poovarasankulam, Vavuniya.	571931907v	774905203	1 Acr	Permit	Agro well	Electric 2"	2
42	Paalchchamy Logeswaran	M	Married	Erukkalamkal ullaka veethi, Poovarasankulam, Vavuniya.	1973 04003550	768901594	1 Acr	Permit	Agro well	Electric 2"	1 1/2
43	Subramaniyam Gnanasegaram	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	633002843V	775212528	1 Acr	Deed	Agro well	Kerosine 2"	2
44	Thampan Ulakanathan	M	Married	Nithiyanagar, Maniyarkulam, Poovarasankulam, Vavuniya.	641022381v	774924497	1 Acr	Permit	Agro well	Electric 2"	1 1/2
45	Samuvel Jebanesan	M	Married	Maniyarkulam, Poovarasankulam, Vavuniya.	1992 07803856	779378665	1 Acr	Permit	Agro well	Electric 2"	2
46	Kumarakulasingam Vinoranjan	M	Single	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	922333483v	763712160	1 Acr	Permit	Agro well	Electric 2"	1 1/2
47	Punniyamoorthy Satheeshkumar	M	Married	Kurukkalputhukkulam, Poovarasankulam, Vavuniya.	782299719v	774059990	1 Acr	Permit	Agro well	Electric 2"	1 1/2
48	Thirusethukavalar Sethuppiriyan	M	Single	Ramayankal, Poovarasankulam, Vavuniya.	2001 21104389	763537625	1 Acr	Permit	Agro well	Electric 2"	1 1/2

49	Kanthan Balakrishnan	M	Married	Nithiyanagar, Maniyarkulam, Poovarasankulam, Vavuniya.	543574317V	779619624	1 Acr	Permit	Agro well	Electric 2"	1 1/2
50	Vikneswaran Jathursan	M	Single	Erukkalamkal, Poovarasankulam, Vavuniya.	2001 16101996	741524537	1 Acr	Permit	Agro well	Electric 2"	1 1/2

ANNEX 4: ESTABLISHMENT OF COMPOST PRODUCTION UNIT

Ancient farmers in Sri Lanka have been using different organic fertilizers until early 1960s.There was no proper fertilizer application system, what they did was, convert the top soil by ploughing or using a mamoty and keep for the period of one month to decay all grasses etc. Then only they do the pulverizing and levelling. Latter part of the 1960s, new improved short term high yielding varieties came up and highly sensitive for new chemical compared to organic fertilizer. Attractive results (greenish colour) of the cultivation can be seen about three days after applying chemical fertilizer especially with high "N" element. Gradually farmers were directed towards chemical fertilizer with high yielding varieties. Prices of chemical fertilizers also gone up with the time but unfortunately a political decision was taken to subsidise the chemical fertilizers. Then farmers used to apply chemical fertilizer without any control. Ultimately the Sri Lankan government has to face a foreign currency crisis and high prices of chemical fertilizer in the international market. Then the real problem came up and Sri Lanka doesn't have either chemical or organic fertilizer. So, this is the good time to start compost preparation at farmer level and train farmers to use organic fertilizer with chemical fertilizer.

The objective of this modernization project is to establish a commercially viable compost soil application as well as the folio application. Soil application of compost fertilizer significantly improve the soil structure, chemical properties (Cation Exchange Capacity (CEC), Water Holding Capacity (WHC) etc.) and biological properties. That will help to optimum usage of chemical fertilizer and water. Small quantities of growth promoting substances also include to the soil. Compost has ability to reduce the incidence of plant diseases.

Raw materials, Yard equipment, Tools Machinery and building requirement for 200 Mts of Compost per season.

Item number	Item	Quantity
1	Cow dung	90M
2	Poultry litter	45 Mts
3	Strew	37.5 M
4	Green leaves	37.5
5	Dry leaves	37.5
6	Eppawala Rock Phosphate (5%)	10 Mts
Yard equipment		
7	Wheel barrows	04
8	Mammoties	04
9	Knife (large)	01
10	Fork	04
11	Shovel	05
12	Weighing machine (250 Kgs)	01
13	Measuring tape (30M)	01

14	Black Polythene (3.5 ft., 750 guage)	300 Kgs
15	Coir twine	75 Kgs
16	Boots	7 pairs
Packing materials		
17	Poly sack bags (40Kgs)	5000 nos
18	Inner bags (large)	5000 nos
Machinery		
19	Water pump 1”	01
20	Chopping machine	01
21	Sieving machine	01
22	Processing, drying and sieving hut 300sqm	01
23	Storage building with office room and basic facilities for staff. 800sqm	01

Although the raw material requirement is like the above table, farmers should be encouraged to utilise freely available organic materials like crop waste. Especially the Banana cultivation gives so much materials for compost preparation. Due to the recycling of organic wastes favourable environment can be created. Organic fertilizer usage can be popularised while increasing the chemical fertilizer use efficiency. Good market for quality compost can be initiated as a viable business.

Site selection for this plant is very crucial because sometimes bad odour as well as the leachate may be taken place. Shadier place is better than the fully opened place because un necessary drying can be prevented. Availability of water source, Electricity, access roads, loading and unloading spaces are must.

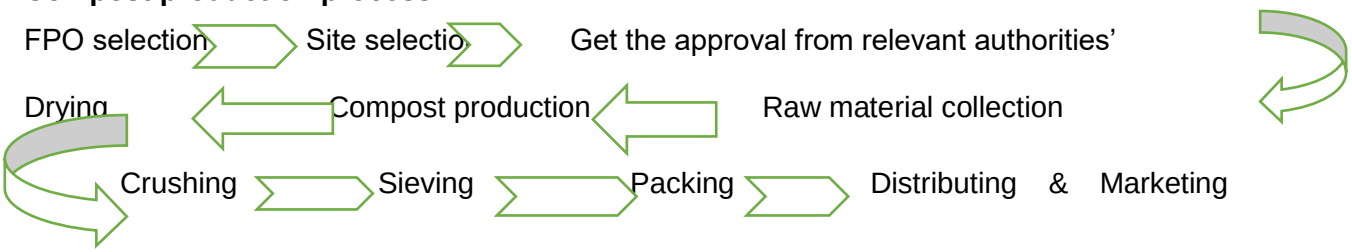
DoA has given different raw material combination for compost preparation in 2021.

Combination 01: Raw plant parts, dried plant parts (equal to 3 raw plant parts), ERP and Old compost.

Combination 02: Cow dung or poultry litter, raw plant parts, dried plant parts (equal to 3 raw plant parts), ERP and old compost.

Compost processing centre.

Compost production process



Proper management and training are very important factors of the compost production. Management includes approvals from relevant authorities, environment friendliness and good quality production. Proper awareness and skilfulness are the other crucial factors of the compost production.