



Carbon Management Assessment (CMA)

Version 03

HPL- Rooftop Solar PV Bundle Project

*Horana Plantations PLC
No. 400
Deans Road, Colombo 10*



Project Title	<i>HPL Rooftop Solar PV Bundle Project</i>
Date of Initial Issuance	<i>21.03.2022</i>
Version	<i>Version 3</i>
Date of Issue	<i>11.07.2022</i>
Project Proponent/s	<i>Horana Plantations PLC</i>
Prepared By	<i>Horana Plantations PLC</i>
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1. Description of Project Activity

1.1. Introduction of Project Activity

Solar Power, a clean renewable resource with zero-emission, has got tremendous potential energy that can be harnessed using a variety of devices. With recent developments, solar energy harnessing systems using solar Photo Voltaic (PV) are readily and cost-effectively available for industrial and domestic use with the added advantage of minimum maintenance. Solar PV systems are made financially viable with recent government tax incentives & rebates.

The exploitation of the abundant solar energy resources available in our country, therefore, being accorded a high priority by the Ministry of Renewable Energy under the initiative of “Soorya Bala Sangramaya”. The Horana Plantations PLC has come forward to support Solar PV based Power Plants in a big way throughout the country with a host of fiscal incentives and readily available spaces.

Considering the solar energy potential available, Horana Plantations PLC is proposed to consider the total of 967 KW_p existing Grid-connected Roof Top Solar PV Power Plants located at Upcot and Lindula region, for adapting to carbon crediting considering the carbon emission reduction (CER) potentiality.

In line with the bundling procedures of SLCCS, seven (07) solar PV systems located at seven tea estates are bundled into a single project activity titled HPL Solar PV Bundled project. The individual project activities are separately monitored by the assigned authorities and data and information so recorded are periodically shared with the focal points of head office for emission reduction calculation.

The proposed Power Plant sites are well connected and all necessary infrastructure facilities are available in & around the site. The proposed plants have crystalline modules, module mounting structures, inverters, and all accessories as the major components. The power generated will be evacuated to the LT panel. Thus, in Promoter's perception, setting-up of the above power plants lead to support the GOSL to meet the growing energy demands and also benefit the Horana Plantations PLC.

1.2. Sectoral Scope and Project Type

Most of the proposed projects in CDM Sri Lanka come under small scale methodologies Type 1- Category 1.D which is renewable power generation for a grid is mostly relevant to Project activity entails with renewable energy generation using the rooftop solar photovoltaic systems and applicable to be registered under SLCCS in accordance with the small scale methodologies of CDM- AMS-I.D (Version 18.0) Grid connected renewable energy generation.

1.3. Project Proponent

Organization Name	<i>Horana Plantations PLC</i>
Contact Person	<i>Mr. Tharindu Weerakoon</i>
Address	<i>N0 400, Deans Road, Colombo 10</i>
Title	<i>Assistant Manager - Sustainability</i>
Telephone	<i>070 212 8762</i>
Fax	<i>011 262 7000</i>
E-mail	<i>tharindu@hplnet.com</i>

1.4. Other Entities Involved in the Project

Organization Name	<i>Fairlawn Estate</i>
Role in the Project	<i>Contractor for supply, installation and commissioning of Solar PV system at Fairlawn Estate.</i>
Contact Person	<i>Mr. C D W Kirinda</i>
Address	<i>Fairlawn Estate, Upcot</i>
Title	<i>Manager</i>
Telephone	<i>070 2128707</i>
Fax	<i>-</i>
E-mail	<i>fairlawnestate@horanaplantations.lk</i>

Organization Name	<i>Mahanilu Estate</i>
Role in the Project	<i>Contractor for supply, installation and commissioning of Solar PV system at Mahanillu Estate.</i>
Contact Person	<i>Mr. A J M L Mangalarathna</i>
Address	<i>Mahanillu Estate - Upcot</i>
Title	<i>The Manager</i>
Telephone	<i>070 2128713</i>
Fax	<i>-</i>
E-mail	<i>mahaniluestate@horanaplantations.lk</i>

Organization Name	<i>Gouravilla Estate</i>
Role in the project	<i>Contractor for supply, installation and commissioning of Solar PV system at Gouravilla Estate.</i>
Contact Person	<i>D L K Jayasekara</i>
Address	<i>Gouravilla Estate - Upcot</i>
Title	<i>Estate Deputy Manager</i>
Telephone	<i>070 2128721</i>
Fax	<i>-</i>
E-mail	<i>gouravillaestate@horanaplantations.lk</i>

Organization Name	<i>Alton Estate</i>
Role in the project	<i>Contractor for supply, installation and commissioning of Solar PV system at Alton Estate.</i>
Contact Person	<i>Mr. Anushka A Wanniarachchi</i>
Address	<i>Alton Estate, Upcot</i>
Title	<i>Manager</i>
Telephone	<i>070 2128726</i>
Fax	<i>-</i>
E-mail	<i>altonestate@horanaplantations.lk</i>

Organization Name	<i>Bambrakelly Estate</i>
Role in the project	<i>Contractor for supply, installation and commissioning of Solar PV system Bambrakelly.</i>
Contact Person	<i>Mr. S.S Narayanan</i>
Address	<i>Bambrakelly - Lindula</i>
Title	<i>Manager</i>
Telephone	<i>070 2128706</i>
Fax	<i>-</i>
E-mail	<i>Bambrakellyestate@horanaplantations.lk</i>

Organization Name	<i>Stockholm Estate</i>
Role in the project	<i>Contractor for supply, installation and commissioning of Solar PV system at Stockholm Estate.</i>
Contact Person	<i>Mr. Pradeep Sudarshan</i>
Address	<i>Stockholm Estate Upcot</i>
Title	<i>Manager</i>
Telephone	<i>070 2128708</i>
Fax	<i>-</i>
E-mail	<i>stockholmestate@horanaplantations.lk</i>

Organization Name	<i>Eildon Hall Estate</i>
Role in the project	<i>Contractor for supply, installation and commissioning of Solar PV system at Eildon Hall Estate.</i>
Contact Person	<i>Mr. D D M C Dunusinghe</i>
Address	<i>Eildon Hall Estate - Lindula</i>
Title	<i>Manager</i>
Telephone	<i>070 2128715</i>
Fax	<i>-</i>
E-mail	<i>eildonhallestate@horanaplantations.lk</i>

1.5. Location of Project Activity

Location of Project Activity	<i>Fairlawn Estate</i>
Province	<i>Central Province</i>
District	<i>Nuwara Eliya District</i>
DS Division	<i>Ambagamuwa</i>
City/Town	<i>Hatton</i>
Community	<i>Upcot</i>
Coordinates	<i>6°51'37" N 80°36'52" E</i>

Location of Project Activity	<i>Mahanillu Estate</i>
Province	<i>Central Province</i>
District	<i>Nuwara Eliya District</i>
DS Division	<i>Ambagamuwa</i>
City/Town	<i>Maskeliya</i>
Community	<i>Upcot</i>
Coordinates	<i>6°59'35" N 80°42'30" E</i>

Location of Project Activity	<i>Gouravilla Estate</i>
Province	<i>Central Province</i>
District	<i>Nuwara Eliya District</i>
DS Division	<i>Ambagamuwa</i>
City/Town	<i>Maskeliya</i>
Community	<i>Upcot</i>
Coordinates	<i>6°55'13" N 80° 36' 15" E</i>

Location of Project Activity	<i>Alton Estate</i>
Province	<i>Central Province</i>
District	<i>Nuwara Eliya District</i>
DS Division	<i>Ambagamuwa</i>
City/Town	<i>Maskeliya</i>
Community	<i>Upcot</i>
Coordinates	<i>6°47'18 "N 80° 37' 12" E</i>

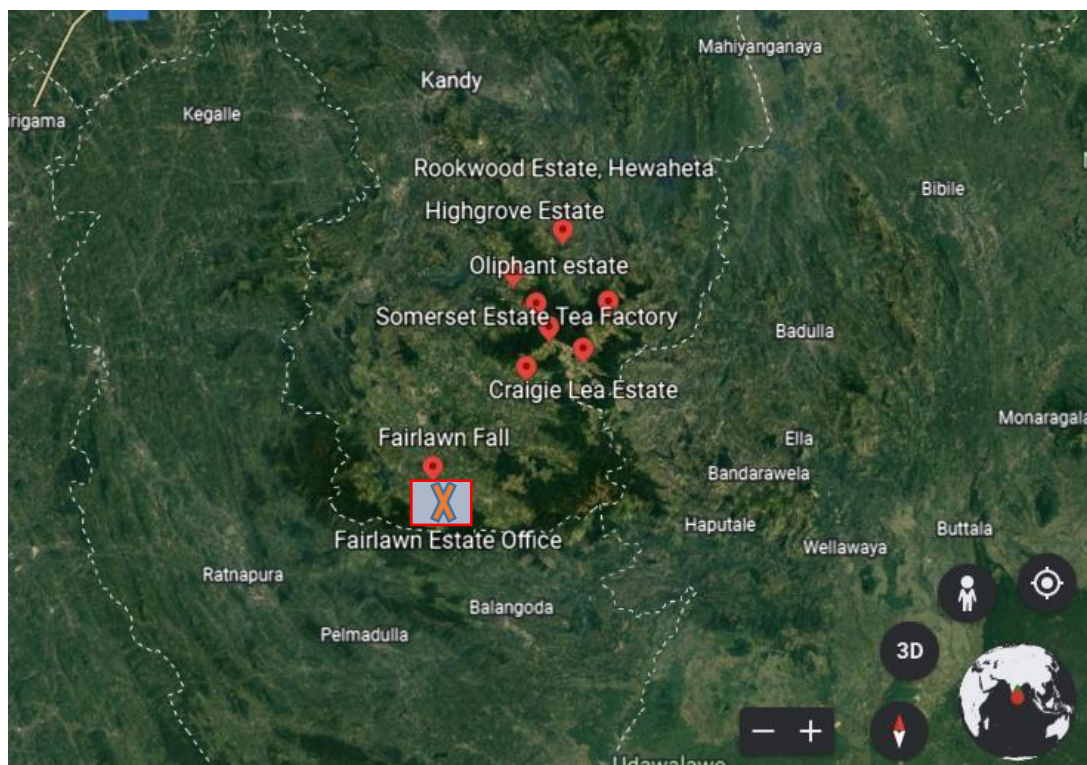
Location of Project Activity	<i>Bambrakelly Estate</i>
Province	<i>Central Province</i>
District	<i>Nuwara Eliya District</i>
DS Division	<i>Ambagamuwa</i>
City/Town	<i>Lindula</i>
Community	<i>Lindula</i>
Coordinates	<i>6°53'16 "N 80° 39' 49" E</i>

Location of Project Activity	<i>Eildon Hall Estate</i>
Province	<i>Central Province</i>
District	<i>Nuwara Eliya District</i>
DS Division	<i>Ambagamuwa</i>
City/Town	<i>Lindula</i>
Community	<i>Lindula</i>
Coordinates	<i>6°53'35 "N 80° 39' 56" E</i>

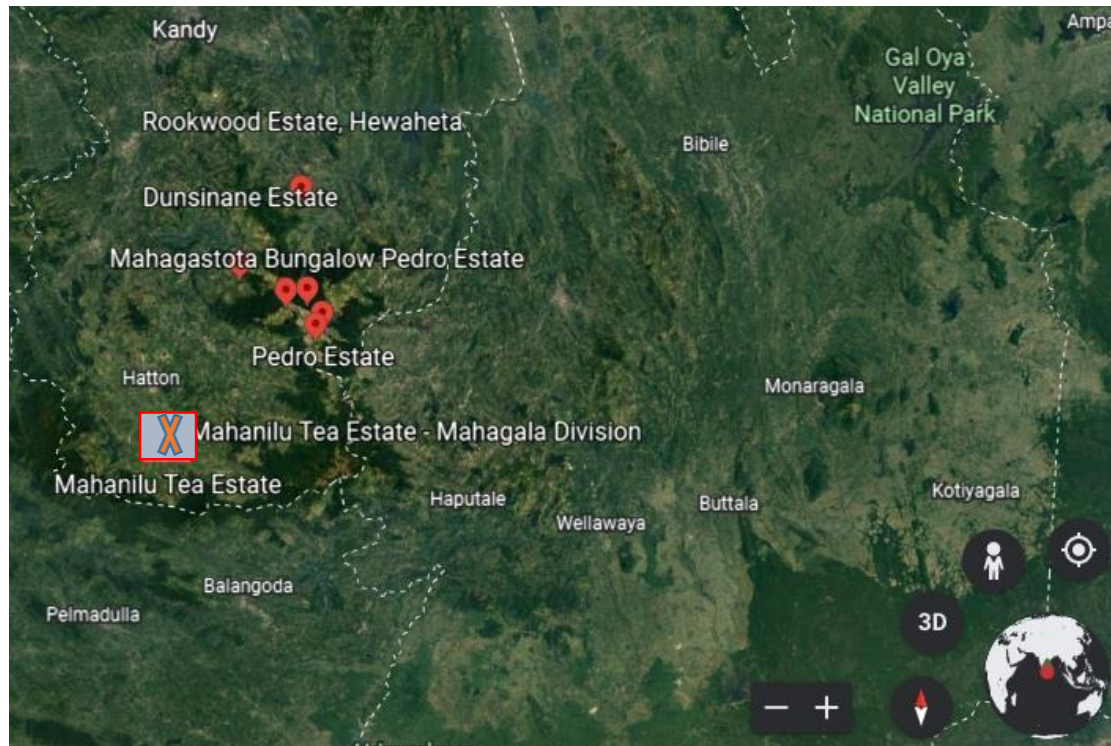
Location of Project Activity	Stockholm Estate
Province	Central Province
District	Nuwara Eliya District
DS Division	Ambagamuwa
City/Town	Lindula
Community	Lindula
Coordinates	6°49'00 "N 80° 36' 03" E

Locations of the sites are indicating in the following maps,

1. Fairlawn Estate



2. Mahanillu Estate



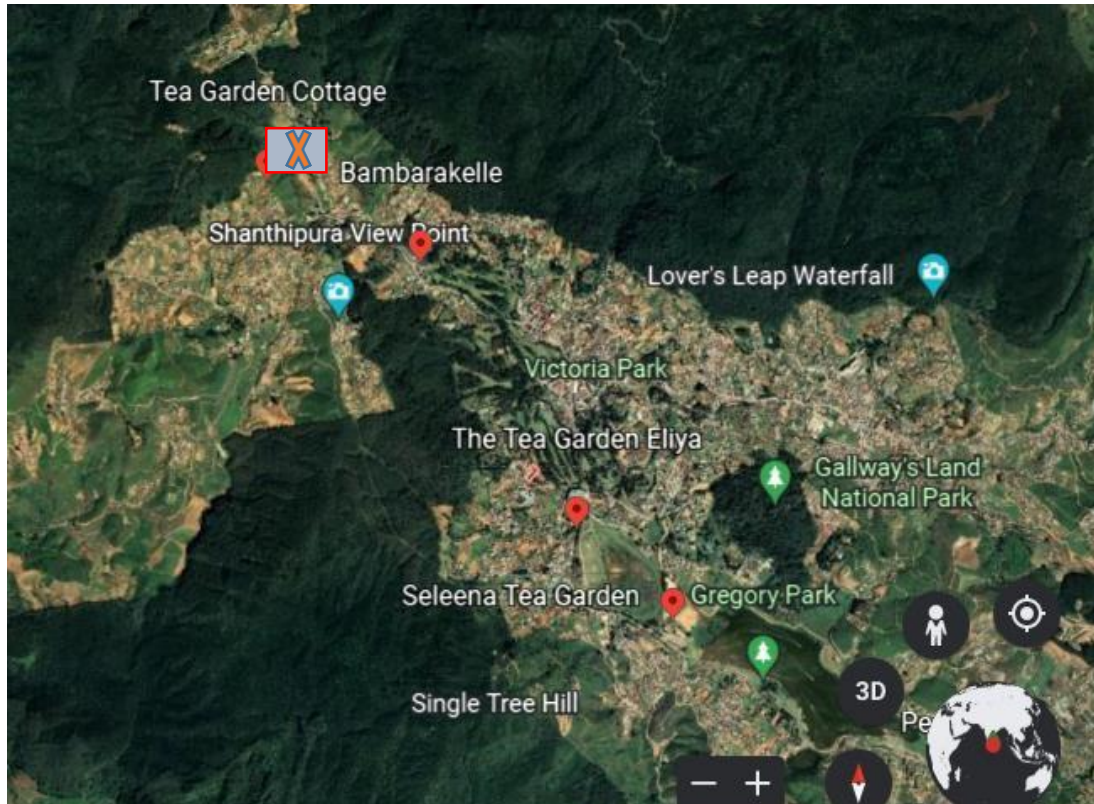
3. Gouravilla Estate



4. Alton Estate



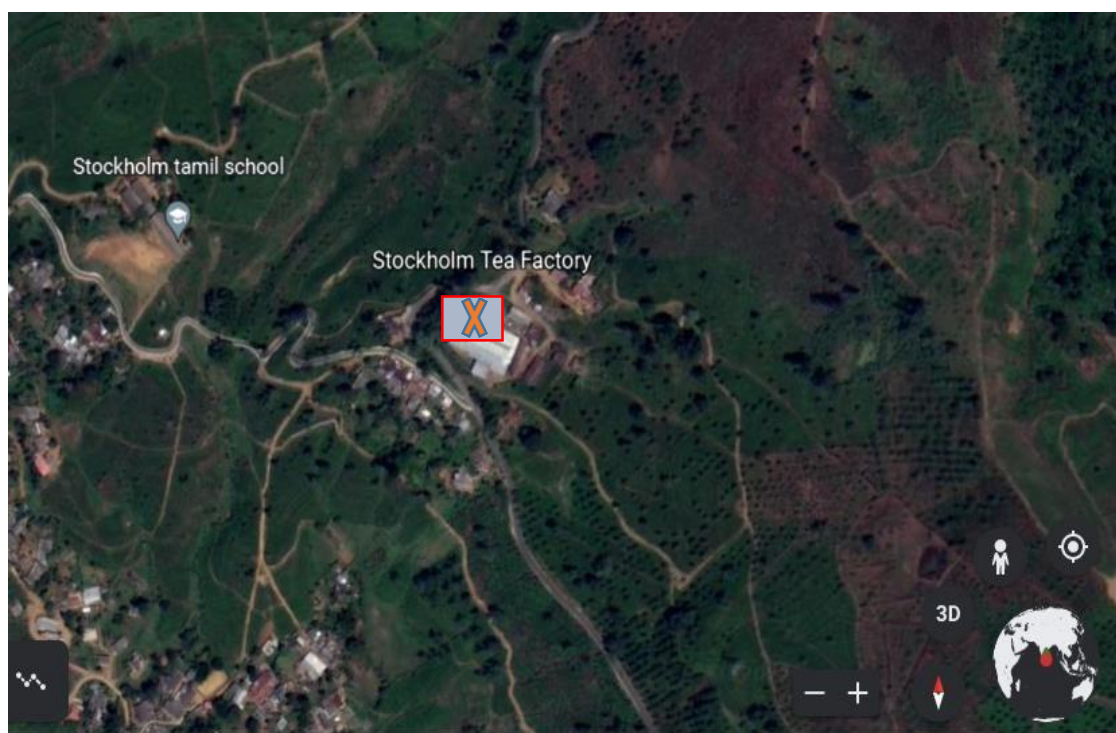
5. Bambarakelly Estate



6. Eildon Hall Estate



7. Stockholm Estate



1.6. Project Ownership

The project is fully owned by the Horana Plantations PLC

1.7. Project Funding

SITE NO	SITE LOCATION	FUNDS
1	Fairlawn Estate	Sri Lanka Tea Board & Commercial Bank Loan
2	Gouravilla Estate	Sri Lanka Tea Board & Commercial Bank Loan
3	Mahanillu Estate	Sri Lanka Tea Board & Commercial Bank Loan
4	Alton Estate	Sri Lanka Tea Board & Commercial Bank Loan
5	Stockholm Estate	Sri Lanka Tea Board & Commercial Bank Loan
6	Bambrakelly Estate	Sri Lanka Tea Board & Commercial Bank Loan
7	Eildon Hall Estate	Sri Lanka Tea Board & Commercial Bank Loan

1.8. Project Start Date

SITE NO	SITE LOCATION	PROJECT START DATE
1	Fairlawn Estate	12/08/2021
2	Gouravilla Estate	14/08/2021
3	Mahanillu Estate	13/08/2021
4	Alton Estate	07/08/2021
5	Stockholm Estate	12/08/2021
6	Bambrakelly Estate	14/08/2021
7	Eildon Hall Estate	12/08/2021

1.9. Project Commissioning Date

SITE NO	SITE LOCATION	PROJECT COMMISSIONING DATE
1	Fairlawn Estate	05/01/2022
2	Gouravilla Estate	28/03/2022
3	Mahanillu Estate	29/03/2022
4	Alton Estate	05/01/2022
5	Stockholm Estate	05/01/2022
6	Bambrakelly Estate	Pending
7	Eildon Hall Estate	Pending

1.10. Project Track

The project activity intends to be registered under TRACK I, since all project activities are started newly with the objective of generating renewable energy and GHG emission reductions. The offsets achieved through the project activity will be used either for internal offsetting or trading purposes.

1.11. Project Crediting Period

The crediting period is the period for which the credits for emission reductions are expected.

A maximum of seven years from 05/01/2022 which may be renewed at most two times provided that, for each renewal, a designated operational entity recognized by SLCCS determines and informs the Executive Board that the original project baseline is still valid or has been updated taking account of new data where applicable.

1.12. Scale of Project and Estimated Emission

Project Scale	
Small	Yes
Large	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2022	599
2023	902
2024	902
2025	902
2026	902
2027	902
2028	902
Total estimated Emission Reductions (ERs)	6011
Total number of crediting years	07
Average annual ERs	858

1.13. Description of the Project Activity

Technology/Measure

This category comprises renewable energy generation units of photovoltaic solar power systems that supply electricity to a national grid. Therefore, it falls under this category

Technical Description

Technical detail of major equipment of the implemented solar PV system is summarized below.

- a) *Fairlawn Estate*
Power 143.38 KW_p
Billing System – Net Plus

Item	Parameter	Value
PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 W _p
	Output voltage under rated conditions	VOC = 41.47V
Inverter	Make	SMA
	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos SUNNY TRIPOWER 15000TL – 1 Nos
	Total Capacity	143.38kW
Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response current	5000A to 100,000A
Earthing	Earth resistance	≈2Ω
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL Cables
Over-current	Dc fuse make	Not Applicable

protection Device	Dc fuse ratings	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

b) Mahanillu Estate

Power – 143.64 KW_p

Billing System – Net Plus

Item	Parameter	Value
PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 Wp
	Output voltage under rated conditions	VOC = 41.47V
Inverter	Make	SMA
	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos SUNNY TRIPOWER 15000TL – 1 Nos
	Total Capacity	143.64 kW
Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response	5000A to 100,000A

	current	
Earthing	Earth resistance	≈2Ω
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL Cables
Over-current protection device	Dc fuse make	Not Applicable
	Dc fuse make	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

c) *Gouravilla Estate*

Power – 143.405 kW_p

Billing System – Net Plus

Item	Parameter	Value
PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 W _p
	Output voltage under rated conditions	VOC = 41.47V
Inverter	Make	SMA
	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos. SUNNY TRIPOWER 15000TL – 1 Nos.
	Total Capacity	143.405 kW

Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response current	5000A to 100,000A
Earthing	Earth resistance	$\approx 2\Omega$
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL Cables
Over-current protection Device	Dc fuse make	Not Applicable
	Dc fuse ratings	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

d) *Alton Estate*

Power – 143.38kW_p

Billing System – Net Plus

Item	Parameter	Value
PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 W _p
	Output voltage under rated conditions	VOC = 41.47V
	Make	SMA

Inverter	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos. SUNNY TRIPOWER 15000TL – 1 Nos.
	Total Capacity	143.38 kW
Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response current	5000A to 100,000A
Earthing	Earth resistance	≈2Ω
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL Cables
Over-current protection Device	Dc fuse make	Not Applicable
	Dc fuse ratings	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

e) *Bambrakelly Estate*

Power – 125 kW_p

Billing System – Net Plus

Item	Parameter	Value
PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 W _p
	Output voltage under rated conditions	VOC = 41.47V

Inverter	Make	SMA
	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos SUNNY TRIPOWER 15000TL – 1 Nos
	Total Capacity	125 kW
Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response current	5000A to 100,000A
Earthing	Earth resistance	≈2Ω
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL Cables
Over-current protection Device	Dc fuse make	Not Applicable
	Dc fuse ratings	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

- f) *Eildon Hall Estate*
Power – 125 kW_p
Billing System – Net Plus

Item	Parameter	Value
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PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 W _p
	Output voltage under rated conditions	VOC = 41.47V
Inverter	Make	SMA
	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos SUNNY TRIPOWER 15000TL – 1 Nos
	Total Capacity	125 kW
Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response current	5000A to 100,000A
Earthing	Earth resistance	≈2Ω
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL
Over-current protection Device	Dc fuse make	Not Applicable
	Dc fuse ratings	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

g) *Stockholm Estate*
Power – 143.38 kW_p
Billing System – Net Plus

Item	Parameter	Value
PV Panel	Make	JA Solar
	Model	JAM72S30-535/MR
	Amount installed	268 Nos
	Peak Wattage	535 W _p
	Output voltage under rated conditions	VOC = 41.47V
Inverter	Make	SMA
	Model & amount	SUNNY TRIPOWER STP 110-60 – 1 Nos SUNNY TRIPOWER 15000TL – 1 Nos
	Total Capacity	143.38 kW
Cabling	DC Side Cables	Siechem Technologies Pvt. Ltd.
	AC Side Cables (Inverter out cables)	Kelani Cables/ ACL Cables
	AC Cables to main breaker	Kelani Cables/ ACL Cables
	DC Side surge arrestor make	Phoenix Contact
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	OBO
	AC side Surge arrestor response current	5000A to 100,000A
Earthing	Earth resistance	≈2Ω
	Solar panel earth cables	Kelani Cables/ ACL Cables
	Cables to earth rods	Kelani Cables/ ACL
Over-current protection Device	Dc fuse make	Not Applicable
	Dc fuse ratings	Not Applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Provided
	Datasheet and Manuals	Provided
	Warranty certificates	Provided
	Test certificates if any	Provided

1.14. Conditions Prior to Project Initiation

Prior to this project activity, there were no solar power plants at these locations. The project activity is the generation of electricity using solar energy and exporting the same to the grid system. This project is not implemented for compliance with an emissions trading programme to meet binding limits on GHG emissions.

Refer the Section 5.4 (Baseline Scenario) for more details.

1.15. Compliance with Laws, Statutes and Other Regulatory Frameworks

This project is in compliance with all relevant local, regional, and national laws, statutes, and regulatory frameworks.

1.16. Participation under Other GHG Programs

The project activity has not been registered under any other program.

1.17. Other forms of Credit

This project has not been sought or received another form of GHG-related environmental credit, including renewable energy certificates.

1.18. Sustainable Development

This renewable energy generation facility is able to reduce the contribution from thermal electricity generation to meet the electricity demand. Unlike in thermal power plants, this project is positively contributing to the electricity demand without compromising the ability of future generations to meet their own needs. The implementation of this project activity would contribute to the sustainable development of the region in the following ways.

Social well being

This project contributes an indirect impact on social wellbeing as there are no direct employment opportunities created but harnessing solar energy reduces the use of environmentally polluted petroleum products for power generation at the National level.

Economic well-being

No extra cost for mounting structures has been invested as Horana Plantations PLC already had the structures constructed for carbon neutral process when the Solar PV projects initiated. Therefore, extra land utilization has not been required for the project. It saves lands that can be used for other purposes in the area.

Environmental well-being

This project activity is to use the available solar potential in seven locations for the power generation process, which has no associated GHG emissions. The project contributes to an improvement of the local environment through reducing emissions such as SO_x and NO_x from thermal power plants which have to be operated to generate an equal amount of power. This certainly has a positive impact on the environment both at the local and global level.

Technological well-being

The project activity has used the reliable and proven technology available locally to ensure that an environmentally safe technology is only being implemented in this project activity.

1.19. Leakage Management

Reductions in anthropogenic emissions by sources shall be adjusted for leakage in accordance with the monitoring and verification. Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases that occur outside the project boundary, and which is measurable and attributable to the CDM project activity. For example, if a project displaces a group of people who started to cut forest elsewhere, this increases GHG emissions. Though this forest clearance is not a part of the project activity, it is an indirect outcome of the project. Therefore, these types of indirect impacts should be estimated as leakages. Leakage should be added to the project emissions.

Leakage management is not applicable for HPL Solar PV Bundled project developed by Horana Plantation PLC.

1.20. Commercially Sensitive Information

No commercially sensitive information has been included in this project scope.

2. Environment Impacts

2.1. Analysis of environmental impacts

As the project has been carried out in already constructed structures and all the structures have been constructed under approvals for all prevailing terms and regulations govern in Sri Lanka, especially for solar PV project does not require the analysis of environmental impact assessment.

Therefore, under prevailing regulations in Sri Lanka, the project has been implemented.

2.2. Environmental impact assessment

Environmental protection laws established in Sri Lanka does not require rooftop Solar PV systems to obtain environmental impact assessment. Therefore environmental impact assessment was not conducted for the current project activity

3. Local Stakeholder Consultation

3.1. Stakeholder Consultation Process

The project activities are not implemented in the community-owned or related premises, the facilities are fully owned by Horana Plantations PLC. Thus, projects do not lead to community issues and therefore the stakeholder consultation process was not executed as a part of the project activities.

3.2. Summary of Comments Received

Not Applicable

3.3. Consideration of Comments Received

Not Applicable

4. Eligibility Criteria

4.1. General Criteria

Sub Section	Eligibility Criteria	Project Activity	Yes/No
4.1.1	The project activity shall be a new project, which will reduce/absorb GHG emissions or the project activity shall be a project, which was implemented on or after 2010 in order to offset GHG emission within the organization.	<i>Project activity is a new project designed and implemented for the benefit of carbon credit.</i>	Yes
4.1.2	The project activity shall be located in Sri Lanka.	<i>Sites are situated in Central Province of Sri Lanka.</i>	Yes

4.1.3	The project activity shall not happen in the absence of benefits received from trading Sri Lanka Certified Emission Reduction units (SCERs).		Yes
4.1.4	The project shall be implemented voluntarily by the project owner but not implemented based on legislation or regulations in the country	<i>Project initiated by Horana Plantations PLC as a voluntary commitment</i>	Yes
4.1.5	The project activity satisfies environmental standard and regulations of the country	<i>Project will be complied to all the relevant standards and regulations in Sri Lanka.</i>	Yes
4.1.6	The project shall not have been registered under any other national or international scheme. However, if a registered project under other scheme is willing to register with SLCCS, then, such project shall be deregistered from the other scheme in order to be eligible	<i>The project not have been registered under any other national or international scheme</i>	Yes

4.2. Bundling Criteria

Sub Section	Eligibility Criteria	Project Activity	Yes/No
4.2.1	The composition of bundles shall not change over time		Yes
4.2.2	All project activities in the bundle shall have the same crediting period		Yes
4.2.3	All project activities in the bundle shall have the same baseline.	<i>Roof top type Solar System</i>	Yes
4.2.4	All project activities in the bundle shall have the same project type, methodologies and technology/measure	<i>Roof top type Solar System</i>	Yes
4.2.5	Maximum number of project activities per bundle shall be seven.	<i>7 projects</i>	Yes

4.2.6	Maximum capacity of a project activity of the bundle shall be less than 1.5 MW.	967 kW _p	Yes
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5. Application of Methodology

5.1. Title and Reference of Methodology

Title: Grid connected renewable electricity generation

Reference: AMS I.D./Version 18/EB 81

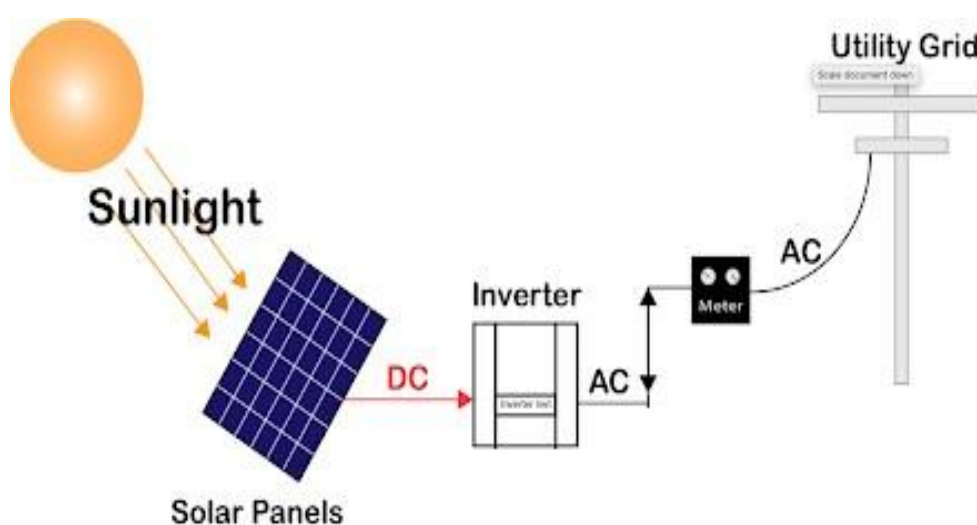
5.2. Applicability of Methodology

The projects which introduced in this report are all new Solar PV projects that are applicable under clause 4 (a) of the AMS I.D./Version 18/EB 81.

All the projects' sites are new installation of Solar PVs mounted on already constructed, therefore, all sites come under the applicability.

5.3. Project Boundary

The project boundary of these solar PV plants encompasses the physical, geographical site of the power plant, and associated physical structure. The project boundary includes the Solar PV arrays, inverters, transformers, and metering/substation systems. The following figure depicts the project boundary.



Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from fossil fuel from each source	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	No	Minor emission source
Project	Solar power generation activity from each source	CO ₂	No	Minor emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	No	Minor emission source

5.4. Baseline Scenario

The baseline for a SLCCS project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors, and sources.

Emission reductions due to the project activity are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Emission reductions are related to the electricity exported by the project and the actual generation mix in the grid system.

5.5. Additionality

The main purpose of investing in this project's activity by Horana plantations PLC carbon emissions from Certified Emission Reduction units (SCERs) received from the solar power projects.

The projects are implemented by the Horana Plantations PLC shall not happen in the absence of benefits received from trading Sri Lanka Certified Emission Reduction units (SCERs). The project is not the business-as-usual scenario (BAU) and is implemented with the intention of carbon removals. As such the project is eligible and accounted for additional.

As per the requirement for adding financial feasibility analysis and NPV calculations are not eligible to Horana Plantations PLC the solar project undertaken by the company lies on a small scale which doesn't exceed 15MW capacity in power generation. (Please refer to appendix 01 for further information.)

5.6. Methodology Deviations

In terms of modalities and procedures for the CDM, three types of small-scale CDM projects are possible.

Type I – Renewable energy project activities with a maximum output capacity equivalent of up to 15 megawatts or appropriate equivalent.

Type ii – Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 GWh per year.

Type iii – Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotons (kt) of carbon dioxide equivalent annually.

Among the approved small-scale methodologies Type 1- Category 1.D which is renewable power generation for a grid is mostly relevant to Sri Lanka. Most of the proposed CDM projects in Sri Lanka come under this category.

5.6.1 Explanation of methodological choices:

This is a renewable power generation project, supplying the entire power generated from the solar systems to the national grid. For calculating emission reduction from this type of project, the most appropriate methodology approved by CDM is AMS-I.D, Version 18.0 Grid connected renewable electricity generation. The methodology is developed by CDM for small scale renewable and non-renewable projects which are not exceeding the limit of 15 MW. HPL Solar PV bundled project detailed in this document is 967_p kW in size which is less than the above stipulated capacity, therefore CDM approved methodology AMS-I.D, Version 18.0 is used for the carbon credit development of HPL Solar PV bundled project.

6. Quantification of GHG Emission Reductions and Removals

6.1. Baseline Emissions

As per applied methodology, the baseline emission is the product of electrical energy baseline expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

A baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors are extracted by Table 9.4 and Figure 9.1: Grid Emission Factors of Sri Lanka by Energy balance 2019 published by Sri Lanka Sustainable Energy Authority. (Annexure 01)

$$\boxed{BE_y = EG_y \times EF_y} \longrightarrow \text{Equation (1)}$$

Where,

BE_y= Baseline Emissions in year y (t CO₂)

EGy = Quantity of net electricity supplied to the grid as a result of the implementation of the **Clean Development Mechanism (CDM)** project activity in year y (MWh).

EFy= CO₂ Emission factor of the grid in the year 2019 (tCO₂/ MWh)

Note: t CO₂ is a ton of Carbon Dioxide emission

6.2. Project Emissions (PEy)

The technology employed for current solar PV bundled project is rooftop solar PV systems. In the optimum level of operation, they do not require to be aided by the auxiliary systems such as standby generator or complex mechanical systems. Therefore, project emissions to be reported for this project activity is Zero.

$$PEy = 0$$

6.3. Leakage (LEy)

Leakage due to transfer of equipment from another activity

The equipment installed in the project activity is not transferred from any other activity. Hence leakage for this part is zero.

$$LEy = 0$$

6.4. Net GHG Emission Reductions and Removals

The emission reduction achieved by the project activity is the difference between the baseline emission and the sum of the project emission and leakage.

$$ERy = BEy - PEy - LEy \longrightarrow \text{Equation (2)}$$

Since LEy = 0; PEy = 0;

$$ERy = BEy$$

Therefore,

$$\text{Emission reduction} = \text{Baseline Emissions in year y (t CO}_2\text{)} \longrightarrow \text{Equation (3)}$$

No	Location	Capacity (KWp)	Date of Commission
1	Fairlawn Estate	143.38 KWp	05/01/2022
2	Gouravilla Estate	143.405 KWp	28/03/2022
3	Mahanillu Estate	143.64 KWp	29/03/2022
4	Alton Estate	143.38 KWp	05/01/2022

5	Stockholm Estate	143.38 KWp	05/01/2022
6	Bambrakelly Estate	125 KWp	Pending
7	Eildon Hall Estate	125 KWp	Pending
	Total Capacity (Tc)	967 KWp	

Summary of emission reduction calculation for the year 2022

Parameter	Value	Unit	Source
Project Capacity (Tc)	717.19	kW	Calculated
Plant Factor	14.38	%	Expert Judgment
Average Energy Output (EGy)	809.32	MWh/year	Calculated
Grid Emission Factor (EFy)	0.7404	tCO ₂ /MWh	SLSEA
Emission Reduction (ERy)	599	tCO ₂ /year	Calculated

$$\text{Emission Reduction (ERy)} = \text{EGy} \times \text{EFy} = 809.32 * 0.7404 = 599 \text{ tCO}_2$$

Summary of emission reduction calculation for the year 2023

Parameter	Value	Unit	Source
Project Capacity (Tc)	967.19	kW	Calculated
Plant factor	14.38	%	Expert Judgment
Average Energy Output (EGy)	1218.35	MWh/year	Calculated
Grid Emission Factor (EFy)	0.7404	tCO ₂ /MWh	SLSEA
Emission Reduction (ERy)	902	tCO ₂ /year	Calculated

$$\text{Emission Reduction (ERy)} = \text{EGy} \times \text{EFy} = 1218.35 * 0.7404 = 902 \text{ tCO}_2$$

Summary of estimated emission reduction

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2022	599	Not applicable	0	599
2023	902	Not applicable	0	902
2024	902	Not applicable	0	902
2025	902	Not applicable	0	902
2026	902	Not applicable	0	902
2027	902	Not applicable	0	902
2028	902	Not applicable	0	902
Total	6011			6011
Total number of crediting years				07
Annual average over the crediting period				858

7. Monitoring

7.1. Data and Parameters Available at Validation

The responsibilities of various personnel in the organization in keeping records as follows;
Real-Time monitoring software (refer Appendix 2) is available from January 2022 onwards at Head office where Net plus system is installed and these details can be used for validation of electricity generation.

However real time monitoring system at Horana Plantations PLC monitored by IT department where Net plus system is installed is on operation after 05/01/2022 and it is proposed to use estimated generation based on the system parameters and available real time monitoring details at the verification.

Since all other sites are operated under Net Plus scheme relevant energy generation and exporting to the CEB grid can be verified by taking at monthly readings of generation levels and bills issued by the CEB.

The verifier will also be welcome to visit the power station sites to confirm the status of operations.

No leakage effects are applicable to the plant's operation as the equipment at the plant has not been moved from any other operational location.

Data / Parameter	Grid emission factor (EFy)
Data unit	tCO ₂ / MWh
Description	Grid emission factor calculated using methodological tool to calculate the emission factor for an electricity system.
Source of data	Table 9.4 and Figure 9.1: Grid Emission Factors of Sri Lanka by Energy balance 2019 published by Sustainable Energy Authority.
Value applied	0.7404 tCO ₂ e/MWh
Justification of choice of data or description of measurement methods and procedures applied	Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors.
Purpose of Data	Calculate the emission reduction

7.2. Data and Parameters Monitored

Data / Parameter	Average Energy Output (EGy)
Data unit	MWh/year
Description	Quantity of net electricity export to the grid as a result of the implementation of the proposed projects activity in the year y for the 07 numbers of projects.
Source of data	This parameter is continuously monitored and recorded. Monthly electricity export voucher issued by CEB/LECO or available real time monitoring software can use to recheck.
Description of measurement methods and procedures to be applied	<p>Net electricity supplied to the grid would be calculated based on export & import data (Net electricity supplied to grid = Export electricity – Import electricity) when net plus connection is available all the generated electricity will be export to the Grid where Net Plus connections are available.</p> <p>The export or/and import energy are measured continuously using Main meter when Net Plus system available and Real Time software will use at Net plus system available sites and readings of meters/portal shall be taken on monthly basis at appointed day and hour (time) by authorized officer and recorded in log book on monthly basis.</p>
Frequency of monitoring/recording	Monthly
Value applied	<p>809 MWh/year for year 2022 (total value)</p> <p>1218 MWh/year from year 2023 onwards (total value)</p>
Monitoring equipment	<p>Energy meter</p> <p>Accuracy class of the meter class 01.</p>
QA/QC procedures to be applied	The meter is properly calibrated and maintained in order to ensure accuracy. Testing/Calibration interval: Annually by CEB; Cross checking of the data with the cheque received from CEB for exported electricity to the grid
Purpose of data	Calculate baseline emission
Calculation method	Direct observation

Comments

The recorded data will be checked periodically by the relevant Manager or CE(M&E)

7.3. Monitoring Plan

The inverters of HPL Solar PV Bundle Project which was installed by Hayleys Feltons (Pvt) are SMA make; they have provided access to the online portal of SMA for real-time monitoring of the system. Monthly production details are monitored and the performance changes are identified and informed to the CEB to be rectified.

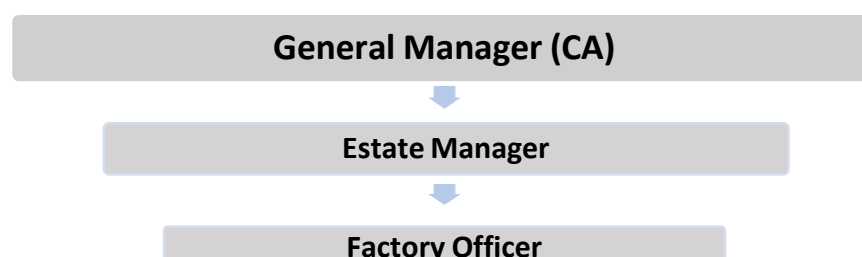
In regional sites, Estate Managers are responsible for maintaining the data records, ensuring completeness of data and reliability of data (calibration of equipment), recording for all the parameters as well as communicating with the General Manager (CA) through regional General Manager. Required technical trainings and knowledge sharing sessions have conducted at the initial stage and plan to have more session's correspondingly to uplift the solar power generation and its basic technical knowledge.

Bill of the Ginigathhena DE Office system where other Net plus system is installed issued by CEB Ginigathhena and these records are recorded in a log book by Electrical Engineer (Ginigathhena) before making the payment which is made by Manager (O&M-Ginigathhena) with EE recommendation. Also, these details will be cross checked with online portal in the future. If an error or reduction in production is identified against the monthly production records taken from the online portal/ frequent generate details, Electrical Engineer will be notified to M/s. Hayleys Feltons Pvt (Ltd) or CEB to take corrective actions accordingly.

Regarding the document control, the following procedures are followed:

- Documents should be stored either electronically or physically in a location with controlled access.
- Only authorized people should be able to view or modify the documentation. A log book of all the modifications should be kept. As a best practice, such a log book should contain.
- All records and payments should strictly follow the rules and regulation issued by Horana Plantations PLC.

Operational and Management Structure



Note: At Regional sites, estate managers and factory officers are responsible for the management of ~~the~~ system.

As a monitoring tool Horana Plantation PLC has created an online WhatsApp platform to record daily solar meter readings via online web portal. The access is given to CEO and managers of each estate and authorized personnel and Head office Business Analyst is the coordinator of the Solar group and responsible for online records monitoring. If there is any error, deviation or misreading of meter values are found directly contact through the engineers and take immediate actions to correct and continual of normal proceedings.



8. Appendix

APPENDIX 1: SLSEA EMISSION FACTOR CALCULATION

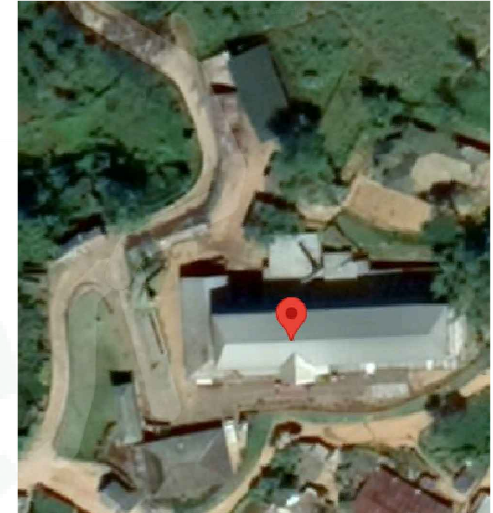
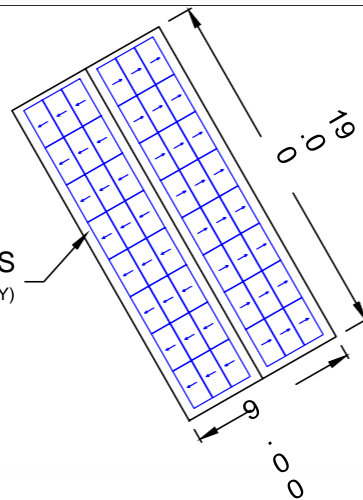
APPENDIX 2: EMISSION REDUCTION CALCULATION

APPENDIX 2: PANEL LAYOUTS & SLD

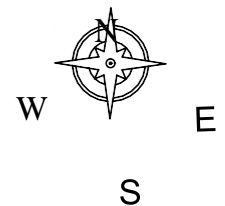
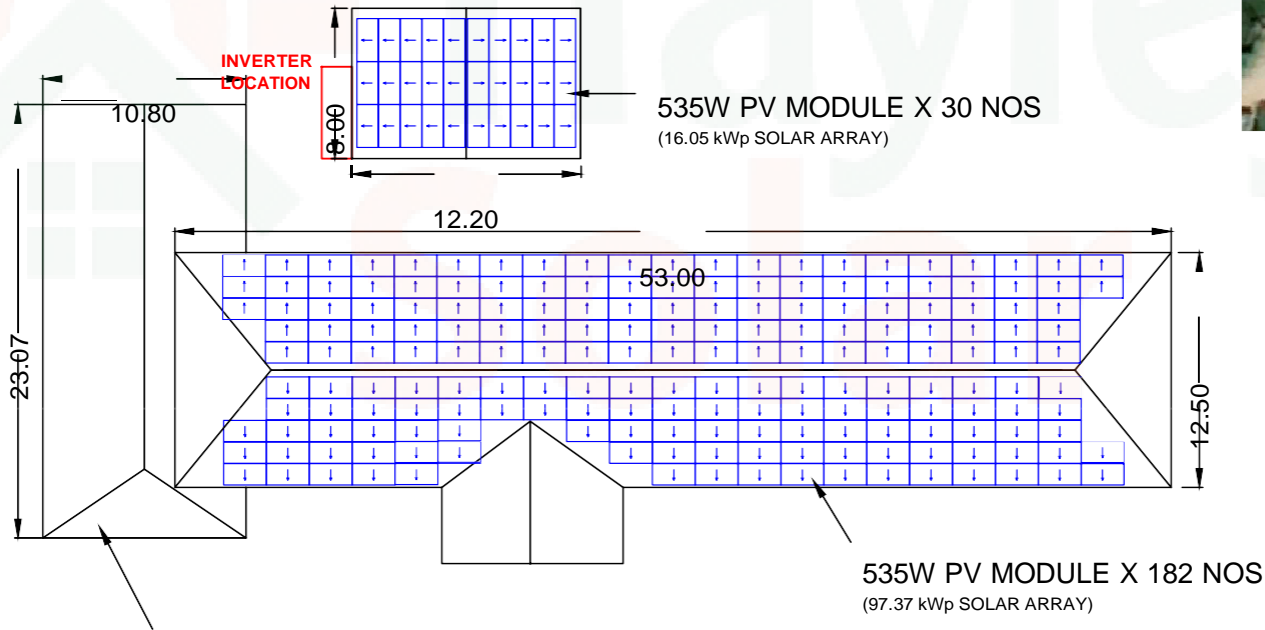
143.38 kWp SOLAR ARRAY

535Wp X 268 NOS SOLAR MODULES

535W PV MODULE X 36 NOS
(19.26 kWp SOLAR ARRAY)



TRANSFORMER
LOCATION



535W PV MODULE X 20 NOS
(10.7 kWp SOLAR ARRAY)

535W PV MODULE X 182 NOS
(97.37 kWp SOLAR ARRAY)



CLIENT:
ALTON FACTORY

CONSULTANT/ARCHITECTS:

SYSTEMS INTEGRATORS:

**Hayleys
Fentons**

Hayleys Fentons Ltd, No. 185A, Deans Road, Colombo 10, Sri Lanka. Tel : +94 11 26486218 Fax : +94 11 26486217 Email : info@hfc.com

PROJECT TITLE:
GROUND MOUNTED SOLAR
PV PROJECTS

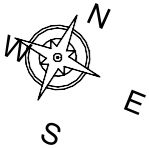
PANEL LAYOUT

Units: METERS
Date: 10.05.2021
Drawn By: DUMALI
Checked By: NISALA
Approved By: DESHAN
Dwg. No. :
FEN/SP/DR/ALTON FACTORY/470/Panel Layout/R1

Rev. Description

Date

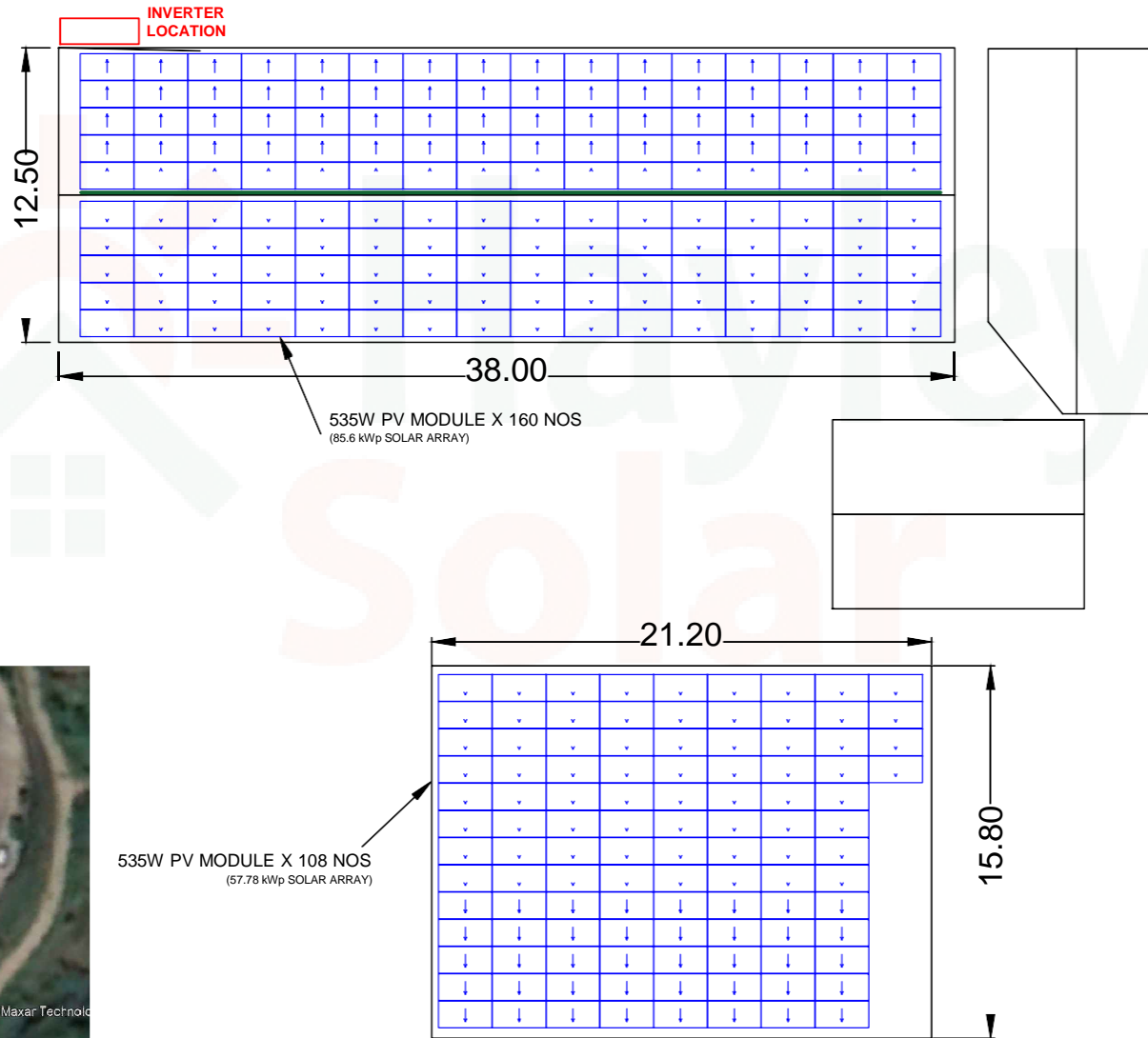
— - WALKING PATH
- INVERTER LOCATION



TRANSFORMER
LOCATION

143.38 kWp SOLAR ARRAY

535Wp X 268 NOS SOLAR MODULES



CLIENT:
FAIR LAWN GROUP

CONSULTANT/ARCHITECTS:

SYSTEMS INTEGRATORS:

**Hayleys
Fentons**

Hayleys Fentons Ltd.
No. 185/8, Deane Road,
Colombo 10, Sri Lanka.
Tel : +94 11 2644611/8
Fax : +94 11 2644617
Email : info@hfc.com

PROJECT TITLE:
GROUND MOUNTED SOLAR
PV PROJECTS

PANEL LAYOUT

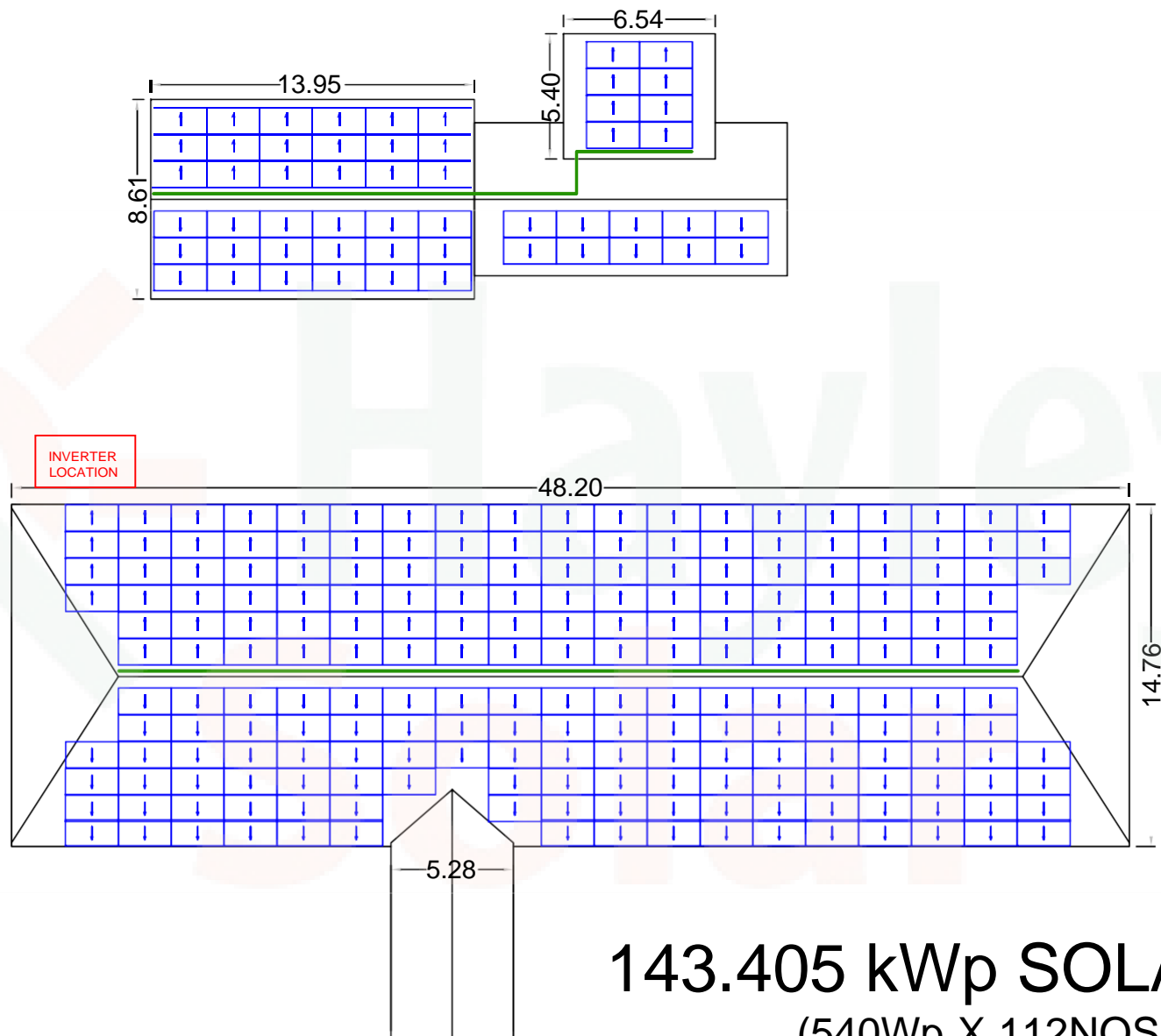
Scale: NTS
Date: 10.05.2021
Drawn By: DUMALI
Checked By: NISALA
Approved By: DESHAN
Dwg. No. :
FEN/SP/DR/FAIR LAWN GROUP/467/Panel Layout/R1

LEGEND

↑ - PV PANEL
- WALKING PATH
- INVERTER LOCATION

Rev. Description

Date



143.405 kWp SOLAR ARRAY

(540Wp X 112NOS PV MODULES)
(535Wp X 155NOS PV MODULES)

CLIENT:

Gouravilla Tea Factory

MAIN CONTRACTOR:

SYSTEMS INTEGRATORS:

Hayleys
Fentons
SINCE 1987

Hayleys Fentons Ltd.
No. 180/2, Deane Road,
Colombo 10, Sri Lanka.
Tel : +94 11 2668618
Fax : +94 11 2668617
Email : info@hayleys.com

PROJECT TITLE:

ROOF MOUNTED SOLAR
PV PROJECTS

PANEL LAYOUT

Scale:

NTS

Date:

14.06.2021

Drawn By:

SANKA

Checked By:

HIRAN

Approved By:

DESHAN

Dwg. No. :

FEN/SP/DR/ Gouravilla Tea Factory/Panel layout/R0

Rev. Description

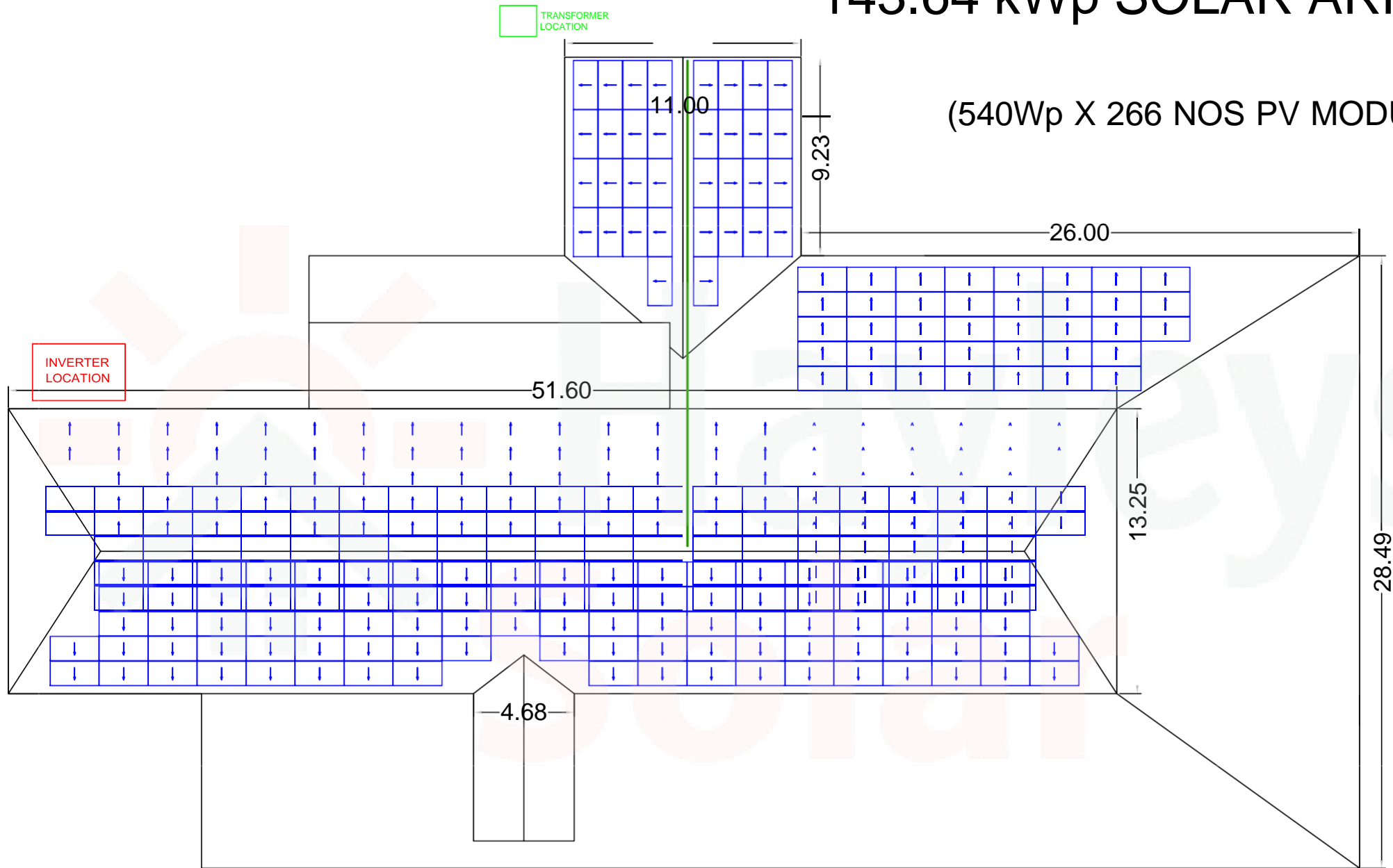
Date Rvsd.By

LEGEND

- - PANEL
- WALKING PATH

143.64 kWp SOLAR ARRAY

(540Wp X 266 NOS PV MODULES)



CLIENT:	MAIN CONTRACTOR:	SYSTEMS INTEGRATORS:	PROJECT TITLE:	Scale:	NTS				
Mahanilu Tea Factory			ROOF MOUNTED SOLAR PV PROJECTS	Date:	14.06.2021				
				Drawn By:	SANKA				
				Checked By:	HIRAN				
				Approved By:	DESHAN				
			PANEL LAYOUT	Dwg. No. :					
				FEN/SP/DR/Mahanilu Tea Factory/Panel layout/R0					
				Rev.	Description	Date	Rvsd.	By	

Hayleys Fentons
Since 1982

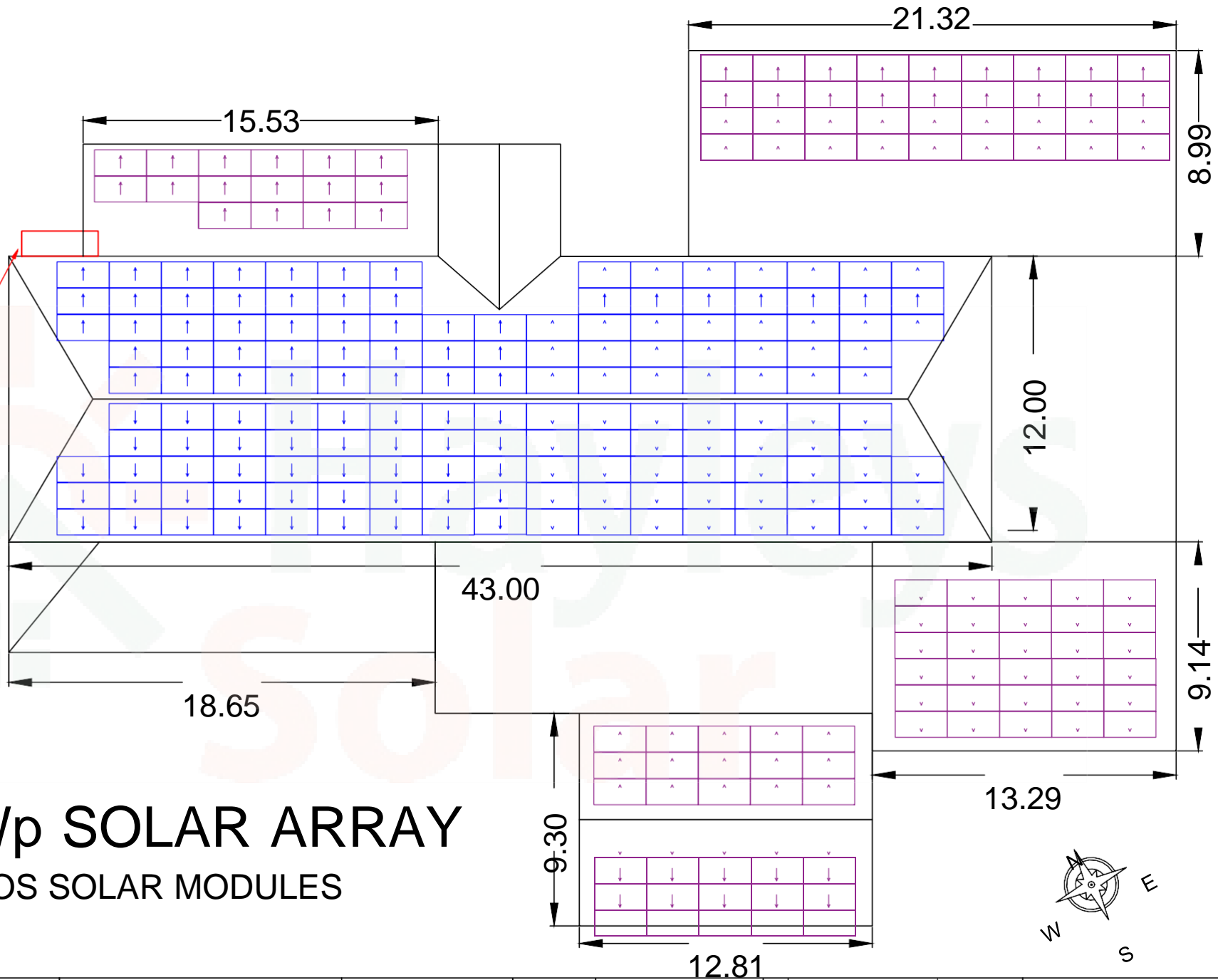
Hayleys Fentons Ltd,
No. 183/2, Desana Road,
Colombo 10, Sri Lanka.
Tel : +94 11 2644961/8
Fax : +94 11 2448917
Email : info@fentons.com

LEGEND
● - PANEL
— WALKING PATH



INVERTER LOCATION

TRANSFORMER LOCATION



143.38 kWp SOLAR ARRAY

535Wp X 268 NOS SOLAR MODULES



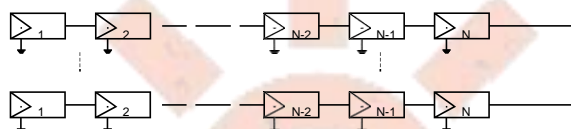
- PV PANEL

<p>CLIENT:</p> <p>Stockholm Tea Factory</p>	<p>CONSULTANT/ARCHITECTS:</p>	<p>SYSTEMS INTEGRATORS:</p> <p>Hayleys Entom <small>Since 1981</small></p> <p><small>Hayleys Entom Ltd, No. 1009, Cinnamon Road, Colombo 10 Sri Lanka. Tel : +94 11 2445818 Fax : +94 11 2445817 Email : info@hayleys.com</small></p>	<p>PROJECT TITLE:</p> <p>GROUND MOUNTED SOLAR PV PROJECTS</p> <p>PANEL LAYOUT</p>	<p>Scale: NTS</p> <p>Date: 10.05.2021</p> <p>Drawn By: DUMALI</p> <p>Checked By: NISALA</p> <p>Approved By: DESHAN</p> <p>Dwg. No. : FEN/SP/DR/Stockholm Tea Factory/466/Panel Layout/R1</p>	<p>Rev. Description</p> <p>Date</p>	<p>Rev. Description</p> <p>Date</p>
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· INVERTER LOCATION

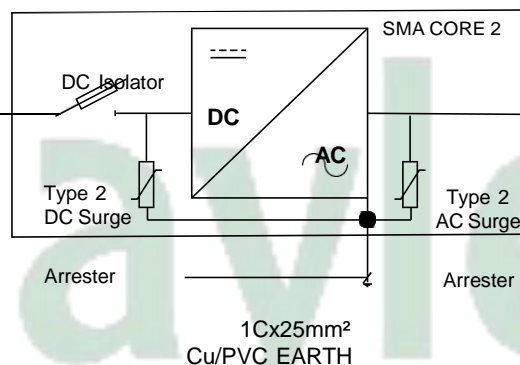
2x1Cx4mm² Cu/XLPE/PVC DC

535W X 236 NOS OF SOLAR MODULES IN SERIES



15 PANELS X 05 STRINGS
16 PANELS X 01 STRINGS
17 PANELS X 01 STRINGS
18 PANELS X 05 STRINGS
19 PANELS X 02 STRINGS

Inverter No. 01 - 110kW INVERTER



1x4Cx50mm²
Cu/XLPE/PVC

1x95mm² ABC
CABLE

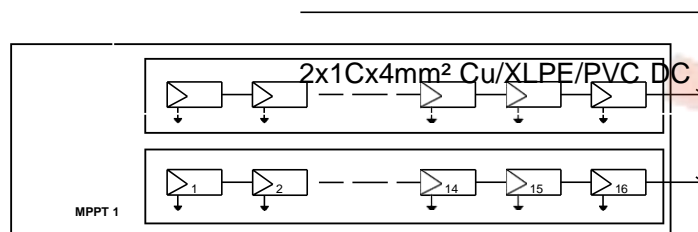
4P 200A
MCCB ADJ

CEB
BREAKER

(4P 200A
MCCB
ADJ)

Type 1
AC Surge
Arrester

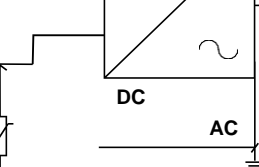
1Cx25mm²
Cu/PVC EARTH



MPPT 1

MPPT 2

Inverter No. 02 - 15kW INVERTER



4x1Cx6mm²
Cu/XLPE/PVC

4P 30A

MCB

PVS-15-TL


1Cx6mm²
Cu/PVC EARTH

Type 2
DC Surge
Arrester

Type 2
DC Surge
Arrester

Type 2
AC Surge
Arrester

17.12 kWp SOLAR ARRAY
535Wp X 32 NOS PV MODULES

CLIENT: Stockholm Tea Factory	CONSULTANT/ARCHITECTS:	MAIN CONTRACTOR:	SYSTEMS INTEGRATORS: <div> Hayleys Fentons LLC, No. 1850, Ocean Road, Colombo 10, Sri Lanka. Tel : 011-24488818 Fax : 011-2448517 Email : info@fentons.com</div>	PROJECT TITLE: ROOF MOUNTED SOLAR PV PROJECTS SINGLE LINE DIAGRAM	<table><tr><td>Scale:</td><td>NTS</td><td></td><td></td></tr><tr><td>Date:</td><td>28.07.2021</td><td></td><td></td></tr><tr><td>Drawn By:</td><td>DUMALI</td><td></td><td></td></tr><tr><td>Checked By:</td><td>HIRAN</td><td></td><td></td></tr><tr><td>Approved By:</td><td>DESHAN</td><td></td><td></td></tr><tr><td>Dwg. No. :</td><td>FEN/SP/DR/Stockholm Tea Factory/557/SLD/R0</td><td></td><td></td></tr></table>	Scale:	NTS			Date:	28.07.2021			Drawn By:	DUMALI			Checked By:	HIRAN			Approved By:	DESHAN			Dwg. No. :	FEN/SP/DR/Stockholm Tea Factory/557/SLD/R0			<table><tr><td>Rev</td><td>Description</td><td>Date</td><td>Rev'd By</td></tr></table>	Rev	Description	Date	Rev'd By
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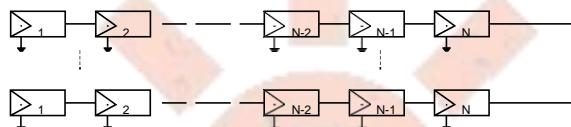
Alton Tea Factory

Fairlawn Tea Factory

Gauravila Tea Factory

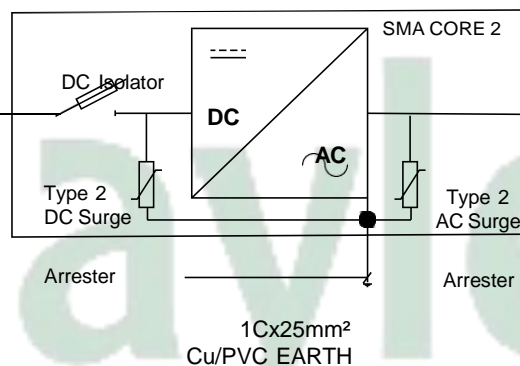
2x1Cx4mm² Cu/XLPE/PVC DC

540W X 234 NOS OF SOLAR
MODULES IN SERIES



15 PANELS X 06 STRINGS
16 PANELS X 01 STRINGS
18 PANELS X 05 STRINGS
19 PANELS X 02 STRINGS

Inverter No. 01 - 110kW INVERTER



1x4Cx50mm²
Cu/XLPE/PVC

1x95mm² ABC
CABLE

4P 200A
MCCB ADJ

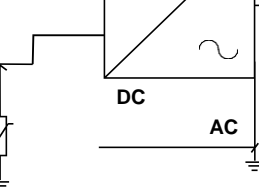
CEB
BREAKER

(4P 200A
MCCB
ADJ)

Type 1
AC Surge
Arrester

1Cx25mm²
Cu/PVC EARTH

Inverter No. 02 -
15kW INVERTER



4x1Cx6mm²
Cu/XLPE/PVC

4P 30A

MCB

PVS-15-TL

1Cx6mm²
Cu/PVC EARTH

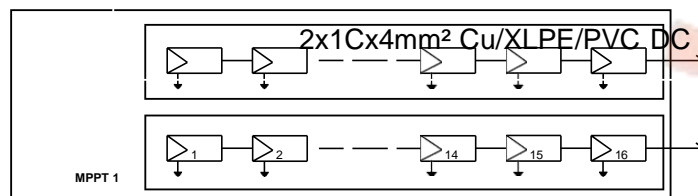
Type 2
AC Surge
Arrester

Type 2
DC Surge
Arrester

Type 2
DC Surge
Arrester

17.28 kWp SOLAR ARRAY

540Wp X 32 NOS PV MODULES



MPPT 1

MPPT 2

CLIENT:

Stockholm Tea Factory

CONSULTANT/ARCHITECTS:

MAIN CONTRACTOR:

SYSTEMS INTEGRATORS:

**Hayleys
Fentons**

Hayleys Fentons LLC
No. 1850, Ocean Road,
Colombo 10, Sri Lanka.
Tel : 011-24488818
Fax : 011-2448517
Email : info@hfc.com

PROJECT TITLE:

ROOF MOUNTED SOLAR
PV PROJECTS

SINGLE LINE DIAGRAM

Scale:

NTS

Date:

28.07.2021

Drawn By:

DUMALI

Checked By:

HIRAN

Approved By:

DESHAN

Dwg. No. :

FEN/SP/DR/Stockholm Tea Factory/557/SLD/R0

Rev.	Description	Date	Rvsd. By

Mahanlu Tea Factory

Stockholm Tea Factory