Validation Report

Validation of Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project

Report No: SLCCS/VDR/2023/04
Version : 01

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Client	Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project
Date of First Issue	10/10/2023
Version No	02
Version date	11/12/2023
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Summary of the validation report

Validation Division of Sri Lanka Climate Fund has conducted the validation of the Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project which is located in five different locations of Sri Lanka, on the basis of Sri Lanka Carbon Crediting Scheme (SLCCS) eligibility criteria and CDM methodologies, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The project activity aims at reducing GHG emissions by installing roof top solar PV systems at the facilities owned by Thalawakelle Tea Estates PLC. The annual estimated emission reduction to be achieved through the implementation of this project is about 448 tCO_2e.

Validation Division of Sri Lanka Climate Fund confirms that the project correctly applies the baseline and monitoring methodology AMS I.D Version 18 and meets all relevant SLCCS requirements. Validation Division of Sri Lanka Climate Fund thus requests the registration of the project as a SLCCS project activity.

Project Title	Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project
Report No	SLCCS/VDR/2023/04
Work carried out by	Validation Division - Sri Lanka Climate Fund (Pvt) Ltd.
Work Approved by	Ms. Harshani Abeyrathna Chief Executive Officer Sri Lanka Climate Fund (Pvt) Ltd.

CONTENT

1 INTRODUCTION

1.1 Objective

The purpose of a validation is to have an independent review of the Carbon Management Assessment (CMA). In particular the project's baseline, the monitoring plan (MP), and the project's compliance with SLCCS standard are validated in order to confirm that the Carbon Management Assessment is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of Sri Lankan Certified Emission Reductions (SCERs).

The information included in the CMA and the supporting documents were reviewed against the requirements as set out by the SLCCS. The validation team has, based on the requirements in the Validation and Verification Standard, carried out a full assessment of all evidences to assess the compliance of the project with the SLCCS. The validation is not meant to provide any consulting to the project participants. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the Carbon Management Assessment.

1.2 Scope and Criteria

The validation scope is given as a thorough independent and objective assessment of the project design including especially the correct application of the methodology, the project's baseline study, local stakeholder commenting process, environmental impacts and monitoring plan, which are included in the CMA and other relevant supporting documents, to ensure that the proposed SLCCS project activity meets all relevant and applicable SLCCS criteria.

1.3 Involved Parties and Project Participant

Title of the Project Activity	*Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project*
Project Participant(s)	*Talawakelle Tea Estates PLC*
Host Party(ies)	*Sri Lanka*
Consultant of the Project	-

1.4 Summary description of the project

The main purpose of the project activity is to generate electricity using solar power at facilities owned by Talawakelle Tea Estates PLC and register this project as a renewable energy generation project under Sri Lanka Carbon Crediting Scheme (SLCCS). The project is a bundled project activity which involves installation of 597.675 kWp solar photovoltaic (SPV) in different sites of Talawakelle Tea Estates PLC and export to national grid operated by Ceylon Electricity Board (CEB). The estimated annual power generation output of this solar power plant is 637.2 MWh. This replaces an equal amount of fossil fuel dominated power in the National Grid. The crediting period set for the project activity runs for seven (07) starting from 1st of August 2021 to 29th of July 2028.

The project is intended to be registered as a bundled renewable energy project complying the methodological requirements of Sectoral scope 1, Type I, AMS-I.D, Grid connected renewable

electricity generation, Version 18.0. The expected annual GHG emission reduction resulting in the operation of project (5 Project Components) is 448 tCO_2e/year and the expected total GHG emission reductions in first crediting period is 3,141 tCO_2e.

2 GHG PROJECT DISCRIPTION

2.1 Project Characteristics

Essential data of the project is presented in the following table.

Item	Data		
Project Title	Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project		
Project size	⊡ Large Scale ☒ Small Scale Bundle Project		
Project Scope *(according to UNFCCC sectoral scope numbers for CDM)*	1	Energy industries (Renewable/ Non-renewable)	☒
	2	Energy distribution	⊡
	3	Energy demand	⊡
	4	Manufacturing industries	⊡
	5	Chemical industries	⊡
	6	Chemical industry	⊡
	7	Construction	⊡
	8	Transport	⊡
	9	Mining / Mineral production	⊡
	10	Fugitive emissions from fuels (solid, oil and gas)	⊡
	11	Fugitive emissions from production and consumption of halocarbons and hexafluoride	⊡
	12	Solvents use	⊡
	13	Waste handling and disposal	⊡
	14	Afforestation and Reforestation	⊡
	15	Agriculture	⊡
Applied Methodology	*AMS-I.D ver.18.0*		
Technical Area(s)	Renewable Energy (Solar Power)		
Crediting period	Renewal crediting Period (7 years)		
Start Date of crediting period	2 years prior to the actual project registration date		

2.2 Project Location

Location of Project Activity	*Bearwell Estate*
Province	*Central Province*
District	*Nuwara eliya District*
DS Division	*Nuwaraeliya*
City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.93252 N, 80.68022 E*

Location of Project Activity	*Calsay Estate*
Province	*Central Province*
District	*Nuwaraeliya District*
DS Division	*Nuwaraeliya*
City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.94275 N, 80.65914E*

Location of Project Activity	*Dessford Estate*
Province	*Central Province*
District	*Nuwara Eliya District*
DS Division	*Nuwaraeliya*
City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.94284 N, 80.66903 E*

Location of Project Activity	*Deniyaya Estate*
Province	*Southern Province*

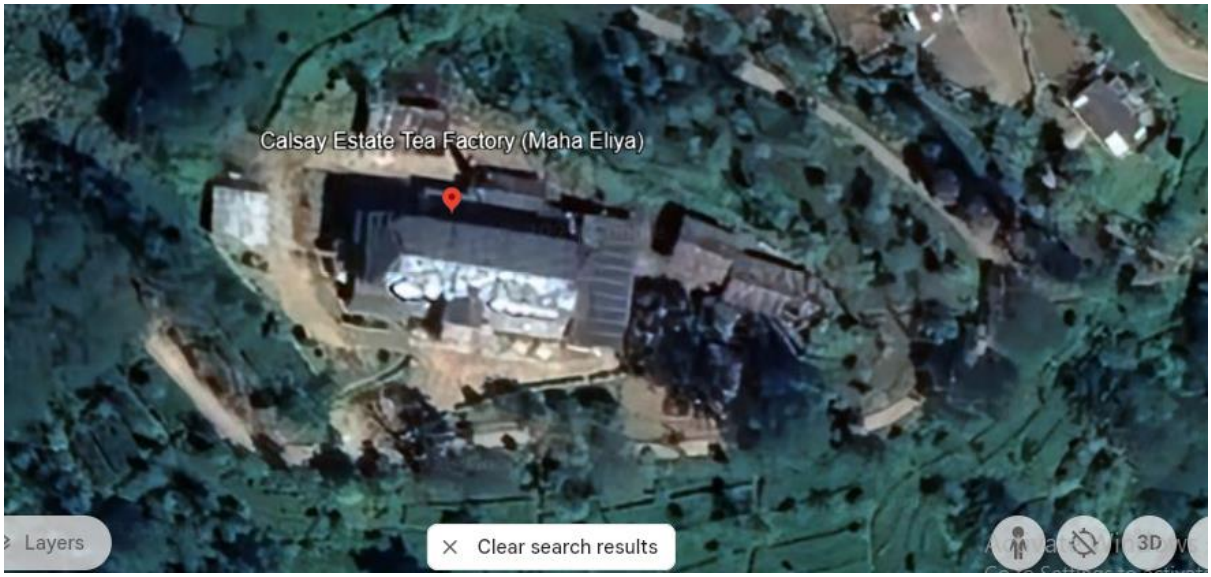
District	*Matara District*
DS Division	*Deniyaya*
City/Town	*Deniyaya*
Community	*Low country*
Coordinates	*6.12235 N, 80.42455 E*

Location of Project Activity	*Moragalla Estate*
Province	*Uva Province*
District	*Badulla District*
DS Division	*Imaduwa*
City/Town	*Deniyaya*
Community	*Low country*
Coordinates	*6.3377952 N, 80.5622228 E*

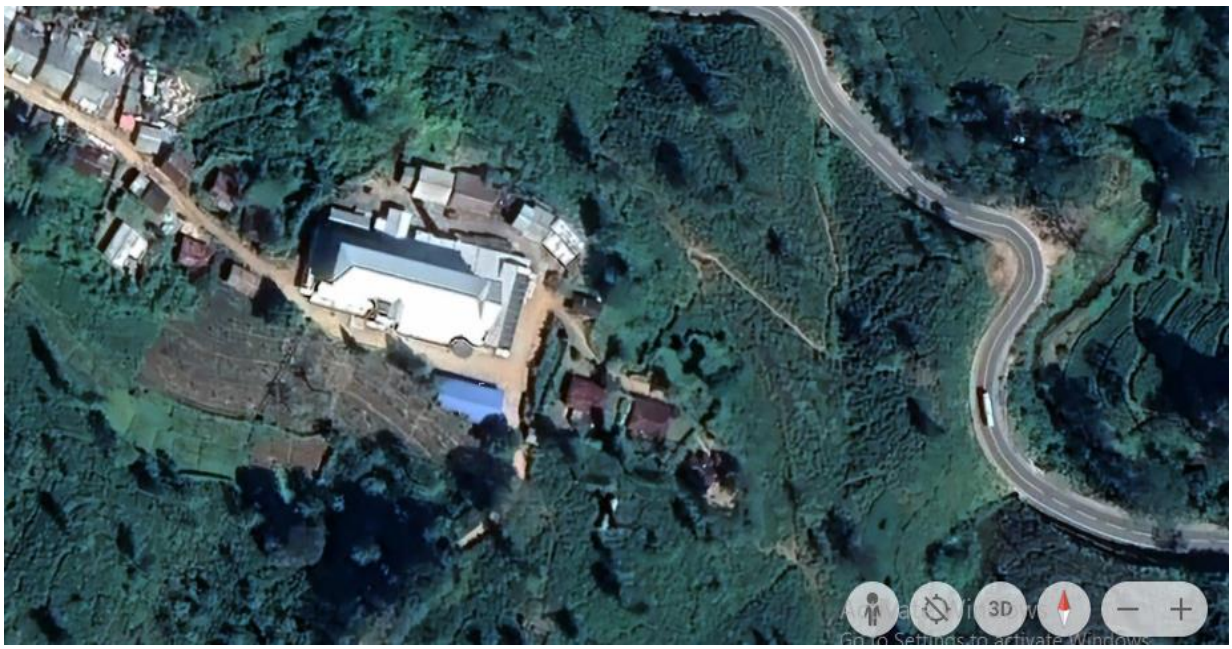
Locations of the sites are indicating in the following maps,

Bearwell Tea Factory

Calsay Tea Factory



Dessford Tea Factory



Moragalla Tea Factory

Deniyaya Tea Factory

2.3 Technical Project description

Bearwell

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	328 Nos
	Peak Wattage	330Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	108.24 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400v
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
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	250 A
	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	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Calsay

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	205 Nos
	Peak Wattage	535 Wp

	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	109.675 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400v
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
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	250 A
	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	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Dessford

Item	**Parameter**	**Value**
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	213 Nos
	Peak Wattage	535 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	113.955 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany

	AC side Surge arrestor response current	4-pole 400v
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
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	250 A
	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	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Deniyaya

Item	**Parameter**	**Value**
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	223 Nos
	Peak Wattage	530 wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	118.19 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400v
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
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	250 A

	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	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Moragalla

Item	**Parameter**	**Value**
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	352 Nos, 73 Nos
	Peak Wattage	325 Wp, 455 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	147.615 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400v
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
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	250 A
	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	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Same type of inverters is used for all components of the project.

3. VALIDATION METHODOLOGY

3.1 Method and Criteria

The validation of the project consisted of the following steps:

- Appointment of team members and technical reviewers
- Publication of the Carbon Management Assessment (CMA)
- Desk review of the CMA and supporting documents
- Validation planning
- On-Site assessment
- Background investigation and follow-up interviews with personnel of the project developer and its contractors
- Draft validation reporting
- Resolution of corrective actions (if any)
- Final validation reporting
- Technical review
- Final approval of the validation

3.1.1 Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities, a validation team, consisting of team leader, team member as well as the one technical review personnel was appointed.

The list of involved personnel and their qualification status are summarized in the section 07.

Name	Company	Function	Task Performed
Mr. Chamara Ariyathilaka	Sri Lanka Climate Fund	TL / TE	☒DR ☒SV ☒RI ⊡TR
Ms. Wageesha Alankara	Sri Lanka Climate Fund	TM	☒DR ☒SV ⊡RI ⊡TR
Mr. Himarsha Rajapaksha	Sri Lanka Climate Fund	ITR	⊡DR ⊡SV ⊡RI ☒TR

TL -Team Leader TE- Technical Expert TM- Team Member ITR- Internal Technical Reviewer
DR- Document Review SV- Site Visit RI- Report Issuance TR- Technical Review

3.1.2 Publication of the Carbon Management Assessment for Public Review

According to the SLCCS requirement the draft CMA, as received from the project participants, has been made publicly available on the dedicated SLCCS website prior to the validation activity commenced. Stakeholders have been invited to comment on the CMA within the 30 days public commenting period.

No comments were received for this project

3.1.3 Desk Review of CMA and supporting documents

Desk review was conducted on 07-08 August 2023 at the office of Sri Lanka Climate Fund. The objective of desk review is to confirm the accuracy and validity of information provided in the CMA against the respective supporting documents. As part of desk review, following documents were reviewed by the validation team.

- Carbon Management assessment report
- Contract agreements entered into with suppliers
- Completion / taking over certificate
- Compliance certificates issued to the equipment manufactures
- Power purchasing agreements, Testing and Commissioning certificates,
- Data management systems adopted by individual facilities
- Competency of personnel engaged in the defined monitoring process

3.1.4 On- Site Inspection

As part of the validation process, a site visit was conducted by the validation team on 9th August 2023. The purpose of this visit was to assess whether the design of the project aligns with the description provided in the CMA. Moreover, the site inspection aimed to verify that the project description, as stated in the CMA, accurately reflects the actual implementation on the ground.

During the site visit, the validation team thoroughly examined the proposed monitoring plan, monitoring parameters, and the responsibilities assigned to the project monitoring team. This assessment allowed for the validation team to review and confirm the validity and appropriateness of these aspects in line with the project's monitoring requirements and objectives. The insights gained from this on-site inspection contributed significantly to the overall evaluation and validation process.

3.1.5. Background investigation and follow-up interviews

Personnel and stakeholders relating to the project activities were interviewed to confirm the background information of issues raised by the validation team. A summary of information resulted in the interviews are given in the following tabulated format

Name	Designation	Organization/Entity	Method (Face to face/ Telephone)	Main topics covered

Sriyani Gamage	Administrative Officer	Deniyaya Estate	Face to Face	Handling Online portal, Project start date, commissioning date, crediting period, Procurement procedures, Issues and challenges associated with the operation of power plant
K.G. Mahinda	Factory Officer	Deniyaya Estate	Face to Face	Overall data management system, QA/QC procedures applicable to data reporting and communication.
Prasanna Dharmapriya	Mechanic	Deniyaya Estate	Face to Face	Mechanical properties of Power, Monitoring parameters, Monitoring plan, personnel engaged in monitoring activities. Data gathering, reporting and archiving, regular maintenance and operation
D.I. De Silva	Deputy Manager	Moragalla Estate	Face to Face	Incident reporting and failures
I.V.I. Prasath	Senior Assistant	Moragalla Estate	Face to Face	Mechanical properties of Power, Monitoring parameters, Monitoring plan, personnel engaged in monitoring activities. Data gathering, reporting and archiving, regular maintenance and operation
R.S. Inoka	Senior Clerk	Moragalla Estate	Face to Face	Online portal, Project start date, commissioning date, crediting period, Procurement procedures,
Lakshika Piyathissa	Executive-Sustainability & Corporate Reporting	Talawakelle Tea Estates PLC	Face to Face	commissioning date, crediting period, personnel engaged in monitoring activities

3.2 Definition of Clarification Request, Forward and Corrective Action Request

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Corrective Action Request (CAR)** will be issued where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence on the project results,
- the requirements deemed relevant for validation of the project with certain characteristics have not been met or

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

3.3 Draft Validation

After reviewing all relevant documents and taken all other relevant information into account, the validation team issues all findings in the course of a draft validation report and hands this report over to the project proponent in order to respond on the issues raised and to revise the project documentation accordingly.

3.4 Resolutions of findings

The findings of validation process are summarized in the tables below,

Type of the Finding	⊡ CL ☒ CAR ⊡FAR
Finding No	CAR-1
Ref. To CMA	Section 1.11
Action requests by validation team	In section 1.11 of the CMA, version 01, the first crediting periodis set for seven (07) years starting from 01st August 2021. However, the ending date is not compliant with the given reporting format.
Summary of Project owner response	Due to an inadvertent oversight, the crediting period has been inaccurately stated in the CMA version 01. As a measure to rectify this situation, a comprehensive examination of the stipulations provided by the SLCCS pertaining to the establishment of the crediting period was undertaken.Consequently, the ending date of the crediting period has been duly corrected and can be verified in the CMA version 02, dated 17.08.2023.
Validation team Assessment	Verification team reviewed the latest version of the CMA to confirm the correctness and the applicability of the revised crediting period. As indicated by the PP, the revised crediting period starts from 01st August 2021 and ends by 31st July 2028. This is fully compliant with the procedures and modalities of SLCCS.
Conclusion	⊡To be checked during the first periodic verification ⊡Additional action should be taken (finding remains open) ⊡Project documentation was corrected correspondingly ☒ **Appropriate action was taken. The finding CAR-1 is**

	closed

Type of the Finding	⊡CL ☒CAR ⊡FAR
Finding No	CAR-2
Ref. To CMA	Section 6.4
Action requests by validation team	Actual installed capacity of Moragalla Estate is not considered for the estimation of emission reduction
Summary of Project owner response	CMA was revised including actual installed capacity of the project for the estimation of emission reduction. This can be verified in the CMA version 02, dated 17.08.2023.
Validation team Assessment	The actual project capacity of Moragalla Estate was accurately accounted and reported as 147.615 kWp in the revised the CMA version 02, dated 17.08.2023. The capacities given five projects were rechecked using correct figures and technical specifications provided in the supportive evidence documents. Any discrepancy was not observed and confirmed 597.675 kWp as actual cumulative project capacity.
Conclusion	⊡To be checked during the first periodic verification ⊡Additional action should be taken (finding remains open) ⊡Project documentation was corrected correspondingly ☒ **Appropriate action was taken. The finding CAR-2 is closed**

Type of the Finding	⊡ CL ☒CAR ⊡FAR
Finding No	CAR-3
Ref. To CMA	Section 6.4
Action requests by validation team	Plant factor applied baseline emission reduction calculation is not conservative which can lead to an over estimation of baseline emission reduction
Summary of Project owner response	After a proper expert elicitation process, a more conservative plant factor for each plant was applied in the baseline emission reduction calculation as follows, Bearwell Estate - 12.20% Calsay Estate - 12.24% Dessford Estate -13.27% Deniyaya Estate - 11.85% Moragalla Estate - 11.50%

Validation team Assessment	Plant factor used for the baseline emission calculation was checked and confirmed to be correct. Further the ex-ante calculations performed for the first crediting period was reviewed and found to be both accurate and compliant with the required methodologies.
Conclusion	⊡To be checked during the first periodic verification ⊡Additional action should be taken (finding remains open) ⊡Project documentation was corrected correspondingly ☒ **Appropriate action was taken. The finding CAR-3 is closed**

In the following table the findings from the desk review of the published CMA, Site visits, interviews and supporting documents are summarised**:**

Table: Summary of CARs, CLs and FARs issued

Validation Category	Specific section	No. of CAR	No. of CL	No. of FAR
General description of project activity	General description Project Location Project boundary			
	Involved Parties and Project Participants			
	Project specification			
	Start date /Commissioning date	01		
	Technical project description			
	Contribution to sustainable development			
	Technology employed			
Project Baseline, Additionality and Monitoring Plan	Application of the Methodology			
	Baseline identification			
	Calculation of GHG emission reductions Project emissions Baseline emissions Leakage	02		
	Additionality determination			
	Monitoring Methodology			
	Monitoring Plan			
	Project management planning			
Duration of the Project / Crediting Period				
Environmental impacts				

Stakeholder Comments				
SUM		**03**		

3.5 Final Validation

The final validation starts after issuance of the proposed corrective action (CA) of the CARs CLs and FARs by the project proponent. The project proponent was replied on those and the requests are "closed out" by the validation team in case the responses were assessed as sufficient. In case of raised FARs the project proponent has to respond on this, identifying the necessary actions to ensure that the topics raised in this finding are likely to be resolved at the latest during the first verification. The validation team was assessed whether the proposed action is adequate or not.

In case the findings from CARs and CLs cannot be resolved by the project proponent or the proposed action related to the FARs raised cannot be assessed as adequate, no positive validation opinion can be issued by the validation team. In this project activity positive validation opinion is granted by validation team.

3.6 Internal Technical Review

Carbon Management Assessment (CMA) and additional background documents related to the project design submitted by Talawakelle Tea Estates PLC and baseline was reviewed. Furthermore, the validation team has used additional documentation by third party legislation, technical reports referring to the project design or to the basic conditions and technical data.

Technical data was reviewed by technical team based on information given in the CMA, supporting documents and observations on validation site visit. Before submission of the final validation report a technical review of the whole validation procedure was carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. As a result of the technical review process the validation opinion and the topic specific assessments as prepared by the validation team leader may be confirmed or revised. Furthermore, reporting improvements might be achieved.

3.7 Final approval

After successful technical review of the final report an overall assessment of the complete validation was carried out validation team of SLCCS and final approval is granted by EB.

4. DATA FOR VALIDATION PROCESS

4.1 Project Details

4.1.1 General Description

The primary objective of the project activity is to generate electricity using rooftop solar photovoltaic power in facilities owned by Talawakelle Tea Estates PLC and register this project as a renewable energy generation project under Sri Lanka Carbon Crediting Scheme (SLCCS). Five (05) individual project activities operating in the facilities located in up country and low country have been consolidated into a single bundled project activity and total project capacity so declared is 597.675 kWp. Renewable energy generated through the system is delivered to national CEB grid under single billing system, Net Plus.

Prior to this project activity, there was no solar power plant belonging to project participant in that region. Hence the project can be considered as a Greenfield project activity. Baseline scenario for this project activity is the electricity from the grid.

4.1.2 Employed Technology

Under project activity, different capacities of solar PV modules have been installed in roof top of the Five facilities owned by Talawakelle Tea Estates PLC as follows.

Site No.	Location	Capacity (kWp)
1.	Bearwell Estate	108.24 kWp
2.	Calsay Estate	109.675 kWp
3.	Dessford Estate	113.955 kWp
4.	Deniyaya Estate	118.19 kWp
5.	Moragalla Estate	147.615 kWp
	Total Capacity (Tc)	597.675 kWp

The modules in the each array are connected in parallel and/or series in order to get the preferred current & voltage which match with the rated input parameters of the inverter. The estimated annual power generation output of this small solar photovoltaic based power plant is 637.2 MWh which is exported to the national electricity grid of Ceylon Electricity Board.

Project activity produces electricity from the solar radiation. Hence it eliminates the generation of carbon dioxide which was happening earlier due to the fossil fuel burning from thermal power plants sites in the National Grid. Thus, the technology eliminates use of fossil fuel for generation of electricity, uses solar radiation and helps in avoidance of CO_2 emissions. The expected annual GHG emission reduction is 448 tCO_2e. Therefore, the technology employed can be said to be environmentally safe.

Validation team has confirmed the accuracy of the project description through a combination of steps consisting of review of purchase agreement related to the project activity, commissioning and taking over certificate for the project, physical site visit and interview of the project participant and their representatives. The confirmation that the electricity is exported to the grid is available through Standard Power Purchasing Agreement (SPPA) with Ceylon Electricity Board. The Project will result in annual emission reductions of 448 tCO_2e. The processes undertaken by the validation team to validate the accuracy and completeness of the CMA include conducting a physical site inspection, sampling, reviewing available designs and feasibility studies, conducting comparison analysis with equivalent projects. SLCF Validation Division hereby confirms that the project description in the final CMA is accurate and complete in all respects.

4.2 Approvals

Project Proponent has obtained all approvals regarding the projects activities from related institutions operating under Government of Sri Lanka and validation team checked those approvals during site visit.

4.3 Application of Methodology

4.3.1 Title and reference

Since CDM methodologies are applicable to SLCCS registration, Type I: Renewable Energy Projects and rightly applies the approved methodology AMS-I.D. Grid connected renewable electricity generation, Version 18.0.

4.3.2 Applicability

All criteria for applicability of selected methodology are fulfilled. The project is a grid connected renewable solar power project which is confirmed from the validation site visit. The project activity is Greenfield projects activity and there will not be any significant emissions related to project as no fossil fuels are used and leakage, no equipment is transferred.

The project activity is renewable energy project and the capacity is less than 15 MW supplying power to the grid and the project activity fulfils the conditions of small scale project. Hence the project activity fulfils all the criteria of the small scale methodology AMS-ID Version 18 “Grid connected renewable energy generation.

Table: Applicability of selected methodology

No	Applicability Criteria	Project Activity	Applicability Criteria Met?
1	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity comprises renewable energy generation through a solar power that supplies electricity to CEB grid, which has been dominated by several fossil fuels fired generating units. The developer has no intention to increase the capacity of the bundle project from 597.675 kWp during the chosen crediting period.	Yes
2	Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A)	The project is solar power project supplying electricity to the national grid, so methodology AMS I.D is only applicable.	Yes
3	This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the	The project was concerned with the installation of new solar power plant and there was no renewable energy power plant operating prior to	Yes

	implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); or (d)Involve a rehabilitation of (an) existing plant(s)/unit(s) or(e)Involve a replacement of (an) existing plant(s).	the implementation of the project activity (Greenfield plant)	
4	Hydropower plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	No reservoir is built for this power plant.	Not applicable
5	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project comprises of only renewable components. The capacity of the entire bundled unit is 597.675 kWp which is less than limit of 15 MW. The developer has no intention to increase the plant capacity during the crediting period,	Not applicable
6	Combined heat and power (co-generation) systems are not eligible under this category.	This is not a co-generation system and project activity comprises solar electricity generation only.	Not applicable
7	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW	Project activity does not involve any addition of renewable energy generation units at an existing renewable power generation facility.	Not applicable

	and should be physically distinct from the existing units.		
8	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	As a project activity is a greenfield project. There was no retrofit or replacement of existing power plant. PP has no intention to increase the capacity of power plant beyond 597.675 kWp during the chosen crediting period. Therefore, the project shall not exceed the limit of 15 MW.	Not applicable
9	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	No recovered methane used for this project activity.	Not applicable
10	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.	No biomass used for this project activity	Not applicable

4.3.3 Project Boundary

The project boundary of Thalawakelle Tea Estates PLC Solar PV Bundle Project encompasses the physical, geographical site of the power plant and associated physical structure. This includes the solar PV arrays, inverters, transformers, and metering/substation systems. The illustration below provides a visual representation of this project scope.

4.3.4 Baseline Identification

This project activity is grid connected solar power generation and purpose of the project is to generate electricity through renewable resources (solar) and displace equivalent amount of electricity in the national grid which is predominantly fossil fuel based. In the absence of the project activity, equivalent amount of power would have been drawn from the grid which is the baseline scenario. Calculations are based on data from the published by Sri Lanka Sustainable Energy Authority. The baseline for the project activity is the carbon intensity of the national grid.

The baseline for the project activity is power generated from renewable energy source multiplied by the grid emission factor of the National grid which is published by Sri Lanka Sustainable Energy Authority.

The grid emission factor for year 2020 calculated and published by SLSEA has used for determining emission reductions.

4.3.5 Formulas used to determine Emission Reductions

The baseline under the adopted methodology AMS I.D Version 18 .0 is the product of energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor (tCO_2e/MWh)

4.3.6 Quantification of GHG Emission Reductions and Removal

Calculation of baseline emission factor

As per AMS I.D and AMS I.F, the grid emission factor was calculated using the latest approved version of "Tool to calculate the emission factor for an electricity system" CDM methodology. The grid emission factor calculated and published by the Sustainable Energy Authority in Sri Lanka is used.

Grid Emission Factor ($EF_{CM,Grid,y}$)	0.7298	tCO_2e/MWh	Published by SLSEA (2020)

Plant factor

GHG emission reduction achieving through the project activity is purely determined by the average annual energy output from the system. Project proponent has accounted average energy output in a conservative approach using valid plant factors which are about 11.85%(Deniyaya), 11.50%(Moragalla), 12.20%(Bearwell), 12.24%(Calsay) and 13.27%(Dessford). These factors had been derived under the consultation of experts who are having substantial competency in the Solar PV installation and energy generation accounting relating to the corresponding systems

Annual Emission Reduction Calculation

Project proponent has set crediting period for seven year (07) starting from 01st August 2021. Baseline emission was calculated complying with the requirements provided in AMS-1.D "Grid connected renewable electricity generation" Version 18.0. The summary of emission reduction calculation validated by validation team is as follows;

Baseline Emission

Parameter	Deniyaya	Moragalla	Bearwell	Calsay	Dessford	Unit
Project Capacity	118.19	147.615	108.24	109.675	113.955	kWp
Plant Factor	11.85	11.50	12.20	12.24	13.27	%
Average Energy Output (EGy)	122.68	148.70	115.67	117.59	132.46	MWh/Year

Grid Emission Factor (EFy)	0.7298	0.7298	0.7298	0.7298	0.7298	tCO_2/MWh
Emission Reduction (ERy)	89.53	108.52	84.41	85.81	96.66	$tCO_2/Year$

Project Emission

The project does not involve project emissions as per AMS I.D. Version 18.0. Project emissions are thus zero tonnes of CO_{2e}, and no relevant formulas need to be considered.

$$PE_y = 0$$

Leakage Emission

The current project activity does not involve any leakage emissions as per AMS I.D. Version 18.0.

$$LE_y = 0$$

Estimated net emission reduction

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2021 Aug - 2022 July	351	0	0	351
2022 Aug - 2023 July	465	0	0	465
2023 Aug - 2024 July	465	0	0	465
2024 Aug - 2025 July	465	0	0	465
2025 Aug - 2026 July	465	0	0	465
2026 Aug - 2027 July	465	0	0	465
2027 Aug - 2028 July	465	0	0	465
Total	3,141	0	0	3,141
Total number of crediting years	7 years			
Annual average over the crediting period	448	0	0	448

4.3.7 Methodology deviations

Applied methodology was AMS-1.D "Grid connected renewable electricity generation" Version 18.0. The project activity is a Greenfield solar power which is in operational stage. This project does not implies no any methodology deviations observed in validation process

4.3.8 Monitoring Plan

Validation team assessed the compliance with the requirements of monitoring plan, as follows:

i) Compliance of the monitoring plan with the approved methodology:

- Project proponent has identified data and parameters to be monitored within the project activity. The available data and parameter identified and reported in the CMA is grid emission factor. It was published at the point of validation by the national responsible entity; Sri Lanka Sustainable Energy Authority. As data and parameters to be monitored in the due monitoring period has been identified as average annual energy output. These parameters satisfy the requirements of selected approved methodology, AMS I.D. AMS I.D, Version 18

- Validation team confirmed that the monitoring plan contains all necessary parameters, that they are clearly described and that the means of monitoring described in the plan complies with the requirements of the applied methodology AMS I.D, Version 18. The project involves measuring, recording, reporting, monitoring and controlling of various key parameters of the solar systems. These monitoring and controls would be the part of the Control Systems proposed for the project activity.

- It was evident that project proponent has identified and taken adequate measures to put the proposed monitoring plan into action. The project has employed qualified and experienced persons for undertaking monitoring activities. The project maintains standard log sheets and formats to record the monitoring parameters. The parameters to be monitored during the crediting period is provided in a tabular format to the designated person. The Plant operators are provided with necessary training with respect to maintenance of the relevant monitoring records to enable him/her to deal the monitoring independently. As part of the monitoring mechanism, project team is committed to keeping the records of Electricity Export, Electricity Import, Gross electricity generated, Parameter of the plant, such as bearing temperature, electrical properties, Fault/Breakdown recording etc.

ii) Implementation of the plan:

- The monitoring arrangements described in the monitoring plan are feasible within the project design;
- The means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the project activity can be reported and verified.

The assessment has been conducted by the validation team by means of reviewing of the documented procedures, interviewing with relevant personnel, project plans and physical inspections of the project activity site.

4.4 Carbon Management Assessment

Sri Lanka Climate Fund Validation Division hereby confirms that the CMA complies with the latest forms of the guidance documents for completion of CMA version 2.0 is comply with Sri Lanka Carbon Crediting Scheme.

4.5 Changes of the Project Activity

All the five projects have already commissioned and did not change the project activity during crediting period.

4.6 Environment Impact

The installation of solar PV on roof structures does not pose severe impacts on the environment. Moreover, environmental regulatory authorities do not recommend obtaining approvals for solar rooftop installations smaller than 1 MW.

4.7 Comments of Stakeholders

The validation team verified through the stakeholder summary documents and the same was cross checked with the information obtained during follow up interviews with the stakeholders. Validation team is of the opinion that the stakeholder meeting was adequate and appropriate.

5. VALIDATION OPINION

Thalawakelle Tea Estates PLC has granted the SLCF Validation Division to conduct the validation of Solar PV Bundle Project with regard to the relevant requirements of the SLCCS for GHG reduction project activities, as well as criteria for consistent project operations, monitoring and reporting. The validation team confirmed that the project is a small scale project applied AMS-I.D version 18 and the project is bundled small scale project.

The validation consisted of the following phases:

i. Desk review of the CMA and additional background documents;
ii. Follow-up interviews with project stakeholders;
iii. Issue of checklist with corrective action requests (CARs) and the draft validation report
iv. Desk review of revised CMA applying AMS.I.D Version 18
v. Review of proposed corrections and clarifications
vi. Issue of the final validation report and opinion
vii. Resolution of outstanding issues and the issuance of the final validation report and opinion.

In the course of the validation, three (03) Corrective Action Requests (CARs) were raised and all were successfully closed.

The review of the CMA and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided SLCF Validation Division with sufficient evidence to validate the fulfillment of the stated criteria.

In detail the conclusions can be summarized as follows:

- The project is in line with criteria in Sri Lanka and all relevant SLCCS requirements for carbon credits. This is to be verified at verification. Further the project activity is in compliance with the requirements set up by the applied approved CDM methodology AMS-I.D ver.18
- The monitoring plan is transparent and adequate.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions are most likely to be achieved within the crediting period.

The conclusions of this report show that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.

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Himarsha Rajapaksha
Internal Technical Reviewer

Date : 11.12.2023

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Chamara Ariyathilaka
Team Leader-Validation

Date : 11.12.2023

6. REFERANCES

Documents referred by the validation team that relate directly to the project

1. Grid emission factor
http://www.energy.gov.lk/images/energy-balance/energy-balance-2020.pdf

2. SRI LANKA ELECTRICITY ACT, No. 20 OF 2009
http://powermin.gov.lk/english/wp-content/uploads/2017/11/2009-Act-No.-20-Sri-Lanka-Electricity-Act-E.pdf

   http://powermin.gov.lk/english/wp-content/uploads/2017/11/2013-Act-No.-31-Amendment-to-Act-No.-20-Sri-Lanka-Electricity-Act-E.pdf

3. CEB LONG TERM GENERATION EXPANSION PLAN 2015-2034
https://www.ceb.lk/front_img/img_reports/1532408363CEB_LONG_TERM_GENERATION_EXPANSION_PLAN_2015-2034.pdf

4. CDM Validation and Verification Manual
https://cdm.unfccc.int/public_inputs/2008/VVM/vvm.pdf

5. IPCC guideline on national greenhouse gas inventories (2006)

6. AMS-I.D Grid connected renewable electricity generation --- (Version 18)
https://cdm.unfccc.int/filestorage/2/P/7/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC/EB81_repan24_AMS-I.D_ver18.pdf?t=c2h8cHk0Y3k4fDC2EXQVmnso7VteREFAW8_M

7. CDM Methodology Booklet
https://cdm.unfccc.int/methodologies/documentation/meth_booklet.pdf#AMS_I_D

7. APPENDIX

Appendix 01: Validation Team

Mr. G A M C Ariyathilaka	**Sri Lanka Climate Fund**	**Team Leader / Technical Expert** Educational Qualification: B.Sc. Engineering (Chemical and process) He has more than 14 year experience in GHG verification in the industrial sector ranging from service facilities to various industrial processing facilities. He has successfully completed management system ISO 14064 and has been working as the team leader for the verification team of Sri Lanka Climate Fund which has been accredited for organizational GHG verification against ISO 14064-3. Being a project specialist for the GEF funded Bio-Energy Technology Project, he has contributed to develop MRV system for commercial biomass energy generation systems. Further he has engaged in development of project design document for the Clean Development Mechanism (CDM)
Ms. Wageesha Alankara	**Sri Lanka Climate Fund**	**Team Member** B.Sc. (Hons) degree in Agriculture specializing in Postharvest Horticulture and engaged over 10 verification assessments conducted by SLCF
Ms. Himarsha Rajapaksha	**Sri Lanka Climate Fund**	**Internal Technical Reviewer** He has a B.Sc. (Hons) degree specializes in Environmental Management and Forestry and reading an MBA degree in Brittany Université; and VERN' University.

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03.0	02-02-2021	Editorial changes