

“TEESTA LOW DAM PROJECT, STAGE-IV”



Earthood Services Private Limited

Project Title	Teesta Low Dam Project, Stage-IV
Version	02
Report ID	1423

Report Title	“Teesta Low Dam Project, Stage-IV”
Client	EKI Energy Services Limited
Pages	29
Date of Issue	22-May-2018
Prepared By	Earthood Services Private Limited
Contact	Regd. Office: 424A, Tower B3, Spaze I-Tech Park, Sector 49, Sohna Road, Gurgaon-122018, INDIA Tel: +91 124 4204599 Fax: +91 124 4204599 Website: www.earthood.in Email: info@earthood.in
Approved By	Dr. Kaviraj Singh
Work Carried Out By	Team Leader: Shreya Garg Technical Expert (1.2): Shreya Garg Methodology Expert: Shreya Garg Verifier: Harshita Kulshrestha Technical Reviewer: Kaviraj Singh

Technical Expert to TR (1.2): Kaviraj Singh

Summary:

Earthood has performed the first VCS verification of the project “Teesta Low Dam Project, Stage-IV” (VCS Id 1423). The project is a hydro power project located in village Kalijohra in Darjeeling district of West Bengal in India; exporting electricity to the regional grid.

The scope of verification includes confirming the implementation of the monitoring plan of the registered VCD PD (version 5.0) and the application of the methodology ACM0002: Grid-connected electricity generation from renewable sources—Version 16.0. The verification consisted of three phases: a. desk review of the project; b. follow-up onsite visit and interviews with project stakeholders; c. resolution of outstanding issues and issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted following Earthood internal quality procedures.

During the verification process 04 CARs, 01 CLs and no FARs were raised.

Earthood confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. The emission reductions from the project activity “Teesta Low Dam Project, Stage-IV” in India during the period 14-02-2016 to 16-07-2017 (including both days) amount to **805,717 tCO₂**

Vintage wise representation of the emission reductions is as follows:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2016	535,102	0	0	535,102
2017	270,615	0	0	270,615
Total	805,717	0	0	805,717

CONTENTS

1	INTRODUCTION.....	5
1.1	Objective	5
1.2	Scope and Criteria	5
1.3	Level of Assurance.....	5
1.4	Summary Description of the Project	6
2	VERIFICATION PROCESS	6
2.1	Method and Criteria.....	6
2.2	Document Review	6
2.3	Interviews	7
2.4	Site Inspections	7
2.5	Resolution of Findings.....	7
2.5.1	Forward Action Requests	8
2.6	Eligibility for Validation Activities	8
3	VALIDATION FINDINGS.....	8
3.1	Participation under Other GHG Programs	8
3.2	Methodology Deviations	8
3.3	Project Description Deviations	9
3.4	Grouped Project	10
4	VERIFICATION FINDINGS.....	10
4.1	Project Implementation Status	10
4.2	Accuracy of GHG Emission Reduction and Removal Calculations	11
4.3	Quality of Evidence to Determine GHG Emission Reductions and Removals	12

4.4	Non-Permanence Risk Analysis.....	21
5	SAFEGUARDS.....	21
5.1	No Net Harm	21
5.2	Local Stakeholder Consultation	22
6	VERIFICATION CONCLUSION	23
	APPENDIX 1: References	23
	APPENDIX 2: Competency Statement.....	25
	APPENDIX 3: Abbreviations.....	27
	APPENDIX 4: Verification Findings	28

1 INTRODUCTION

1.1 Objective

EKI Energy Services Limited has appointed Earthood Services Private Limited (Earthood) to perform the first verification of “Teesta Low Dam Project, Stage-IV” (hereafter referred to as project) for the monitoring period 14-02-2016 to 16-07-2017. The VCS reference number of the project is 1423. The objective of this verification is a thorough and independent review of the emission reductions reported for “Teesta Low Dam Project, Stage-IV” that is managed by NHPC Limited/10/.

The verification is the periodic independent review and ex post determination by Earthood Services private limited of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS project activity during a defined monitoring period. Certification is the written assurance by Earthood that, during a specific period in time, a project activity achieved the emission reductions as verified.

1.2 Scope and Criteria

The scope of the verification is to establish and verify that;

- a) The project activity has been implemented and operated as per the registered PD or any approved revised PD, and that
- b) All physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- c) The monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of VERs, verifiable, and in accordance with applicable VCS requirements;
- d) The actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan, any revised approved monitoring plan, the approved methodology including applicable tool(s). The data recorded and stored as per the monitoring methodology including applicable tool(s) and, where applicable, the standardized baseline.

1.3 Level of Assurance

A draft verification report that is prepared by assessment team will be reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable VCS and CDM (Clean Development Mechanism) requirements as appropriate. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the validation team. The report approved by Quality Manager is endorsed by Managing Director, who is overall responsible to ensure quality, before final release. The further details of applicable procedures and responsibilities about Earthood Quality Management System (QMS) are available on its website (www.earthood.in).

Earthood's verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Earthood planned and performed the verification by obtaining evidence and other information and explanations that Earthood considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 04/02/2016 – 16/07/2017 are fairly stated in the Monitoring Report Version 02 dated 31/01/2018. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002, Version 16.0, and the VCS standard.

For more information, please refer to section six of this verification report.

1.4 Summary Description of the Project

The project is a Greenfield Hydro Power Project installed on Teesta River near village Kalijhora, in Darjeeling district, of West Bengal state in India. It is a run of the river project with a diurnal storage for peaking purpose and with a concrete gravity dam with an approx. height of 45 m from deepest foundation level. It has a surface power house which is equipped with 4 Kaplan turbine units with a collective capacity of 160 MW (40 MW each). The hydel energy generated from the hydel power plant is evacuated to the State Grid System which is part of NEWNE Grid.

The energy from the hydropower plant is a cleaner form of energy and displaces electricity that would otherwise be generated using fossil fuel sources.

This is the first verification for the project, and the monitoring period for the same is 14-02-2016 to 16-07-2017. **832,524 MWh** of electricity was generated during the monitoring period and the total emission reductions achieved is **805,717 tCO₂**.

2 VERIFICATION PROCESS

The registered VCS project is undergoing its first verification, the approach adopted to ensure the quality of emission reductions is described in the following sections.

2.1 Method and Criteria

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Earthood internal procedures.

The Project was verified against the latest requirements and guidance set out in VCS and CDM standards.

No sampling approach has been applied by the verification team as all the monthly reported figures in the MR/02/ and the ER sheet/03/ were checked from the actual records.

2.2 Document Review

The verification is performed primarily as a document review of the documents submitted at various stages of assessments. The review is performed by assessment team using dedicated protocols. The assessment team cross checks the information provided in the documents (PDD, MR, validation report) and information from sources other than those used, if available, and also conducts independent background investigations. Earthood conducted a desk review as under;

- a) A review of the data and information presented to verify their completeness.
- b) A review of the monitoring plan, the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures.
- c) An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

2.3 Interviews

Earthood performed an on-site visit and interviews between 03/04/2015 to 04/04/2015 with project stakeholders to confirm selected information and to resolve issues identified in the document review. During the on-site visit, the PP representatives of were interviewed.

S. No.	Name	Subject	Organization
1	K. B. Singh	Project implementation	Deputy Manager, NHPC
2	Mr. Saha	Plant maintenance and operational data	Plant supervisor, NHPC
3	R. K. Mehta	Monitoring procedures	General Manager, NHPC
4	Ravi Shankar	Data monitoring	Technical advisor, NHPC
5	Deepak Jain	Emission reduction calculation	Consultant, EKI ESL

Deepak Jain was interviewed (telephonically and/or in person) on more number of occasions than the indication above.

2.4 Site Inspections

A combined site visit for validation and verification was undertaken by Earthood Services Private Limited between 03/04/2015 to 04/04/2015. The project including the power house and dam located in Kalijhora village in Darjeeling district in the state of West Bengal, India were visited by the assessment team during the physical assessment. The assessment involved a desk review of relevant documentation as well as an on-site visit(s).

The personnel employed and their role in this assessment is mentioned below;

The verification includes;

- An assessment of the implementation and operation of the registered project activity as per the registered VCS PD and VCS MR;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PD;
- A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;

An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.5 Resolution of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting

of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and nonconformities, which may be of following types; CAR (Corrective Action Request) is raised if one of the following occurs:

- a) Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient
- b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants
- c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions
- d) Change to the key sustainable development indicators
- e) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable GS requirements have been met. All CARs and CLs raised by the Earthhood during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

A total of 04 CAR and 01 CL were raised in the current verification.

All the findings that are raised and communicated to project participant during the verification are included under Appendix 4. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise

2.5.1 Forward Action Requests

The project activity is the first verification; there were no FARs raised during the validation, as confirmed from the validation report/19/.

2.6 Eligibility for Validation Activities

Not Applicable

3 VALIDATION FINDINGS

Not Applicable

3.1 Participation under Other GHG Programs

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

3.2 Methodology Deviations

None

3.3 Project Description Deviations

PP has requested the following deviations in the current monitoring period:

1. The source document for electricity exported. In the registered VCS PD/01/ the export values have been mentioned Joint Meter Reading (JMR) / Monthly Special Energy Meter statement (SEM) however in actual the export values are being sourced from “Deviation Settlement Account document”/16/. Also, the source document for cross-checks has been changed from invoices to Monthly Generation Reports/18/.

The deviation proposed by the PP was accepted by the verification team as the documents mentioned in the registered PD/01/ are not available for the project activity, it being a hydro energy generation project. The exported electricity is in turn sourced from “Deviation Settlement Account document”/16/ which are publicly available documents issued by the ‘Northern Regional Power Committee’, Ministry of power; Government of India/17/ entity, this entity coordinates planning and maintenance of generating machines of various generating companies of the region. On further assessment DOE found that, for hydro projects, the PP needs to provide schedule for electricity to be injected and electricity meters are used to measure the actual injected electricity. The difference between the scheduled and the actual injected electricity is reported in the Deviation Settlement Account Statement. The state local dispatch centre (WB) West Bengal State Electricity Transmission Company Limited (A Govt. of W.B. Enterprise) issues statement on deviation also called as Deviation Settlement Account document.

Central Electricity Regulation Commission Notification No. L-1/132/2013/CERC/21/ has also indicated that actual injection /electricity generated and actual drawal /electricity drawn by a buyer is presented in Deviation Settlement Account Statement, while calculating the CERs, the actual generation is used

Since the measuring equipment for this actual injected electricity (i.e. the net quantity of electricity supplied) is electricity meter, it meets the requirement of version 16.0 of the methodology ACM0002.

The source was therefore found acceptable.

For cross-checks the invoices/15/ provided by the PP did not conform the export values. The project being a hydro project the invoices are based on scheduled energy. The actual energy exported might vary from the scheduled amount, this information gets reflected in the “Deviation Settlement Account document”/16/. Therefore, the cross-check document had to be changed. For the current monitoring period, Monthly Generation Reports/18/ have been used which tell an indicative electricity export. The approach was found applicable by the assessment team because MGRs are produced by NHPC Limited in order to assess the performance of all NHPC projects. Since NHPC Ltd is a government of India enterprise and the documents contains generation details of all its projects it is fair to assume it a credible source.

2. The second deviation is concerning the parameter “Quantity of Electricity imported by the project from the grid at interconnection point of the Regional Supply in year y; $EG_{Import,y}$ ” The calibration for the import meters was not done during the monitoring period and the import values have been conservatively summed applying the maximum permissible error. PP provided data/17/ which was certified by the State Electricity Board. Since the State Electricity Board is the supplier of electricity here and has admitted the amount of electricity billed to the PP. The import data was found acceptable by the assessment team

The deviation in calibration of the electricity import was found acceptable by the assessment team as the import meters are under the jurisdiction of the State electricity board and PP has no control over these meters. Even though the values monitored/17/ by these meters form the basis of monetary transactions the calibration certificates for the monitoring period were not available.

Therefore, the team concludes that there is no deviation in the project which may affect the applicability of methodology, additionality or the appropriateness of the baseline scenario and the project is in compliance with the applied methodology

3.4 Grouped Project

Not Applicable

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

This project activity consists of installation of hydropower turbines to generate hydro-electricity. The total installed capacity of the project activity is 160 MW consisting of 4 units of 40 MW each in Darjeeling district, West Bengal. The electricity generated is supplied to the regional electricity grid as per the signed power purchase agreement/10/

The project is a run-of-river hydropower plant with a catchment area of 8021 Sq. Km.. The dam is of Concrete Gravity/ RCC type. The plant includes four Kalpan turbines, the capacity of each turbine is 40 MW totalling to a capacity of 160 MW. The surface power house is located on the left bank of Testa river.

The technical specifications related to the plant were verified through onsite assessment/08/ and validation report/19/.

Project Name	Unit No.	Turbine Capacity	Location	Commissioning Date
Teesta Low Dam Project, Stage-IV	I	40 MW	Kalijhora, Darjeeling (W.B)	14-Feb-2016
	II	40 MW	Kalijhora, Darjeeling (W.B)	16-Mar-2016
	III	40 MW	Kalijhora, Darjeeling (W.B)	03-July-2016
	IV	40 MW	Kalijhora, Darjeeling (W.B)	11-Aug-2016

The installation capacity and specifications of the turbines were verified on site and through commissioning certificates/09/. There was no major breakdown or shutdown during the monitoring period which might affect the applicability of methodology of might cause material errors in emission reductions. Start date of the project activity is 14/02/2016 which was verified by the commissioning certificates/09/.

The project activity geo-coordinates are: Latitude: 26.9273 N, Longitude 88.4553 E; which were verified from the NHPC website/20/ and during the physical site inspection The geographical were also verified from the <https://www.latlong.net/>

Assessment team concludes the following:

- a. The implementation status of the project activity was found to be in compliance with registered PD.
- b. DOE has conducted the on-site visit to confirm the implementation status of the project.
- c. The commissioning date of the project activity was found to be accurately and consistently recorded.
- d. The actual operation of project activity was found to be in compliance with the flow diagram provided in registered PD.
- e. The emission reductions achieved during the current monitoring period are 805,717 tCO₂e.

The project activity contributes to sustainable development by utilising hydro power for generating electricity which otherwise would have been generated through fossil fuels. Hence, it leads to reduction in usage of non-renewable sources for generation of electricity.

Further, the GHG emission reductions generated by the project activity have not been included by any other emission trading program or any other mechanism that includes GHG allowance trading. Also the project has not received any other form of environmental credit and has not participated/ been rejected under any other GHG programs.

The project activity contributes to the sustainable development of the region in addition to the generation of renewable electricity. The following indicators for sustainable development (as given by the Ministry of Environment and Forest, Government of India) are considered:

In conclusion, the project has been implemented as described in the project description. The total emission reductions achieved in this monitoring period i.e. from 14/02/2016 to 16/07/2017 are 805,717 tCO₂e.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

The project monitoring has been carried in accordance with the registered VCS PD/01/ and the monitoring report/02/. The monitoring plan laid in the registered PD is being followed at the site. The assessment team has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the MR/02/.

The emission reductions are purely based on the net electricity generated and exported from the machines. PP has provided all the sufficient data for current monitoring period. The values of the parameter EG_{PJ,y} used in deriving the GHG emission reduction could be very well correlated between the data sets and ER spreadsheet/03/ provided by PP. the verification of each monitoring parameter has been discussed later in section 4.3.

The calculation method and formulae used in calculating baseline emission is in compliance to the methodology used i.e. ACM0002 version 16.0 /07/. Since project activity is a hydro power project, leakage emission and project emission has been considered as zero.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

Monitored Parameters

- a) Quantity of net electricity generation supplied by the project plant/unit to the grid in year y; $EG_{PJ,y}$; MWh

Parameter	$EG_{PJ,y}$ (MWh)	
Means of verification		
	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is continuously measured and monthly recorded.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the registered PD/01/ and monitoring methodology/07/.
	Monitoring equipment	The parameter is a calculated parameter calculated as the difference between $EG_{Export,y}$, $EG_{Import,y}$. the two parameters are measured using Tri-vector Energy Meters of 0.2s accuracy class.
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The parameter is a calculated parameter. The details of the monitoring equipment are provided under the respective parameter heads.
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable

	Calibration frequency /interval:	once in 5 years
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, Pending untill the findings are closed.or as per the manufacturer's specifications?	The parameter is a calculated parameter. The details of the monitoring equipment's calibration frequency have been provided under the respective parameter heads.
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes, the calibrtn is conducted by a certified agency/04/.
	Is(are) calibration(s) valid for the whole reporting period?	Not applicable
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable
	How were the values in the monitoring report verified?	The value obtained for the parameter is 832,524 MWh. Net electricity supplied to grid is a calculated value Where: EGExport,y is sourced from the deviation settlement account statement published by Northern Regional Power Committee/16/ EGImport,y is sourced from the certified data from State Electricity Board/17. $EGPJ,y = EGExport,y - EGImport,y$
	If applicable, has the reported data been cross-checked with other available data?	The monthly reported data was cross-checked, with the Monthly generation reports /18/ and the data was found compareable.

	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The data management system is transparent and reliable.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
Findings	No findings.	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology/07/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. The implementation of the project is as per the registered PD which was confirmed by the verification team. The emission reduction calculation for the project activity is estimated based on the electricity generated by the hydropower plant. and result in 805,717 tCO₂e of emission reductions.	

b) Quantity of Electricity exported by the project to the grid at project site switch yard in year y; EG_{Export, y}; MWh

Parameter	EG _{Export, y} (MWh)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is continuously measured and monthly recorded.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the registered PD/01/ and monitoring methodology/07/.

	Monitoring equipment	The parameter is monitored by tri-vector meters (SEMs) which record both import and export are installed at a) Two transmission lines: each having a main and a check meter b) Project site switch yard: four SEMs for each generating unit. these meters act as standby meters. All the energy meters are Power Grid Corporation Limited owned/09/ and are installed by Power Grid Corporation Limited in the presence of the representatives of the power producer. The details of the meters are provided under calibration head. The electricity produced by the project activity is monitored continuously by the Northern Regional Power Committee.
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of the monitoring equipment used to measure the values is as per the registered PD/01/
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment is valid for the entire range.
	Calibration frequency /interval:	Energy meters are calibrated once in a five year. there is no deviation for calibration

		frequency interval. Please refer to section 3.3 for more details
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, Pending until the findings are closed or as per the manufacturer's specifications?	there is no deviation for calibration frequency interval. Please refer to section 3.3 for more details
	Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is carried out by Secure/04/.
	Is(are) calibration(s) valid for the whole reporting period?	Yes. It is valid for the entire monitoring period.
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. It is comparable with the range for which measurements have been carried out.
	How were the values in the monitoring report verified?	Total electricity exported by the project to the grid is 836,380 MWh which was verified from the excel sheet provided. The Deviation Settlement Account Statement/16/ provided by the PP was used to verify the values.
	If applicable, has the reported data been cross-checked with other available data?	The data was cross checked from the Monthly Generation Report/18/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes the data ensure correct transfer of data and reporting of emission reductions management and QA/QC processes are in place.

	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	The registered PD/01/ states Joint Meter Readings (JMR) as the source. A deviation was sought to use Deviation Settlement Account Statements as the source.
Findings	CL#02 and CAR#04 were raised and resolved.	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology/07/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. The implementation of the project is as per the registered PD/01/ could be confirmed by the verification team. The emission reduction calculation for the project activity is estimated based on the electricity supplied by the WTGs and result in 805,717 tCO₂e of emission reductions.	

c) **Quantity of Electricity imported by the project from the grid at interconnection point of the Regional Supply in year y; $EG_{Import,y}$; MWh**

Parameter	$EG_{Import,y}$ (MWh)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is continuously measured and monthly recorded.
	Is measuring and reporting frequency in accordance with the	Yes. The reporting frequency is in line with the monitoring plan as

	monitoring plan and monitoring methodology? (Yes / No)	outlined in the registered PD/01/ and monitoring methodology/07/.
	Monitoring equipment	The import meters are located at various points in the project premise. The electricity is imported from two 11kV Electricity Supply line from State Electricity Boards system. The meter details are provided under calibration head.
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of the monitoring equipment used to measure the values is given in the section 1.4, which is as per the registered PD/01/.
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment is valid for the entire range.
	Calibration frequency /interval:	Once in a five years.
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, Pending untill the findings are closed.or as per the manufacturer's specifications?	Due to inaccessibility of calibration certificates, the PP has used maximum permissible error of 0.5% as a conservative approach for the parameter. PP has requested a deviation in the same regard discussed in detail in section 3.3.
	Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is under the purview of the State Electricity Boards and calibration was not conducted during the monitoing period PP has requested a deviation in th same regard discussed in detail in section 3.3.

	Is(are) calibration(s) valid for the whole reporting period?	Since the calibration certificates are not accessible, the PP has used maximum permissible error factor of 0.5% on the import values has been applied.
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable
	How were the values in the monitoring report verified?	EGimport,y is 3,855 MWh in the monitoring report which was verified from the excel sheet provided. The values in the excel sheet were cross checked using the monthly electricity bills/17/ submitted by the PP.
	If applicable, has the reported data been cross-checked with other available data?	The data provided has been certified by state electricity board, therefore it was accepted
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes the data ensure correct transfer of data and reporting of emission reductions management and QA/QC processes are in place.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Deviation has been sought since the calibration certificates were not under the control of the PP.
Findings	No findings.	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology/07/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

	The implementation of the project is as per the registered PD/01/ could be confirmed by the verification team. The emission reduction calculation for the project activity is estimated based on the electricity supplied by the WTGs and result in 805,717 tCO₂e of emission reductions.
--	--

Parameters fixed ex ante

1. **EF_{grid,OM,y}** – It is the Operating Margin CO₂ emission factor in year y. The mentioned value, 0.9862 tCO₂/MWh (NEWNE Grid), is consistent with the value in the registered PD/01/.
2. **EF_{grid,BM,y}** - It is the Build Margin CO₂ emission factor in year y. The mentioned value of 0.9495 tCO₂/MWh (NEWNE Grid) is consistent with the value stated in the registered PD/01/.
3. **EF_{grid,CM,y}** – It is the Combined Margin CO₂ emission factor in year y. The value mentioned, tCO₂/MWh

Calibration

During the site visit, the team visited the metering locations. It was found that no meter has been replaced during the current monitoring period; therefore, there is no change in the accuracy class of the meters. The details of the equipment monitoring electricity exported have been provided below:

Sl. No.	Meter	Meter Identification No	Meter model & Make	Accuracy Class
1.	Main meter Feeder 1	WBE 12813	Secure	0.2s
2.	Check meter Feeder 1	WBE 12816	Secure	0.2s
3.	Main meter Feeder 2	WBE 12784	Secure	0.2s
4.	Check meter Feeder 2	WBE 12817	Secure	0.2s
5.	Main meter Feeder 3	WBE 12815	Secure	0.2s
6.	Check meter Feeder 3	WBE 12818	Secure	0.2s

All the meters were calibrated on 07/10/2013 at the time of installation by the L&T itself/4/. The calibration for these meter is valid for five years and therefore cover the entire monitoring period.

The details of the Import Meters are given below.

S. No.	Meter details	Meter Sl. No.	Accuracy class	Make of Meter
1.	Main Meter	WBE18371	0.5s	Secure
2.	Main Meter	RSH5D104	0.5s	Secure

3.	Main Meter	WBE12815	0.5s	Secure
----	------------	----------	------	--------

The import meters are owned by the state electricity board and are not under the control of PP and the calibration certificates of the import meters could not be traced for the current monitoring period. Therefore, the PP has applied an error factor factoring the maximum permissible error as per the accuracy class of the meters. The approach is in accordance with the CDM VVS V01/09 therefore the approach was accepted on the grounds of conservativeness.

A deviation has also been requested in the current verification, details can be found in section 3.3 of the report.

Net GHG Emission Reductions and Removals

As per para 61 of ACM0002 version16; Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$$ER_y = BE_y - PE_y$$

$$ER_y = 805,717 - 0 = 805,717 \text{ tCO}_2$$

4.4 Non-Permanence Risk Analysis

The data variable used for the calculation of emission reductions was overall net electricity supplied by the project activity. The parameter has been monitored through electronic meters therefore the likelihood of error is purely systematic in nature. The energy meters are state utility owned and undergo a calibration check. The monthly sheets for the energy generated issued by the state utility have been submitted to the assessment team and 100% of the data has been verified.

Therefore, assessment team is of the opinion that the emission reductions are free from any omissions, misstatement and material errors

5 SAFEGUARDS

5.1 No Net Harm

Not Applicable

5.2 Local Stakeholder Consultation

Local stakeholder consultation has been conducted at the time of project registration hence not applicable in the current monitoring period.

6 VERIFICATION CONCLUSION

Earthood Services Private Limited (Earthood), contracted by EKI Energy Services Limited, has performed the independent verification of the emission reductions for the VCS project activity ref number 1423 “Teesta Low Dam Project, Stage-IV” in India for the monitoring period 14/02/2016-16/07/2017 reported in the Monitoring Report Version 02 dated 31/01/2018. NHPC is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

It is our responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity.

Earthood commenced the verification on the basis of the baseline and monitoring methodology ACM0002: Grid-connected electricity generation from renewable sources - Version 16.0, the monitoring plan contained in the PD Version 05 and VCS guidelines version 3.7, Monitoring Report Version 02 dated 31/01/2018 as per the process described under section 2 of this report.

Earthood's verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Earthood planned and performed the verification by obtaining evidences and other information and explanations that Earthood considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

Verification period: From 14/02/2016 to 16/07/2017.

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2016	535,102	0	0	535,102
2017	270,615	0	0	270,615
Total	805,717	0	0	805,717

Approved by

Dr. Kaviraj Singh

Managing Director

Earthood Services Privated Limited

Date:

Place: Gurgaon, Haryana

APPENDIX 1: References

S.No	Title of Document	Version	Date
1.	Registered VCS PD	5.0	31/10/2015
2.	VCS Monitoring Report	02	31/01/2018

3.	ER spreadsheet (corresponding to the final monitoring report)	02	31/01/2018
4	Certificates of Calibration for all the export meters	-	07/10/2013
5.	Invoice issued	-	For the entire monitoring period
6.	CDM VVS	Version 01	-
7.	ACM0002: 'Grid-connected electricity generation from renewable sources' Methodology	16.0	-
8.	On-site assessment, interviews of plant staff		03/04/2015 to 04/04/2015
9.	Commissioning certificate for all the units of the project activity under central electricity authority -progress of ongoing hydro electric projects	-	Aug 2016
10.	Power Purchase Agreement	-	17 June 2005
11.	VCS webpage for the project, VCS ID 1423 http://www.vcsprojectdatabase.org/#/project_details/1423	-	Last accessed on 12/02/2018
12.	VCS Standard	Version 3.7	21/06/2017
13.	VCS Program Guide	Version 3.7	19/10/2016
14.	https://www.latlong.net/	-	Last accessed on 12/02/2018
15.	Invoices for electricity generation	-	For the entire monitoring period.
16.	Deviation settlement account statement	-	For the entire monitoring period.
17.	Monthly electricity sales bills raised by state electricity board.	-	For the entire monitoring period.
18.	Monthly generation report by NHPCL	-	For the entire monitoring period
19	Validation report	03	10/12/2015
20	http://www.nhpcindia.com/home.aspx		Last accessed on 10/03/2018
21	Central Electricity Regulation Commission Notification No. L-1/132/2013/CERC (http://www.cercind.gov.in/2014/regulation/noti132.pdf)	-	Last accessed on 22/05/2018

APPENDIX 2: Competency Statement

Competence Statement			
Name	Shreya Garg		
Country	India		
Education	M.Sc. (Climate Science & Policy), TERI University		
Experience	6 Years +		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS.I.A., AMS.I.C., AMS.I.D., AMS.I.F., AMS.II.D., AMS.II.G., AMS.II.J., AMS.III.AV., ACM0002, ACM0012		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.2, TA 3.1)		
Reviewed by	Abhishek Mahawar	Date	01/03/2018
Approved by	Ashok Gautam	Date	01/03/2018

Competence Statement			
Name	Harshita Kulshrestha		
Country	India		
Education	M.Sc. (Environmental Studies and Resource Management), TERI University		
Experience	1.5 Year +		
Field	Climate Change		
Approved Roles			
Team Leader	NO		
Validator	YES		
Verifier	YES		
Methodology Expert	NO		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert	NO		
Reviewed by	Abhishek Mahawar	Date	01/03/2018
Approved by	Ashok Kumar Gautam	Date	01/03/2018

Competence Statement			
Name	Kaviraj Singh		
Country	India		
Education	Ph.D. (Environmental Engineering), IIT Delhi Masters (Energy & Environmental), DAVV Indore		
Experience	15 Years +		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS-I.D., AMS-II.D., ACM0006, AMS-I.A., AMS-I.C., AMS-II.B., AMS-III.H, ACM0002, ACM0001		
Local expert	YES (India)		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert	YES (TA 1.1, TA 1.2, TA 13.1)		
Reviewed by	Abhishek Mahawar	Date	01/03/2018
Approved by	Ashok Gautam	Date	01/03/2018

APPENDIX 3: Abbreviations

Abbreviations	Full texts
BEF	Baseline Emission Factor
BM	Build Margin
CAR	Corrective Action Request
CL	Clarification Request
CO ₂	Carbon dioxide
FAR	Forward Action Request
GHG	Green House Gas
JMR	Joint Meter Reading
MR	Monitoring Report
MW	Megawatt
MWh	Megawatt-hour
NEWNE	Northern Eastern Western North-Eastern
PD	Project Description
PGCL	Power Grid Corporation Limited
PP	Project Proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance and Quality Control
VCS	Voluntary Carbon Standard
VCSA	Voluntary Carbon Standard Association
VCS PD	VCS Project Description
VCUs	Voluntary Carbon Units

APPENDIX 4: Verification Findings

Table 1. Remaining FAR from validation and/or previous verification

FAR ID	01	Section no.	E.2	Date : DD/MM/YYYY
Description of FAR				
There are no FAR from the previous validation.				
Project participant response				Date : DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

Table 2. CL from this verification

CL ID	02	Section no.	4.1	Date : 24/01/2018
Description of CL				
PP is requested to provide the following documents: 1. Power Purchase Agreement 2. Commissioning Certificate for Unit 3 and 4. 3. Layout of the facility with metering locations 4. Monthly Generation Report to cross check EGExport,y 5. Monthly electricity sales bills raised by State Electricity Board for all the meter location for the month July, 2017. The CL is Closed				
Project participant response				Date : 31/01/2018
1. The power Purchase agreement has been provided to DOE 2. The evidences for commissioning dates for all 4 units are provided to DOE 3. The metering location arrangement has been provided to DOE 4. The Monthly generation data has been provided to DOE 5. The Import bills for July 2017 month has been provided to DOE.				
Documentation provided by project participant				
Revised MR and ER sheet				
DOE assessment				Date: 07/02/2018
1. The power purchase agreement submitted by the project participant was appropriate. Closed. 2. Commissioning dates for Unit 3 and Unit 4 were found to be consistent with the evidence submitted. Closed 3. Metering locations given in the document provided was found to be in line with registered monitoring plan. Closed 4. EGExport,y was cross checked with the Monthly Generation report submitted, and was found to be consistent. Closed. 5. The import bills were provided for July 2017. Closed The CAR is closed.				

Table 3. CAR from this verification

CAR ID	03	Section no.	4.3	Date : 24/01/2018
Description of CAR				
Cell K11 in the sheet "ER calculation" of the ER sheet considers the start of the monitoring period as 14 February 2016 whereas the MR states is as 08 February 2016. Also the start date of the monitoring is inconsistent within the MR. Closed				
Project participant response				Date : 31/01/2018
The ER sheet is updated with consistent start date of monitoring period as 14/02/2016. The MR also updated accordingly.				
Documentation provided by project participant				
Revised MR and ER sheet				
DOE assessment				Date: 07/02/2018
The start date of the monitoring period is now consistent in the ER and MR. Closed				

CAR ID	04	Section no.	4.3	Date : 24/01/2018
Description of CAR				
Source for the parameter "EG _{Export,y} " in the MR was found to be inconsistent with reference to the deviation sought. Closed				
Project participant response				Date : 31/01/2018
The source of the parameter "EG _{Export,y} " is mentioned as Deviation Settlement Account Statement consistent with deviation request.				
Documentation provided by project participant				
Revised MR and ER sheet				
DOE assessment				Date: 07/02/2018
The MR has been updated and found consistent with the deviation sought. Closed				

CAR ID	05	Section no.	4.3	Date : 24/01/2018
Description of CAR				
The total generation (cell F4 of weekly export data in the ER sheet) comprises of TLDP_FIRM and TLDP_INFRM. PP is requested to explain the significance of TLDP_INFRM. Closed				
Project participant response				Date : 31/01/2018
The power which is supplied to grid before commercial operation of project activity is called as infirm power and after commercial operation, the power is called as firm power. In terms of project activity, both firm and infirm power are supplied to grid and same is reflected in Weekly Deviation Settlement Account Statements, hence both are considered for emission reduction calculations. As per Weekly Deviation Settlement Account Statements, project starts supplying power to grid from 14/02/2016 onwards, hence start date of current monitoring period is considered as 14/02/2016.				
Documentation provided by project participant				
Revised MR and ER sheet				
DOE assessment				Date: 07/02/2018
The explanation provided by the PP was found to be satisfactory. Closed				

CAR ID	06	Section no.	4.3	Date : 24/01/2018
Description of CAR				
The emission reductions achieved during the current monitoring period are higher than the estimated amount. PP is requested to justify the increase.				
Project participant response				Date : 31/01/2018

The current monitoring period is from 14/02/2016 to 16/07/2017 and based on these total 519 days, ER estimation becomes as 990815 t CO₂. The actual emission reductions are 805717 t CO₂ which are less than estimated value. This is due to low plant load factor and different commissioning dates for each unit.

Documentation provided by project participant

Revised MR and ER sheet

DOE assessment

Date: 07/02/2018

The justification provided by the PP was found to be satisfactory. **Closed**

Table 4. FAR from this verification

FAR ID	07	Section No.	Date : DD/MM/YYYY
Description of FAR			
<i>there is no FAR from this verification.</i>			
Project participant response			Date : DD/MM/YYYY
Documentation provided by project participant			
DOE assessment			Date: DD/MM/YYYY