VERIFICATION REPORT FOR 'ISHASHA 6.6 MW SMALL HYDROPOWER PROJECT'

Document Prepared by Earthood Services Private Limited

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Prepared By	Earthood Services Pvt. Ltd.
Contact	Regd. Office: 224, Tower A, 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 (Managing Director)
Work Carried Out By	Team Leader: Nayan Jyoti Deka Technical Expert (TA 1.2): Nayan Jyoti Deka Trainee Verifier: Deepika Mahala Technical Reviewer: Abhishek Mahawar Technical Expert (TA 1.2): Abhishek Mahawar

Summary:

Earthood has performed the verification of the VCS project “Ishasha 6.6 MW Small Hydropower Project” VCS Ref. Number 1286. This project is also registered with CDM EB (UN 6381) however, the emissions for this monitoring period (01/01/2015-31/12/2015) are not been found verified on the UNFCCC website.

The scope of verification includes confirming the implementation of the monitoring plan of the registered PD (version 08) and the application of the monitoring methodology Consolidated baseline methodology for grid-connected electricity generation from renewable sources, AMS-I.D., Version 17. The verification is consisted of three phases: i) desk review of the project; ii) follow-up onsite visit and interviews with project stakeholders; iii) resolution of outstanding issues and the 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, 00 CL and 00 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 VCS project activity 1286 “Ishasha 6.6 MW Small Hydropower Project” in Uganda during the period 01/01/2015-31/12/2015 (including both days) amount to 16,104 tonnes of CO_2e.

Vintage wise representation of the emission reductions is as follows:

Period	Baseline Emissions (tCO_2e)	Project Emissions (tCO_2e)	Leakages (tCO_2e)	Emission Reductions (tCO_2e)
2015(01/01/2015-31/12/2015)	16,104	0	0	16,104
Total	16,104	0	0	16,104

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1 INTRODUCTION

1.1 Objective

C-Quest Capital Malaysia Limited has contracted Earthood Services Private Limited (Earthood) to conduct the verification and certification of emission reductions reported for the VCS project activity VCS Ref number 1286 “01/01/2015-31/12/2015 (both days inclusive). This report contains the findings of the verification process and a certification statement for the certified emission reductions.

The verification is the periodic independent review and ex-post determination by Earthood 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.

The objective of this verification was to verify and certify emission reductions reported for “Ishasha 6.6 MW Small Hydropower Project” for the monitoring period 01/01/2015-31/12/2015.

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 all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;

b) 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;

c) 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) and/or, where applicable, the approved standardized baseline;

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

The level of assurance is reasonable for the project activity. The threshold for materiality in this assignment is 5%, which is in accordance with EB 69 Annex 6 para 10 (d) “Guidelines on the application of the materiality in verifications,” Version 1.

1.4 Summary Description of the Project

The project activity is generation of electricity by using hydro-electricity generators. The energy generated is supplied to the Uganda Electricity Transmission Company Limited (UETCL), which operates the national grid system. The project activity leads to reduction of greenhouse gas(GHG), as the energy is generated from renewable source. The emission reductions were real, measurable, and verifiable and also plays a beneficial role in the mitigation of climate change.

The Project activity involves installation of a run-of river hydropower plant system with capacity 6.4MW. The unit consists of two francis turbines of capacity 3.4MW and two synchronous generators manufactured by Leroy Somer generators rated 4.0MVA operating at power factor of 0.8, resulting in net generation capacity of 6.4MW/13,14/.

The Wind Turbine Generators were commissioned on 06/03/2011, which was verified against the revised CDM PDD and commissioning certificates/15, 27/.
By on-site assessment of the project activity, the verification team confirms that all the components of installed technology are fully functional. The total emission reductions achieved under the monitoring period 01/01/2015-31/12/2015 are 16,104 tCO2e/08/.

2 VERIFICATION PROCESS

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.

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 (PD, 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

On site assessment was carried on 29/07/2016 by Earthood. Interviews with the project stakeholders and representatives of EcoPower EPUL were conducted to confirm the selected information and to resolve the issues identified in the document review.

The stakeholders interviewed are:

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Samaratunga	Nihal	EPUL	29/07/2016	Project description, Monitoring plan	Nayan J Deka
2.	Wisidagema	W.C.	EPUL	29/07/2016	Implementation of monitoring plan, data recording	Nayan J Deka
3.	Welikala	D.L.K.	EPUL	29/07/2016	Implementation of monitoring plan	Nayan J Deka
4.	Tugume	Emma B.	EPUL	29/07/2016	Implementation of monitoring plan	Nayan J Deka

The topics covered during interview ranges from general features and implementation of project to technical details of the project like calibration details, monitoring and measuring system and data collection, recording and archiving procedures. The assessment was drawn based on the feedback received during interview coupled with the documentation and on-site observations.

2.4 Site Inspections

A site visit was undertaken by Earthood on 29/07/2016 to carry out following;

a. An assessment of the implementation and operation of the registered project activity as per the revised PD;

b. A review of information flows for generating, aggregating and reporting the monitoring parameters;

c. Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PD;

d. A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, energy statements issued by TNGDC or similar data sources;

e. 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;

f. A review of calculations and assumptions made in determining the GHG data and emission reductions;

g. 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 Earthood 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.

All the findings that are raised and communicated to project participant during the verification are included under Appendix 2. 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

There is no FAR from the previous verification or validation of the project activity/10,12/.

2.6 Eligibility for Validation Activities

Not Applicable

3 VALIDATION FINDINGS

Not Applicable

3.1 Participation under Other GHG Programs

The project activity is registered under CDM with reference number 6381 and crediting period of 10years from 01/07/2012 to 30/06/2022/25/.

3.2 Methodology Deviations

Not Applicable

3.3 Project Description Deviations

There is a project description deviation in the current monitoring period.

1. The revised PD version 10 dated 26/09/2016, sets a frequency of calibration as once in five years. However, a delay has been observed in calibration of energy meters with serial numbers CW001303 and CW001304. The PP has used adjusted values with error factor applied to the values. The error factor applied is equal to the maximum permissible limit as per the VVS standard version 09. Therefore, accept the justification provide by the PP for delay in calibration. The verification team confirms that the change does not impacts the additionality and the appropriateness of the baseline scenario.

Deviation accepted during the previous monitoring period are as follows:

1. A project description deviation was sought in the previous monitoring period which focuses on the design capacity of the project activity. As per the registered PD, the capacity was stated as 6.6 MW. However, the plant design capacity of 6.4MW was produced during the actual implementation.

The deviation has been approved by the CDM EB during the Post registration correction process/23/. Therefore, the verification team accepts the justification provided by the PP in the MR/06/. The verification team confirms that the change does not impacts the additionality and the appropriateness of the baseline scenario.

2. A project description has been sought in the monitoring period 01/11/2013-31/12/2014. As per the paragraph 247 of PS version 9.0, PP shall provide all parameter used to calculate baseline, project and leakage GHG emissions in MR. Parameter $EF_{CO2,grid,y}$ is used for calculation of baseline emissions. However, it was not included in registered PDD as ex ante parameter. PP has made a correction in the monitoring period 01/11/2013 to 31/12/2014 and the correction is applicable for the subsequent monitoring periods also. The value of the parameter is 0.6673 tCO2e/MWh and it was already corroborated at the time of the validation. The parameter is now listed as ex-ante parameter in the revised PDD version 10.0/27/. The change was accepted by the assessment team it does not affect the calculation of emission reduction, additionality and the appropriateness of baseline scenario/26/. The change has been marked as a Post registration change and will be submitted to UN with the verification report for previous monitoring period(01/11/2013-31/12/2014).

3.4 Grouped Project

Not Applicable

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

On site assessment of the project activity was carried out on 29/07/2016 by the verification team to check the implementation status of the project activity and the instrumentation installed for the project activity. During the site visit to project location (Kanungu District of South-Western Uganda) it was observed that the project withdraws water from Ishasha River to run two turbines installed under this project activity. The water is transported through penstock of 1,140metres. The runoff of water tailrace was directed to the Ishasha River.

The exact geo-coordinates of the project activity were verified with the help of a hand held GPS device:

Location	Coordinates
Weir/Diversion Intake	-0.935556, 29.668611
Power House/Tailrace	-0.878611, 29.657500

The energy generated from the project activity will be transmitted to the Uganda Electricity Transmission Company Limited(UETCL), which operates the national grid. This was verified from the invoices raised to UETCL/18/.

The project activity has commissioned on 06/03/2011. The commissioning date was verified from the validation report/10/. Installation and specification of the turbines and the generators were verified from the photos of the name plates of the equipment taken during the site visit/13,14/.

There has been no major breakdown or shut downs during the monitoring period which might affect the applicability of the methodology or might cause material errors in emission reductions.
Interview of the personnel was conducted by the verification team, which revealed that all the QA/QC procedures listed in the revised PDD have been followed while operating the project activity/27/.
Assessment concludes the following:

- The implementation status of project activity was found to be in compliance with revised PD
- DOE has conducted the on-site visit to confirm the implementation status of the project.
- The commissioning date of the project activity was found to be accurately and consistently recorded.
- The actual operation of project activity was found to be in compliance with the flow diagram provided in revised PD.
- There was no increase in emission reduction from estimates made in revised PD, therefore no additional explanation was sought from PP regarding the same.
- The project is registered under VCS program with reference number 1286 and CDM program with reference number 6381.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

The project activity has been monitored as per the monitoring plan mentioned in revised PD. All the deviations identified during the previous monitoring periods have been considered and implemented under the current monitoring period. The verification team confirms that the flow of information (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) is as per the MR/06/.

Parameters to be monitored:

The assessment of each parameter identified in the project activity to calculate the GHG emission reductions have been done in the tables given below. The assessment team confirms that each parameter has been checked. The actual monitoring complies with the monitoring plan.

a) Annual electricity supplied by the project to the grid, $EG_{y,}$ in MWh

<table>
<tr><th>Criteria/Requirements</th><th>Assessment/Observation</th></tr>
<tr><td>Measuring /Reading /Recording frequency</td><td>The parameter is measured and it is continuously monitored and monthly recorded/06,27/.</td></tr>
<tr><td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</td><td>Yes. The measuring and reporting frequency are in line to the revised PDD/27/.</td></tr>
<tr><td>Monitoring equipment</td><td>There is one main Energy meter and one check meter. The details of the meters are given below:
<table>
<tr><td>Meter</td><td>Type</td><td>Serial Number</td></tr>
<tr><td>Main meter</td><td>CEWE Promoter W</td><td>CW001303</td></tr>
<tr><td>Check Meter</td><td>CEWE Promoter W</td><td>CW001304</td></tr>
</table>
The technical details of the meters are specified in the MR/06/ are found consistent with calibration certificates/19,20/.</td></tr>
</table>

<table>
<tr><th>Criteria/Requirements</th><th>Assessment/Observation</th></tr>
<tr><td>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?</td><td>The accuracy of the monitoring equipment is 0.2s, is found to be consistent with the revised PDD/27/.</td></tr>
<tr><td>Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?</td><td>Yes. The accuracy is not valid for the entire range/19,20/.</td></tr>
<tr><td>Calibration frequency /interval:</td><td>The calibration frequency is set as 5 years as per the manufacturer specification in the revised PDD/27/.</td></tr>
<tr><td>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, or as per the manufacturer’s specifications?</td><td>Yes. The calibration carried out without any delay in between. The details are mentioned below:
<table>
<tr><th>Meter</th><th>Serial number</th><th>Calibration date</th><th>Validity</th></tr>
<tr><td rowspan="2">Main meter</td><td rowspan="2">CW001303</td><td>18/12/2010</td><td>17/12/2015</td></tr>
<tr><td>14/06/2016</td><td>13/06/2021</td></tr>
<tr><td rowspan="2">Check meter</td><td rowspan="2">CW001304</td><td>18/12/2010</td><td>17/12/2015</td></tr>
<tr><td>15/06/2016</td><td>14/06/2021</td></tr>
</table>
The revised PDD states that the calibration frequency of the equipment should as per the manufacturer specification i.e., once in five years. However, delay in calibration has been observed as the calibration does not cover the entire monitoring period.However, in accordance to VVS version 9.0 an error factor equivalent to the maximum permissible error of the measuring equipment has been applied to the values between the period when calibrated instrument has not been used/08/.
Therefore, it was accepted by the assessment team.</td></tr>
<tr><td>Is the calibration of measuring equipment carried out by an accredited person or institution?</td><td>The calibration is conducted by CEWE Instrument AB, which is the manufacturer of the meters/27/.</td></tr>
</table>

Criteria/Requirements	Assessment/Observation
Is(are) calibration(s) valid for the whole reporting period?	Yes. The calibration does not cover the entire monitoring period 01/01/2015-31/12/2015 /19,20/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out the manufacturer of the meters.
How were the values in the monitoring report verified?	The monthly reported values for net electricity exported to the grid data was verified by cross checking the values with the joint meter readings sheet/17/. Refer ER sheet for the monthly values of the parameter verified/08/. All the values were found consistent. The total energy generated from project activity during the monitoring period is 24,134.42 MWh. The verified value is consistently reported in the MR/06/.
If applicable, has the reported data been cross-checked with other available data?	The monthly reported data was cross-checked, as prescribed in the registered PDD, with the invoices raised to Uganda Electricity transmission company limited/18/ and was found consistent.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The necessary QA/QC procedures are in place and the data management system is effective and reliable.
In case project participants have temporarily not monitored the parameter?	No such issues.

b) Installed capacity of hydro power plant after the implementation of the project activity, Cap_{PJ}, in MW

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The parameter is calculated and the calculation is done yearly/27,06/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Not Applicable

Criteria/Requirements	Assessment/Observation
Monitoring equipment	Not applicable as the value of the parameter would be determined based on manufacturer's specification or recognized standards.
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?	Not applicable as it is a calculated parameter.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable as it is a calculated parameter.
Calibration frequency /interval:	Not applicable as it is a calculated parameter.
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, or as per the manufacturer's specifications?	Not applicable as it is a calculated parameter.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable as it is a calculated parameter.
Is(are) calibration(s) valid for the whole reporting period?	Not applicable as it is a calculated parameter.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable as it is a calculated parameter.
How were the values in the monitoring report verified?	The value of the parameter was verified from the PRC validation opinion approved by CDM EB /23/. The verified value of the parameter is 6.4., which is consistently reported in the MR/06/
If applicable, has the reported data been cross-checked with other available data?	The value of the parameter was cross checked from the revised PDD/27/.

Criteria/Requirements	Assessment/Observation
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Not applicable
In case project participants have temporarily not monitored the parameter?	No such issues.

c) Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full, A_{PJ}, in m^2.

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The parameter is monitored yearly/27,06/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency are in line to the revised CDM PDD/27/.
Monitoring equipment	The parameter is measured from topographical surveys, maps, satellite pictures, etc.
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?	Not applicable as it is a calculated parameter.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable as it is a calculated parameter.
Calibration frequency /interval:	Not applicable as it is a calculated parameter.
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, or as per the manufacturer's specifications?	Not applicable as it is a calculated parameter.

Criteria/Requirements	Assessment/Observation
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable as it is a calculated parameter.
Is(are) calibration(s) valid for the whole reporting period?	Not applicable as it is a calculated parameter.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable as it is a calculated parameter.
How were the values in the monitoring report verified?	The verified value of the parameter is 9,608 m^2. Ishasha Dam reservoir layout, submitted by the PP, was used by the assessment team to check the value of the parameter/22/.
If applicable, has the reported data been cross-checked with other available data?	Not applicable
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Not applicable
In case project participants have temporarily not monitored the parameter?	No such issues.

Through onsite audit and assessment of documents DOE can conclude the following:

- Monitoring results are consistently recorded as per approved frequency
- QA/QC procedures have been applied in accordance with the registered monitoring plan.
- No sampling approach has been followed for monitoring which is appropriate for the project activity.

Parameter fixed ex ante:

a) **$FC_{i,m,y}$, $FC_{i,j,y,}$ $FC_{i,k,y}$, Mass or volume unit:** The data is sourced from utility official publications, collected from UETCL and was used for the calculation of operating margin at the time of validation/10/.

b) **$NCV_{i,y,}$ GJ/ mass or volume unit:** The revised PDD/27/ gives the value of 41.4TJ/10^3 tonnes for diesel/distillate and 39.8TJ/10^3 for residual fuel. The values have been sourced from IPCC guidelines on National GHG Inventories.

c) **$EF_{co2,l,j}$ and $EF_{co2,m,l,y:}$** The revised PDD/27/ gives the value of 72.6 tCO_2/TJ for diesel/distillate and 75.5 tCO_2/TJ for residual fuel. The values have been sourced from IPCC guidelines on National GHG Inventories.

d) **EGm,y, EGj,y, EGk,y, MWh:** The data is sourced from the most recent three data collected from Electricity Regulatory Authority(ERA) and Uganda Electricity Transmission Company Limited(UETCL). and was used for the calculation of operating margin at the time of validation/10/.

e) **$EF_{CO2,grid,y}$,t CO2/MWh:** The parameter is CO_2 emission factor of the grid. The value of the parameter is 0.6673 as per the revised PDD/27/.

f) **$Cap_{BL,}$ W**: The parameter is Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero. The value of the parameter is 0 as per the revised PDD/27/.

g) **A_{BL}, m^2:** The parameter is Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero. The value of the parameter is 0 as per the registered revised PDD/27/.

Calibration:

The on-site assessment conducted by the verification team confirms that the calibration of the meters has been done inline to the monitoring plan described in the VCS PD. The calibration details of each meter installed have listed in the table provided below:

As per the revised PDD/27/, the calibration of the meters used for monitoring the net electricity exported to the grid needs to be once in five years. The meters installed under this project activity have been calibrated as per the frequency set in the revised PDD/27/. This is in line with the manufacturer's specification. The calibration has been conducted by CEWE implementation AB, the manufacturer of the meters/19,20/. The calibration conducted does not cover the entire monitoring period. The validity of the calibration expires before the end date of the monitoring period. In accordance to VVS version 9.0 an error factor equivalent to the maximum permissible error of the measuring equipment has been applied to the values between the period when calibrated instrument has not been used/08/. Therefore, accept the justification provide by the PP for delay in calibration.

The Calibration details are as follows:

Meter	Serial number	Calibration date	Validity	Accuracy class
Main meter	CW001303	18/12/2010	17/12/2015	0.2s
		14/06/2016	13/06/2021	0.2s
Check meter	CW001304	18/12/2010	17/12/2015	0.2s
		15/06/2016	14/06/2021	0.2s

GHG Calculations

The calculation of emission reduction has been done in accordance to the applied methodology/11/. As per the applied methodology, the values of project emission and leakages are considered as zero for the project activity/11/. The equation used for calculation of baseline emission is given below:

Baseline emissions are calculated as follows:
$BE_y = EG_y * EF_{co2, grid}$
Where,

BE_y	=	Baseline Emissions in year y (t CO_2)
EG_y	=	Annual Electricity supplied by the project to the grid
$EF_{CO2, grid}$	=	CO2 emission factor of the grid (t CO_2/MWh)

Therefore, the baseline emissions = 24,134.42 MWh * 0.6673 t CO_2/MWh

= 16,104 tCO_2e

The calculation of the net emission reduction achieved is done using the equation provided below:

Net Emission reduction= BE_y - Project emissions - Leakage

Where, BE_y is baseline emissions

For project emission following approach has been followed:

As per the paragraph 20 of AMS-I.D., the project emissions have to be considered following the procedure described in the methodology ACM0002 for emissions from water reservoirs of hydro power plants. It has been clearly shown by the PP in the MR/06/ that the power density of the project activity is 666.11W/m^2, which is greater than 10W/m^2. Therefore, as per ACM0002 it can be taken as zero. This consideration was found to be in line with the applied methodology AMSI.D version 17.0 and ACM0002 version 12.3.0/11,16/.

Leakages have been considered as zero for the project activity as per the applied methodology/11/.

As the values of the PE = 0 and Leakage = 0,

Therefore, Net Emission Reductions = BEy-0-0

= 16,104 tCO_2e

The verification team confirms that appropriate methods and formulae for calculating baseline emissions have been followed. The assumptions, emission factors and default values that were applied in the calculations are justified. All the data were made available and have monitored as per required monitoring frequency. The means of verification for the values of parameters, used for baseline emission calculation, is described above.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

The emission reduction calculation for the project activity is estimated based on the electricity supplied by the WEGs. Monthly values of electricity generated inserted in the ER sheet was verified with the Joint Meter Reading Report and Invoices provided by the project proponent/17,18/. Since 100% data was verified, the team can ascertain that the values taken for emission reduction calculation are free from material errors.

4.4 Non-Permanence Risk Analysis

The data variable used for the calculation of emission reductions is the 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 have been calibrated by the manufacturer/19,20/. 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, the assessment team is of the opinion that the emission reductions are free from any omissions, misstatement and material errors.

5 VERIFICATION CONCLUSION

Earthood Services Private Limited (Earthood), contracted by C-Quest Capital Malaysia Limited, has performed the independent verification of the emission reductions for the VCS project activity ref number 1286 “Ishasha 6.6 MW Small Hydropower Project” in Uganda for the monitoring period 01/01/2015-31/12/2015 reported in the Monitoring Report Version 2.1 dated 26/09/2016. C-Quest Capital Malaysia Limited 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

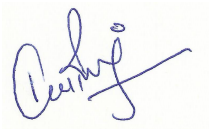
Earthood commenced the verification on the basis of the baseline and monitoring methodology AMS-I.D., Version 17, the monitoring plan contained in the revised PDD/27/ and VCS guidelines version 3.5, Monitoring Report Version 02.1 dated 26/09/2016 as per the process described under Section 2 of this report.

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 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 01/01/2015-31/12/2015 are fairly stated in the Monitoring Report Version 2.1 dated 26/09/2016. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS-I.D. version 17.0, and the VCS standard.
Verification period: From 01/01/2015-31/12/2015 (both days inclusive)
Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2015(01/01/2015 to 31/12/2015)	16,104	0	0	16,104
Total	16,104	0	0	16,104

Approved by



Dr. Kaviraj Singh
Managing Director

Date: 10/01/2017

Earthood Services Privated Limited

Place: Gurgaon, Haryana

APPENDIX 1: ABBREVIATIONS

Abbreviations	Full texts
General	
ACM	Approved Consolidated Methodology
AM	Approved Methodology
AMS	Approved Methodology for SSC Projects
BE	Baseline Emission
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CH4	Methane
CL	Clarification Request
CM	Combined Margin
CME	Coordinating/Managing Entity
CO2	Carbon di oxide
CP	Crediting Period
CPA DD	Component Project Activity Design Document
DNA	Designated National Authority
DR	Desk Review
DOE	Designated Operational Entity
EB	Executive Board
EIA	Environmental Impact Assessment
ESPL	Earthood Services Private Limited
FAR	Forward Action Request
GHG	Green House Gas
GSC/GSP	Global Stakeholder Consultation Process
GW	Giga Watt
GWh	Giga Watt hour
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
kW	kilo Watt
kWh	kilo Watt hour
LoA	Letter of Approval/Authorization
LSC	Local Stakeholder Consultation Process
MoC	Modalities of Communication
MoV	Means of Verification
MP	Monitoring Plan
MW	Mega Watt
MWh	Mega Watt hour
N2O	Nitrous Oxide
OM	Operating Margin
PCP	Project Cycle Procedure
PDD	Project Design Document
PE	Project Emission
PLF	Plant Load Factor

PD	Project description
PP	Project Participant
PS	Project Standard
RFR	Request for Registration
tCO2e	Tonnes of Carbon di oxide equivalent
TPH	Tonnes Per Hour
UNFCCC	United Nations Framework Convention on Climate Change
V	Version
VVS	Validation and Verification Standard
Project Specific	
AENOR	Asociacion Espanola de Normalization y Certification
EPUL	Eco Power Uganda Limited

APPENDIX 3: DOCUMENTS REVIEWED OR REFERENCED

No.	Author	Title	References to the document	Provider
1	UNFCCC	Standard: CDM PS	Ver. 9	Others
2	UNFCCC	Standard: CDM PCP	Ver. 9	Others
3	UNFCCC	Standard: CDM VVS	Ver. 9	Others
4	UNFCCC	Form: CDM-MR-FORM	Ver. 5.1	Others
5	VCS	VCS Standard	Version 3.4	Other
6	CQC Capital	Monitoring Report (revised/final)	Version 2.1 dated 26/09/2016	PP
7	CQC Capital	ER Spreadsheet (draft)	-	PP
8	CQC Capital	ER Spreadsheet (revised/final)	-	PP
9	CQC Capital	Revised PDD	Version 9, dated 08/10/2014	Others
10	AENOR	Validation Report (Revised PDD)	Version 2.0 dated 25/05/2012	Others
11	UNFCCC	Methodology: AMS-I.D.	Ver. 17 dated	Others
12	AENOR	1st verification Report	Version 2.0 dated 06/02/2015	Other
13	-	Nameplate of “Francis turbine”	-	PP
14	-	Nameplate of Leroy Somer synchronous generator.	-	PP
15	EPUL	Commissioning certificate	06/03/2011	PP
16	UNFCCC	Methodology: ACM0002	version 12.3.0 dated 02/03/2012	PP
17.	Uganda Electricity Transmission co. ltd	Joint Meter Readings	01/01/2015-31/12/2015	PP
18	Eco power Uganda Limited	Invoices addressed to Uganda electricity transmission company limited	01/01/2015-31/12/2015	PP

19	CEWE Instrument	Test certificate for meter CW001303(main meter)	19/12/2010	PP
20	CEWE Instrument	Test certificate for meter CW001304(check meter)	19/12/2010	PP
21	EPUL	Environmental Audit Report	12/03/2011	PP
22	EPUL	Ishasha Dam Reservoir layout	13/01/2011	PP
23	AENOR	Post Registration Changes assessment opinion	Version 02, dated 06/02/2015	Other
24	UNFCCC	https://cdm.unfccc.int/PRCContainer/DB/prcp519601910/view	-	Other
25	UNFCCC	https://cdm.unfccc.int/Projects/DB/AENOR1339140439.41/view	-	Other
26	ESPL	PRC validation opinion	28/09/2016	Other
27	CQC Capital	Revised CDM PDD	Version 10, 26/09/2016	PP

APPENDIX 4: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUEST AND FORWARD ACTION REQUESTS

CAR ID	01	**Section no.**	3.3, 4.2	**Date :** 09/08/2016
Description of CAR				
1. Three ex-ante parameters have not been mentioned in the MR. This is inconsistent with the revised PDD. 2. The description of EG_y is inconsistent with the revised PDD. 3. For the parameter EG_y Validity of calibration has not provided in the table. 4. Incorrect crediting period in mentioned in section 1.6 of the MR.				
Project participant response				**Date :** 06/09/2016
The monitoring report has been updated to address the issues in the CAR.				
Documentation provided by project participant				
Revised monitoring report.				
DOE assessment				**Date:** 19/09/2016
1. The parameters have now been added to the revised MR as per the PD. 2. The description has been corrected in the revised MR. 3. Validity has now been added to the section 3.2 of the MR. 4. Crediting period has been corrected in the revised MR. Thus, the CAR is closed.				

CAR ID	02	**Section no.**	3.3	**Date : :** 09/08/2016
Description of CAR				
PP is requested to kindly include brief discussion on the project design changes that has been already approved in the relevant section of MR.				
Project participant response				**Date :** 06/09/2016
The summary of changes that already approved is updated in the monitoring report.				
Documentation provided by project participant				
Revised monitoring report.				
DOE assessment				**Date:** 19/09/2016
Description about the already approved changes have been added in the revised MR. Thus, the CAR is closed.				

CAR ID	03	**Section no.**	4.2	**Date : :** 09/08/2016
Description of CAR				

1. Please include the complete details of the meter calibration viz. last calibration date, current calibration date and next due date of calibration under the section 3.2.
2. Please indicate the downtimes in hours during the current monitoring plan under section B.1.

Project participant response	**Date :** 06/09/2016
Sections 3.2 and 2.1 of monitoring report are updated to address the issues above.	
Documentation provided by project participant	
Revised monitoring report.	
DOE assessment	**Date:** 19/09/2016

1. Complete details of meter calibration have been included in section 3.2. of the revised MR.
2. Downtimes in hours have been added to the revised monitoring report version 2.0.

Thus, the CAR is closed.

CAR ID	04	**Section no.**	4.2	**Date : :** 09/08/2016

Description of CAR

1. Delay in calibration of meter number CW001303 and CW001304 was observed for the period between 18/12/2015 to 31/12/2015. The calibration does not cover the entire monitoring period.
2. Parameter $EF_{CO2,grid,y}$ is not listed as an ex ante parameter in the registered PD. However, it has been added as an ex-ante parameter in the MR. Inconsistency was observed between these two documents.

Project participant response	**Date :** 06/09/2016

1. The subsequent calibration which was scheduled on 14/06/2016 and 15/06/2016 respectively, confirmed that the percentage of error found was within the maximum permissible error (0.2%) of the meter.
2. The parameter said has been removed from monitoring report.

Documentation provided by project participant	
Revised monitoring report, revised VER calculation sheet and latest meter calibration report.	
DOE assessment	**Date:** 19/09/2016

1. PP needs to clarify why the adjustment to the values of reading obtained during the period when the meter was not calibrated has not been done as per the Appendix(Table1.) of VVS. (Open).
2. As per the paragraph 247 of PS version 9.0, PP shall provide all parameter used to calculate baseline, project and leakage GHG emissions under the section 'Data and Parameters' of MR. Since $EF_{CO2,grid,y}$ is used for calculation of baseline emissions, PP needs to clarify how the above stated requirement of PS has been followed. (Open).

Project participant response	**Date :** 26/09/2016

1. The adjustment to values of reading obtained during the monitoring period has been corrected as per Appendix (Table 1) of VVS.
2. The parameter of $EF_{CO2,grid,y}$ has been included in the revised PDD and submitted to auditor for post registration changes approval.

Documentation provided by project participant	
Revised monitoring report version 2.1, revised VER calculation sheet version 2.1	
DOE assessment	**Date:** 30/09/2016

1. Correct adjustment is now applied to the values of ER sheet for which calibration delay was observed.
2. The parameter has now been included in the revised PDD and information about the correction has also been included in section 2.2.2 of the VCS MR.

APPENDIX 5: COMPETENCE STATEMENTS OF THE TEAM

Name	Nayan Jyoti Deka		
Country	India		
Education	M.Tech. (Energy Technology), Tezpur University		
Experience	8 Years +		
Field	Climate Change & Energy Management		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS-I.D., AMS-III.H., AMS-I.C., ACM0006, ACM0002		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.1, 1.2, 3.1, 13.1)	YES		
Reviewed by	Abhishek Mahawar	**Date**	08/09/2016
Approved by	Ashok Kumar Gautam	**Date**	08/09/2016

Name	Deepika Mahala
Country	India
Education	M. Sc. (Environmental Mgmt), GGSIP University B.Sc. Honour (Chemistry), Sri Venkateshwar College, DU
Experience	1.5 Year
Field	Climate Change
Approved Roles	
Team Leader	NO
Validator	NO
Verifier	NO
Methodology Expert	NO
Local expert	YES (India)
Financial Expert	NO

Technical Reviewer	NO		
TA Expert	NO		
Trainee (Validator/Verifier)	YES		
Reviewed by	Abhishek Mahawar	**Date**	08/09/2016
Approved by	Ashok Kumar Gautam	**Date**	08/09/2016

Name	Abhishek Mahawar		
Country	India		
Education	B. Tech. (Chemical Engineering) MBA (Finance)		
Experience	7 Years +		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS-I.D and ACM0002		
Local expert	YES (India)		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
Reviewed by	Ashok Gautam	**Date**	07/09/2016
Approved by	Kaviraj Singh	**Date**	07/09/2016