VERIFICATION REPORT

Document Prepared By

Earthood Services Private Limited

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Summary:

Earthood has performed the VCS verification of the project "300MW Hydropower project by JHPL" VCS ID 92, against VCS Standard Version 3.5.

The scope of verification includes confirming the implementation of the monitoring plan of the registered VCS PD dated 25/12/2007 and the application of the monitoring methodology "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002, Version 8. 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 03 CAR, 00 CL and 00 FARs were raised. All the findings have been closed satisfactorily and the same has been discussed in Appendix 2.

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 "300MW Hydropower project by JHPL" in India during the period 01/07/2014 – 31/08/2015 (including both days) amount to 1,422,190 tonnes of CO_2e.

Vintage wise representation of the emission reductions is as follows:

Year	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions (tCO_2e)
2014	633,887.72	1,390.89	0.00	632,496.83
2015	791,066.03	1,372.86	0.00	789,693.17
Total	**1,424,953.75**	**2,763.75**	**0.00**	**1,422,190**

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1 INTRODUCTION

1.1 Objective

Jaiprakash Power Ventures Limited (JPVL) has contracted Earthood Services Private Limited (Earthood) to perform VCS Verification of the '300MW Hydropower project by JHPL' in India (hereafter called project). This project is listed in the VCS project database with VCS ID 92. The objective of this verification is a thorough and independent assessment of registered VCS project activities against the applicable VCS requirements, by the DOE. The verification process shall determine whether the proposed project activity complies with the requirements of paragraph 37 of the CDM &, latest VCS guidelines, applicability conditions of the selected methodology, relevant host country regulations and guidance issued by the VCS Board. This project has not been registered under CDM. Based on the independent review conducted by the assessment team the project has not been doubted for double counting which was also confirmed from the earlier verification reports.

1.2 Scope and Criteria

The scope of validation is to assess the claims and assumptions made in the VCS project document (PD), VCS monitoring report (MR) against the VCS & CDM criteria, including but not limited to, VCS standard, CDM PS, CDM VVS, applied methodology and other relevant rules and requirements established for VCS project activities. The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarification and/or correction actions request may have provided inputs for improvement of the project design.

1.3 Level of Assurance

A draft verification report that is prepared by assessment team is 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).

1.4 Summary Description of the Project

The project activity is a run-of the river project involves electricity generation harnessing potential energy from river Baspa /20/ at Kuppa in Himachal Pradesh and supplying the generated electricity to the NEWNE Grid. The project activity is a 300 MW facility consisting 3 Pelton turbines of 100 MW each. The project leads to emission reduction through generation of electricity from renewable sources which would have been otherwise generated through fossil fuel dominated processes. The project activity results in reductions of greenhouse gas (GHG) emissions that are real, measurable, and verifiable and also plays beneficial role in the mitigation of climate change.

The project has an installed capacity of 300 MW and has a diversion barrage located in Kuppa in Himachal Pradesh. The power house is located downstream at Karcham village. The project activity was an initiative of Jaiprakash Hydro Power Limited and recently has been bought over by another entity. The information regarding the project could be verified through nameplate present at the project site witnessed during the site visit. The project activity has been commissioned on 08/06/2003 and the same was verified from the commissioning certificates/20/. It was also confirmed that the same date has been mentioned and validated in the registered VCS PD/1/.

The project activity was found operational in its full capacity as verified through onsite visit. The assessment team confirms that the total emission reductions achieved under this monitoring period (01/07/2014 – 31/08/2015) are 1,422,190 tCO2e.

2 VERIFICATION PROCESS

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

2.1 Method and Criteria

Earthood assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the criteria and relevant guidance provided by the VCS Board. The validation/verification process consist of the following three phases;

- A desk review of the VCS PD and VCS MR
- Site visit and follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion.

2.2 Document Review

The validation is performed primarily as a document review of the VCS PD, MR, previous verification reports and associated documents as stated in details in appendix 1 of this document. The assessment is performed by a verification team using a protocol. The cross checks between information provided in the Monitoring report, VCS PD and information from sources other than those used, if available, the team's sectoral or local expertise and, if necessary, independent background investigations.

2.3 Interviews

The site visit for the project location, by the assessment team, was conducted on 05/02/2016 and the following persons were interviewed.

S.No	Name	Organisation
1.	Vikas Gupta	Jaiprakash Power Ventures Limited
2.	Ravi Kumar Gupta	Jaiprakash Power Ventures Limited
3.	Durvesh Kumar	Jaiprakash Power Ventures Limited
4.	Amit Gupta	EVI Private Limited

Mr. Amit Gupta was interviewed telephonically. 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 team on 05/02/2016 to carry out the following;

a. An assessment of the implementation and operation of the registered project activity as per the registered VCS PD and VCS MR;
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, inventories, purchase records 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 non-conformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

- 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;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- 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 CDM 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

The project activity is undergoing third VCS verification; there were no FARs raised during the previous verifications/3, 6, 7/

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 listed under any other GHG programme other than VCS.

3.2 Methodology Deviations

There has been no deviation from the applied methodology for the project activity

3.3 Project Description Deviations

There had been no deviation in the project description for the project activity.

There has a change in the metering points from the registered monitoring plan. The meter location change had taken place on 12/05/2011 and the same has been validated in past and applied during the previous verifications.

3.4 Grouped Project

The project activity is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The existence of any material discrepancies between project implementation and the project description.

The project activity is a 300 MW run-of the river hydroelectricity project located in Kinnaur district in Himachal Pradesh/20/. It avoids the carbon emission which would have been caused by using fossil fuel for power generation which now comes from this hydro power plant.

The project activity installation has been verified implementation was found inline to the description provided in the MR and PD. The project activity consists 3 Pelton turbines of 100 MW each. The diversion barrage is located at river Baspa from where the diverted water is utilised for power generation. The project description was also confirmed during the onsite observation. The generated electricity is being supplied to NEWNE grid as verified through Power Purchase Agreement (PPA) /15/. The plant got commissioned on 08/06/2003 as verified though commissioning certificate/20/.

The project description was found to be inline to the description as given in registered VCS PD/2/ as verified through commissioning certificate/20/ and onsite visit.

The implementation status of the monitoring plan and the completeness of monitoring, including the suitability of the implemented monitoring system

The monitoring plan has been designed and implemented as per the applied methodology/8/. The monitoring at the project site is based on the requirements set by the applied monitoring methodology. The emission reduction from the project activity are based on the net electricity exported to the grid. The net electricity supplied to the grid has been quantified by subtracting the imported electricity from the total exported electricity and the auxiliary consumption on-site. The emission from the leakage of SF_6 have also been considered under project emissions. The monitoring equipment used are owned by the state utility with a calibration interval of 1 year.

The values of net electricity generation, as reported in MR, have been verified from the log books and Joint meter reading reports through invoices issued by state electricity authority.

The existence of any material discrepancies between the actual monitoring system, and the monitoring plan set out in the project description and the applied methodology.

PP has applied Approved Consolidated Baseline and Monitoring Methodology ACM0002 Version 8.0/8/. The monitoring system and monitoring plan has been found to be in compliance with the registered monitoring plan/2/ and applied methodology/8/ as verified through onsite visit, interview with personnel and review of evidences as listed in other sections of report.

Whether the GHG emission reductions or removals generated by the project have become included in an emissions trading program or any other mechanism that includes GHG allowance trading.

The project is nor a part of any emission trading programs or other binding limits and neither using any other form of environmental credits. The PP is claiming credits only under VCS program for the entire crediting period (01/04/2006 to 31/03/2016).

Therefore, assessment team can conclude that the project has been implemented as described in the project description as provided in registered VCS PD/2/.

There was no major breakdown or shut downs reported during the monitoring period which might affect the applicability of methodology or might cause material errors in emission reductions.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

The project monitoring has been carried in accordance with the registered VCS PD/2/ and the monitoring report/4/. The monitoring plan laid in the registered PD is being followed at the site as verified through onsite visit, interviews and document review. 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/4/.

The emission reductions are purely based on the net electricity exported from the plant. PP has provided all the sufficient data for current monitoring period. The values used in deriving the GHG emission reduction could be very well correlated between the data sets/17,18/ and ER spreadsheet/5/ 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 8.0 /8/. Since project activity is a run of the river hydro power project, leakage emission has been considered as zero. However, project emission have been considered as necessary as per the applied methodology/8/.

Assessment team can conclude that GHG emission reductions and removals have been quantified correctly in accordance with the project description/2/ and applied methodology/8/.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

The below tables describe how each parameter, which is to be measured according to the monitoring plan, has been verified to confirm that the actual monitoring complies with the monitoring plan, monitoring data has been thoroughly assessed and that the calibration requirements are met.

a) Net Electricity supplied to the grid by the project activity during the year y; EG_y; MWh

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The parameter is calculated, however, the two input parameters (export and import) used to calculate the value of this parameter are continously measured, recorded daily and monthly reported, through the energy meters installed onsite.
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 registered VCS PD/2/.
Monitoring equipment	There is 1 main Energy meter and one check meter on each Line; there are 2 Lines at the project premise. All the meters are of Secure meter Ltd. make with 0.2s accuracy. The serials numbers of the meters are as follows: Line 1 (Old Main meter): HPU02547 Line 1 (Old Check Meter): HPU02548

	Line 2 (Old Main Meter): HPU02549 Line 2 (Old Check Meter): HPU02550 All the meters were changed on 07 January 2015. Line -1 (New Main meter): UPU 01237 Line -1 (New Check meter): UPU 01235 Line -2 (New Main meter): UPU 01238 Line -2 (New Check meter): UPU 01236 The technical details of the meters specified in the MR was found consistent with the actual records/16/ and installation on site.
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 is verified as 0.2s, which is as per the registered VCS PD/2/. It was also found to be consistent with onsite observation and calibration certificates/16/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.
Calibration frequency /interval:	Once every year.
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?	Yes. The calibration frequency is in line with the registered VCS PD/2/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is conducted by the state utility as the meter is under the agency's control/16/. PP has no control over calibration of meters.
Is(are) calibration(s) valid for the whole reporting period?	Yes
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the measuring range is comparable with the range for which measurement have been carried out.
How were the values in the monitoring report verified?	The monthly reported net electricity exported data was verified from the joint meter reading reports

	issued by state utility/17/. All the monthly reported values were checked and found consistent.
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 PD/1,2/, with the internal log books /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 data management system is effective 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.

b) Quantity of SF_6 loss during the year y; Q_{SF6}; tonne

Criteria/Requirements	**Assessment/Observation**
Measuring /Reading /Recording frequency	The parameter is monitored on a quarterly basis.
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 registered VCS PD/2/.
Monitoring equipment	The SF_6 cylinders at project site are weighed using an electronic balance. The details are as follows: Model No. CSP 2000k Sl. No. 8111312 Capacity : 2,000 kg Least count: 200gm Class: III The technical details of the equipment were found consistent with the actual records/16/ and installation on site.
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	The monitoring equipment has not been replaced. It was also found to be consistent with onsite observation and calibration certificates/16/.

local/national standards, or as per the manufacturer's specification?	
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.
Calibration frequency /interval:	Once every year.
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?	Yes. The calibration frequency is in line with the registered VCS PD/2/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is conducted by an external agency.
Is(are) calibration(s) valid for the whole reporting period?	Yes
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the measuring range is comparable with the range for which measurement have been carried out.
How were the values in the monitoring report verified?	There no SF_6 loss in the concerned monitoring period which was verified from the plant documents.
If applicable, has the reported data been cross-checked with other available data?	The previous verificaion reports were reviewed.
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 effective 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.

c) SF_6 gas pressure in the BAY VT; $P_{BAY\ VT}$; bar

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The parameter is measured daily and consoliidated on monthly basis.
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 registered VCS PD/2/.
Monitoring equipment	The pressure of the bay is checked with the help of the digital pressure indicator. The details of the equipment are: DPI-705 Least count 0.001 bar Make: Druck Limited Sr. No. 70553534/10-07 Range: 0-20 bars
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 is as per the registered VCS PD/2/. It was also found to be consistent with onsite observation and calibration certificates/16/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.
Calibration frequency /interval:	Once every year.
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	Yes. The calibration frequency is in line with the registered VCS PD/2/.

the local/national standards, or as per the manufacturer's specifications?	
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is conducted by external agency.
Is(are) calibration(s) valid for the whole reporting period?	Yes
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the measuring range is comparable with the range for which measurement have been carried out.
How were the values in the monitoring report verified?	The reported values were verified from the SCADA system used for online monitoring during the site visit.
If applicable, has the reported data been cross-checked with other available data?	The monthly reported data was cross-checked, during the onsite visit.
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 effective 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.

d) SF_6 gas pressure in the Breaker; $P_{breaker}$; Bar

Criteria/Requirements	**Assessment/Observation**
Measuring /Reading /Recording frequency	The parameter is measured on annual basis.
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 registered VCS PD/2/.
Monitoring equipment	The pressure of the bay is checked with the help of the digital pressure indicator. The details of the equipment are:

	DPI-705 Least count 0.001 bar Make: Druck Limited Sr. No. 70553534/10-07 Range: 0-20 bars
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 is as per the registered VCS PD/2/. It was also found to be consistent with onsite observation and calibration certificates/16/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.
Calibration frequency /interval:	Once every year.
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?	Yes. The calibration frequency is in line with the registered VCS PD/2/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is conducted by external agency.
Is(are) calibration(s) valid for the whole reporting period?	Yes
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the measuring range is comparable with the range for which measurement have been carried out.
How were the values in the monitoring report verified?	The reported values were verified from the SCADA system used for online monitoring during the site visit.
If applicable, has the reported data been cross-checked with other available data?	The monthly reported data was cross-checked, during the onsite visit.

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 effective 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.

e) SF_6 gas pressure in the Feeder; $P_{Feederr}$; Bar

Criteria/Requirements	**Assessment/Observation**
Measuring /Reading /Recording frequency	The parameter is measured on annual basis.
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 registered VCS PD/2/.
Monitoring equipment	The pressure of the bay is checked with the help of the digital pressure indicator. The details of the equipment are: DPI-705 Least count 0.001 bar Make: Druck Limited Sr. No. 70553534/10-07 Range: 0-20 bars
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 is as per the registered VCS PD/2/. It was also found to be consistent with onsite observation and calibration certificates/16/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.

Calibration frequency /interval:	Once every year.
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?	Yes. The calibration frequency is in line with the registered VCS PD/2/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is conducted by external agency.
Is(are) calibration(s) valid for the whole reporting period?	Yes
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the measuring range is comparable with the range for which measurement have been carried out.
How were the values in the monitoring report verified?	The reported values were verified from the SCADA system used for online monitoring during the site visit.
If applicable, has the reported data been cross-checked with other available data?	The monthly reported data was cross-checked, during the onsite visit.
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 effective 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.

f) Quantity of diesel consumed during the year y; $Q_{diesel\ r}$; Litre

Criteria/Requirements	**Assessment/Observation**
Measuring /Reading /Recording frequency	The parameter is monitored daily and recorded monthly.

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 registered VCS PD/2/.
Monitoring equipment	The diesel consumption is measured with the help of the level gauge provided on the fuel injection tank of each DG set.
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?	Diesel consumption and running hours of the DG are recorded daily in the log books which were verified during the onsite visit.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.
Calibration frequency /interval:	Not applicable.
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.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable.
Is(are) calibration(s) valid for the whole reporting period?	Yes
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 monthly reported values were verified from the log books maintained onsite.
If applicable, has the reported data been cross-checked with other	The monthly reported data was cross-checked, from the diesel purchace records.

available data?	
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 effective 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.

g) Electricity consumed during the year y; $E_{22\,kV\,r}$; kWh

Criteria/Requirements	**Assessment/Observation**
Measuring /Reading /Recording frequency	The parameter is monitored on monthly basis.
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 registered VCS PD/2/.
Monitoring equipment	There is an energy meter at the project premise. The details of the meter are as follows: Type of meter: Energy Meter Serial No.HPS00409 513029 Type: C3v055 (Static Meter) Accuracy class:0.5 S The technical details of the meters specified in the MR was found consistent with the actual records/16/ and installation on site.
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 is verified as 0.5s, which is as per the registered VCS PD/2/. It was also found to be consistent with onsite observation and calibration certificates/16/.

Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy is valid for the entire range.
Calibration frequency /interval:	Once every year.
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?	Yes. The calibration frequency is in line with the registered VCS PD/2/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration is conducted by the state utility as the meter is under the agency's control/16/. PP has no control over calibration of meters.
Is(are) calibration(s) valid for the whole reporting period?	Yes
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the measuring range is comparable with the range for which measurement have been carried out.
How were the values in the monitoring report verified?	The monthly reported electricity importeddata was verified from the bills issued by state utility/17/. All the monthly reported values were checked and found consistent.
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 PD/1,2/, with the internal log books /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 data management system is effective 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.

Parameters fixed ex ante:

a) **EF_{grid} ;** tCO_2e/MWh: it is the Operating margin emission factor of NEWNE Grid fixed at the time of project registration. The mentioned value of 0.805 tCO_2e/MWh is consistent with the registered VCS PD/2/.

b) ℓ_{diesel}**;** Kg/liter: it is density of diesel obtained from publically available source fixed at the time of project registration. The mentioned value of 0.860 Kg/liter is consistent with the registered VCS PD/2/.

c) EF_{diesel}**;** tCO_2e/tonne: it is the emission factor of diesel sourced from default values provided by IPCC fixed at the time of project registration. The mentioned value of 3.186 tCO_2e/tonne is consistent with the registered VCS PD/2/.

d) GWP_{SF6}: it is the global warming potential of SF_6 sourced from default values provided by IPCC. The value has been used from the IPCC Fourth Assessment Report in accordance to the CDM Project Standard and CDM VVS version 9.

Calibration

During the site visit, the verification team visited the entire facility especially the locations where the monitoring equipment are installed.
The details of the energy meters monitoring energy export have been provided below:

Meter Type	**Meter Sr. no.**	**Accuracy Class**	**Calibration Date**	
			Last Calibration	**Validity**
Line -1 Main Meter	HPU 02547	0.2s	11/01/2014	10/01/2015
Line -1 Check Meter	HPU 02548	0.2s	11/01/2014	10/01/2015
Line -2 Main Meter	HPU 02549	0.2s	11/01/2014	10/01/2015
Line -2 Check Meter	HPU 02550	0.2s	11/01/2014	10/01/2015
New meters installed on 07/01/2015				
Line -1 Main Meter	UPU 01237	0.2s	06/01/2015	05/01/2016
Line -1 Check Meter	UPU 01235	0.2s	06/01/2015	05/01/2016
Line -2 Main Meter	UPU 01238	0.2s	06/01/2015	05/01/2016
Line -2 Check Meter	UPU 01236	0.2s	06/01/2015	05/01/2016

No calibration delay was observed.

GHG Calculations

The emission reduction as per the applied methodology/8/ the emission reduction are a resulatant of the baseline emission minus the project emissions. The calculation are as follows:

Baseline Emissions

These are based on the net electricity exported to grid multiplied with the grid emission factor.
$BE_y = EF_y$ X EG_y
Where,
BE_y **=** Baseline emissions due to displacement of electricity during year y in tons of CO_2
EG_y **=** Electricity supplied to the grid by the project activity during the year y in MWh (1,781,710 MWh). A 0.65% transmission losses (11,581.12 MWh) is deducted from the power exported to the grid as per the PPA. Therefore the net saleable electricity is 1,770,128.89 MWh
EF_y: **=** CO_2 baseline emission factor fixed ex ante (0.805 tonne CO_2/MWh)

The calculation of the baseline emissions is as follows:

BE_y **=** EF_y X EG_y

= 1,770,128.89 MW h X 0.805 tCO_2/ MWh

= **1,051,094** tCO_2

Project Emissions

a) Emissions from diesel consumption

The emissions from diesel consumption as per the registered VCS PD are as follows:

$$PE_{y1} = Q_{diesel} \times \ell_{diesel} \times EF_{diesel} / 1000$$

Where,
Q_{diesel} = Quantity of diesel consumed, litre (15,053 liters)
ℓ_{diesel} = Density of diesel, 0.860 kg/ litre
EF_{diesel} = Emission factor of diesel, 3.186 tCO_2e/ tonne (IPCC Default value)

Therefore, the project emission from diesel consumtion have been verified as 41.24 tCO_2.

b) Emission from 22 KV Transmission line

The emissions from electricity consumption as per the registered VCS PD are as follows

$$PE_{y2} = E_{22\,kV} * EF_{grid} / 1000$$

Where,
$E_{22\,kV}$ = Electricity consumed at the site in kWh (3,382,000)
EF_{grid} = Grid Emission Factor for NEWNE Grid, 0.805 tCO_2/Mwh

Therefore, the project emission from electricity consumtion have been verified as 2,722.51 tCO_2

c) Emissions from SF_6

The project uses SF_6 which being a greenhouse gas might contradict the emission reductions from the project activity. Therefore, PP monitors the SF_6 leakage to avoid such instances. In the current monitoring period no leakage was observed hence the emissions from the same have been evaluated zero.

The leakage emission from the project activity have been considered zero in accordance with The the applied methodology and registerd VCS PD.

Net emission reduction

The net emission reductions are calculated based on the following equation.

$$\mathbf{ER_y = BE_y - PE_{y1} - PE_{y2} - PE_{y3} - L_y}$$

Emission Reductions = 1,424,953.75 – 41.24 – 2,722.51 – 0 – 0

= 1,422,190 tCO_2e

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 VERIFICATION CONCLUSION

Earthood Services Private Limited (Earthood), contracted by Jaiprakash Power Ventures Limited., has performed the independent verification of the emission reductions for the VCS project activity VCS Ref number 092 "300MW Hydropower project by JHPL" India for the monitoring period 01/07/2014 – 31/08/2015 as reported in the Monitoring Report Version 1.1 dated 11/02/2016. Jaiprakash Power Ventures 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 ACM0002 version 8.0, the monitoring plan contained in the VCS guidelines version 3.5, Monitoring Report Version 1.1 dated 11/02/2016 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 01/07/2014 – 31/08/2015 are fairly stated in the Monitoring Report Version 1.1 dated 11/02/2016. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002, Version 8.0, and the VCS standard.

Verification period: From 01/07/2014 – 31/08/2015 (including both days)

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)
Year 2014	633,887.72	1,390.89	0.00	632,496.83
Year 2015	791,066.03	1,372.86	0.00	789,693.17
Total	**1,424,953.75**	**2,763.75**	**0.00**	**1,422,190**

Approved by

Abhishek Mahawar
Quality Manager
Earthood Services Privated Limited

Date: 04/03/2016
Place: Gurgaon, Haryana

APPENDIX 1: REFERENCES

S.No	Title of Document	Version	Date
1.	Detailed Project Report		
2.	Registered VCS PD	02	25/12/2008
3.	VCS Validation Report	1	26/12/2008
4.	VCS Monitoring Report (Initial) VCS Monitoring Report (Final)	1 1.1	25/01/2016 11/02/2016
5.	ER spreadsheet (Initial) ER spreadsheet (corresponding to the final monitoring report)	1 1.1	25/01/2016 11/02/2016
6.	Previous Monitoring reports		
7.	VCS Verification Report for earlier monitoring periods		
8.	"Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002, EB 67	8	
9.	VCS Standard	3.5	25/03/2015
10.	On-site assessment	-	05/02/2016
11.	Diesel consumption log books		
12.	VCS webpage for the project, VCS ID 92; http://www.vcsprojectdatabase.org/#/project_details/92	-	Last accessed on 24/02/2016
13.	Double counting undertaking by PP		
14.	Tool to calculate the emission factor for an electricity system	5	27/11/2015
15.	Power Purchase Agreement	-	09/12/2010
16	Calibration Certificates		
17.	17.1 Monthly statement of energy injection to the 17.2 Daily log books		
18.	Invoices issued by PP to the grid	-	-
19.	Technical specifications document	-	-
20.	Commissioning certificate	-	
21.	CDM Validation and Verification Standard	9	20/02/2015

APPENDIX 2: FINDINGS

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

FAR ID		**Section no.**		**Date :** DD/MM/YYYY
Description of FAR				
Not applicable				
Project participant response				**Date :** DD/MM/YYYY
Not applicable				
Documentation provided by project participant				
Not applicable				
DOE assessment				**Date:** DD/MM/YYYY
Not applicable				

Table 2. CL from this verification

CL ID		**Section no.**		**Date :** DD/MM/YYYY
Description of CL				
None				
Project participant response				**Date :** DD/MM/YYYY
None				
Documentation provided by project participant				
None				
DOE assessment				**Date:** DD/MM/YYYY
None				

Table 3. CAR from this verification

CAR ID	01	**Section no.**		**Date :** 08/02/2016
Description of CAR				
The meters reported in the monitoring report were not found installed at the site. The meters reported could not be verified.				
Project participant response				**Date :** 15/02/2016
The energy meters were changed on 05/01/2016. This date is beyond the current monitoring period. This is the reason the meters reported in monitoring report were not matched with actual meters at site. The changed meter details are provided to DOE for verification.				
Documentation provided by project participant				
The Latest change meter report issued by HPSEB.				
DOE assessment				**Date:** 22/02/2016
The clarification provided was supported with evidences and similar clarification was provided by the site personnel. Therefore it was accepted,				

CAR ID	02	**Section no.**		**Date :** 08/02/2016
Description of CAR				
The global warming potential of SF6 used in the MR is not in accordance with paragraph 57 of project standard.				
Project participant response				**Date :** 15/02/2016
The GWP is revised and now consistent with paragraph 57 of project standard.				
Documentation provided by project participant				
Revised MR and ER sheets.				
DOE assessment				**Date:** 22/02/2016
The revised documentation includes the GWP from the fourth assessment report. Therefore the issue is closed.				

CAR ID	03	**Section no.**		**Date :** 08/02/2016
Description of CAR				
The emission factor for diesel reported in the monitoring report was found inconsistent within the documents and with the registered documents.				
Project participant response				**Date :** 15/02/2016
This was a typo error and value of emission factor corrected in section 3.1 of revised monitoring report.				
Documentation provided by project participant				
Revised monitoring report version 1.1 dated 11/02/2016				
DOE assessment				**Date:** 22/02/2016
The revised documentation includes consistent value. Therefore accepted.				

Table 4. FAR from this verification

FAR ID		**Section No.**		**Date :** DD/MM/YYYY
Description of FAR				
None				
Project participant response				**Date :** DD/MM/YYYY
None				
Documentation provided by project participant				
None				
DOE assessment				**Date:** DD/MM/YYYY
None				

APPENDIX 3: COMPETENCY STATEMENT

Competence Statement			
Name	Shreya Garg		
Country	India		
Education	M.Sc. (Climate Science & Policy), TERI University		
Experience	4 Years		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
Reviewed by	Abhishek Mahawar	**Date**	29/12/2014
Approved by	Ashok Gautam	**Date**	29/12/2014