3 MW HYDRO POWER PROJECT BY DARJEELING POWER PVT. LTD.

Document Prepared By (SUKANTA DAS- LEAD AUDITOR/TECHNICAL EXPERT)

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Summary:

Validation purpose: The project activity is a new 3 MW Shaung hydro power plant in the Kinnour district, Himachal Pradesh, India with 25% continuous over load installed capacity. It is a run-of-the-river power project.

Shaung Mini Hydropower project was allotted to Darjeeling Power Pvt. Ltd. For harnessing the power potential of Shaung stream. The Shaung Mini Hydropower is a run of river power project of 3 MW power generation on Shaung stream. Shaung stram is a tributary of river Bapsa. Power house is located near village Shaung. Diversion cum trench weir is proposed to withdraw the requisite design discharge +50% addition for de- silting.

The power produced displaces an equivalent amount of power from the grid, which is fed mainly by fossil fuel fired power plants. Hence, it results in reduction of GHG emissions. GHG emission reductions from the project activity will be 16,404 tonnes of CO_{2e} per year and total GHG emission reductions for the chosen 10 year crediting period will be 164,040 tonnes of CO_{2e}.

A risk based approach has been followed to perform this validation activity. In the course of Joint Validation and Verification, for validation scope, 09 Corrective Action requests (CARs) and 00 Clarification Requests (CLs), 00 Forward action request were raised and successfully closed. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and PROJECT OWNERS have provided Applus+ Certification with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

Verification purpose:

The project activity is a new 3 MW Shaung hydro power plant in the Kinnour district, Himachal Pradesh, India with 25% continuous over load installed capacity. It is a run-of-the-river power project.
Being a renewable resource, using Hydro power energy to generate electricity contributes to resource conservation. Darjeeling Power Pvt. Ltd has developed this project keeping in consideration of the

funding available under the VCS mechanism. The project activity is also responsible for sustainable economic growth and conservation of environment through use of Hydro power energy as a renewable source of energy.

Project Type	Project Capacity (in MW)	Owner of Project	Project Location	State
Hydro	3 MW	Darjeeling Power Pvt. Ltd.	Kinnaur	Himachal Pradesh

The Project activity is a new facility (Greenfield) and the purpose of the project activity is to generate electricity by the utilization of hydro power, and selling the generated electrical energy from the project to the respective state utilities under the Indian Grid.

The total capacity of the project activity is 3 MW and the project is commissioned on 15/04/2016[1]. During the current monitoring period the net electricity generated is 25,777 MWh and resulting reduction of 24,386 tonnes of CO_{2e}.

A risk based approach has been followed to perform this verification activity. In the course of verification, 02 Corrective Action requests (CARs) and 00 Clarification Requests (CLs) were raised and successfully closed. The review of the Monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and PROJECT OWNERS have provided Applus+Certification with sufficient evidence to verify the fulfillment of the stated criteria of VCS

[1] Commissioning Certificate is checked by the assessment team and found correct

Table of Contents

CONTENTS

1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. (Applus+ Certification) (hereafter referred as Applus+ Certification in the whole report) has been appointed by "Darjeeling Power Pvt. Ltd." to perform the Joint validation and verification of the "3 MW Hydro Power Project by Darjeeling Power Pvt. Ltd." under VCS standard and guideline. The objective of this joint validation and verification activity is to have an independent third party for the assessment of the VCS PD, emission reduction sheet and Monitoring report, and to ensure a thorough assessment of the proposed project activity against the CDM and VCS requirements. In particular;

- The project's baseline is assessed against "AMS-I.D: Grid connected renewable electricity generation (Version 18, EB 81, Annex 24[2]).
- The project's monitoring plan is assessed against "AMS-I.D: Grid connected renewable electricity generation (Version 18, EB 81, Annex 24).
- The project is in compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7 for the project activity.
- CDM Validation and Verification Standard version 01 for the project activity.
- CDM Project Standard version 01 for the project activity.
- CDM Project Cycle Procedure version 01 for the project activity.
- VCS standard v3.7 and program guideline v3.7.

Joint Validation and verification is a requirement for all VCS Joint PD & Monitoring Report and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

1.2 Scope and Criteria

The scope of the Joint validation and verification is the independent and objective review of the Project Document as per the requirement of VCS for the project activity and Monitoring report (MR). The PD and MR are reviewed against the relevant criteria (see 1.1) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The validation and verification was based on the guidance given in the CDM Validation and Verification Standard version 01

[2] http://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

for the project activity, CDM Project Standard version 01 for the project activity, CDM Project Cycle Procedure version 01 for the project activity, VCS program guideline and standard version 3.7

The assessment team has employed a risk based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the PD and MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The validation and verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design and monitoring report combined.

The only purpose of the validation and verification is its usage during the registration /issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the validation/verification opinion, which will go beyond that purpose.

1.3 Level of Assurance

The verification and validation has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS.

1.4 Summary Description of the Project

The project activity is a new 3 MW Shaung hydro power plant in the Kinnour district, Himachal Pradesh, India with 25% continuous over load installed capacity. It is a run-of-the-river power project which is utilizing water from the tail race of Sarbari I SHP.

Shaung Mini Hydropower project was allotted to Darjeeling Power Pvt. Ltd. for harnessing the power potential of Shaung stream. The Shaung Mini Hydropower is a run of river power project of 3 MW power generation on Shaung stream. Shaung stram is a tributary of river Bapsa. Power house is located near village Shaung. Diversion cum trench weir is proposed to withdraw the requisite design discharge +50% addition for de- silting.

Being a renewable resource, using Hydro power energy to generate electricity contributes to resource conservation. Darjeeling Power Pvt. Ltd has developed this project keeping in consideration of the funding available under the VCS mechanism. The project activity is also responsible for sustainable economic growth and conservation of environment through use of Hydro power energy as a renewable source of energy.

Project Type	Project Capacity (in MW)	Owner of Project	Project Location	State
Hydro	3 MW	Darjeeling Power Pvt. Ltd.	Kinnaur	Himachal Pradesh

The power produced displaces an equivalent amount of power from the grid, which is fed mainly by fossil fuel fired power plants. Hence, it results in reduction of GHG emissions. GHG emission reductions from

the project activity will be 16,404 tonnes of CO_2e per year and total GHG emission reductions for the chosen 10 year crediting period will be 164,040 tonnes of CO_{2e}.

The Project activity is a new facility (Greenfield) and the purpose of the project activity is to generate electricity by the utilization of hydro power and selling the generated electrical energy from the project to the respective state utilities under the Indian Grid.

During the current monitoring period the net electricity generated is 25,777 MWh and resulting reduction of 24,386 tonnes of CO_{2e}.

The diesel consumption as a part of project emission is applicable to the project. The details are described in section 3.3.6 below in the report.

In the Pre- project scenario the equivalent amount of electricity delivered to the grid by the project activity, would have otherwise been generated by the operation of grid-connected fossil fuel based power plants and by the addition of new generation sources.

The major milestones achieved for the implementation of the project activity of 3 MW Hydro Power project by Darjeeling Power Pvt. Ltd. as checked by the assessment team during the onsite visit are as follows:

SL No.	**Description**	**Date[3]**
1.	Completion of Detailed Project Report	02/02/2009
2.	Board Decision for implementation of the project activity	04/02/2009
3.	No Objection Certificate from Gram Panchayat for the implementation of the project activity- Statutory requirement as per host country regulation for Hydro project	14/10/2009
4.	No Objection Certificate from State Govt. for the implementation of the project activity- Statutory requirement as per host country regulation for Hydro project	26/11/2009
5.	Land Diversion permission from Himachal Pradesh Forest Dept. for the implementation and operation of the project activity- Statutory requirement as per host	24/12/2009

[3] Assessment team checked all the relevant dates as mentioned in the milestone and confirms that the same are correct and appropriate.

	country regulation for Hydro project	
6.	Service Contract Agreement	09/03/2011
7.	Start of Civil Works	04/10/2011
8.	Sanction of Credit Facility from Bank of Maharashtra	27/03/2012
9.	Operation and Maintenance Contract signed	14/10/2014
10.	Power Purchase Agreement signed	20/05/2016
11.	Commercial Operation of Power Plant- Commissioning certificate	15/04/2016
12.	Provisional Consent order by HPSPCB (**Himachal Pradesh State Pollution Control Board**) for the operation of the project activity.	03/08/2016

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification Scope: The scope is defined as an independent and objective review of the Joint project design document and Monitoring report (MR). The Joint PD and MR is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board and VCS standard and guideline version 3.7, including the approved baseline and monitoring methodology AMS-I.D version 18 . The validation and verification was based on the requirements in the Validation and Verification Standard (VVS version 01 for the project activity), project standard version 01 for the project activity, project cycle procedure version 01 for the project activity and VCS program guideline and standard version 3.7 The validation and verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project document and the Monitoring period.

Validation and Verification Process: The project assessment is based on the "Clean Development Mechanism Validation and Verification Standard version 01.0 for the project activity and VCS standard and program guideline version 3.7 and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the VCS project activity are appointed.

Once the project is received by the assessment team, the members of the assessment team carried out:

I A desk review of the Joint project design documentation and monitoring report;

II Follow-up interviews with project stakeholders;

III The resolution of outstanding issues and the issuance of the final verification/ validation report and opinion.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. Applus+ Certification has developed a specific checklist customized for the project. The checklist demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

The detail of corrective action/clarification request/ forward action request is presented as Appendix 2 of this report.

Appointment of the assessment team

According to the sectoral scope / technical area and experience in the sectoral or national business environment, DOE has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of Applus+ Certifications.

The composition of audit team shall be approved by the Applus+ Certificationsensuring that the required skills are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as presented below:

●Lead Auditor (LA).

●Auditor (A) / Auditor in Training (AiT).

●Technical Expert (TE).

●Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be

covered by the assessment team.

Name	**Role**	**SS Coverage**	**TA Coverage**	**Financial aspect**	**Host country experience**
Mr. Sukanta Das	TL	YES	YES	YES	YES
Mr. Denny Xue	TR	YES	YES	YES	NA

The complete list of CVs is included as Appendix 3 of this report.

Document review

The Joint Project Document and Monitoring report submitted by the Client was reviewed against the approved methodology and other relevant criteria to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done. A complete list of all documents and evidence material reviewed is included in this report below in appendix 1.

Follow-up interviews

A site visit is conducted by Applus+ Certification performed interviews, telephone conferences, and physical site inspection with project stakeholders to confirm selected information and to resolve issues identified in the document review. The detail is provided in this report in the below sections.

Resolution of Clarification and Corrective Action Request

The objective of this phase of the joint validation and Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for Applus+ Certification positive conclusion on the Joint Project design and Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the validation/verification process, the concerns raised and responses given are summarized below in the appendix 2.

The Joint PD and MR Version 03 submitted by PP respectively serve as the basis for the final assessment presented. Additional changes to the project during the joint validation and verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Internal quality control

As final step of a joint validation and verification of the final documentation including the final Joint validation and verification report have to undergo an internal quality control by the technical review committee, i.e. each report has to be finally approved either by the head of the technical review committee or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one to avoid any conflict of Interest.

After confirmation of the PP the positive validation/verification opinion and relevant documents are submitted to the VCS secretariat through the VCS web-platform.

2.2 Document Review

The details of the document observed during the validation and verification process are listed below in appendix 1 of this report.

2.3 Interviews

The site visit for the project activity was carried out on 01/02/2018 in the State of Himachal Pradesh in the republic of India. No sampling procedures were adopted either in document verification and all the document were cross checked to ensure conservative estimation of emission reduction. Kindly find below name of the person interviewed (during onsite and telephonic interview later) for all the sites.

Project Investors	**Project Owners representative**	**Villager-1-Stakeholder**	**Villager-2-Stakeholder**	**Date of audit**
Darjeeling Power Pvt. Ltd	Shyam Sundar - site in-charge	Ramparvesh Singh-shopkeeper	Vishnu Singh-villager	01/02/2018

2.4 Site Inspections

Duration of on-site inspection: 01/02/2018				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Assessment team checked the implementation of the project, Baseline emission, Emission reduction calculation, technical description of the project and Monitoring.	The project activity is located in Shaung, Kinnaur in the state of Himachal Pradesh, India	**01/02/2018**	Mr. Sukanta Das

2.5 Resolution of Findings

The objective of this phase of the joint validation and Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for Applus+ Certification positive conclusion on the project design and Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the validation process, the concerns raised and responses given are summarized below in the appendix 2.

The Joint final PD and MR Version 03 submitted by PROJECT OWNERS on respectively serves as the basis for the final assessment presented. Additional changes to the project during the validation and verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation and verification findings	No. of CL	No. of CAR	No. of FAR
Project design document and Monitoring report	00	01	00
Description of project activity	00	00	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
Applicability of methodology and standardized baseline	00	00	00
Deviation from methodology	00	00	00
Clarification on applicability of methodology, tool and/or standardized baseline	00	00	00
Demonstration of additionality	00	01	00
Emission reductions	00	01	00
Monitoring plan	00	01	00
Local stake holders	00	01	00
No net Harm	00	01	00
Public opinion	00	01	00
Environment impact	00	01	00
Others (please specify)-Matter related to double counting- **for validation**	00	01	00
Others (please specify)-Matter related to Feeder details+ Actual emission reduction calculation+ Calibration and Breakdown details- **for verification**	00	02	00
Total	00	Validation+ Verification: 11	00

The list of findings and their resolution is presented in appendix 2 of this report.

2.5.1 Forward Action Requests

No FAR was raised during this joint validation and verification process.

3 VALIDATION FINDINGS

3.1 Project Details

The proposed project activity involves the installation of Hydro Power Project. The total installed capacity of the project is 3 MW. The project is promoted by Darjeeling Power Ltd.

The Project activity is a new facility (Greenfield) and the electricity generated by the Project will be exported to the Indian Grid. The Project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The Project Proponent plans to avail the VCS benefits for the Project.

In the Pre-project scenario the equivalent amount of electricity, either fetched or delivered to the grid by the project activity, would have otherwise been generated by the operation of grid-connected fossil fuel based power plants and by the addition of new generation sources.

The project shall result in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 16,404 tCO_2e per year, thereon displacing 17,337 MWh/year amount of electricity from the grid.

Hydro Power Project Technology Details –

The technology employed[4], converts potential Water energy to electrical energy. In hydro power generation, energy of water is converted into mechanical energy and subsequently into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation. There is no transfer of technology involved in the project activity.

The project activity comprises of 3 MW Hydro Power project in the state of Himachal Pradesh. The generating unit consists of a horizontal shaft arrangement. Turbine unit discharges water into tailrace channel at the downstream end of the power house. The service bay is placed at the far end of the powerhouse where road access is contemplated.

The generation voltage is 6.6 kV. It is stepped up to 33 kV by a power transformer and is then transmitted through an overhead line to a 33 kV substation at Nathpa of Himachal Pradesh State Electricity Board. The metering is provided at the Nathpa sub-station which is the point where the power gets exported to the grid.

Technical details of the project activity are as follows:

SR. NO.	PARTICULARS	DETAILS
1.	Horizontal twin jet Pelton Wheel Turbine with all the accessories	1
2.	Electro hydraulic Micro Processor based Digital Governor with all accessories	1
3.	Inlet Ball Valve	1
4.	Penstock Butterfly Valve with accessories	1
5.	Oil Pressure Pumping System for Governor and MIV	1
6.	Neutral Grounding Panel	1

[4] Assessment team checked the detail technical specification (Generator+ Turbine) during the on site visit and also cross checked the same from the individual manufacturers technical booklet available to PP.

7.	Lightning Arrestor and Voltage Transformer cubicle	1
8.	11 KV Breaker Panel	1
9.	Auxiliary Transformer	1
10.	Estimated design Life time	30 years.

Technical Specifications of the Generator are as follows:

Number of Generators	1
Rated Output	3000 KW + 25% overload
Power Factor	0.85
Rated Voltage	3.3 KV +/- 10%
Frequency	50 Hz
Range of Frequency Variation	50 +/- 3%
Number of Phases	3, star connected
Inertia Constant	Not less than 1.0
Short Circuit Ratio	Not less than 1.0

Technical Specifications of the Turbine are as follows:

Number of Turbines	1
Type	Horizontal Shaft Pelton
Power Factor	3191 KW + 20% Overload
Rated Net Head	530.27 meter
Nominal Discharge	0.70 Cumecs
Maximum Pressure Rise	25%

Maximum Speed Rise	25%

Assessment team checked the geographical location of the power plant via Google map and confirm that Latitude and longitude as presented in the Joint PD and MR is correct and accurate. The project activity is located in the state of Himachal Pradesh, India. The details of Geo-coordinates are as below:

Project Investor	**Project Type**	**Capacity (MW)**	**Location**	**State**	**Latitude**	**Longitude**
Darjeeling Power Pvt. Ltd.	Hydro	3 MW	Shaung, Kinnaur	Himachal Pradesh	$31^0$26'40" N	$78^0$12'38" E

The project is a Small-scale project that involves setting up of 3 MW hydro power projects. As the Estimated GHG emission reductions or removals per year is 16,404 (tCO_2e) which is less than 300,000 tonnes of CO_2e per year, thus the project falls in the category of Project.

Project Scale	
Project	✓
Large project	

Assessment team checked that the first project activity instance of the project under consideration was commissioned and power generation started on 15/04/2016. Hence this date is considered as project start date as per the requirement of VCS standard version 3.7.

Assessment team checked the Project Start Date: 15/04/2016

The project start date is the date on which Hydro power plant was commissioned under the project activity.

Assessment team checked the project crediting period:

Crediting Period Start date: 15/04/2016

Crediting Period End date: 14/04/2026

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

In the Pre-project scenario the entire electricity, delivered to the grid by the project activity, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. The baseline as identified in section 2.4 of the Joint PD and MR would continue to be in pre-project scenario. Assessment team also confirms that the project is in compliance with applicable local law and guidance of the host country for the implementation of renewable technology. The Project has received necessary approvals for development and commissioning for each plants from the state Nodal agencies and is in compliance to the local laws and regulations. The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using hydro energy is not a legal requirement or a mandatory option.
- There are state and sectoral policies, framed primarily to encourage hydro power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

Moreover, Assessment team noted that as per Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India), final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (29/02/2016)

The newly introduced White category of industries pertains to those industrial sectors which are practically non-polluting such as Biscuit trays etc. from rolled PVC sheet (using automatic vacuum forming machines), Cotton and woollen hosiers making (Dry process only without any dying/washing operation), Electric lamp (bulb) and CFL manufacturing by assembling only, Scientific and mathematical instrument manufacturing, Solar power generation through photovoltaic cell, wind power and mini hydel power (less than 25 MW).

There shall be no necessity of obtaining the “Consent to Operate’’ for White category of industries. An intimation to concerned State Pollution Control Board shall suffice. As described earlier PP received provisional consent to operate from Himachal Pradesh state pollution control board on 03/08/2016.

Since project activity falls under white category and the non-polluting nature of project fulfils the compliance to the local laws and regulations.

Assessment team checked the details of the project proponent as per right of Use definition of VCS standard version 3.7 and found the details to be correct. The Project is owned by Individual investors hence it possess right of use of ER credits. The Ownership is demonstrated through the following documents.

1) Commissioning certificates for Hydro Project in the name of Darjeeling Power Ltd. issued by respective state nodal agencies /authorities of the Himachal Pradesh State of India.

2) Power Purchase Agreement with respective State Electricity Board of Himachal Pradesh for sale of electricity by the Darjeeling Power Ltd.

The details are as follows:

Organization name	Darjeeling Power Pvt. Ltd.
Contact person	Mr. Sunil Lavti
Title	Authorized Signatory
Address	Empire House, 3rd Floor, 219 Dr. D.N. Road, Fort, Mumbai- 400001, India.
Telephone	-
Email	accounts@somani.com , finance@somani.com

The details of the other entity are as follows:

Organization name	EKI Energy Services Limited
Role in the project	Project Advisory
Contact person	Bhaskar Dutta
Title	Manager- Operations
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore-452010, India
Telephone	+91-9109916710
Email	bhaskar@enkingint.org

The project activity qualifies as Type I during every year of the crediting period in accordance with applicable provisions for project activity eligibility as discussed above. Also the total installed capacity of

project activity is 3 MW which is applicable as per small scale project activities methodology AMS-I.D version 18. The project capacity will always remain under stipulated limit for small scale project throughout the crediting period and thereafter as confirmed during the onsite visit.

Verification of the project boundary:

Project boundary has been ascertained and confirmed during the site visit using AMS-I.D version 18– "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".

The project boundary includes the intake, tunnel, penstock, powerhouse, plant and the transmission system till the evacuation point (which is at the HPSEB electrical substation). The electrical energy exported to the grid is monitored at this point. The proposed project activity will evacuate power to the Indian grid. Therefore the entire Indian grid and all connected power plants have been considered in the project boundary for the proposed VCS project activity. The project boundary also includes a stand-by diesel generator (DG) set which will be operated only for standby power requirements (basic lighting for staff) in case the power plant is not operating and there is also no supply from the grid.

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity Owner or project activity Implementer does not have any control on it. Thus for project activity net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

It is to be noted that metering arrangement is under control of state electricity board and PP do not have any control on it.

The sources and GHG gases involved for proposed Project activity are as below

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	No CO_2 emissions are emitted from the project
Project	Greenfield Hydro Power Project Activity.	CO_2	Yes	CO_2 emissions due to fossil fuel in the project
		CH_4	No	Project activity does not emit CH_4
		N_2O	No	Project activity does not emit N_2O
		Other	No	Project activity does not emit other forms of GHG emissions

The project activity involved setting up of a hydro plant to harness the power of water to produce electricity and supply to grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the state grid (part of INDIAN grid), which is fed mainly by fossil fuel fired plants.

Hence, the baseline for the project activity is the equivalent amount of power from the INDIAN grid.

During conceptualization of the project activity, board of directors of the Individual project proponents considered the VCS revenue to improve the project financials. The board meeting dates for Project owners is provided below:

SL No.	Description	Date
1.	Board Decision for implementation of the project activity	04/02/2009

In continuation to the board decision, PROJECT OWNERS issued the respective purchase order for the supply of hydro turbine and generator.

Joint PD and MR mentioned that the project would not be economically or financially feasible without the revenue from the sale of Verified emission reductions (VERs). The claim of the project developer has been assessed by the Validation Team through the following steps

a) Suitability of investment analysis, financial indicator and benchmark:

Assessment team checked that in line with VCS Standard version 3.7, the additionality of the Project activity is ascertained in line with the applicable guidance from the UNFCCC. The demonstration of additionality for the proposed Project activity is being carried out in accordance with the additionality tool provided by the UNFCCC i.e. Demonstration of Additionality of Small-scale Project Activities (Ver. 10 EB 83 Annex 14), to establish the project additionality, it has to be shown that the project activity would not have occurred anyway due to at least one of the following barriers:

- **Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions;
- **Technological barrier:** a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
- **Barrier due to prevailing practice:** prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
- **Other barriers:** without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

The project investor has selected Investment barrier to demonstrate in a conservative and transparent manner that the proposed VCS project activity is financially unattractive. In line with the guidelines stipulated under Annex 34 of EB 35 ("Non-binding best practice examples to demonstrate additionality for SSC project activities"), a benchmark analysis is used in the project case under investment barrier.

",.

Investment analysis

Project developer had demonstrated that the financial returns of the proposed VCS project activity would be insufficient to justify the required capital investment as per VVS version 01.0 for the project activity. In the Initial PD version 01 PROJECT OWNERS has adopted a conservative approach to identify the benchmark for the project activity. The project is earning revenue from the installation of the project activity. Thus **simple cost analysis** is not appropriate. Also in the absence of the project activity grid electricity would have been the obvious choice for the Project which requires no investment. Hence **investment comparison analysis** is also not appropriate for the project activity. **Therefore, benchmark analysis (Option III) is used for the project activity as per project type and decision-making context**. Hence, the Expected return on equity is considered appropriate benchmark. Accordingly, the post-tax Equity IRR has been considered as the relevant financial indicator for the project activity. Moreover, the financial indicator selected by the PP is correct based on the fact that tool do not restrict the PP to either use project IRR or Equity IRR. This is under the prerogative of the PP to select appropriate indicator based on his preferences to know the IRR based on his equity investment or debt investment. The same is this acceptable to the assessment team. Assessment team however checked the Equity IRR calculation and thus found that input assumptions used for the calculation of Equity IRR is applicable at the time of investment decision of the project and thus is in accordance with the relevant guideline of the tool.

Choice of Benchmark:

As per Investment Analysis tool, Required/expected returns on equity are appropriate benchmarks for an equity IRR. The Equity IRR is considered as the financial indicator and the benchmarks used is cost of equity. Thus assessment team confirms that the benchmarks used are applicable to the project activity and the type of IRR calculation presented.

At the time of decision made of project activity, Annex 5 EB 92 was the latest available tool to PP, hence PP has considered the same tool for default value of return on equity. Appendix A in EB 92 Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 11.06%.

Assessment team observed that the Methodology deployed for arriving at a suitable value of Benchmark using Default Value has been described below:

- As the proposed project activity generates power utilizing hydro energy, Group 1 as per para 5 of Appendix of EB 92, Annex 5 has been identified as a suitable category.

- The investment analysis has been carried out in Nominal terms. The investment decision date of the project activity is on 04/02/2011. Accordingly, Default value as given in Para 6, Appendix of Annex 5, EB 92[5] has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India).

- Project investor has calculated Benchmark based on WPI mean inflation rate. As per Para 17 of EB 92, Annex 5, the inflation forecast should be for the duration of the crediting period. The project investor has calculated benchmark using 10 years forecast and the same is considered as Benchmark for the project activity.

Default Value Benchmark:

The benchmark has been computed in the following manner:

Nominal Benchmark[6] = {(1+Real Benchmark)*(1+Inflation rate)}-1

Where,

Real Benchmark = Default Value, i.e., 11.06% (as per Appendix of Annex 5, EB 92)

Inflation rate = Projected Inflation Rate for India

Benchmark estimation:

Appendix in EB 92, Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.06%**

Inflation Forecast for India as per RBI website[7]:

Since RBI publishes the inflation forecast for 5 years and 10 years, PP has considered the maximum 10 year inflation considering the renewable crediting period of total 30 years.

Project Investor	**Inflation Forecast**	**Benchmark**
	10 Years	**10 Years**
Darjeeling Power Pvt. Ltd.	5.40%	17.06%

Thus benchmark of **17.06%** has been selected for this project activity.

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v7.0.pdf

[6] As per Fisher Equation, https://en.wikipedia.org/wiki/Fisher_equation

[7] https://rbi.org.in/Scripts/PublicationsView.aspx?id=13050

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):

The Post tax Equity IRR is evaluated for the entire lifetime of the project activity, i.e. 30 years (= Operational lifetime of the project as per the manufacturer specification). It is calculated based on the cash outflows from and cash inflows into the project activity.

The IRR and Benchmark analysis are calculated in excel spreadsheet which is being checked and found correct by the assessment team.

Based on result of IRR excel spreadsheets, equity IRR is less than Benchmark.

This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark). Thus it can be easily concluded that project activity is additional & is not business as usual scenario.

b) Parameters and assumptions used:

The project activity is a renewable source of electricity generation and supplies the electricity to the INDIAN Electricity grid. The key parameters which determine the Equity IRR of the project activity are project cost, PLF and profitability estimates.

In the revised Joint PD and MR Version 02, the project cost is based on the **detailed project report dated 02/02/2009**. The DPR for project owners is checked by the assessment team and found that the value as mentioned in IRR sheet is correct and appropriate for the region.

As DPR were available to the individual project owner at the time of investment decision hence the same is deemed appropriate for IRR calculation. The details of project cost as per DPR are as follows:

Site Name	Name of the Investor/Owner	Project Capacity (MW)	Project Cost (In Million)	DPR Date
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	279.40	02/02/2009

Validation team checked the DPR of the project activity and found that consideration of the project cost in revised Joint PD and MR Version 02 is correct and it is in line with appendix of Annex 5 EB 92 as well as in compliance to VVS version 01.0 for the project activity. Hence, the project cost consideration is justified.

Moreover, the **actual cost of the project activity** is provided below and considering the same the project still do not breach the benchmark as detailed out in sensitivity analysis. If the actual cost is considered IRR still reduce and hence the same is considered conservative.

Site Name	Name of the Investor/Owner	Project Capacity (MW)	Project Cost (In Million)	PO Date
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	248.4	09/03/2011

Assessment of Plant Load Factor (PLF):

PROJECT OWNERS considered the Plant load factor from a Third party Engineering Company (=DPR) to adhere as per Annex 11 EB 48 requirement, for expected electricity generation estimation. The third party engineering company is contracted by the PROJECT OWNERSs for this project activity as confirmed by the assessment team. PROJECT OWNERS has submitted the copies of the PLFs estimation report to the assessment team.

Validation team assessed the PLF assessment report and found that the PLF estimation by 3rd party engineering company is in line with Para 3 (b) Annex 11, EB 48 and acceptable to the assessment team. For the IRR evaluation PLF available at decision making is considered. For Emission reduction calculation PLF available at the decision making in considered. Assessment team confirms that all the project owners adhere to the guideline of Annex 11 EB 48.

The detail of PLF is as below:

Site Name	Name of the Investor/Owner	Project Capacity (MW)	PLF (%)= 3rd party engineering company	Date
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	**71.71%** (for 1st 12 years) **63.11%** (for last 18 years)	02/02/2009

Assessment of Electricity Tariff:

The tariff is considered from State electricity board tariff order available to them at the time of decision making.

Validation team assessed the tariff and found that same value was available during decision making and in conformity with guidance appendix of Annex 5 EB92. Furthermore, assessment team has also checked the actual tariff in the power purchase agreement and State Electricity regulatory commission signed for further substantiation as these values are available during the validation stage. The IRR still do not cross the benchmark. The tariff details for individual project owners are given below:

Site Name	Name of the Investor/Owner	Tariff Rate (as per SERC)[8]	Tariff Rate (as per actual PPA)	PPA Date
Himachal Pradesh	Darjeeling Power Private Limited	3.00	3.00	20/05/2016

Assessment of O& M cost:

[8] http://hperc.org/File/appenB6-7.pdf- Available at the time of decision making.

PROJECT OWNERS considered the Operation and Maintenance (=O&M) cost from the DPR for project owner. The DPR has been used in the financial calculation as same was available during decision making and hence applicable. According to appendix of EB 92 Annex 5, the cost should be based on the input parameters available at the time of decision making and the project owners has submitted DPR supporting this consideration. Therefore, considering the above assessment, validation team concluded that the O&M cost considered from respective DPR in the computation of financial indicator is in conformity with guidance Appendix of EB92 Annex 5. The detail of the O&M cost for individual project owners is given below:

Site Name	Name of the Investor/Owner	Project Capacity (MW)	O&M (In Million) (Without tax)	Date
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	8.38	02/02/2009

The actual O&M agreements were also signed for individual PP and the values are mentioned in the below table. The IRR is still below the benchmark

Site Name	Name of the Investor/Owner	Project Capacity (MW)	O&M (In Million) (Without tax)	Date
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	7.8	14/10/2014

Assessment of Tax computation:

The project developer has adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit and Income Tax Act 1961 stipulated for income tax calculation, which are in conformity with the accepted accounting principles adopted by the company and income tax laws in the host country. The block of assets has been computed for depreciation purpose as per the accepted accounting principles. Tax liability has been calculated as per the income tax rules and the rulings given. In computing the income tax liability, the project developers have considered Tax holiday (u/s 80IA of the Income Tax Act, 1961). Accelerated depreciation on plant and machinery is also sourced from IT act. The tax rates assumed corresponds to the tax rate prevailing at the time of taking decision (conformity to Appendix of EB85 Annex 12). Hence, these assumptions are appropriate during decision making context.

Cross checking parameters:

The cost of hydro turbines, electricity tariff, depreciation, and salvage value and tax rate have been checked with DPRs, tariff order, Income Tax Act, power purchase agreement.

Name of the parameter	DOE assessment

Project Cost

The proposed project activity is a Hydro Power project. The details are given below.

Name of the Investor/Owner	Project Capacity (MW)	Project Cost (In Million)	Project cost in Million per MW
Darjeeling Power Private Limited	3 MW	279.40	93.13

The above mentioned project cost has been considered from DPR and was available at the time decision made for the project activity.

The DOE has also checked the actual cost of the each project site from the Purchase Order and found that few project sites, the reduction in project cost is within 10% range of sensitivity analysis. Since the comparison is done with actual project cost and hence increase of the same in future is not possible. Thus, the project activity is additional with actual project cost.

Site Name	Name of the Investor/Owner	Project Capacity (MW)	Project Cost (In Million)- Actual from PO	Project Cost (In Million) per MW- Actual from PO
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	248.4	82.8

The difference in actual project cost for different project site is due to time difference, manufacturer, different EPC contractor, negotiation skills of individual PP etc.

The assessment team also checked different states tariff orders and found that project cost considered for project is found to be appropriate.

Based on sectoral scope expert and local knowledge, the project cost considered as per DPR for the proposed project activity is found to be appropriate for hydro projects. Also since the actual cost is available to DOE and IRR is still within benchmark and thus the same is acceptable.

The IRR as per the assumption from the DPR is as follows:

Site Name	Name of the Investor/Owner	Project Capacity (MW)	Project Cost (In Million)	IRR	Benchmark
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	279.40	8.07%	17.06%

The IRR as per the actual project cost is defined as below:

Site Name	Name of the Investor/Owner	Project Capacity (MW)	Actual project cost as per the PO	IRR	Benchmark
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	248.4	10.98%	17.06%

As described above actual project cost with benchmark, the project is still additional. Since the comparison is done with actual project cost, the increase of the same in future is not possible.

<table>
<tr><td></td><td>Thus assessment team is of the opinion that, project is still additional with the consideration of actual project cost for the project activity.</td></tr>
<tr><td>O&M cost and Escalation in the operational expense =5 (%)- Standard practice in India</td><td>
The proposed project activity is a Hydro Power project. The details are given below.
<table>
<tr><th>Name of the Investor/Owner</th><th>Project Capacity (MW)</th><th>O&M (In Million) (Without tax)</th></tr>
<tr><td>Darjeeling Power Private Limited</td><td>3 MW</td><td>8.38</td></tr>
</table>
The above mentioned O&M cost has been considered from DPR and was available at the time decision made for the project activity.

The DOE has also checked the actual O&M contract for each project site and found the changes in O&M cost is within threshold limit. Thus the project activity is additional with actual O&M cost.
<table>
<tr><th>Site Name</th><th>Name of the Investor/Owner</th><th>Project Capacity (MW)</th><th>O&M (In Million) (Without tax)- Actual</th></tr>
<tr><td>Himachal Pradesh</td><td>Darjeeling Power Private Limited</td><td>3 MW</td><td>7.8</td></tr>
</table>
Even after consideration of O&M cost as zero, the project activity is additional.

The assessment team also checked different states tariff orders and found that O&M cost and its escalation considered for project is found to be appropriate.

IRR value as per the assumptions from the DPR is as below:
<table>
<tr><th>Name of the Investor/Owner</th><th>Project Capacity (MW)</th><th>O&M (In Million)</th><th>IRR</th><th>Benchmark</th></tr>
<tr><td>Darjeeling Power Private Limited</td><td>3 MW</td><td>8.38</td><td>8.07%</td><td>17.06%</td></tr>
</table>
IRR value based on the actual O&M agreement signed is as below:
<table>
<tr><th>Site Name</th><th>Name of the Investor/Owner</th><th>Project Capacity (MW)</th><th>O&M (In Million) (Without tax)- Actual</th><th>IRR</th><th>Benchmark</th></tr>
<tr><td>Himachal Pradesh</td><td>Darjeeling Power Private Limited</td><td>3 MW</td><td>7.8</td><td>8.69%</td><td>17.06%</td></tr>
</table>
Benchmark for the project as described above along with actual O&M value, the project is still additional.
</td></tr>
</table>

<table>
<tr><td></td><td>Based on sectoral scope expert and local knowledge, the project O&M cost and its escalation considered as per DPR for the proposed project activity is found to be appropriate for hydro projects. Also since the O&M cost is available to DOE and IRR is still within benchmark and thus the same is acceptable.</td></tr>
<tr><td>Tariff</td><td>The Tariff rate has been considered from state tariff order and the same was available at the time decision made for the project activity.

The DOE has also checked the actual PPA for each project site and found there are no changes in tariff rate and is within threshold limit. Thus the project activity is additional with actual Tariff rate.

<table>
<tr><th>Site Name</th><th>Name of the Investor/Owner</th><th>Tariff Rate (as per SERC)</th><th>Tariff Rate (as per PPA)</th></tr>
<tr><td>Himachal Pradesh</td><td>Darjeeling Power Private Limited</td><td>3.00</td><td>3.00</td></tr>
</table>

The SERC tariff order has been checked and found that tariff rate considered for the project activity is appropriate.

http://hperc.org/File/appenB6-7.pdf

The tariff considered is levellised tariff and hence there is no any escalation. This is found to be appropriate and found to be accepted.

IRR value as per the actual PPA signed between Individual project owners and State electricity Board is as below:

<table>
<tr><th>Site Name</th><th>Name of the Investor/Owner</th><th>Tariff Rate (as per PPA)</th><th>IRR</th></tr>
<tr><td>Himachal Pradesh</td><td>Darjeeling Power Private Limited</td><td>3.00</td><td>8.07%</td></tr>
</table>

Since the IRR is still below benchmark with the consideration of actual Power Purchase Agreement signed which is valid for total operational lifetime of the project, assessment team confirms that the project is still additional with actual Tariff rate. Moreover, in the above table the order from State electricity tariff order is checked and it is confirmed that PPA signed with the rate as mentioned in the Tariff order and hence increase of the same is not possible.

Based on sectoral scope expert and local knowledge, the project tariff rate considered as per state tariff order for the proposed project activity is found to be appropriate for hydro projects.</td></tr>
<tr><td>PLF</td><td>The proposed project activity is a Hydro Power project. The details are given below.

<table>
<tr><th>Name of the Investor/Owner</th><th>Project Capacity (MW)</th><th>PLF (%)</th></tr>
<tr><td>Darjeeling Power Private Limited</td><td>3 MW</td><td>71.71% (for the 1st 12 years)
63.11% (for the last 18 years)</td></tr>
</table>
</td></tr>
</table>

Validation team assessed the DPR. Same report has been used in the financials and the emission reduction calculation. PLF estimation by 3rd party engineering company is in line with Para 3 (b) Annex 11, EB 48 and acceptable to the assessment team.

CERC tariff order has been checked and found that PLF considered for the project activity in within the range of sensitivity analysis and found to be appropriate.

http://cercind.gov.in/2010/ORDER/February2010/53-2010_Suo-Motu_RE_Tariff_Order_FY2010-11.pdf

Based on sectoral scope expert and local knowledge, the project PLF considered as per DPR for the proposed project activity is found to be appropriate for hydro projects.

IRR for PLF value as per the DPR = 3rd party report, Annex 11 EB 48

Name of the Investor/Owner	Project Capacity (MW)	PLF (%)	IRR
Darjeeling Power Private Limited	3 MW	**71.71%** (for the 1st 12 years) **63.11%** (for the last 18 years)	8.07%

IRR as per the PLF value of the Tariff orders= Third party CERC (=**Central electricity regulatory commission**) order. The details link are given above:

Name of the Investor/Owner	Project Capacity (MW)	PLF (%)- As per the tariff order of State electricity regulatory commission	IRR
Darjeeling Power Private Limited	3 MW	45%	0%

Assessment team confirms that since with the value as mentioned in the tariff order for Central Electricity regulatory commission report are considered and still the IRR is still below the benchmark, hence the project is additional.

Tax Rates

Income tax rate (%)	**33.99%**
MAT (Minimum Alternate tax) (%)	**20.96%**
Service Tax (%)	**12.36%**

The above table shows the tax rate considered for individual project Owner and the same is found suitable.

Assessment team noted that the project developer has adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit and Income Tax Act 1961 stipulated for income tax calculation, which are in conformity with the accepted accounting principles adopted by the company and income tax laws in the host country i.e. INDIA. Tax

	liability has been calculated as per the income tax rules and the rulings given. In computing the income tax liability, the project developers have considered Tax holiday (u/s 80IA of the Income Tax Act, 1961). Accelerated depreciation on plant and machinery is also sourced from IT act. The tax rates assumed corresponds to the tax rate prevailing at the time of taking decision. Hence, these assumptions are appropriate during decision making context and thus acceptable to the assessment team. No further assessment is required as the Values are directly procured from Income Tax Act, 1961 which is standard guideline for Tax value in India.

The documents supporting the financial calculations, in the opinion of Validation Team, are therefore authentic and conform to the guidance given by EB. The PD having been incorporated, the input costs considered conform to guidance on investment analysis issued by EB. All the input parameters considered in computation, the basis, and correctness and appropriate thereof are checked and found correct.

Assessment of correctness of computation:

The assessment involved checking the data input taken from DPR, power purchase agreement, tariff order, adoption of correct accounting principle and arithmetical accuracy. Validation Team checked the documents and ensured that appropriate input has been taken in the project cost and projections. The arithmetical accuracy was also found to be correct.

The equity IRR has been computed for a period of 30 years (=Operational lifetime of the project (for hydro), which is the life time of the project and is in conformity with the Investment guideline. As required by appendix of EB92 Annex 5 the expected realization on the sale of assets at the end of the operating life has been taken as salvage value in the terminal year. In computing the IRR, the project developer has taken into account profit after tax, depreciation tax shield and salvage value (in the terminal year). The principle adopted conforms to the accepted accounting and taxation principles.

Validation team also confirms that rest of the input parameters are considered appropriately and are in line with guidance appendix of EB92 Annex 5.Therefore, from the above arguments/ justifications it is evident that the project is not business as usual scenario and requires VCS benefits to sustain.

Sensitivity analysis:

The Guidance Investment analysis requires the robustness of the conclusion arrived at to be proved through a sensitivity analysis by varying the critical assumptions to a reasonable variation. The project developer has identified Plant Load Factor (PLF), Project cost, Electricity tariff and O&M cost as critical assumptions. These critical parameters constitute more than 20% of either total project costs or total project revenues.

Since the project cost is being taken as per the DPR, being available at the time of investment making decision, hence the cost is subject to variation. However the same can be compared with actual values as per the purchase orders and the purchase order value is less than the cost mentioned in the DPR. The tariff is determined by previous year's electricity bill which is subject to minor variation. All other expenses are much less than 20% of the total cost. Hence, only PLF needs to be subjected to reasonable variation. Nevertheless, following factors have been subjected to sensitivity analysis:

(a) PLF
(b) O&M Cost
(c) Project Cost
(d) Tariff Rate

The sensitivity analysis reveals that even under more favourable conditions, the IRR without CDM revenue would not cross the benchmark return as given in the following table:

	Equity IRR without CDM		Benchmark (Equity IRR)	
Final Results	8.07%		17.06%	
Sensitivity Analysis	**Equity IRR**			
Variation %	**-10%**	**Normal**	**10%**	**Breaching Value**
PLF	4.43%	8.07%	11.30%	25.85%
O&M	8.92%	8.07%	6.74%	-98.46%
Project Cost	10.45%	8.07%	5.86%	-26.74%
Tariff Rate	4.43%	8.07%	11.30%	25.85%

The rationale of sensitivity is, "The ultimate objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to provide a cross-check on the suitability of the assumptions used in the development of the investment analysis."

Assessment team also confirmed the breaching values for individual parameters (=Individual project owners) and thus confirms that the project is still additional

Site Name	Name of the Investor/Owner	Project Capacity (MW)	PLF in DPR	Tariff order PLF	Variation in PLF	Breaching Value for PLF
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	**71.71%** (for the 1st 12 years) **63.11%** (for	45%	25%	25.85%

			the last 18 years)			

Site Name	Name of the Investor/Owner	Project Capacity (MW)	DPR Cost	Actual PO Cost	Variation in project cost	Breaching value for Project Cost
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	279.40	248.40	11%	-26.74%

Site Name	Name of the Investor/Owner	Project Capacity (MW)	SERC Tariff	PPA Tariff	Variation in Tariff	Breaching value in Tariff Rate
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	3.00	3.00	0%	25.85%

Site Name	Name of the Investor/Owner	Project Capacity (MW)	DPR O&M cost / MW	Actual O&M cost/MW	Variation in O&M	Breaching value in O&M
Himachal Pradesh	Darjeeling Power Private Limited	3 MW	2.79	2.6	7%	-98.46%

It can be observed from sensitivity table that in various scenarios wherein there are changes in tariff, O&M cost, electricity generation and project's capital cost, the equity IRR does not cross the benchmark. Thus, it can be concluded that revenue from sale of VERs is important to alleviate this gap and hence the project has been considered to be additional.

Moreover, Annex 3 of the EB 22 states that national and/or sectoral policies and circumstances have to be accounted for when considering the baseline scenario. Paragraph 7(a) states that, only those national and/or sectoral policies or regulations under paragraph 6(a), i.e., type E+ policy that increase GHG emissions, that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11/12/1997), shall be taken into account when developing a baseline scenario. The Electricity Act of 2003 promoted cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity (Refer Section 86(1) of Electricity Act 2003). Therefore, it could be seen that the provincial and sectoral policies are E- i.e., policies that decrease GHG emissions and are after November 2001.Hence the baseline scenario of electricity generation by grid connected fossil fuel dominated power plants is in accordance with Annex 3 of EB 22.

The baseline mentioned in Section 3.3.4 below is in compliance with all the applicable regulatory policies and laws. Additionally, the Project Participant is under no compulsion to opt for any particular technology or even a renewable mode of power generation. There is no governmental body or EB policy which

requires a particular kind of fuel to be chosen and there is no legal requirement to which the above alternative does not conform.

No commercially sensitive information has been excluded from the public version of the project description.

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity will also help to reduce the demand supply gap in the state. The project activity will generate power using zero emissions hydro based power generation which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.

- **Technological well-being:** The successful operation of project activity would lead to promotion of hydro based power generation and would encourage other entrepreneurs to participate in similar projects

- **Environmental well-being**: hydro being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the project activity also helps in avoiding significant amount of GHG emissions.

During the site visit it was concluded that the project is implemented as per the instruction of the PD. During the current monitoring period it was observed that no unforeseen situation evolved which can impact the operation of the project activity. Scheduled maintenance was carried out as per the instruction of the manufacturer and the same is acceptable to the assessment team. CAR 01 was raised during the validation process. Please refer Appendix 2 of this report for the detail closure of the CAR.

3.2 Participation under Other GHG Programs

During the site visit the Project Proponent confirmed that they have not applied under any other GHG programs to avail revenues from emission reductions achieved from this particular project activity. A declaration for the same is checked and found correct by the assessment team.

For current monitoring period, there is no any claim of GHG emission reductions with other GHG program.

The present project activity is not participating in other Environmental credits, other GHG programs and has not been rejected by other GHG programs.

The project is not involved in any other form of GHG emission program and VERs generated from this verification will not be used for other trading program to avoid any kind of double counting. The same is confirmed by the individual project owners during the verification site visit. Assessment team also conducted independent review regarding the same and found that the statement/declaration of the Project owners is accurate and project is not involved in any other kind of GHG trading for the present verifications/monitoring period. Assessment team also checked other GHG program web site (cdm.unfccc.int, www.v-c-s.org, https://www.goldstandard.org/) and confirm that the Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals. The project activity is willing to get registered under VCS program. Assessment team also crosschecked that Project owner is not claiming any REC benefit; the same can be verified with the Renewable Energy Certificates accreditation body of India[9].Further, if the Project owner is availing REC benefits in future, the Project owners will claim either VCU or REC and there will not be any double accounting for the same monitoring period. CAR 02 was raised during the validation process. Please refer Appendix 2 of this report for the detail closure of the CAR.

3.3 Application of Methodology

3.3.1 Title and Reference

The project activity as part of the proposed project activity will be small scale project activity with power generation capacity less than 15 MW. Accordingly the following methodologies are used for each of the project activity instance based on its capacity:

The methodology for small scale project activity will be the approved methodology for small scale CDM project activities. The details of the methodology are as follows:

Title: Grid connected renewable electricity generation

Reference: The project activity meets the eligibility criteria of small scale project as it is less than 15 MW

Methodology : AMS-I.D: Grid connected renewable electricity generation (Version 18, EB 81, Annex 24[10])

Type I: Energy industries (renewable / non-renewable sources)

Category: Approved Consolidated Methodology (AMS-I.D)

Tools referred with above methodology and applicable for project activity are:

Tool to calculate the emission factor for an electricity system[11] - Version 06.0 (EB 97, Annex 07)

[9] https://recregistryindia.nic.in/index.php/general/publics/accredited_regens_pdf

[10] http://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

Demonstration of Additionality of Small-scale Project Activities (Ver. 10 EB 83 Annex 14)

3.3.2 Applicability

The following steps will show the applicability of the project under this methodology.

Applicability	**Project activity vis-à-vis applicability** **Conditions**
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid. (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is a Renewable Energy Project i.e. Hydro Power Project which falls under applicability criteria option 1(a). Hence the project activity meets the given applicability criterion.
2. Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is included in the appendix[12].	The 1st option or 3rd option (of Table 2 of AMS I.D. Version 18, EB 61 is applicable (please refer footnote) as project supplies electricity to national grid. 1st option is applicable for the project activity.

[11] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf

[12]

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid[12] system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√

3. This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The project activity instance is installation of new hydro based electricity generation green field plants (not addition to existing system). Option a is applicable.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The proposed project activity is a run – off the river small hydro project, where water from the tail race of Bapsa river, will be taken as an intake and is diverted through the power house to generate renewable power. Hence no reservoirs are used for the power generation. Hence not applicable
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The small scale project activity involves only renewable component with capacity less than 15 MW. The capacity of the renewable component only for the project is 3 MW. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable hydro energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct [13] from the existing units.	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity

5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

[13] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered “physically distinct”.

8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable, the hydro project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	The Project activity is a renewable hydro power project and is not a landfill gas, waste gas, waste water treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable hydro power project and is not a biomass project. Hence the criteria are not applicable to the project activity.

3.3.3 Project Boundary

Means of validation	The project boundary as depicted in the Joint PD and MR version 01 is checked during the validation site visit and also during the interview with the plant official.
Findings	No Findings raised
Conclusion	The spatial extent of project boundary diagram (including the metering system) referred by the methodology is now mentioned in the PDD as per the requirement of applied methodology (for AMS-I.D version 18) and thus the same is acceptable to the assessment team. The below table mentions the emission source:

	Sources	**GHGs involved**	**Description**
Baseline Emissions	INDIAN Grid	CO_2	Carbon Dioxide
Project Emissions	NA	NA	NA

3.3.4 Baseline Scenario

Means of validation	The baseline scenario as depicted in the Joint PD and MR version 01 is checked during the validation site visit and also during the interview with the plant official.
Findings	No findings were raised.

Conclusion

Assessment team checked as per the applicable methodology, a Greenfield power plant is defined as "a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology (AMS-I.D version 18) is the following:

As per para AMS-I.D version 18; If the project activity is the installation of a Greenfield power plant

If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Hence, the baseline for the project activity is the equivalent amount of power to the INDIAN grid.

The combined margin ($EF_{grid,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) (having weightage 50%) and build margin (BM) (having weightage 50%). Calculations for this combined margin must be based on data from an official source of CEA database (where available) version 12 and made publically available.

The combined margin of the INDIAN National Grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9462 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.50) & build margin (0.50) values, sourced from Baseline CO_2 Emission Database, Version 12.0, May 2017 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9843 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2013-14, 2014-15, 2015-16) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 12.0, May 2017 published by Central Electricity Authority (CEA), Government of India

		$EF_{grid,BM,y}$	0.9083 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 12.0, May 2017 published by Central Electricity Authority (CEA), Government of India
	Validation Team, therefore, concludes that the PDD conforms to the guidance given by EB via VVS version 01 for the project activity.				

3.3.5 *Additionality*

Means of validation	The Detailed project report is checked to confirm the capacity and additionality of the project
Findings	CAR 03 was raised during the validation process. Please refer Appendix 2 of the report for the closure of the CAR.
Conclusion	**The project activity applied Demonstration of Additionality of Small-scale Project Activities (Ver. 10 EB 83 Annex 14), to establish the project additionality, it has to be shown that the project activity would not have occurred anyway due to at least one of the following barriers:** • **Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;** • **Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;** • **Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;** • **Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.** **The project investor has selected Investment barrier to demonstrate in a conservative and transparent manner that the proposed VCS project activity is financially unattractive. In line with the guidelines stipulated under Annex 34 of EB 35 ("Non-binding best practice examples to demonstrate additionality for SSC project activities"), a benchmark**

	analysis is used in the project case under investment barrier. **The detail regarding investment analysis is already reported above.**

3.3.6 *Quantification of GHG Emission Reductions and Removals*

Means of validation	The emission reduction sheet, CEA database and Joint PD and MR version 02 is checked by the assessment team.
Findings	CAR 04 was raised during the validation process. Please refer Appendix 2 for the closure of the report.
Conclusion	The baseline emissions as discussed in above in this report include emissions that would have occurred in the absence of the project activity. The emission reduction calculation has been done as per the AMS-I.D version 18. **Baseline Emission (BE_y):** $BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ ----------(1) Where BE_y = Baseline Emissions in year y; (tCO_2) $EG_{pj,y}$= Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)- $EF_{grid,CM,y}$ = Grid emission factor (MWh/tCO_2) PROJECT OWNERS has estimated the baseline energy generation considering the capacity of the project activity, yearly generation hour and plant load factor. Validation team assessed the technical specification of the promoters of the project activity, Power purchase agreement and found that installed capacity of this project activity is correct. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors according to the procedure prescribed in the "Tool to calculate the emission factor for an electricity system" version 6.0 which is sourced from CEA, Govt. of India and forms the part of emission reduction calculation. The baseline emission factor calculation is checked by the validation team and found that the calculation is transparent and conservative. For estimating the operating margin emission factor, PROJECT OWNERS calculated ex-ante Simple Operating Margin (OM). As per the "Tool to calculate the emission factor for an electricity system": for grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the Joint PD and MR to the DOE for validation. Hence, PROJECT OWNERS considered the weighted average of latest net electricity generation and import of electricity and associated emission from CEA version 12. The value of operating margin considered as $0.9843tCO_2$ /MWh and the value of build margin as $0.9083tCO_2$ /MWh (based on the latest one year data). The weighting for both operating margin is taken as 0.50 and build margin as 0.5 for hydro power generation projects. Validation team checked the estimation procedure and considered data and found transparent and conservative.

	Emission factor of the project considered is mentioned below: $EF_{grid,CM,y}$ = 0.9462tCO_2e/MWh and it is fixed ex ante for the crediting period. Considering this process, combined margin emission factor has been considered and same value is confirmed correct. **Project Emissions:** As per the approved consolidated Methodology AMS-I.D (Version 18.0, EB 81): "For most renewable energy power generation project activities, PE_y = 0. As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity is a hydro power project, CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the Methodological tool "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 3.0). The project activity envisages the installation of one DG set to meet the emergency requirements of power house. Emissions due to use of diesel in DG set will be accounted as project emissions based on the following derived equation based on tool. CO_2 emissions from fossil fuel combustion in process j are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows: $PE_{FC,j,y} = \sum FC_{i,j,y} \times CO_{EFi,y\,i}$ Where: $PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr) $FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr) $CO_{EFi,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit) i = Are the fuel types combusted in process j during the year y Since the chemical composition of fossil fuel is not available with PP, the option B of tool is followed for CO_2 emission coefficient $CO_{EFi,y}$ Option B: The CO_2 emission coefficient $CO_{EFi,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type i, as follows: $CO_{EFi,y} = NCV_{i,y} \times EF_{CO2,i,y}$ Where: $CO_{EFi,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit) $NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

	$EF_{CO2,i,y}$ = Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ) i = Are the fuel types combusted in process j during the year y As per tool, IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories is considered as ex –ante values for the current crediting period for NCV and CO_2 emission factor of diesel. **Leakage Emissions:** As per AMS-I.D version 18, there is no leakage emission. **Emission Reductions:** The project activity reduces carbon dioxide emissions through displacement of grid electricity generation with predominantly fossil fuel based power plants[14] by renewable electricity. The emission reduction (ER_y) due to project activity during a given year y is calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) as per the formulae given below: $ER_y = BE_y – PE_y$ - LEy(Since leakage emission is zero, Therefore, ERy= BEy- PEy

3.3.7 Methodology Deviations

The project activity used AMS-I.D version 18 which is as latest as per UNFCCC website and thus no deviation is sought regarding the methodology. The project complies with all the requirement of the methodology and thus deviation to the methodology is not a requirement for the present project activity.

3.3.8 Monitoring Plan

Means of validation	Assessment team checked the monitoring practice onsite and also checked the guideline of respective State electricity regulatory commission.
Findings	CAR 05 was raised during the validation process. Please refer Appendix 2 of this report for the closure of the CAR.
Conclusion	**Parameters determined ex-ante:** Baseline emission factor of INDIAN Grid is establish ex-ante based on Tool to calculate the grid emission factor version 06, using a combined approach consisting 50 % operating margin($EF_{grid,OM,y}$) and 50 % build margin ($EF_{grid,BM,y}$).

[14] http://www.cea.nic.in/power_sec_reports/general_review/0304/tables.pdf

	The emission coefficient from official data published in Central Electricity Authority (CEA) CO_2 Baseline database version 12 available to the project participant at the time of submission of Joint VCS PD and MR for validation and global stakeholder's consultation process. CEA is an official source of Ministry of Power; Government of India have worked out baseline as CO_2 baseline database. The assumption were verified by the validation team and found to be correct. $NCV_{Diesel,y=}$ Net calorific value of Diesel. Assessment team noted that IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories is used. This parameter is fixed ex-ante for the entire crediting period. $EF_{CO2,Diesel,y=}$ CO_2 Emission Factor of Diesel. Assessment team noted that IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories is used. This parameter is fixed ex-ante for the entire crediting period. **Parameters determined ex-post:** The parameters monitored ex-post involves net electricity supplied to the grid (calculated from electricity exported and imported) to the INDIAN grid by the project activity. As per the Joint MR and PD version 02, JMR monthly generation report from state electricity board/DISCOM will be the source of data during verification for each of the respective states. The DOE will use the same source for verification of emission reductions As per the AMS-I.D version 18 "Monitoring shall consist of metering the net electricity supplied by the project activity to the grid. Measurement results shall be cross-checked with records of the Invoices". In accordance with the methodology requirement, net electricity supplied by the project activity is obtained from JMR monthly generation report from respective state electricity board/DISCOM which provide input values ($EG_{export,y}$ $EG_{import,y,}$ EG_{trans}[15]), used for calculation of $EG_{PJ,y}$. by the project activity and form the forms the basis for emission reduction calculation. Electricity export to the grid and import from the grid is metered by main and check tri-vector energy meters. The main meter reading is taken jointly on a fixed day of every month for the preceding month at the delivery point and signed by the representatives of state utility and O&M personnel. In the event of failure of main meter, the check meter will be used in monitoring the electricity data. The agency is experienced in the monitoring system and is managing O&M of

[15] It is to be noted here that due to change in interconnection point of project activity with the substation, transmission losses are being accounted every month from July 2016 onwards. The value obtained as a difference between export, import and transmission losses is being used for billing purpose and for calculating the baseline emission reduction resulting from the project activity.

	numerous other hydro farm projects. The validation team therefore is of the opinion that the project participant through the O&M agency is capable of implementing the monitoring plan in the context of the project activity. Calibration of all the meters is done by state electricity board officials as per the industry standards. However, the calibration will be done once in a 5 year[16] for all the project activity. The meters will be of accuracy class 0.2 for the respective states. The meter accuracy class and calibration interval is under purview of state electricity board and PP do not have any control on it. The Calibration agency follows the national guideline for calibration and the traceability is also established regarding the same. The national guideline is under the purview of National Accreditation Board for Testing and Calibration Laboratories (http://www.nabl-india.org/) and all the Calibration agency follows the same. Assessment team found that for the present project activity the calibration is done by an accredited calibration agency by National Accreditation Board for Testing and Calibration Laboratories and thus the Calibration certificate is found correct. The available parameter to PP is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter. The Net electricity exported to the grid will be cross checked against the invoice raised by the PP towards the DISCOM The energy meter recording the export and import from the grid at substation is under the control and supervision of state electricity board officials. Similarly O&M contractor is responsible for monitoring of the generation data at CMS. It is reported that the data will be kept for 2 years following the end of the crediting period. The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedure have been systematically established and formalized and the same was verified during the site visit. The parameter is used for baseline emission calculation. $QC_{Diesel:}$ Volume of Diesel Consumed per annum. The diesel consumed shall be monitored as in when consumed on the basis of level measuring scale. The approach is checked by the assessment team during the validation site visit and the normal practice used in any power plant in India. Plant manager would be responsible for regular inspection of the records & shift in charge is responsible for recording the diesel consumed. The recorded diesel consumption figures will be crosschecked with the purchase receipt. The parameter is used for project emission calculation. It is reported that the data will be kept for 2 years following the end of the crediting period. The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedure have been systematically established and formalized and the same was verified during the site visit.

[16] http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf, page 12

3.4 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 SAFEGUARDS

4.1 No Net Harm

The project activity promotes environmental and socio-economic well-being as it results in zero GHG emissions due to installation and operation of clean, renewable energy technology for electricity generation. CAR 06 was raised during the validation process. Please refer Appendix 2 in the report for the closure of the CAR.

As project is a renewable energy project hence there is no negative environmental and socio impact effect and the same can be summarized in the below table:

The project activity does not cause any harm to the local ecology. It primarily requires the installation of the Hydro power project, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

Also as per the Central Pollution Control Board of India notification[17] small hydro project of less than 25 MW falls under White Category and are practically non-polluting.

Also following safety and structural features are incorporated to combat any adverse impact on ecology of the project area:

1. The placement of raised crested diversion weir across the river, has been done with due considerations to the effect on fish present in water. The weir is located at an altitude of +/- 1100 m above main sea level where the climate remains pleasant throughout the year. Critically important to the survival of fish population are water quality, water temperature and mobility. Catchment area upstream of the diversion weir is sparsely populated with plenty of vegetation. As such quality of water remains good throughout the year to facilitate fish population.

Some species of migratory fish normally ascend the tributaries of Bapsa river during the spawning season. However, in Bapsa river, no large size fishes are reported to be available. Water in the river flows in a shallow depth and thus remains sufficiently warm to keep the existing fish species surviving. Cold water fish species such as trout is not present in water.

The most common method for allowing fish to pass by an artificial obstruction such as the raised crested diversion weir as in the case of 3 MW Hydro project is the fish ladder. The design of Fish passage of 3 MW H.E. Project, Himachal Pradesh has been carried out largely in-line with the recommendations contained in “Design of Small Dams, United States Department of the Interior, Bureau of Reclamation”. Examples of the type of fish ladder provided for 3 MW Hydro project have been depicted in a technical paper titled “Atlantic States Marine Fisheries Commission Fish Passage Working Group Upstream Fish Passage Technologies for Managed Species” published in September 2010.

[17] http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

2. Implementation of 3 MW Hydro project was taken-up under the guidelines laid down by HPJVNL – the appointed Nodal Agency of the Govt. of Himachal Pradesh. Himachal Pradesh is having a large number of small hydropower projects had been implemented as per the guidelines laid down by its State Nodal Agency HIMURJA. Thus, taking cue from HIMURJA, the Nodal Agency of Himachal Pradesh namely HPJVNL had laid down similar guidelines for implementation of small hydro schemes by the Private Developers.

As per the guidelines, it was mandatory to release Sacrificial Discharge, which would be Greater of 10% of Discharge which is available for 130 days in a 50% dependable year or 0.3 m3/sec whichever is greater. Accordingly, for 3 MW Hydro project, sacrificial discharge of 1.761 m3/sec, which is equal to 10% of the discharge available or 130 days in a 50% dependable year is being continuously released from the diversion weir. This discharge is being released perennially through a V-notch provided within the body of the weir. The V-notch abuts the left side wall of the gate pier and feeds the fish ladder and thus serves the twin purpose of releasing the desired minimum flow as well as providing the passage for movement of fish.

3. Design head being 54.5 m, although silt particles greater than 0.5 mm size could have been permitted to remain in the diverted water without causing appreciable early removal of metal from the turbine runners, a surface type de-silting tank has been provided to remove silt particles down to 0.2 mm size. The de-silting tank has been provided immediately downstream of the intake gates. The Dufour type de-silting tank comprises of twin basins placed parallel to each other and silt flushing pipes release the accumulated silt particles about 150 m downstream of the weir. The removal of silt particles, which leads to flushing of the de-silting tank; is accomplished through opening of the silt flushing gates provided on the silt flushing pipes. In addition to the above, a silt flushing valve placed centrally in the left side wall of the de-silting tank has been provided. This valve is opened occasionally to remove the excessive silt load during monsoon months.

The river bed where silt flushing discharge is released comprises of rocky and bouldery strata, which does not get uprooted due to the action of silt laden flushing discharge which is released at a high velocity.

As stated earlier, silt trapping and flushing operations are required to be carried out only during the monsoon months when discharge in the river is quite high. During this period, river discharge often exceeds the discharge which is required to be passed through the intake gates. Since the small reservoir created upstream of the diversion weir always remains filled upto the brim, the high incoming discharge in the river overtops the weir and flows further downstream. The silt particles released from the silt flushing pipes are thus carried away further downstream by the river discharge overtopping the weir.

Bapsa river is a tributary of the mighty river Satluj. The entire range of the river between the diversion weir site and confluence point with River Satluj thus remains largely unaffected because of the silt flushing operations carried out in the de-silting tank 3 MW Shaung H.E. Project.

Water in River Bapsa remains largely clean for almost 9 months of the year (except the three monsoon months). Silt flushing gates of the two silt flushing pipes as well as the centrally placed silt flushing valve therefore, remain “shut” for almost 9 months. However, to keep the system in a healthy operating condition, these gates and the silt flushing valve are opened for about 15-20 minutes once every month even during the non-monsoon period when there is no silt in the water.

4.2 Environmental Impact

Means of validation	The guideline provided by MOEF is checked by the assessment team http://envfor.nic.in/legis/eia/so1533.pdf

Findings	CAR 07 was raised during the validation/verification process. Please check Appendix 2 for the detail closure of the CAR.
Conclusion	The project activity is expected to have positive impacts and no significant adverse environmental impacts are foreseen. Since, the project activity is an electricity generation from renewable source (i.e. hydro energy) therefore no negative impact are envisaged. There is no mandatory legal requirement for carrying out an environmental impact assessment in the host country. The Ministry of Environment and Forests (MoEF), Government of India (GoI) notification [18] dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. The list includes thirty nine project activities that require EIA studies. The hydro power projects are not included in this list and thus an EIA study is not required.

4.3 Local Stakeholder Consultation

.**Means of validation**	The local stakeholder consultation MOM, attendance sheet is checked by the assessment team. During the validation site visit assessment team also interviewed some of the stakeholder present during the meeting with PP.
Findings	CAR 08 was raised during the validation process. Please refer below Appendix 2 for the closure of the CAR
Conclusion	As per the VCS requirements, it is necessary to invite the relevant stakeholders, prior of the validation process. The detail of the invitation date and stakeholder meeting date is as below: The details of the Stakeholder Meetings are as follows: Date of invitation – 01/02/2011 Date of Meeting – 08/02/2011 Location of Meeting - Project site, Shaung, Himachal Pradesh All the stakeholders have been invited through public notice to attend the stakeholders meeting. The local stakeholders' consultation meeting was attended by local persons including local villagers, local vendors and technology suppliers. The stakeholders identified by the project participant were local villagers who are the major population of the particular area, local communities and gram panchayat (Village head), project proponent representatives, O&M Team and other people involved in the project. Validation team verified the list of participants who attended the stakeholder meeting and feedback questionnaire and confirms the stakeholders identified are relevant. Validation team verified the list of participants who attended the stakeholder meeting and feedback

[18] http://envfor.nic.in/legis/eia/so1533.pdf

	questionnaire and confirms the stakeholders identified are relevant. The validation team also verified the minutes of meeting to note that no negative comments were received and the same was cross checked with the information obtained during follow up interviews with the stakeholder's. Thus Validation team is of the opinion that the stakeholder meeting was adequate and appropriate. Assessment team also noted during the validation site visit that PP has already put a grievance register onsite in where stakeholders can write there complain if any. The complaint if found genuine will be immediately resolve by PP with the best reasonable level of knowledge and satisfaction of the stakeholders. The process is found genuine and thus PP ensured that ongoing process of Stakeholders benefits and complain can be taken care after and during operation of the power plant.

4.4 Public Comments

Assessment team checked the project was listed on VCS web site. The detail is as below

http://vcsprojectdatabase.org/#/pipeline_details/PL1739

The project was open for public comment from 30/01/2018- 01/03/ 2018. No comments were received

However, CAR 09 was raised during the validation and verification process. Please refer Appendix 2 for the detail closure of the CAR.

5 VERIFICATION FINDINGS

5.1 Accuracy of GHG Emission Reduction and Removal Calculations

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the Joint VCS PD+ MR. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the monitoring plan of the CDM PDD.
Findings	CAR 10 was raised during the verification process. Please refer Appendix 2 of this report for the detail closure of the CAR.
Conclusion	The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. The grid in this case would be the 'INDIAN Grid' **Formula Used (As per the PD):-** $BE_y = EG_{PJ,y} * EF_{grid,CM,y}$ Where BE_y= Baseline emission for year 'y' $EG_{PJ,y}$ = Energy Baseline; and $EF_{grid,CM,y}$ = Emission factor for INDIAN Grid The verification team has checked the entire monthly JMR monthly generation report from respective state electricity board/DISCOM (primary source) and

invoices (cross check) applicable for the monitoring period as per the project activity applied for verifications and found all the parameters are monitored and recorded as per the monitoring plan in the PD. The verification team has crosschecked the emission reduction sheet and monitoring report data with the JMR monthly generation report from state electricity board/DISCOM and invoice bills and found all the values are matching. The value is used for baseline emission calculation and found correct.

As per the approved methodology AMS-I.D version 18 baseline emissions for the project activity are calculated by multiplying the net quantity of electricity supplied by this project activity ($EG_{PJ, y}$) with the CO_2 baseline emission factor for the electricity displaced due to the project ($EF_{grid,CM,y}$) as follows:
$BEy = EG_{PJ,y} \times EF_{grid,CM,y}$
Where,

$EF_{grid,CM,y}$	=	Baseline emission factor
	=	0.9462 tCO_2e/MWh
$EG_{PJ,y}$	=	Net electricity supplied to the NEWNE regional grid (MWh)
	=	25,777 MWh
BEy	=	25,777 * 0.9462
	=	24,390 tCO_2e

Project emissions would cover all the emissions which will result from operation of the project. The only source of emissions from the project activity is the DG set at the plant and the associated emissions due to operation of the same have been calculated in the following manner

$PE_y = EF_{Diesel} * QC_{diesel}$
Where:
PE_y = Project Emissions (tCO_2e)
EF_{Diesel} = Emission Factor of Diesel (tCO_2e/litre)
QC_{Diesel} = Quantity of diesel consumed (litres)
Substituting the values,
EF_{Diesel} = 0.00269 tCO_2/liter (Please refer ER sheet for this factor)
QC_{Diesel} = 1,445 liters
PE_y = 1,445 X 0.00269 = 3.885 **tCO_2e =** 4 tCO_2e (nearest integer value)

Hence Emission reduction is as below:

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	10,199	2	0	10,197

	2016				
	Year 2017	14,191	2	0	14,189
	Total	24,390	4	0	24,386

Moreover, It is to be noted here that as per the ER estimated for the current monitoring period, the emission reductions was estimated to be 28,179 tCO_2e, whereas actual emission reductions achieved are 24,386 tCO_2e, which is approximately 13% lower than the estimated emission reductions. The generation of electricity depends upon the water availability, which is influenced by natural phenomena of melting of snows and rainfall and not within the control of the project participant. The lower generation during the current verification period was hence due to lower availability of water during the same period.

5.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	The verification team checked the break down log for the monitoring period. During the verification site visit the feeder wise location of the WTGs is also checked. The Calibration details are also checked.
Findings	CAR 11 raised during the verification process which was closed successfully. Please refer Appendix 2 of this report for the detail closure of the CAR.
Conclusion	The metering arrangement is tri-vector bi-directional energy meters (main and check) at the State Electricity Board (SEB) substation. These meters record several parameters including electricity exported & imported. Moreover, the meters are located at the HT side of the transformer and are of accuracy class of 0.2 for each project activity applied for verification. These electricity meters are being used by state electricity board for JMR (Joint Meter Reading) electricity generation statements. The Net electricity supplied to the grid is then calculated from export and import values. The net electricity exported to the grid is also cross checked from the invoices raised to respective state electricity board which is in line with Methodology requirement for small scale project. Hence assessment team confirmed that the value of net electricity exported to the grid as used in emission reduction calculation is correct. Electricity export to the grid and import from the grid is metered by main and check tri-vector energy meters. The main meter reading is taken jointly on a fixed day of every month for the preceding month at the delivery point and signed by

	the representatives of state utility and O&M personnel. In the event of failure of main meter, the check meter will be used in monitoring the electricity data. The validation team therefore is of the opinion that the project participant through the O&M agency is capable of implementing the monitoring plan in the context of the project activity. Calibration of all the meters is done by state electricity board officials as per the industry standards. However, the calibration is done once in a 5year[19]. The energy meter recording the export and import from the grid at substation is under the control and supervision of state electricity board officials. Similarly O&M contractor is responsible for monitoring of the generation data at CMS. The Calibration agency follows the national guideline for calibration and the traceability is also established regarding the same. The national guideline is under the purview of National Accreditation Board for Testing and Calibration Laboratories (http://www.nabl-india.org/) and all the Calibration agency follows the same. Assessment team found that for the present project activity the calibration is done by an accredited calibration agency by National Accreditation Board for Testing and Calibration Laboratories and thus the Calibration certificate is found correct. It is reported that the data will be kept for 2 years following the end of the crediting period. The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedure have been systematically established and formalized and the same was verified during the site visit. On-site visit and interview with O&M personnel also confirms that the operational and organizational chart as mentioned in Joint PD+MR is as per the site practice and thus assessment team confirms that the details are correct. The break down log is checked and found that the hydro power plant undergone scheduled maintenance and break down. No unforced error observed and feeder wise hydro power plant is also checked and found correct.

[19] http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf, page 12

6 VALIDATION AND VERIFICATION CONCLUSION

Applus+ Certification has been engaged by Darjeeling Power Pvt. Ltd. to perform the Joint validation and verification of the "3 MW Hydro Power Project by Darjeeling Power Pvt. Ltd."

The management of the project participant/owner is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the Joint PD and MR and the approved methodology AMS-I.D version 18.

Our Validation approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board and VCS board. Our approach is risk-based, drawing on an understanding of the risks associated with estimated GHG emissions data and the controls in place to mitigate these. The validation can confirm that:

- The projects description compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7

- The project's baseline and additionality is assessed against AMS-I.D version 18 for the project

- The project's monitoring plan is assessed against AMS-I.D version 18 for the project activity.

- A risk based approach has been followed to perform this validation activity. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews with Project Owner have provided Applus+ Certification with sufficient evidence for positive validation opinion as per the requirement of VCS.

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is operated as planned and described in the project document;
- the monitoring plan is as per the applied methodology;
- the monitoring process in Monitoring Report is as per the PD
- the development and maintenance of records and reporting procedures are in accordance with the monitoring plan;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately
- the monitoring system is in place and generates GHG emission reductions data;
- The GHG emission reductions are calculated without material misstatements.

Verification period: From 15/04/2016 to 01/01/2018 (both days included)

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 2016	10,199	2	0	10,197
Year 2017	14,191	2	0	14,189
Total	24,390	4	0	24,386

APPENDIX 1: DOCUMENTS REVIWED DURING VALIDATION AND VERIFICATION

No.	Author	Title	References to the document	Provider

1	NA	Commissioning certificates of the hydro turbine implemented in the project site.	Commissioning certificates of the respective states.	PROJECT OWNERS
2	NA	Contract of the other entity with the DOE	Contract of the other entity with the DOE	PROJECT OWNERS
3	NA	Technical specifications of hydro turbine and generators from manufacturers	Manufacturer technical specifications	PROJECT OWNERS
5	NA	Emission Calculation sheet- Estimated- Version 01 Emission Calculation sheet- Actual- Version 01 Emission reduction Calculation sheet- Actual Version 02(As per TR comments)	20/02/2018 23/02/2018 05/04/2018	PROJECT OWNERS
6	N	The operational	Manufacturer technical specifications	PROJECT

	A	lifetime of the project activity from the manufacturer =(Technical specefications)		OWNERS
7	NA	SERC orders: hperc.org.in/ RBI: Reserve Bank of India www.rbi.org.in Ministry of Environment and forest: www.envfor.nic.in UNFCCC www.cdm.unfccc.int CEA: Central electricity authority www.cea.nic.in Income tax act 1961 http://law.incometaxindia.gov.in/DIT/	Reference link is provided.	Independent Search

		VCS: Verified Carbon Standard www.v-c-s.org		
08	NA	Tools/ guidelines used in the project activity • Tool to determine the remaining lifetime of the project activity in line with Annex 15 EB 50 • Tool to calculate the emission factor for an electricity	UNFCCC CDM web site	UNFCCC

		system version 06 • Glossary of CDM terms version 07 • VCS verification report template version 03		
09	NA	JMR records for the complete monitoring period	JMR records	PROJECT OWNERS
10	NA	Joint PD+MR version 01 Joint PD+MR version 02 Joint VCS PD+MR version 03	17/01/2018 28/02/2018 05/04/2018	PROJECT OWNERS
11	NA	Invoices for the complete monitoring period	Invoice	PROJECT OWNERS

12	NA	Break down details of the complete monitoring period	Log sheet	PROJECT OWNERS
13	NA	Calibration details of the project undergoing verifications	Please referee Appendix 5 of this report	PROJECT OWNERS
14	NA	Financial Analysis sheet.	28/02/2018	PROJECT OWNERS
15	NA	PLF reports for Individual project owners	=DPR dated 02/02/2009	PROJECT OWNERS
16	NA	Board decision for individual project	BD dated 04/02/2009	PROJECT OWNERS
17	NA	DPR	DPR dated 02/02/2009	PROJECT OWNERS
18	NA	NOC from Gram Panchayat	NOC from Gram Panchayat dated 14/10/2009	PROJECT OWNERS
19	NA	Sanction of Credit Facility from Bank of Maharashtra	Sanction of Credit Facility from Bank of Maharashtra dated 27/03/2012	PROJECT OWNERS
20	NA	Operation and Maintenance Contract signed	Operation and Maintenance Contract signed dated 14/10/2014	PROJECT OWNERS
21	NA	PPA signed	Power purchase agreement dated 20/05/2016	PROJECT OWNERS

22	NA	Provisional Consent order by HPSPCB	Provisional Consent order by HPSPCB dated 03/08/2016	PROJECT OWNERS

APPENDIX 2: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUEST (CL/ CAR/FAR)

FOR VALIDATION:

CAR ID	01	**Section no.**	1	**Date:** 02/02/2018
Description of CAR				
During the document review it was observed that following details are missing in section 1 of the joint PD+MR version 01: 1. A summary description of the technologies/measures for individual Hydro turbine as per the respective state (e.g., plant, equipment, process, or management or conservation measure) included in the project and the status of their implementation. Supporting for technical measures is also not submitted to DOE. 2. The relevant implementation dates (e.g., dates of construction, continued operation periods). Supporting regarding Commissions certificate is also missing. 3. The total GHG emission reductions or removals generated in this monitoring period. 4. The Latitude and longitude for the power plant is missing in the joint PD and MR. The geographical map for the power plant is missing 5. The compliance of section 1.11 is not as VCS PD template. Corrective action is required 6. The scenario prior to project activity is not described in section 1.10 of the VCS PD. The scenario as mentioned in section 2.4 is similar or different? Kindly take corrective action Corrective action is sought for the same.				
Project participant response				**Date:** 28/02/2018
1. Technical specifications of the project activity is mentioned in section 1.8 of Joint PD & MR. *2. Chronology of major events of the project activity is mentioned in section 1.1 of PD Version 02.* *3. The total GHG emission reductions generated during the current monitoring period is mentioned in joint PD and MR Version 02.* *4. The Latitude and Longitude of the project site as well as geographical map is given in joint PD and MR.* 5. The Project has received necessary approvals for development and commissioning for Hydro				

Power project from the state Nodal agencies and is in compliance to the local laws and regulations.

6. *The project is a greenfield power project and does not involve any GHG emissions and the same is mentioned in section 1.10 of the VCS PD.*

Documentation provided by project participant

Joint PD and MR Version 02

DOE assessment	**Date:** 03/04/2018

Following are the observation of the DOE:

1. Assessment team observed that Technical specifications of the project activity is mentioned in section 1.8 of Joint PD & MR. CAR is thus closed

2. Chronology of the Major events are now added in revised Joint PD and MR Version 02. Based on the revision, CAR is thus closed.

3. Assessment team observed that the total GHG emission reductions generated during the current monitoring period is mentioned in joint PD and MR Version 02. CAR is thus closed

4. The latitude and longitude is now added in joint VCS PD and MR Version 02. CAR is thus closed.

5. The project received nodal agency clearances and thus complies with local law and regulation. CAR is thus closed

6. Section 1.10 is now revised and based on the revision CAR is thus closed.

CAR ID	02	**Section no.**	1.12.3 to 1.12.5	**Date:** 02/02/2018

Description of CAR

During the desk review it was observed that the details regarding REC benefits were not provided. Please provide appropriate link for the same and also proper documents to confirm that the PP will not claim other form of environmental credit for the monitoring period concerned. Moreover, PP should also produce documentary evidence that it has not participated in any other form of GHG emission/rejected by any other form of GHG program for the current monitoring period.

Corrective action is sought for the same and documents are required to be submitted for further analysis.

Project participant response	**Date:** 28/02/2018

The project is not availing any REC benefits and the same has been mentioned in section 1.12.3 of the PD version 02. *Declaration letter by the PP has also been provided by the PP justifying no participation in any other kind of environmental credits.*
Documentation provided by project participant
1. *Joint PD and MR Version 02* 2. *Declaration by the PP availing no other environmental credits.*

DOE assessment	**Date:** 03/04/2018
Assessment team checked the undertaking dated 12/02/2018 and confirm that project activity is not availing any REC benefits/ ODA assistance. Moreover, the project is not rejected by any other GHG program and thus complying with section 1.12.3 to 1.12.5 of Joint VCS PD and MR version 02. CAR is thus closed.	

CAR ID	03	**Section no.**	2.5	**Date:** 02/02/2018
Description of CAR				
During the desk review of the PDD and onsite visit document verifications, APPLUS team observed following inconsistency in the additionality determination : 1. Following documents are missing and thus the IRR calculation is reserved: a. PLF reports b. All the input value (e.g. Offer letters, DPR (if any), Loan sanction if any, Insurance etc.) 2. IRR calculation is reserved as no IRR sheets are provided 3. The Step wise compliance of the *Tool for demonstration and assessment of Additionality (EB 70, Annex 8)* Additionality section of the VCS PD version 01 is reserved till the documents and IRR sheet are submitted.				
Project participant response				**Date:** 20/02/2018
1. *For the input values used for IRR calculations, DPR of the project submitted by Third Party (Sai Engineering Foundation) is referred and submitted to the Validation team.*				

2. *IRR worksheet is submitted with Version 02 of the PD.* 3. *The step wise approach for the Tool for demonstration and assessment of additionality has been mentioned in PD version 02*
Documentation provided by project participant
1. *Third Party DPR* 2. *IRR worksheet* 3. *Joint PD and MR Version 02*

DOE assessment	**Date:** 03/04/2018
Following are the observation of the DOE: 1. All the inputs value documents are now submitted to the DOE. CAR is thus closed 2. IRR calculation sheet is now submitted and the same is checked and found correct by the assessment team. CAR is thus closed 3. The step wise demonstration of *Tool for demonstration and assessment of additionality* is now incorporated and thus CAR is closed.	

CAR ID	04	**Section no.**	3	**Date:** 02/02/2018
Description of CAR				
Assessment team found during desk review is that emission reduction sheet is missing for the project activity. Hence estimated ER in section 3 of the Joint PD and MR is thus reserved. Moreover, project emission is considered as zero. The backup generation is missing. Please elaborate?				
Project participant response				**Date:** 28/02/2018
ER sheet is submitted with PD Version 02. *For the project activity, in case of emergency conditions DG set is used and the project emissions is being calculated as per the applied methodology and tools.*				
Documentation provided by project participant				

1. *ER Sheet version 01* 2. *Joint PD and MR Version 02*
DOE assessment **Date:** 03/04/2018
The emission reduction sheet is now submitted to the assessment team. Actual and estimated ER sheet is checked and it is observed that estimation and actual value of Emission reduction is correct. No overestimation envisaged for the project and thus CAR is closed.

CAR ID	05	**Section no.**	4.2	**Date:** 02/02/2018
Description of CAR				
The source of data in the monitoring plan mentions that "Joint Meter Reading reports from respective state electricity board". As per DOE understanding there is only one state Board. Kindly take corrective action.				
Project participant response				**Date:** 28/02/2018
Typographical error is regretted. Corrective action has been taken as a measure to address the CAR raised.				
Documentation provided by project participant				
Joint PD and MR version 02.				
DOE assessment				**Date:** 03/04/2018
The typographical error is now corrected in the Joint VCS PD and MR and thus CAR is cosed.				

CAR ID	06	**Section no.**	5.1	**Date:** 02/02/2018
Description of CAR				
The no Net harm details are missing in the VCS PD. Moreover, as VCS PD claims that there are no negative impacts on air, water, soil quality and ambience are envisaged due to the project activity however supporting and explanation of the same is missing. Moreover, please also explain how the				

resettlement is done while the construction and operation of the Hydro power plant is achieved. The detail need to include and supporting is required to submit. Following detail regarding Hydro Turbine operation is missing : 1. Fish Passage Effectiveness 2. Minimal Water Flow and Water Flow Monitoring QA/QC Protocol 3. Sediment Flow Management Corrective action is sought for the same.

Project participant response	**Date:** 28/02/2018

As per the Central Pollution Control Board of India notification[20] small hydro project of less than 25 MW falls under White Category and are practically nonpolluting. The project being a small hydro project falls under White Category and thus nonpolluting.

4. The placement of raised crested diversion weir across the river, has been done with due considerations to the effect on fish present in water. The weir is located at an altitude of +/- 1100 m above main sea level where the climate remains pleasant throughout the year. Critically important to the survival of fish population are water quality, water temperature and mobility. Catchment area upstream of the diversion weir is sparsely populated with plenty of vegetation. As such quality of water remains good throughout the year to facilitate fish population.

Some species of migratory fish normally ascend the tributaries of Bapsa river during the spawning season. However, in Bapsa river, no large size fishes are reported to be available. Water in the river flows in a shallow depth and thus remains sufficiently warm to keep the existing fish species surviving. Cold water fish species such as trout is not present in water.

The most common method for allowing fish to pass by an artificial obstruction such as the raised crested diversion weir as in the case of 3 MW Hydro project is the fish ladder. The design of Fish passage of 3 MW H.E. Project, Himachal Pradesh has been carried out largely in-line with the recommendations contained in "Design of Small Dams, United States Department of the Interior, Bureau of Reclamation". Examples of the type of fish ladder provided for 3 MW Hydro project have been depicted in a technical paper titled "Atlantic States Marine Fisheries Commission Fish Passage Working Group Upstream Fish Passage Technologies for Managed Species" published in September 2010.

5. Implementation of 3 MW Hydro project was taken-up under the guidelines laid down by HPJVNL – the appointed Nodal Agency of the Govt. of Himachal Pradesh. Himachal Pradesh is having a large number of small hydropower projects had been implemented as per the guidelines laid down by its State Nodal Agency HIMURJA. Thus, taking cue from HIMURJA, the Nodal Agency of Himachal Pradesh namely HPJVNL had laid down similar guidelines for implementation of small hydro schemes by the Private Developers.

   As per the guidelines, it was mandatory to release Sacrificial Discharge, which would be Greater of 10% of Discharge which is available for 130 days in a 50% dependable year or 0.3 m3/sec whichever is greater. Accordingly, for 3 MW Hydro project, sacrificial discharge of 1.761 m3/sec, which is equal to 10% of the discharge available or 130 days in a 50% dependable year is being continuously released from the diversion weir. This discharge is being released perennially through a V-notch provided within the body of the weir. The V-notch abuts the left side wall of the gate pier and feeds the fish ladder and thus serves the twin purpose of releasing the desired minimum flow as well as providing the passage for movement of fish.

[20] http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

6. Design head being 54.5 m, although silt particles greater than 0.5 mm size could have been permitted to remain in the diverted water without causing appreciable early removal of metal from the turbine runners, a surface type de-silting tank has been provided to remove silt particles down to 0.2 mm size. The de-silting tank has been provided immediately downstream of the intake gates. The Dufour type de-silting tank comprises of twin basins placed parallel to each other and silt flushing pipes release the accumulated silt particles about 150 m downstream of the weir. The removal of silt particles, which leads to flushing of the de-silting tank; is accomplished through opening of the silt flushing gates provided on the silt flushing pipes. In addition to the above, a silt flushing valve placed centrally in the left side wall of the de-silting tank has been provided. This valve is opened occasionally to remove the excessive silt load during monsoon months.

   The river bed where silt flushing discharge is released comprises of rocky and bouldery strata, which does not get uprooted due to the action of silt laden flushing discharge which is released at a high velocity.

   As stated earlier, silt trapping and flushing operations are required to be carried out only during the monsoon months when discharge in the river is quite high. During this period, river discharge often exceeds the discharge which is required to be passed through the intake gates. Since the small reservoir created upstream of the diversion weir always remains filled upto the brim, the high incoming discharge in the river overtops the weir and flows further downstream. The silt particles released from the silt flushing pipes are thus carried away further downstream by the river discharge overtopping the weir.

   Bapsa river is a tributary of the mighty river Satluj. The entire range of the river between the diversion weir site and confluence point with River Satluj thus remains largely unaffected because of the silt flushing operations carried out in the de-silting tank 3 MW Shaung H.E. Project.

   Water in River Bapsa remains largely clean for almost 9 months of the year (except the three monsoon months). Silt flushing gates of the two silt flushing pipes as well as the centrally placed silt flushing valve therefore, remain “shut” for almost 9 months. However, to keep the system in a healthy operating condition, these gates and the silt flushing valve are opened for about 15-20 minutes once every month even during the non-monsoon period when there is no silt in the water.

Documentation provided by project participant	
Joint PD/MR Version 02	
DOE assessment	**Date:** 03/04/2018
The explanation is acceptable to the assessment team as the same is considered from the 3rd party	

implementation guideline and thus CAR is closed.

CAR ID	07	**Section no.**	5.2	**Date:** 02/02/2018
Description of CAR				
As per PP "Project received EIA clearance from the authority". However, the EIA assessment/Clearance Certificate/document is not submitted to DOE. Corrective action is sought				
Project participant response				**Date:** 28/02/2018
Typographical error is regretted. The project being a small scale 3 MW hydro power project and hence EIA is not required. *Further this can be evident from the* in the Schedule I of the EIA notification S.O.1533 (E) dated 14th September 2006[21] , hydro power project of less than 50 MW are exempted from obtaining prior environmental clearance and thus an EIA is not required.				
Documentation provided by project participant				
Joint PD/MR Version 02				
DOE assessment				**Date:** 03/04/2018
The typographical error is now corrected. Moreover, *this can be evident from the* in the Schedule I of the EIA notification S.O.1533 (E) dated 14th September 2006[22] , hydro power project of less than 50 MW are exempted from obtaining prior environmental clearance and thus an EIA is not required. CAR is thus closed				

CAR ID	08	**Section no.**	5.3	**Date:** 02/02/2018
Description of CAR				

[21] http://envfor.nic.in/legis/eia/so1533.pdf
[22] http://envfor.nic.in/legis/eia/so1533.pdf

During the desk review related to stakeholder consultation following observation is made by the APPLUS project team: 1.The stakeholder documentation is also not provided to the DOE 2. The site photograph of LSHC meeting is not provided to the DOE. Corrective action is this sought for the same.

Project participant response	**Date:** 28/02/2018
1. Stakeholder documentation of the project activity has been submitted with PD Version 02 *2. Site photographs of LSHC meeting*	
Documentation provided by project participant	
List of attendees, MOM and site photographs *Joint PD and MR Version 02*	
DOE assessment	**Date:** 03/04/2018
The Stakeholder consultation documents are now submitted to the assessment team. Assessment team also checked the Minutes of meeting, attendance sheet and site photographs and confirm that the LSHC meeting were conducted in a fair and transparent manner. Moreover, assessment team also observed that a grievance register is also placed onsite and allowed stakeholder to comment on the project during the operation stage of the project. The procedure followed is acceptable to the assessment team and in accordance with the requirement of VCS. CAR is thus closed.	

CAR ID	09	**Section no.**	5.4	**Date:** 02/02/2018
Description of CAR				
During the desk review it is observed that the section in the VCS PD & MR contains details “The project is yet to be listed for comments from public. The comments or concerns raised during the Stakeholder meeting were addressed adequately”. How the concerned is addressed when the comments are yet to raise from GSC? Corrective action is sought.				
Project participant response				**Date:** 28/02/2018

Typographical error is regretted. The PD Version 02 has been revised with appropriate details of the stakeholder meeting being conducted at site.
Documentation provided by project participant
Joint PD and MR Version 02

DOE assessment	**Date:** 03/04/2018
Assessment team checked the web site for public comment and found that no public comment received for the project.http://www.vcsprojectdatabase.org/#/pipeline_details/PL1739. The typographical error is now corrected. CAR is thus closed.	

FOR VERIFICATION:

CAR ID	10	**Section no.**	3	**Date:** 02/02/2018
Description of CAR				
Assessment team found during desk review is that emission reduction sheet is missing for the project activity. JMR sheets and the invoices are missing. The claimed ER is thus reserved till submission of proper documents.				
Project participant response				**Date:** 28/02/2018
ER Calculation sheet along with Monthly JMR and Invoices has been submitted with PD Version 02.				
Documentation provided by project participant				
1. *ER Calculation sheet version 01* 2. *Monthly JMR and Invoices*				
DOE assessment				**Date:** DD/MM/YYYY
The JMR sheets and invoices for the complete monitoring is checked and found correct. The actual Emission reduction calculation is thus correct. CAR is closed.				

CAR ID	11	**Section no.**	Appendix	**Date:** 02/02/2018
Description of CAR				

The calibration certificates of and details for the individual PP are missing. The assessment is thus reserved until the calibration details are submitted.

The breakdown details for the complete monitoring period is missing. Log records are not submitted to DOE. Corrective action is sought in joint PD and MR and supporting documents are sought for the same.

The feeder details for the connected Hydro turbine is missing. Corrective action is sought in joint PD and MR and supporting documents are sought for the same.

Project participant response	**Date:** 28/02/2018

The Calibration details and Metering arrangement is depicted in the PD Version 02.

Breakdown sheet is also submitted for the reference.

Documentation provided by project participant

1.Calibration Reports of Main and Check meter

2. Breakdown Sheet

3. Joint PD/MR Version 02

DOE assessment	**Date:** 03/04/2018

Following observation are made by DOE:

1. The calibration details are checked and found correct by the assessment team. CAR is this closed

2. The break down details are checked and found correct. No unforeseen incident occurred during the monitoring period. The power plant undergone scheduled maintenance as per the manufacturer specifications. CAR is thus closed

3. The feeder details are now included in Joint VCS PD and MR. CAR is thus closed.

APPENDIX 3: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader/Lead Assessor	OR	DAS	SUKANTA	TQC-Outsourced entity	Yes	Yes	Yes	Yes

Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer (TR)	EI	Xue	Denny	Applus+ LGAI
2.	Approver	IR	Sendin	Juan	Applus+ LGAI

Short CVs of the Team:

1. Mr. Sukanta DAS, has done M. SC in (Electronics and Photonics) and M. Tech in (Energy technology) from Tezpur Central University/ Indian Institute of technology Bombay in India. He is a certified lead auditor for ISO 14001 EMS LA and ISO 9001 QMS LA from International registry for Certified Auditors (IRCA) and Certified Lean Management practitioner from Quality Council of India (QCI). He has more than Nine (9) years of working experience at TUV NoRD/ Re-consult/CRA/APROJECT OWNERSLUS certifications under various categories of projects stating from Renewable to waste to supercritical projects. He was JI/ CDM Lead Assessor in TUV NoRD and was involved in more than 100 CDM validation and verifications activities in Gold Standard, VCS, CDM projects as a team leader/technical reviewer / validator / verifier covering the sectoral scope 1, 13 technical areas 1.2/1.1/13.1. Currently he is associated with True Quality Certifications Private Limited and is empanelled with APROJECT OWNERSLUS certification to carry out GHG audit.

2. Hanshen (Denny) Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is an Auditor appointed by Applus+ LGAI for the GHG project assessment. He is based on Shanghai. He has 1.5 years of work experiences in CDM project development. Before he joined Applus+ LGAI, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

APPENDIX 4: ABBREVIATIONS

Abbreviations	Full texts
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CEA	Central Electricity Authority
CL	Clarification request
CM	Combined Margin
CMS	Central Monitoring system
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse gas(es)

GWP	Global Warming potential
HPERC	Himachal Pradesh state electricity regulatory commission
SCADA	Supervisory control and data acquisition
JMR	Joint Metering reading
RBI	Reserve Bank Of India
SERC	State Electricity regulatory commission

APPENDIX 5: CALIBRATION DETAILS OF THE PROJECT ACTIVITY (UNDERGONE VERIFICATION)

Assessment team found that being a Green field project activity and commissioned within 2 years, all meters are used for monitoring purpose are pre calibrated before installation as per state electricity board regulations, thus installed pre calibrated meters have validity of calibration till 5 years of commissioning date. The current monitoring period is within 2 years of commissioning date, thus all meters initial calibration is valid for current monitoring period. The meters are tested by state electricity board during commissioning, thus all meters have valid calibration period during current monitoring period.

The below mentioned meter and calibration details are for current monitoring period, and the same will be changed in future.

The Energy Meters details used for commissioned project activity is as below.

Meter Number and Type	Make and Type	Calibration Dates	Validity
HPU005424 (Main Meter)	Secure, E3M024	22/01/2016	21/01/2021
HPU005425 (Check Meter)		22/01/2016	21/01/2021
HPU005623[23] (Main Meter)[24]		01/08/2017	31/07/2022
HPU005624[25] (Main Meter)		01/08/2017	31/07/2022

[23] Substation Meters

[24] Due to change in interconnection point of project activity with the substation, the metering is being done with above set of main and check meters only.

[25] Substation Meters