



Verified Carbon Standard

PARBATI HYDROELECTRIC PROJECT, STAGE III



Project title	Parbati Hydroelectric Project, Stage III
Project ID	1425
Monitoring period	01-March-2021 to 30-June-2022 (Including first and last dates)
Original date of issue	29-February-2024
Most recent date of issue	10-October-2024
Version	03
VCS Standard Version	VCS Standard, Version 4.7
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CONTENTS

PROJECT DETAILS	4
1.1 Summary Description of the Implementation Status of the Project	4
1.2 Audit History.....	4
1.3 Sectoral Scope and Project Type	5
1.4 Project Proponent	5
1.5 Other Entities Involved in the Project	5
1.6 Project Start Date	5
1.7 Project Crediting Period	6
1.8 Project Location	6
1.9 Title and Reference of Methodology	7
1.10 Double Counting and Participation under Other GHG Programs	7
1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions.....	7
1.12 Sustainable Development Contributions	8
1.13 Commercially Sensitive Information.....	10
2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT	10
2.1 Stakeholder Engagement and Consultation.....	10
2.2 Risks to Stakeholders and the Environment.....	14
2.3 Respect for Human Rights and Equity	14
2.4 Ecosystem Health	16
3 IMPLEMENTATION STATUS	17
3.1 Implementation Status of the Project Activity	17
3.2 Deviations	18
3.3 Grouped Projects	20
3.4 Baseline Reassessment.....	20
4 DATA AND PARAMETERS.....	20
4.1 Data and Parameters Available at Validation	20
4.2 Data and Parameters Monitored.....	21
4.3 Monitoring Plan.....	25
5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	27
5.1 Baseline Emissions	27

5.2	Project Emissions	28
5.3	Leakage Emissions	28
5.4	GHG Emission Reductions and Carbon Dioxide Removals	28
APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION.....		30

PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Parbati Hydroelectric Project, Stage III is a large-scale hydro power project of 520 MW located in the state of Himachal Pradesh, India. It is a run-of-the-river scheme whose design discharge includes the diversion of the tail race releases of Parbati Stage-II Power house as well as inflows from river Sainj and Jiwa nallah This inflow of 177 cumec from Sainj river through 7.875 km long headrace tunnel utilized for generation of 520 MW (4x130 mw) in underground power house near village Bihali .Tailrace outlet near village Larji. The Underground powerhouse is designed for installation of four generating units each having a capacity of 130 MW and is utilised to generate 1,975.95 MU of electricity as per registered VCS PD.

The project aims to displace electricity produced by fossil fuel power plants harnessing hydel energy. The energy produced is supplied to the Indian National Grid. Therefore, the project reduces greenhouse gas emissions and thereby contributes to sustainable development. The project got commissioned in four phases, The 1st phase got commissioned on 24th March 2014 which is the start date of the project and the final 4th phase got commissioned on 06-June-2014. The detailed phase wise commissioning dates are mentioned in section 3.1 of this monitoring report. The project is registered at VCS (Project I.D. 1425¹).

During the current monitoring period of 01-March-2021 to 30-June-2022, the project has supplied 732,147 MWh of electricity to the Indian National Grid, and thus contributing to the GHG reductions of 708,572 tCO₂e.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	17-March-2016	VCS	Earthood Services Private Limited	-
Verification 1	24-March-2014 to 29-March-2015	VCS	Earthood Services Private Limited	1 Year, 6 Days
Verification 2	30-March-2015 to 28-February-2021	VCS	LGAI Technological Center, S.A.	5 Years, 11 Months
Verification 3	1-March-2021 to 30-June-2022	VCS	RINA	1 Year 2 Months

¹ <https://registry.verra.org/app/projectDetail/VCS/1425>

1.3 Sectoral Scope and Project Type

Sectoral scope	01 - Energy industries (renewable / non-renewable sources)
Project activity type	I - Renewable Energy Projects

1.4 Project Proponent

Organization name	NHPC Limited
Contact person	Mr. Avinash Kumar
Title	General Manager (Environment)
Address	NHPC Limited, NHPC Office Complex, Sector 33, Faridabad, 121003, Haryana, India
Telephone	0129-2278421
Email	cdm-env@nhpc.nic.in

1.5 Other Entities Involved in the Project

Organization name	MPCON Ltd
Role in the project	Project Consultant
Contact person	Mr Manoj Mishra
Title	Chief Engineer
Address	Ground Floor, Rajiv Gandhi Bhawan-2, 35, Shyamla Hills Bhopal-462002
Telephone	0755-4909829,2666556
Email	operationscc.mpcon@mpconsultancy.org

1.6 Project Start Date

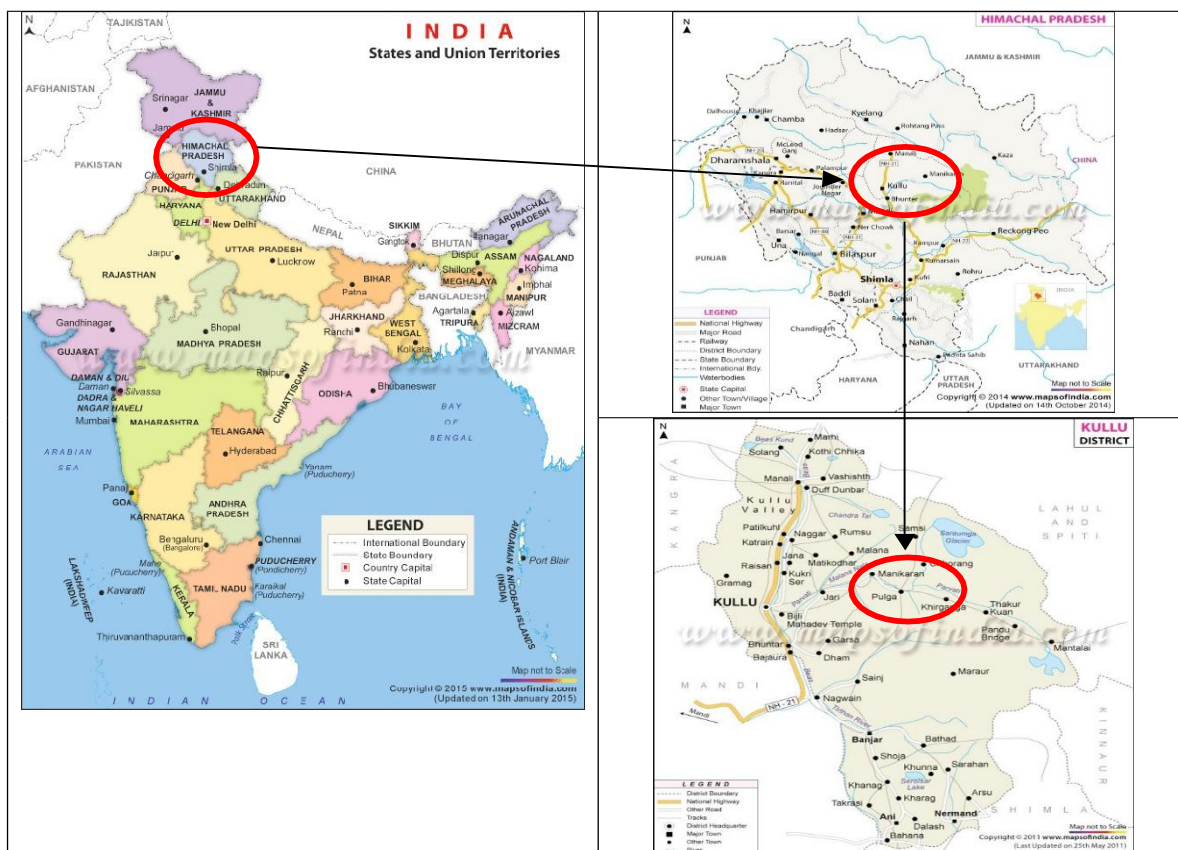
Project start date	24-Mar-2014
Justification	As per VCS Standard version 4.7, The project start date of a non-AFOLU project is the date on which the project began generating GHG emission reductions or carbon dioxide removals. Hence, the earliest date of commissioning is considered as project start date.

1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ 10 years (Renewable twice; Opted from the VCS Standard version 4.0 since the first validation of the project activity)
Start and end date of first or fixed crediting period	24-March-2014 to 23-March-2024

1.8 Project Location

Parbati Stage-III hydroelectric project is installed across Sainj and Jiwa nallah near Bihali village in Kullu distt. in the Himachal Pradesh state of India. The geographical co-ordinates of the project activity are Latitude: 32.5833N, Longitude= 77.5833E. The map below shows the exact location of the project activity:



1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID	Title	Version
Methodology	ACM0002	Grid-connected electricity generation from renewable sources	16.0 ²
Tools	Tool 07	Tool to calculate the emission factor for an electricity system	04.0 ³
Tools	Tool 01	Tool for the demonstration and assessment of additionality	07.0 ⁴

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit?.

☐ Yes ☒ No

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system?.

² <http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf>

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

☐ Yes ☒ No

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.12 Sustainable Development Contributions

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

For SDG- 7: Through this project activity, it has contributed towards SDG-7 i.e., Affordable and clean energy by setting up of 520 MW capacity run-of-the-river hydro power project.

For SDG- 4: NHPC Limited, along with technology supplier has provided 9 training related to technical and soft skills to its staff & other team members during the current monitoring period. The details of training have been provided to the VVB.

For SDG- 13: NHPC Limited is committed to work for mitigation of climate change by generating electricity using clean energy sources. In this current monitoring period, project has achieved GHG emission reductions of 708,572 tCO₂e

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 732,147 MWh renewable electricity has supplied to Indian National Grid during the reported period that helps to increase the renewable energy share in the energy mix.	Overall, 5,301,292 MWh (651,970 + 3,917,175 + 732,147) renewable electricity has been supplied to Indian National Grid throughout the project lifetime that helps to increase the renewable energy share in the energy mix
2)	4.4	4.4.1: Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill	Implemented activities to increase	Together with the technology supplier, the Project organize 9 training during the current monitoring period. Training related to technical and soft skills.	Overall, various trainings would be provided during over project lifetime.
3)	13.0	Total greenhouse gas emissions per year	Implemented activities to increase	By supplying 732,147 MWh of clean electricity to Indian National Grid, the project avoided release of 708,572 tCO ₂ e in to the atmosphere during the reporting period.	Overall prevented the release of 5,130,591 (630,977 + 3,791,042 + 708,572) tCO ₂ e into the atmosphere since project commissioning.

1.13 Commercially Sensitive Information

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

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification

In accordance with paragraph 3.18.1 of VCS Standard 4.7, which states, “In identifying stakeholders, the project proponent must consider the significance of user populations and how deeply affected they may be by the project activities, such that distant or intermittent user groups who will be affected in very limited ways by the project need not be defined as stakeholders,” A detailed stakeholder consultation process has been conducted by NHPC. This task was accomplished by the H.P. State Pollution Control Board. The Member Secretary has issued notice for environmental public hearing on 22nd July, 1998. An Environmental public hearing was conducted successfully on 27th August, 1998 at Village Larji in Distt. Kullu (H.P.)⁵

The stakeholders identified for the project activity are as follows:

1. Government Officials
2. Local Citizens
3. Representatives of affected people including women residing in the project area.
4. Representatives of Panchayats of villages

NGO representatives

⁵ Details of LSC meeting can be referred from Registered VCS PD available at <https://registry.verra.org/app/projectDetail/VCS/1425>

Legal or customary tenure/access rights	The PP holds the company ownership and land-use rights, granted through specific legal statutes.
Stakeholder diversity and changes over time	The project has been set up at Kullu district of Himachal Pradesh state (India), characterized by a vibrant tapestry of social, economic and cultural diversity. The project's impacts on stakeholder diversity over time are as follows:
Expected changes in well-being	Social Diversity: No adverse effects of the project activity on the social diversity of the project location (at Kullu) have been observed.
Location of stakeholders	Cultural Diversity: No negative impacts of the project activity on the cultural diversity of the project location have been identified.
Location of resources	Economic Diversity: The project contributes to the local economy by providing employment opportunities to the common folk. No detrimental effects on economic diversity have been recorded.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	As a part of ongoing communication with stakeholders, a dedicated visitor cum grievance register has been placed at the project site and accessible to stakeholders to provide their feedback on the project.
Date(s) of stakeholder consultation	A detailed stakeholder consultation process has been conducted by NHPC. This task was accomplished by the H.P. State Pollution Control Board. The Member Secretary has issued notice for environmental public hearing on 22nd July, 1998. An Environmental public hearing was conducted successfully on 27th August, 1998 at Village Larji in Distt. Kullu (H.P.)⁶ The stakeholders identified for the project activity are as follows: 1. Government Officials

⁶ Details of LSC meeting can be referred from Registered VCS PD available at <https://registry.verra.org/app/projectDetail/VCS/1425>

	2. Local Citizens 3. Representatives of affected people including women residing in the project area. 4. Representatives of Panchayats of villages 5. NGO representatives
Communication of monitored results	The monitoring results are communicated from the concerned individuals (stakeholders) to PP, through the grievance register. The site officials acknowledge and address the comments, suggestions, or grievances submitted by stakeholders, resolving issues as needed.
Consultation records	The consultation record (grievance register) is maintained by the site officials of the project activity.
Stakeholder input	Stakeholder input

2.1.3 Free, Prior, and Informed Consent

Consent	Following clause 3.18.8 of VCS standard v.4.7, the project proponent has disclosed 1. The minimum information, including the nature, size, pace, reversibility, and scope of the hydroelectric project activity; 2. The reason/purpose of the project, which is to implement the project activity that utilizes the renewable source of hydro-energy to produce electricity; 3. The duration of the project activity, set at 35 years; 4. The locations that will be affected, primarily the district Kullu (Himanchal Pradesh); and 5. A preliminary assessment of the likely economic, social, cultural, and environmental impact, including potential risks and fair and equitable benefit sharing in a context that respects the precautionary principle. Stakeholders were briefed that the project would bring solely positive effects on economic, social, cultural, or environmental aspects, including the production of electricity from
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	a renewable source of energy and increased employment opportunities. 6. Moreover, information regarding personnel likely to be involved in the execution of the proposed project, (including Indigenous Peoples, private sector staff, research institutions, government employees, and others), was shared with stakeholders, and the project was implemented after their collective consent. Hence, it is evident that the affected community was informed prior to the operational date of the project activity.
Outcome of FPIC	Adhering to the FPIC rights of the stakeholders, they were informed in advance regarding the implementation, the overall impacts and other relevant details of the project activity, through the stakeholders' consultation. And only after receiving the collective consent of the stakeholders, the project activity was implemented. The project has not encroached on land, relocated people without consent, and forced physical or economic displacement.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
NA	NA, since no grievances have been recorded for the current monitoring period.

2.1.5 Public Comments

The Global Stakeholder Consultation commenting period had been completed before first crediting period. **No comments** have been received outside the public comment period.

The web link of the project is given below:

<https://registry.verra.org/app/projectDetail/VCS/1425>

Summary of comments received	Actions taken
NA	NA

2.2 Risks to Stakeholders and the Environment

	Risk identified	Mitigation or preventative measure taken
Risks to stakeholder participation	No risk Identified	There are no exclusions, lack of communication or barriers in the project activity, that might prevent stakeholders from engaging or participating.
Working conditions	No risk Identified	There are no risks related to working conditions of the employees in the project activity, due to comprehensive safety training programs for the workers/employees.
Safety of women and girls	No risk Identified	The project activity has no negative impact over the safety of women and girls. No women or girls are employed at site location, Moreover, the project strictly adheres to the laws for the women and girls, demonstrating the commitment to address any threat related to the safety of the women/girls of the project location..
Safety of minority and marginalized groups, including children	No risk Identified	No threats to the safety of minority and marginalized groups, including children have been identified. The PP duly diligently follows the legal and human rights of the children, minorities and marginalized groups, and hence, the project poses no negative effects on them.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	Not Applicable	There is no risk due to generation of pollutants (noise, discharges to water, generation of waste, and release of hazardous materials), due to project activity. The project rather improves air quality by preventing fossil fuel burns and mitigates climate change by producing electricity from a clean source of energy, i.e. hydro energy.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	The PP strictly follows the national laws prohibiting discrimination and sexual harassment, and hence no discrimination or sexual harassment has occurred or will occur in the future.
Management experience	The PP has a proficient management team for the seamless operation of the project activity. The team consists of the members,

	having expertise in their relevant fields and who work closely with local communities and government agencies.
Gender equity in labor and work	The PP strictly follows the national laws promoting the gender equality in labor and work, and commits that equal opportunities have been or will be provided in the context of gender equity and pay for labor and work.
Human trafficking, forced labor, and child labor	The PP strictly follows the national laws prohibiting human trafficking, forced labor and child labor, and hence does not and will not use victims of human trafficking, forced labor, and child labor.

2.3.2 Human Rights

The following demonstrations show how the project is committed to safeguard the rights of IPs, LCs, and customary right holders, while following the international human rights law⁷, the UNDRIP⁸ and ILO Convention 169-

- **Free, Prior, and Informed Consent (FPIC)**: The project activity has obtained the FPIC from the local stakeholders including the IPs, LCs and customary right holders, ensuring their unforced consent before the project operation, respecting their right to make decisions.
- **Non-discriminatory Participation in the Project Activity**- The project employed people without cultural or social biases, safeguarding the rights of IPs, LCs, and customary rights holders to be free from discrimination.
- **Employment due to the Project Activity**- The project activity also leads to the employment from the IPs, LCs and customary right holders, enabling them to exercise their right to fair treatment in employment and salary.

2.3.3 Indigenous Peoples and Cultural Heritage

Not Applicable, As the project activity does not impact the tangible or intangible cultural heritage or the indigenous people nearby.

2.3.4 Property Rights

Disputes over rights to territories and resources	Not Applicable
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⁷ <https://www.ohchr.org/sites/default/files/Documents/Publications/fs9Rev.2.pdf>

⁸ https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

Respect for property rights	The land / property for the project activity belongs to the project proponent and, it can be supported through the relevant documents. Additionally, the project activity has obtained the free, prior and informed consent of the stakeholders (including the IPs, LCs, and customary rights holders). This ensures that their lands are property rights are protected and respected.
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2.3.5 Benefit Sharing

Summary of the benefit sharing plan	Since the above section 2.3.4 is not applicable, hence this section is also not applicable.
Benefit sharing during the monitoring period	N/A

2.4 Ecosystem Health

	Risk identified		Mitigation or preventative measure taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified		This project activity doesn't result in adverse effects; instead, it positively impacts on the biodiversity and ecosystem by decreasing air pollution and mitigating climate change.
Soil degradation and soil erosion	No risk identified		This project activity keeps check of the soil degradation and soil erosion by periodic monitoring.
Water consumption and stress	No risk identified		This project activity is a hydro power run-of-river project and does not have any negative impacts on water consumption or does not lead to water stress in any way.
Usage of fertilizers	No risk identified		Since, this is a hydroelectric project activity, hence it does not account for any adverse impacts associated with the use of fertilizers.

2.4.1 Rare, Threatened, and Endangered species

Not Applicable, Since the project activity involves the production of electricity utilizing the hydro energy, which is not located in or adjacent to habitats for rare, threatened, or endangered species; hence this cell is not applicable.

2.4.2 Introduction of species

Not Applicable, Since this project activity involves the production of hydroelectricity and its export to the Indian National Grid, and there is no planting or species introduction.

2.4.3 Ecosystem conversion

Not Applicable, as the project activity is neither (ARR) Afforestation, Reforestation & Revegetation, (ALM) Application Lifecycle Management, (WRC) Water Resilient Cities nor (ACoGS) Avoided Conversion of Grasslands and Shrublands

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The total installed capacity of the project activity is 520 MW consisting of 4 units of 130 MW each. The electricity generated is supplied to the Indian National Grid as per the signed power purchase agreement. The Project is already commissioned & fully operational. The details of commissioning are as follows:

Project Name	Unit NO	Capacity (MW)	Location	Commissioning Dates
Parbati Hydroelectric Project, Stage III	1	130	Kullu, Himachal Pradesh	24-March-2014
	2	130		24-March-2014
	3	130		30-March-2014
	4	130		06-June-2014
Total		510		

- During current monitoring period (01-March-2021 to 30-June-2022), There has been no major downtime of equipment's, overhaul times or exchange of equipment's in the project activity during the current monitoring period.
- The other entity involved has been changed to MPCON Limited which is a consulting company for the verification of the project
- There has been no change in technical parameters of the project as provided in registered VCS PD (Project I.D. 1425⁹).
- During the current monitoring period there no events and/or situations have occurred that may impact the applicability of the applied methodology.

⁹ <https://registry.terra.org/app/projectDetail/VCS/1425>

3.2 Deviations

3.2.1 Methodology Deviations

Not Applicable, as there are no methodological deviations applied during current monitoring period.

3.2.2 Project Description Deviations

Project description deviations applied and approved in the 1st periodic verification period. (24-March-2014 to 29-March-2015.)

Deviation- 1: The source document for electricity exported has been changed from Joint Meter Reading (JMR) to “Deviation Settlement Account document” which are publicly available documents issued by the ‘Northern Regional Power Committee”, Ministry of power; Government of India.

The nature of above applied deviation is permanent and have already been approved in the previous verification¹⁰.

Deviation- 2:

- The source for the import data has been changed from Monthly electricity sales bills to import data certified by State Electricity Board.
- The second deviation is related to applying Maximum permissible error factor in the import meter reading, as the calibration of the import meters is not under the control of PP. The state electricity board who decides about when to calibrate the import meters. The state electricity board does not share the calibration certificates with the PP for import meters and this is common practice followed by them.

The nature of above applied deviation is permanent and have already been approved in the previous verification¹¹.

Project description deviations applied and approved in the current (3rd periodic) verification. (01-March-2021 to 30-June-2022.)

Deviation 3:

During current monitoring period (01-March-2021 to 30-June-2022), There is a change in other entity as per registered VCS PD. The details for other entity involved for the current monitoring period is mentioned below-

Organization name	MPCON Ltd
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¹⁰ <https://registry.verra.org/app/projectDetail/VCS/1425>

¹¹ <https://registry.verra.org/app/projectDetail/VCS/1425>

Role in the Project	Project Consultant
Contact person	Mr Manoj Mishra
Title	Chief Engineer
Address	Ground Floor, Rajiv Gandhi Bhawan-2, 35, Shyamla Hills Bhopal-462002
Telephone	0755-4909829,2666556
Email	operationscc.mpcon@mpconsultancy.org

The applied deviation doesn't have any impact on the project applicability, baseline scenario, additionality etc.

Deviation 4:

During current monitoring period (01-March-2021 to 30-June-2022), The project activity involves Import parameter as a monitoring parameter and PP has monitored this parameter. However, the available calibration report covers period until April 2022 and hence there is gap of 2 months in meter calibration for import value. Thus, project description deviation is requested for application of 100% error factor for import value due to delay in calibration. Application of 100% error factor is conservative

Justification: The non- availability of calibration of import meters are justified as below and conservative approach has been followed for import values for the delayed period

- The import meters are not under control of PP.
- As per VCS Registered PD "The Import meters will be calibrated and maintained by state electricity Board", thus PP do not have import meters calibration certificates.
- Since there is monetary transaction involved and PP need to pay to state electricity Board for import of electricity, thus state electricity board ensures that meters are running accurately. PP do not have any role for calibration of meters.
- It is the state electricity board who decides about when to do calibration of import meters.
- The state electricity board is not sharing calibration certificates to PP for import meters and this is common practice followed by them.
- All Import meters are under calibration till the month of April 2022. For the period where calibration details are not available e.g., May 2022 & June 2022, an appropriate error factor (100%) is applied to the total import value for the corresponding month. Also, as the calibration is partially covering April 2022 month, hence as a conservative approach, error factor has also been applied for the full month import value for April 2022. Thus, project description deviation is requested for application of 100% error factor for import value due to delay in calibration for 3 months (01 April 2022 to 30-June-2022), which is conservative
- Hence, as a conservative approach, the applied Import value for the delayed period shall be $(\text{Export}_{\text{MWh}} * (1+100\%))$

The applied deviation doesn't have any impact on the project applicability, baseline scenario, additionality etc.

3.3 Grouped Projects

Not Applicable, as project is not a grouped project

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ¹²
Value applied	0.9862
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 04.0.0” as 3-year generation weighted average using data for the years 2011-12, 2012-13 & 2013-14. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9495
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 04.0.0” as 3-year generation weighted average using data for the years 2013-14. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version

¹²https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver10.pdf

	10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9678
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 50% W_{BM} = Weighting of build margin emissions factor (%) = 50%
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Energy Meters
Description of measurement methods and procedures to be applied	Net electricity supplied to grid will be calculated as Net electricity generated and supplied by the project plant/unit to the grid = Electricity exported by the project to the grid at project site switch yard – Electricity imported by the project from the grid at interconnection point of the Regional Supply $EG_{PJ,y} = EG_{Export,y} - EG_{Import,y}$
Frequency of monitoring/recording	Continuous measurement and at least monthly recording

Value monitored	732,555
Monitoring equipment	Not applicable, as this is a calculated value
QA/QC procedures to be applied	Not applicable, as this is a calculated value
Purpose of the data	Calculation of Baseline emissions
Calculation method	$EG_{PJ,y} = EG_{Export,y} - EG_{Import,y}$ $EG_{PJ,y} = 735,549 - 3,402$ $EG_{PJ,y} = 732,147$
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

Data / Parameter	$EG_{Export,y}$
Data unit	MWh
Description	Quantity of Electricity exported by the project to the grid at project site switch yard in year y
Source of data	Deviation Settlement Account statement issued by NRPC
Description of measurement methods and procedures to be applied	Monitoring equipment: Tri-Vector Energy Meters of 0.2s accuracy class Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: 5 years Electricity exported by the project to the grid at project site switch yard is the Net Transmitted Units recorded and monitored by the metering system installed at the project site switch yard. The metering system comprises of four individual special energy meters (SEMs) (acts as standby meters) installed at the project site switch yard, for each generating unit. These are connected via two transmission lines of 400 kV, each having its own SEM meter (main meter and check meter). In case, anyone transmission line in not in service than complete load is shifted to other transmission line which is in operation.

	The energy meters are tri-vector meter which are installed and sealed by the Power Grid Corporation Limited in the presence of the representatives of the power producer. The energy meters have capacity of recording both import & export; however net transmitted units are recorded & monitored. Northern Regional Power Committee monitors the export of project activity through online on daily basis and publishes weekly Deviation Settlement Account where actual export value is mentioned. The check meter shall be used during the period the main metering system is not in service. Further in case of failure of both main meter and check meter, sum of the net electricity generation recorded by four individual special energy meters (SEMs) and individual auxiliary meters shall be used for accounting and billing purpose. Records of Deviation Settlement account is used for the calculation of electricity exported by the project to the grid at project site switch yard. The deviation Settlement account statement mentioned collectively total export of all units and all transmission lines.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	735,549
Monitoring equipment	Tri-Vector Energy Meters of 0.2s accuracy class. The details of meters & calibration details are provided in Section 4.3 of this Monitoring Report.
QA/QC procedures to be applied	The export energy meters were supposed to be calibrated once in a five-year period; however, the calibration of the energy meters was not valid for the duration from 01-March-2021 to 28-June-2022. The PP has applied appropriate error factor for the same. Please refer section 4.3 for details. EG_{Export,y} is cross checked from Monthly Generation Report. The Monthly generation report gives the gross generation by the project activity and this monthly generation report value should be higher than export value mentioned in deviation Settlement account.
Purpose of the data	Calculation of Baseline emissions
Calculation method	NA

Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.
Data / Parameter	EG_{Import,y}
Data unit	MWh
Description	Quantity of electricity imported by the project plant/unit from grid in year y
Source of data	Data certified by state electricity board
Description of measurement methods and procedures to be applied	Monitoring equipment: Tri-Vector Energy Meters of 0.5s accuracy class Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: 5 years The Project activity has provision for two 11kV Electricity Supply line from State Electricity Boards system however only single line is connected which is used to import electricity during start-up, shutdown and the lean period. The Electricity imported during start-up, shutdown and the lean period would also be recorded and monitored. Especially, in winter season when the project is partially or totally unable to operate, the project draw energy required for startup and maintenance of the project from the State Electricity Boards system, which is metered at the interconnection point of the regional supply. The data is recorded by duly tested and sealed meter installed by State Electricity Board. The meters are calibrated and maintained by State Electricity Board. Records of monthly electricity sales bills raised by State Electricity Board are used as evidence for power imported from the State Electricity Grid.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	3,402
Monitoring equipment	Special Energy Meters (SEMs) of 0.5s accuracy class. The details of meters & calibration details are provided in Section 4.3 of this Monitoring Report.

QA/QC procedures to be applied	The import energy meters were supposed to be calibrated once in a five-year period, however, the calibration of the energy meters was not valid for the duration from 21-April-2022 to 30-June-2022. As these meters are under the custody of the state electricity board, the project proponent could not arrange post calibration of these meters. Therefore, the project proponent has sought a deviation in the current monitoring period. The detail justification of the deviation is provided in 3.2.2 of the monitoring report. The project proponent has applied 100% error in the import readings from 01-April-2022 to 31-June-2022. Please refer section 4.3 for the calibration details and the error applied.
Purpose of the data	Calculation of Baseline emissions
Calculation method	NA
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

4.3 Monitoring Plan

The project proponents at the power station have a procedure to ensure proper monitoring of the VCS project activity. The project activity has installed monitoring and control equipment that measure, record, report, monitor and control various key parameters.

The methodology requires monitoring of the net electricity supplied from the project activity. The proponent is maintaining complete and accurate records and all other data required for the purpose of proper administration and operation of the hydro power plant. The data are kept for at least 2 years after the end of the crediting period.

- Purpose** - The purpose of monitoring the project is to assess the annual emission reductions in tonnes of CO₂ that the project activity has achieved.
- Data to be reported** - EG_{PJ,y} in MWh and periodical calibrations of monitoring equipment's
- Origin of data and monitoring including estimation approach**- Net electricity generate and supplied to Indian National Grid is sourced from Deviation Settlement Account statement issued by Northern Regional Power Committee.
- Meter Details**

The details of the Export Meters are given below.

Meter Details	Main meter Line 1	Check meter Line 1	Main meter Line 2	Check meter Line 2
Meter SI. No	NP-8576-A	NP-8577-A	NP-8592-A	NP-8540-A
Meter model & make	ER300P L&T			
Accuracy Class	0.2s			
Calibration Frequency	5 yrs			
Calibration date & Validity	All Meters were calibrated as below			
	No	Calibration Date	Calibration Validity	
	1	11-June-2013	10-June-2018	

	2	29-June-2022 ¹³	28-June-2027
Detail of Meter Change	No Change		
Delayed calibration	1-March-2021 to 30-June-2022		
Error Factor	There was a delay in calibration from 1-March-2021 to 30-June-2022. The PP has applied appropriate error factor for the same in estimation of ER		

Details of the import meters are as follows:

No.	Meter location	Meter Identification	Make	Accuracy Class	Calibration date	Calibration Validity
1	BHB 1 (OLD OFFICE)	30825	SEMS Premier	0.5s	19-April-2017	19-April-2022
2	BHB 8 (Administrative Building)	547566	Secure		19-April-2017	19-April-2022
4	SPB1 (Sapangini Township)	6645897	L & T		20-April-2017	20-April-2022
4	BHB12 (Power House)	7044580			19-April-2017	19-April-2022
5	SJP16 Dam Site)	6769799			20-April-2017	20-April-2022
6	BHB13 (Surge Shaft)	229228	HPL Electric & power Pvt Ltd		19-April-2017	19-April-2022
7	LDT 1 (TRT)	226972			20-April-2017	20-April-2022
All Import meters are under calibration till the month of April 2022. For the period where calibration details are not available e.g., May 2022 & June 2022, as per deviation applied in section 3.2.2 of this report, appropriate error factor is applied to the total import value for the corresponding month. Also, as the calibration is partially covering April 2022 month, hence as a conservative approach, error factor has also been applied for the full month import value for April 2022.						
Error Factor Applied for period: 01 April 2022 to 30-June-2022						

5. **Monitoring times and periods-** The data is monitored on a continuous basis but is recorded on a monthly basis with the energy meters installed at the site.
6. **Data Accuracy-** As per clause 4.0, Metering Arrangement of the Power Purchase Agreement (PPA) the metering arrangement including its installation, testing, maintenance and collection transportation and processing of data required for energy exchange is governed as per the notification/ directives issued/or to be issued by Central Electricity Regulatory Commission and as per relevant provisions contained in IEGC as amended from time to time. The Central Electricity Authority (CEA) notification regarding Installation and Operation of meters regulations, 2006, says that meters are required to

¹³ Latest Calibration

- be tested once in 5 years (refer clause 18 of the guideline)”¹⁴. Thus, the meters recording the electricity exported are calibrated at least once in 5 years.
7. **Emission Reduction Calculation Approach-** The emission reductions are calculated as a product of the net electricity generated from the project activity and the combined margin emission factor. The calculation approach is explained in detail under section 5 of this document.
 8. **Managing Data Quality-** The Power plant In-charge prepares the report pertaining to the recorded values of the monitored parameters as by the shift-in- charge. The day-to-day records are verified, compiled and documented by Unit Head. The company has introduced a safe storage of data. NHPC is an ISO– 9000, and ISO– 14000 certified company having an integrated management system. It also ensures that requirements are met for the project as well.
 9. **Monitoring roles and responsibilities-** A project team is constituted for the monitoring of the project, which is responsible for data collection and archiving. The team meets periodically to review the data collected as per section 4.2. In case of any irregularity observed by any of the team members, it is informed to the concerned person for necessary actions to be taken. The following is the team structure for project monitoring:
 - Unit Head: Overall responsibility of compliance with the monitoring plan.
 - Power Plant In-charge: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation
 - Shift In-charge: Responsibility of daily report generation from the SCADA system/ log-books.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per registered PD, Baseline emission is

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr)

¹⁴ CEA metering regulation clause 18 on page 12 of the regulation http://www.powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr)

$EF_{grid,CM,y}$: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂e/MWh)

Based upon monitoring values:

Baseline Emission:

$$BE_y = 732,147 * 0.9678$$

$$= 708,572 \text{ tCO}_2\text{e (round down values)}$$

5.2 Project Emissions

As per registered VCS PD, there are no any project emissions occurred for the project activity. Hence, $PE_{FF,y} = 0$.

5.3 Leakage Emissions

As per registered VCS PD & para 60 of ACM0002 version 16, No leakage emissions need to considered for the project. Hence, $LE_y = 0$.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

The net GHG Emission Reductions in this monitoring period is shown in following table:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCUs (tCO ₂ e)
01-March-2021 to 31-December-2021	552,544	0	0	0	0	552,544
01-Januray-2022 to 30-June-2022	156,028	0	0	0	0	156,028
Total	708,572	0	0	0	0	708,572

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions / removals	Percent difference	Explanation for the difference
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01-March-2021 to 31-December-2021	1,597,969	552,544	-65%	As the project is a hydropower project, the energy generation depends on water availability. The availability of water is not under the control of the Project Proponent. The difference in ex-ante emission reductions is due to the non-availability of water in the monitoring period.
01-Januray-2022 to 30-June-2022	943,064	156,028	-83%	
Total	2,541,033	708,572	-72%	

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Not Applicable.