

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

RELATED SUPPORT – **TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

Key Project Information

SECTION A - Description of project

SECTION B - Implementation of project

SECTION C - Description of monitoring system applied by the project

SECTION D - Data and parameters

SECTION E - Calculation of SDG Impacts

SECTION F - Safeguards Reporting

SECTION G - Stakeholder inputs and legal disputes

KEY PROJECT INFORMATION

Programme of Activity Information – (delete below table if N/A)

GS ID of Programme	GS1247
Title of Programme	GS1247 Improved Kitchen Regimes Multi-Country PoA
Version of POA-DD applicable to this monitoring report	15.3
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	GS1247 VPA 159 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7132) GS1247 VPA 160 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7133) GS1247 VPA 161 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7134) GS1247 VPA 162 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7135) GS1247 VPA 163 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7136) GS1247 VPA 198 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7470) GS1247 VPA 199 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7471) GS1247 VPA 200 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7472) GS1247 VPA 201 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7473) GS1247 VPA 202 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7474)

Key Project Information

GS ID (s) of Project (s)	GS 7132 GS 7133 GS 7134 GS 7135 GS 7136 GS 7470 GS 7471 GS 7472
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	GS 7473 GS 7474
Title of the project (s) covered by monitoring report	GS1247 VPA 159 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7132) GS1247 VPA 160 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7133) GS1247 VPA 161 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7134) GS1247 VPA 162 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7135) GS1247 VPA 163 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7136) GS1247 VPA 198 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7470) GS1247 VPA 199 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7471) GS1247 VPA 200 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7472) GS1247 VPA 201 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7473) GS1247 VPA 202 Improved Kitchen Regimes Manica Province Safe Water (Mozambique) (GS7474)
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	GS 7132: Version 5 GS 7133: Version 5 GS 7134: Version 5 GS 7135: Version 5 GS 7136: Version 5 GS 7470: Version 3 GS 7471: Version 3 GS 7472: Version 3 GS 7473: Version 3 GS 7474: Version 3
Version number of the monitoring report	Version 2
Completion date of the monitoring report	18/12/2023
Date of project design certification	04/12/2019
Date of Last Annual Report	23/12/2022

Monitoring period number	MP4
Duration of this monitoring period	All VPAs: 01/07/2022 – 30/06/2023
Project Representative	CO2balance UK Ltd
Host Country	Republic of Mozambique
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	TPDDTEC v.1
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved		Units/ Products
SDG 3 Good Health and Well-being	Additional people consuming safe water	GS 7132	6063	Number of people
		GS 7133	6353	
		GS 7134	5817	
		GS 7135	6136	
		GS 7136	6574	
		GS 7470	6034	
		GS 7471	6616	
		GS 7472	6408	
		GS 7473	7121	
		GS 7474	6825	
SDG 5 Gender Equality	Variation of time spent on firewood and water collection	GS 7132	1.44	Hours
		GS 7133	1.44	
		GS 7134	1.44	
		GS 7135	1.44	
		GS 7136	1.44	
		GS 7470	1.44	
		GS 7471	1.44	
		GS 7472	1.44	
		GS 7473	1.44	
		GS 7474	1.44	
SDG 6 Clean Water and Sanitation	People gain access to safe water	GS 7132	8861	Number of People
		GS 7133	9285	
		GS 7134	8502	

	GS 7135	8968	
	GS 7136	9609	
	GS 7470	8819	
	GS 7471	9669	
	GS 7472	9366	
	GS 7473	10407	
	GS 7474	9974	
SDG 13 Climate Action Emissions Reduction	GS 7132	9791	tCO2e
	GS 7133	9982	
	GS 7134	8723	
	GS 7135	6602	
	GS 7136	6460	
	GS 7470	6354	
	GS 7471	6177	
	GS 7472	6314	
	GS 7473	6279	
	GS 7474	6564	

Table 2 – Product Vintages

GS7132

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	4936
01/01/2023	30/06/2023	4855

GS7133

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	5033
01/01/2023	30/06/2023	4949

GS7134

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	3774
01/01/2023	30/06/2023	4949

GS7135

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1665
01/01/2023	30/06/2023	4937

GS7136

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1489
01/01/2023	30/06/2023	4971

GS7470

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1539
01/01/2023	30/06/2023	4815

GS7471

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1554
01/01/2023	30/06/2023	4623

GS7472

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1519
01/01/2023	30/06/2023	4795

GS7473

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1398
01/01/2023	30/06/2023	4881

GS7474

		Amount Achieved
Start Dates	End Dates	VERs
01/07/2022	31/12/2022	1645
01/01/2023	30/06/2023	4919

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

>> The Micro-Scale VPA Manica Province Safe Water project is eligible under the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption Version 1.0. The project supports the provision of safe water using borehole technology to hundreds of households within Manica Province, Mozambique. By providing safe water, the project ensures that households consume less firewood during the process of water purification and as a result there is a reduction of carbon dioxide emissions from the combustion process.

Manica Province is a largely rural province where local people typically use wood fuel on inefficient three stone fires to purify their drinking, cleaning, and washing water. This process results in the release of greenhouse gas emissions from the combustion of wood - this can be avoided if a technology that does not require fuel (wood or fossil) supplies clean water desired by households.

Many existing boreholes were established by community groups or community-based organizations (CBOs) and have fallen into disrepair because maintenance programmes have been poorly managed or proven too expensive. CO2balance is working in partnership with British NGO, Village Water, to work with a local NGO and communities in Manica Province. We identified communities in need of a safe water source and located broken down boreholes in need of rehabilitation. We include these in the project and rehabilitate the boreholes so that communities have reliable access to clean, safe water. The capacity of communities to maintain their boreholes will also be supported through the project to ensure that the water keeps flowing. The boreholes included under the project are entirely emission-free as they are hand-pumps. The depth of the boreholes will be limited to 100m or less.

CO2balance and Village Water deliver the maintenance programme for all the boreholes rehabilitated in the project activity. The quality of the water delivered by the boreholes is fit for human consumption for the entire length of the project.

This project is developed under the Gold Standard carbon accreditation body who verify the carbon credits and measure the local social, environmental and economic impact.

The date of rehabilitation is confirmed by a Repair Confirmation Form which was signed by the mechanic carrying out the repair along with a village administrator from the local community. The date of rehabilitation is used as the start date of operation and crediting for each borehole; we have conservatively assumed that the first day of crediting is not counted.

The number of days each borehole credited for in this monitoring period was multiplied by the number of people using the borehole to give the total number of project technology days for that borehole. The individual project technology days for each borehole were totaled to give the total number of project technology days for this monitoring period.

A.2. Location of project

Below are details of the physical location to allow unique identification of the project. The Manica Province is marked in red in Figure 1 below. The target area and the fuel collection area are defined as being contained within the project boundary, with the outer limits of the project boundary being clearly defined below. As the majority of beneficiaries collect their wood fuel locally in close proximity to their homesteads, the wood fuel collection area and target area are considered the same.



Figure 1 Project area - Manica Province, Mozambique (Google Earth image).

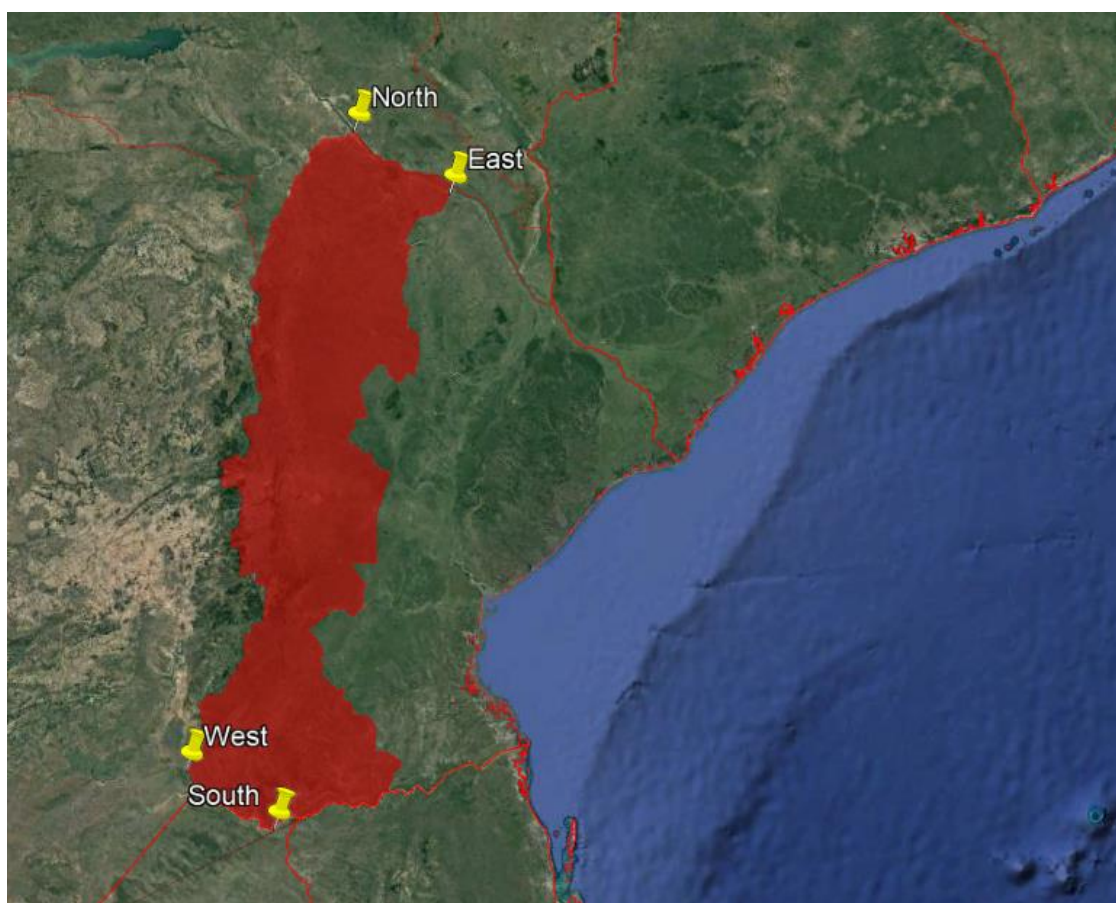


Figure 2 The northern, eastern, southern and western boundaries of the project area pinned in yellow.

All villages are within the project boundary shown in Figures 1 and 2 above. The table below shows the extent with latitude and longitude coordinates.

Table 2 North, South, East, West project area coordinates.

Project Area Coordinates		
	Latitude	Longitude
North	16°23'7.12"S	33°47'4.90"E
South	21°35'9.51"S	33° 4'3.46"E
East	16°51'59.19"S	34°32'5.72"E
West	21° 8'12.18"S	32°22'0.32"E

In total 240 boreholes were rehabilitated as part of this project between 09/04/2019 and 13/04/2022. During this monitoring period no additional rehabilitations were carried out. The type of pump used for all boreholes rehabilitated is Afridev. The rehabilitation date, location and number of people served by each borehole are included in the project database that is shared during verification.

A.3. Reference of applied methodology

>> This project applies the Gold Standard Methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 1'.

A.4. Crediting period of project

>> The date of rehabilitation was used as the start date of operation. It was conservatively assumed that the first day of crediting is not counted and the crediting period begins the following day after the borehole is rehabilitated.

The length of the crediting period is 5 years as per the approved PDD.

The start dates for the projects, and crediting periods, are as follows:

Project ID	Crediting Period Start Date	Crediting Period End Date
GS 7132	19/06/2019	19/06/2024
GS 7133	01/10/2019	01/10/2024
GS 7134	15/05/2019	15/05/2024
GS 7135	10/04/2019	10/04/2024
GS 7136	29/08/2019	29/08/2024
GS 7470	31/05/2019	31/05/2024
GS 7471	31/05/2019	31/05/2024
GS 7472	14/06/2019	14/06/2024
GS 7473	10/09/2019	10/09/2024
GS 7474	18/09/2019	18/09/2024

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

CO2balance and Village Water have rehabilitated 240 boreholes as part of this project. The boreholes are in working order but a few of them went through some technical problems and didn't produce safe water while they were not functional; the non-functional days have been discounted from the ERs.

Hand pump specifications:

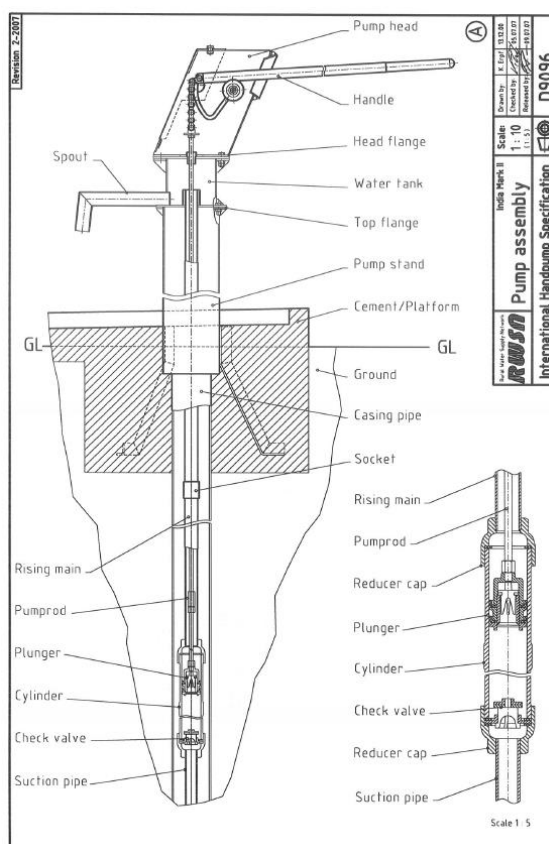


Figure 3 Examples of the Afridev Handpump and India Mark II. During the project the boreholes rehabilitated were Afridev only.

Technical Specifications:

	Afridev	India Mark II
Cylinder Diameter (mm)	50	63.5
Maximum Stroke (mm)	225	125
Approx. discharge at about 75 watt input (m³/h)	At 10m head 1.4	at 10 m head 1.8
	At 15 m head 1.1	at 15 m head 1.3
	At 20m head 0.9	at 20 m head 1.0
	At 30m head 0.7	at 30 m head 0.8
Pumping Lift (m)	10-45	10-50
Water Consumption (litres per capita)	15-20	15-20

Borehole Functionality

The in-country partner are the main contact for all water point committees which exist for every borehole. If there are any problems with borehole functionality, the water resource committee will contact the in-country partner to inform them.

For major repairs, the Community Water Committee reports the problem to the partner, who contacts the technicians; the technicians visit the site and conduct a technical assessment and repairs if possible, if they need extra materials they arrange for a time to revisit and carry out the maintenance. When the cause of the pump malfunction is a major problem and a technician is needed, the maintenance forms are signed by the technician, by a member of the Water Committee and by a representative of the project.

If the breakdown is minor, the community looks after the repair themselves: a local pump minder will assess the problem and get the parts. The costs are covered with the fees paid by the members of the community. The community informs the local partner stating the problem, the non-functional days and the details of the repairs done, and should report the work and cost in the log-books. When the cause of breakdown is minor and the community enacts the repair, the form is signed by a

representative of the project as the community usually informs our local partner of the problem and parts repaired via phone.

The local partner shares activities with Village Water who inform CO2balance when the borehole is not functional. The non-functional days are then discounted in the PTDs and the ERs are not accredited for those days.

A full breakdown of all boreholes that underwent any maintenance during this MP has been supplied in the accompanying Emissions Reductions spreadsheet under the specified maintenance section. This details all works required, carried out, date from reported first break down to repair as well as whether the repair was carried out by the community or project partner/technician. An additional down day has been added to all total non-functional days per repair for added conservativeness.

Water Quality Testing

All boreholes undergo water quality testing to ensure the water is safe for human consumption as per Mozambique national water standards.

Feedback Mechanisms

Grievance log-books are placed at boreholes and any feedback received during this monitoring period from the borehole users regarding damage or breaking of boreholes is shared through telephone and verbal reports. The feedback/grievance mechanisms were discussed during the LSC so that all relevant stakeholders are aware of the processes in place for reporting any issues.

B.1.1. Forward Action Requests

MP3:

No FARs were raised during the last Monitoring Period reviews.

B.2. Post-Design Certification changes

>> N/A

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

>> N/A

B.2.2. Corrections

All breakdowns are recorded, maintenance and re-repairs are carried out on a regular basis as and when needed, ensuring that communities are able to access safe water throughout the project even during the rainy season when access to communities for monitoring has been impacted.

B.2.3. Changes to start date of crediting period

>> N/A

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

>> These VPAs transitioned to GS4GG. The Monitoring Plan was therefore updated from including Sustainable Development Indicators to monitoring impacts and contributions towards the Sustainable Development Goals as per the approved Transition Annex.

The $W_{p,y}$ and $W_{b,y}$ value changed in the previous monitoring period and remains as a permanent change. Previous monitoring periods used a measured baseline value obtained from the Baseline Water Boiling Test. However, the recent update to the parameters means a cap has now been introduced which has been applied to this project since the previous monitoring period - considering the firewood required to boil 1 litre of water for 10 minutes using a three stone fire (0.4 kg/L).

Updates have been made to parameter EF (Non-CO₂ CH₄ and N₂O emission factor arising from use of wood fuel in baseline scenario), as the new rule update came into force on 01/01/2021, both 2021 and 20222 vintages have been calculated with the updated AR5 value in the corresponding parameter box.

B.2.5. Changes to project design of approved project

>> N/A

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

All surveys are administered by trained CO2balance staff and in-country partner employs local staff who are conversant in the local dialects to ensure that the responses are consistent and not biased by any regional language barriers. Each participant is provided with a briefing on the purpose of the survey and is assured that no individual names are used in the presentation of analysis.

The Project and Usage Survey are deployed via mobile devices, where all the answers are securely stored online. The results of the surveys are then downloaded and collated in Excel spreadsheets and stored on a central server in an electronic format.

The Water Consumption Field Test (WCFT) survey is carried out on paper and all the original copies are retained in the office and are scanned upon request of the UK team. The results of the surveys are collated in Excel spreadsheets and stored on a central server in an electronic format. These are then sent to the UK head office for data analysis. The documentation procedure that CO2balance has devised ensures a minimum chance of original data being lost and data entry error.

Below is a summary of the key information that has been collected and monitored as part of this project;

Borehole database

The borehole rehabilitation record includes the following information:

- Date of rehabilitation
- Quantity of boreholes installed
- The total number of people obtaining their water from each borehole
- Mode of use: commercial/domestic
- Model of the borehole

The installation record will be backed up electronically, with original documentation being stored in the appropriate office for the respective VPAs.

All data collected in relation to the project is held in the local office and/or on the Project Database for the entire life cycle of the project and a period of 2 years afterwards. The data may be archived during the project in order to maintain clarity and security.

Ongoing Monitoring Studies

The following ongoing monitoring studies were conducted; the results are given in the parameter boxes tables:

- Water Consumption Field Test (WCFT):** For this Monitoring period, PP decided to utilise the values gained from previous WCFT survey. According to the methodology, the WCFT tests are representative of project technologies every 2 years; and hence the test can be conducted every other year. The Water Consumption Field Test was carried out on a randomly selected sample of 40 households from the project database in Manica province. This complies with the recommended minimum sample size of 30 in the Gold Standard requirements.

The test was carried out over a period of four days (1 day preparation and 3 days measurement) following a similar method as the Kitchen Performance Test, and all tests were conducted between 15/09/2021 – 29/09/2021. The total litres of water consumed each day was measured and divided by the number of people consuming water in that day – this measurement was repeated over 3 consecutive days and an overall average per household was calculated. The results showed that on average 8.15 litres of non-boiled clean water used only for drinking, hand washing and food preparation (capped at 7.5l) and 0 litres of boiled clean water is consumed per person per day.

The total amount of water credited for in this monitoring period is equal to the average amount of clean non-boiled water consumed per person per day (7.5l), minus the average amount of boiled clean water consumed per person per day (0 litres).

The WCFT is carried out by staff trained by CO2balance to meet the specific requirements of the methodology. All data presented in Excel is subject to checking and cross referencing of a sample of the raw data by CO2balance.

- **Water Quality Test (WQT):** The quality of the treated water is assessed to ensure that it is fit for human consumption. This is done in accordance with Mozambique national standards. The parameters used to assess the water quality are in line with Mozambique standards for potable water and all parameters need to be within levels considered acceptable for domestic human consumption.
- **Usage Survey:** Usage Survey is used to determine the $U_{p,y}$ (usage rate in the project scenario p through year y) parameter. The annual usage survey is conducted, exceeding the minimum sample size requirement of 100 as 130 surveys were carried out. During this monitoring period the Usage Survey was conducted between 17/04/2023-21/04/2023 and found a usage rate of 99.55%, which has been capped at 95% to be conservative.

The updated and approved Usage Survey also captures average litres collected from the borehole per household across seasons – used to gain an average litres per user figure.

- **Project Survey** – Conducted annually to survey end users currently using project technologies in order to explore changes in project scenario over time. The annual project survey is conducted, exceeding the minimum sample size requirement of 100 as 130 surveys were carried out. Individual participants were selected from the borehole user data base using the random sampling process outlined in the monitoring plan. Sample sizes are in line with the Gold Standard requirements. During this monitoring period the Project Survey was conducted between 17/04/2023-21/04/2023. Data collected during the project surveys explores the following characteristics:
 - General information – Name, address, telephone number etc.
 - Household socio-demographic information
 - Water use and purification characteristics
 - Sources and availability of fuel
 - Time use and time saved information
 - Hygiene and Sanitation practices In the Household

- **Project Technology Days (Np,y)-** Number of persons consuming water supplied by project scenario p through year y. Sum of the total number of people using each borehole in the project multiplied by the number of crediting days of each borehole in this monitoring period. The total number of households using each borehole will be determined through information supplied by our partner. Using this method, the total number of people using each borehole is known, and hence a figure for person technology days can be calculated. All monitoring tasks will be selected at random. The following caps, applied in the 'PTD' tab of the corresponding emissions reductions calculation spreadsheets are applied:
 - 95% functionality cap
 - 300 user cap per borehole

Individual participants were selected from the borehole user data base using the random sampling process outlined in the monitoring plan. Sample sizes are in line with the Gold Standard requirements.

Double Counting

To avoid double counting during the monitoring period the project has not been included in any other voluntary or compliance standards programmes, and dual certification has not been sought. As the project area contains multiple VPAs, double counting has further been avoided through the unique identification of each water point along with GPS coordinates.

fNRB

Below is described the method used to develop the fraction of non-renewable biomass (fNRB) for Mozambique in line with the Annex 1 section A.1.3 of the TPDDTEC v.1. The source of data is the Global Forest Resources Assessment Reports for the years 2015 and 2020 from FAO.

As the Carbon Living biomass related to forest shows a decrease from 2015 to 2020, the following condition is observed: (a) Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data show that carbon stocks are depleting in the project area thus the approach described in the Annex 1 section A.1.3 of the TPDDTEC v.1 is applicable.

a. $fNRB = NRB / (NRB + DRB)$

$$86\% = 100,152,498 / (100,152,498 + 16,262,285)$$

where:

fNRB = Fraction of non-renewable biomass in the country (%)

NRB = Quantity of non-renewable biomass in the country (t/yr)

DRB = Demonstrably Quantity of renewable biomass in the country (t/yr). The approach satisfies the following condition regarding DRB:

Condition 1 - The woody biomass is originating from land areas that are forests where:

(a) The land area remains a forest; and

(b) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and

(c) Any national or regional forestry and nature conservation regulations are complied with.

b. $NRB = R - DRB$

$$100,152,498 = 116,414,783 - 16,262,285$$

And

c. $R = MAI + \Delta F$

$$116,414,783 = 85,759,936 + 30,654,847$$

And

d. $MAI = F * GR$

$$85,759,936 = 36,743,760 * 2.33$$

Where:

R = Total annual biomass removals in the country (t/yr)

MAI = Mean Annual Increment of biomass growth (t/yr)

ΔF = Annual change in living forest biomass (t/yr)

F = Extent of forest (ha)

GR = Annual Growth rate of biomass (t/ha-yr)

e. $DRB = PA * GR$

$$16,262,285 = 6,967,560 * 2.33$$

Where:

PA = Protected Area Extent of Forest (ha)

SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

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Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	EF _{b,co2}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor arising from use of fuels in baseline scenario
Source of data	IPCC default value, EFDB Emission Factor Database. Accessible: https://www.ipcc-nggip.iges.or.jp/EFDB/main.php
Value(s) applied)	112
Choice of data or measurement methods and procedures	Deemed valid by Methodology.
Purpose of data	Calculation of baseline emissions.
Additional comments	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	EF _{b,non co2}
Unit	tCO ₂ e/TJ
Description	Non-CO ₂ (CH ₄ and N ₂ O) emission factor arising from use of wood fuel in baseline scenario
Source of data	IPCC Default emissions factor, EFDB Emission Factor Database. Accessible: https://www.ipcc-nggip.iges.or.jp/EFDB/main.php
Value(s) applied)	9.46

Choice of data or measurement methods and procedures	Deemed valid by Methodology				
	Gas	Default Emissions factor (kg_gas/TJ _{NCV})	GWP of gas	Default Emissions factor (kg_CO ₂ e/TJ _{NCV})	Default Emissions factor (t_CO ₂ e/TJ _{NCV})
	CH ₄	300	28	8,400	8.4000
	N ₂ O	4	265	1,060	1.060
				Total	9.460
Purpose of data	Calculation of emission reductions.				
Additional comments	AR5 values applied to 2021 and 2022 vintage for this MP.				

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)				
Data/parameter:	EF _{p,co2}				
Unit	tCO ₂ /TJ				
Description	CO ₂ emission factor arising from use of wood fuel in project scenario				
Source of data	Volume 2: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2, Table 2.5				
Value(s) applied)	112				
Choice of data or measurement methods and procedures	Deemed valid by Methodology.				
Purpose of data	Calculation of emission reductions.				
Additional comments	-				

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)				
Data/parameter:	EF _{p,non co2}				
Unit	tCO ₂ e/TJ				
Description	Non-CO ₂ (CH ₄ and N ₂ O) emission factor arising from use of wood fuel in project scenario				

Source of data	IPCC Default emissions factor, EFDB Emission Factor Database. Accessible: https://www.ipcc-nggip.iges.or.jp/EFDB/main.php			
Value(s) applied)	9.46			
Choice of data or measurement methods and procedures	Deemed valid by Methodology			
	Gas	Default Emissions factor (kg_gas/TJ _{NCV})	GWP of gas	Default Emissions factor (kg_CO ₂ e/TJ _{NCV})
	CH ₄	300	28	8,400
	N ₂ O	4	265	1,060
			Total	9.460
Purpose of data	Calculation of emission reductions.			
Additional comments	-			

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	NCV _b
Unit	TJ/ton
Description	Net calorific value of the wood fuel used in the baseline
Source of data	https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (Table 1.2)
Value(s) applied)	0.0156
Choice of data or measurement methods and procedures	Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	NCV _p
Unit	TJ/ton
Description	Net calorific value of the wood fuel used in the project
Source of data	https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (Table 1.2)
Value(s) applied)	0.0156
Choice of data or measurement methods and procedures	Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 3.9.2 (Good Health and Well-Being)
Data/parameter:	$W_{b,y}$
Unit	T/litre
Description	Quantity of wood fuel that is used to treat 1 litre of water in the baseline scenario b during year y
Source of data	Default Value GS Rule Update: Application of TPDDTEC Methodology to Safe Water Supply Projects (section 2.1.2)
Value(s) applied)	0.0004
Choice of data or measurement methods and procedures	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
Purpose of data	Calculation of emission reductions and impact on SDG 3.
Additional comments	

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 3.9.2 (Good Health and Well-Being)
Data/parameter:	$W_{p,y}$
Unit	T/litre
Description	Quantity of wood fuel that is used to treat 1 litre of water in the project scenario p during year y
Source of data	Default Value GS Rule Update: Application of TPDDTEC Methodology to Safe Water Supply Projects (section 2.1.2)
Value(s) applied)	0.0004
Choice of data or measurement methods and procedures	The baseline water boiling test is used to determine the amount of wood used to purify 1 litre of water by boiling. This data is gathered according to: <i>Technologies and Practices to Displace Decentralized Thermal Energy Consumption</i> Version 1, <i>Draft General Guidelines On Sampling And Surveys</i> ; EB37 Annex 27; and <i>Standard For Sampling And Surveys For CDM Project Activities and Programme of Activities</i> (Version 02); EB65 Annex 2
Purpose of data	Calculation of emission reductions.
Additional comments	

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Clean Water and Sanitation)
Data/parameter:	C _j
Unit	Percentage
Description	Portion of users of project safe water supply who were already in baseline using a non-boiling safe water supply.
Source of data	Baseline study.
Value(s) applied)	0.79%
Choice of data or measurement methods and procedures	The portion of safe water users is determined through the baseline project survey and refers to the number of users that already use safe water from water sources such as boreholes. Deemed valid by Methodology.
Purpose of data	Calculation of emission reductions and SDG 6 impact.
Additional comments	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	X _{boil} Non-Suppressed Demand
Unit	Percentage
Description	Percentage of premises that in the absence of the project activity would have used non-GHG emitting technologies like chlorine treatment techniques (if available) in the project boundary.
Source of data	Baseline study. Credible literature, studies, survey, reports, relevant to the project target area
Value(s) applied)	14.29%
Choice of data or measurement methods and procedures	Suppressed demand will be determined through a set of questions in the project survey that establish the method households use to purify their water, if any, and how they would choose to purify if they were not subject to monetary and access barriers. This is in line with the Gold Standard principles of suppressed demand outline in annex 2. A fixed suppressed demand baseline has been opted for, however, in the event the project surveys show a substantial change in fuel use characteristics, a new baseline shall be conducted.
Purpose of data	Calculation of emission reductions.
Additional comments	-

Relevant SDG Indicator	SDG 5.4.1 (Gender Equality)
Data/parameter:	T _{b,y}
Unit	Hours
Description	Time spent collecting firewood per household per day prior to project
Source of data	Baseline survey
Value(s) applied)	3.67

Choice of data or measurement methods and procedures	Measured by question in the baseline survey.
Purpose of data	Calculating time saved collecting water by project.
Additional comments	-

D.2. Data and parameters monitored

>>

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	fNRB,i,y
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel in scenario i during year y
Measured/calculated/default	N/A
Source of data	The data used for the assessment are obtained from the "Global Forest Resources Assessment Reports" for the years 2015 and 2020 from FAO. http://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/country-reports/en/ http://www.fao.org/forest-resources-assessment/fra-2020/country-reports/en/
Value(s) of monitored parameter	0.86
Monitoring equipment	Desk study
Measuring/reading/recording frequency:	Ongoing
Calculation method (if applicable):	$fNRB = NRB / (NRB + DRB)$ $86\% = 100,152,498 / (100,152,498 + 16,262,285)$ where: fNRB = Fraction of non-renewable biomass in the country (%) NRB = Quantity of non-renewable biomass in the country (t/yr) DRB = Demonstrably Quantity of renewable biomass in the country (t/yr). The approach satisfies the following condition regarding DRB:
QA/QC procedures:	The fNRB assessment has been done in line with Annex 1 section A.1.3 of the TPDDTEC v.1. both condition 1 (p.31) and a (p.31) are satisfied.
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	N _{p,y}
Unit	Project Technology Days
Description	Number of persons consuming water supplied by project scenario p through year y

Measured/calculated/default	N/A
Source of data	Borehole Project Database
Value(s) of monitored parameter	GS7132 – 2,449,095.25 Down Days: 26 GS7133 – 2,496,600.00 Down Days: 223 GS7134 –2,181,960.00 Down Days: 26 GS7135 – 1,631,654.50 Down Days: 29 GS7136 – 1,615,869.25 Down Days: 22 GS7470 – 1, 589,597.00 Down Days: 16 GS7471 – 1,545,293.75 Down Days: 216 GS7472 – 1,579,541.25 Down Days:14 GS7473 – 1,570,445.00 Down Days: 30 GS7474 – 1,641,956.25 Down Days: 233
Monitoring equipment	Project Database
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Sum of the total number of people using each borehole in the project multiplied by the number of days crediting each borehole earns in a given monitoring period. A 95% functionality cap is implemented on all BHs claiming functionality above this figure to be conservative. Where below 95% functionality is present, the true value is used to calculate the Project Technology Days. PTDs are also further capped as a result of a 300 user cap during this MP.
QA/QC procedures:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 6.1.1 (Clean Water and Sanitation)
Data/parameter:	$U_{p,y}$
Unit	Percentage
Description	Usage rate in project scenario p through year y
Measured/calculated/default	N/A
Source of data	Usage Survey
Value(s) of monitored parameter	99.55 (capped at 95%)
Monitoring equipment	Usage Survey
Measuring/reading/recording frequency:	Annual

Calculation method (if applicable):	The usage survey has been carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures:	N/A
Purpose of data:	Calculation of usage.
Additional comments:	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 3.9.2 (Good Health and Well-Being)
Data/parameter:	$Q_{p,y}$
Unit	Litres per person per day
Description	Quantity of safe water supplied in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	7.5 cap
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	8.15 (capped at 7.5)
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. Volume is capped at 7.5 litres per person per day as per the methodology. The WCFT will be carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	Value used from previous monitoring period when the WCFT was conducted.

Relevant SDG Indicator	SDG 13.B.1 (Climate Action), SDG 3.9.2 (Good Health and Well-Being)
Data/parameter:	$Q_{p, \text{cleanboil}, y}$
Unit	Litres per person per day
Description	Quantity of safe water boiled in the project scenario p during the year y using the zero or low emissions clean water supply technology
Measured/calculated/default	N/A
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	0

Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	$Q_{p,rawboil, y}$
Unit	Litres per person per day
Description	The raw of unsafe water that is still boiled after installation of the water treatment technology
Measured/calculated/default	N/A
Source of data	Water Consumption Field Test (WCFT)
Value(s) of monitored parameter	0
Monitoring equipment	WCFT Survey
Measuring/reading/recording frequency:	Biennial
Calculation method (if applicable):	Method used similar to Kitchen Performance Test in which the volume of water consumed in each household is averaged over 3 days. The WCFT has been carried out by trained local staff to meet the specific requirements of the methodology. All data presented in excel is subject to checking and cross referencing of a sample of the raw data by CO2balance UK Ltd.
QA/QC procedures:	N/A
Purpose of data:	Calculation of emission reductions.
Additional comments:	

Relevant SDG Indicator	SDG 6.1.1 (Clean Water and Sanitation)
Data/parameter:	Quality of Treated Water
Unit	Parameters as per national standards ¹ :

Description	Performance of the treatment technology
Measured/calculated/default	Measured
Source of data	Laboratory Tests
Value(s) of monitored parameter	Pass
Monitoring equipment	Laboratory equipment
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	The District Service for Planning and Infrastructure/ Serviço Distrital de Planeamento e Infraestrutura (SDPI) has certified each water supply is in line with national standards.
QA/QC procedures:	The first test will be within 6 months of the rehabilitation.
Purpose of data:	To test water quality for safety of human consumption.
Additional comments:	-

Relevant SDG Indicator	SDG 13.B.1 (Climate Action)
Data/parameter:	LE _{p,y}
Unit	tCO ₂ e per year
Description	Leakage in project scenario p during year y
Measured/calculated/default	0
Source of data	Baseline and Monitoring surveys
Value(s) of monitored parameter	0
Monitoring equipment	Desk based research
Measuring/reading/recording frequency:	Completed every two years
Calculation method (if applicable):	Assessed every two years using baseline and monitoring surveys.
QA/QC procedures:	N/A
Purpose of data:	Calculation of leakage.
Additional comments:	-

Relevant SDG Indicator	SDG 5.4.1 (Gender Equality)
Data/parameter:	T _{p,y}
Unit	Hours
Description	Project time spent collecting firewood and water per household per day (hours)
Measured/calculated/default	0
Source of data	Project Survey
Value(s) of monitored parameter	2.23 hours
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey

QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 5.
Additional comments:	-

Relevant SDG Indicator	SDG 6.1.1 (Clean Water and Sanitation), SDG 3.9.2 (Good Health and Well-Being)	
Data/parameter:	P,y	
Unit	Number of people	
Description	Number of persons having access to safe water in the project activity	
Measured/calculated/default	0	
Source of data	Usage Survey and Household List	
Value(s) of monitored parameter	GS7132: 9402 GS7133: 9851 GS7134: 9021 GS7135: 9515 GS7136: 10195 GS7470: 9357 GS7471: 10259 GS7472: 9937 GS7473: 11042 GS7474: 10583	
Monitoring equipment	Project Database/Household List	
Measuring/reading/recording frequency:	Annual	
Calculation method (if applicable):	Assessed every year using Project Survey, Usage Survey and Household list	
QA/QC procedures:	N/A	
Purpose of data:	Calculation of SDG 6 and SDG 3	
Additional comments:	-	

Relevant SDG Indicator	SDG 3.9.2 (Good Health and Well-Being)	
Data/parameter:	P _{safe}	
Unit	Number	
Description	Number of additional persons having access to safe water in the project activity compared to the baseline scenario	
Measured/calculated/default	Calculated	
Source of data	Project Database/Household list; Usage Survey	

Value(s) of monitored parameter	GS 7132: 6063 GS 7133: 6353 GS 7134: 5817 GS 7135: 6136 GS 7136: 6574 GS 7470: 6034 GS 7471: 6616 GS 7472: 6408 GS 7473: 7121 GS 7474: 6825
Monitoring equipment	Project Database/Household list; Usage Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using the Project Database and Usage Survey
QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 3
Additional comments:	-

Relevant SDG Indicator	SDG 5.4.1 (Gender Equality)
Data/parameter:	Usage of time saved on firewood collection
Unit	%
Description	Uses of time saved which was previously spent on firewood collection
Measured/calculated/default	Measured
Source of data	Project Survey
Value(s) of monitored parameter	Unpaid domestic work – 20% Income generating activities – 18% Religious activities – 18% Social and leisure activities – 12% Voluntary activities – 15% Education and training – 16% Other (Specify) – 0%
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Percentage of Project Survey respondents
QA/QC procedures:	N/A
Purpose of data:	To quantify how time which was previously spent on firewood collection is now being used
Additional comments:	-

Relevant SDG Indicator	SDG 6.1.1 (Clean Water and Sanitation)
Data/parameter:	P _{access}
Unit	Number of people
Description	Number of additional persons having access to safe water in the project activity compared to the baseline scenario
Measured/calculated/default	Calculated
Source of data	Project Survey and baseline survey
Value(s) of monitored parameter	GS7132: 8861 GS7133: 9285 GS7134: 8502 GS7135: 8968 GS7136: 9609 GS7470: 8819 GS7471: 9669 GS7472: 9366 GS7473: 10407 GS7474: 9974
Monitoring equipment	Project Survey, Usage Survey and Household list
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using the Project Database and Usage Survey
QA/QC procedures:	N/A
Purpose of data:	Calculation of SDG 6
Additional comments:	-

Relevant SDG Indicator	SDG 5.4.1 (Gender Equality)
Data/parameter:	TR _y
Unit	hours
Description	Total reduction in time spent collecting firewood and water per day for project activity in year y
Measured/calculated/default	Calculated
Source of data	Project Survey and baseline survey.
Value(s) of monitored parameter	1.44 hours (39% reduction in project compared to baseline)
Monitoring equipment	Project Survey
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Assessed every year using Project Survey. Calculate the average amount of time spent collecting firewood and water in the project scenario and compare to the pre-project scenario
QA/QC procedures:	N/A

Purpose of data:	To quantify whether the project has contributed to a reduction in the amount of time spent collecting firewood compared to the pre-project scenario towards SDG 5 target.
Additional comments:	-

D.3. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
fNRB _{i,y}	0.86	0.86
N _{p,y}	GS7132: 2,449,095	GS7132: 1,845,180
	GS7133: 2,496,600	GS7133: 1,829,130
	GS7134: 2,181,960	GS7134: 2,077,935
	GS7135: 1,631,654	GS7135: 1,356,344
	GS7136: 1,615,869	GS7136: 1,265,604
	GS7470: 1,589,597	GS7470: 1,234,487
	GS7471: 1,545,294	GS7471: 1,197,328
	GS7472: 1,579,541	GS7472: 1,199,636
	GS7473: 1,570,445	GS7473: 1,135,820
	GS7474: 1,641,956	GS7474: 1,201,061
U _{p,y}	99.55% (capped at 95%)	100% (capped at 95%)
Q _{p,y}	8.15 (capped at 7.5)	8.15 (capped at 7.5)
Q _{p,cleanboil,y}	0	0
Q _{p,rawboil, y}	0	0
Quality of Treated Water	Pass	Pass
LE _{p,y}	0	0
T _{p,y}	2.23	2.23
P _y	GS7132: 9402	GS7132: 9402
	GS7133: 9851	GS7133: 9851
	GS7134: 9021	GS7134: 9021
	GS7135: 9515	GS7135: 9515
	GS7136: 10195	GS7136: 10195
	GS7470: 9357	GS7470: 9357
	GS7471: 10259	GS7471: 10311
	GS7472: 9937	GS7472: 9937
	GS7473: 11042	GS7473: 11042
	GS7474: 10583	GS7474: 10558

P _{safe}	GS 7132: 6063	GS7132: 6063
	GS 7133: 6353	GS7133: 6353
	GS 7134: 5817	GS7134: 5817
	GS 7135: 6136	GS7135: 6136
	GS 7136: 6574	GS7136: 6574
	GS 7470: 6034	GS7470: 6034
	GS 7471: 6616	GS7471: 6649
	GS 7472: 6408	GS7472: 6408
	GS 7473: 7121	GS7473: 7121
	GS 7474: 6825	GS7474: 6808
Usage of time saved on firewood collection	Unpaid domestic work – 20%	Unpaid domestic work – 18.95%
	Income generating activities – 18%	Income generating activities – 18.95%
	Religious activities – 18%	Religious activities – 17.58%
	Social and leisure activities – 12%	Social and leisure activities – 13.67%
	Voluntary activities – 15%	Voluntary activities – 13.67%
	Education and training – 16%	Education and training – 17.19%
	Other (Specify) – 0%	Other (Specify) – 0%
P _{access}	GS7132: 8861	GS7132: 8861
	GS7133: 9285	GS7133: 9285
	GS7134: 8502	GS7134: 8502
	GS7135: 8968	GS7135: 8968
	GS7136: 9609	GS7136: 9609
	GS7470: 8819	GS7470: 8819
	GS7471: 9669	GS7471: 9718
	GS7472: 9366	GS7472: 9366
	GS7473: 10407	GS7473: 10407
	GS7474: 9974	GS7474: 9951
TR _y	1.44	1.44

D.4. Implementation of sampling plan

>> Surveys were conducted through use of a Random Sample Group (RSG) in accordance with 90/30 precision, the exact sampling process is supplied during the verification process, summarised below. The individual participants surveyed from the RSG were selected at random from the project database, in accordance with the

methodology's minimum sample size requirement for each survey, as detailed in Secyion D.4.1, D.4.2, D.4.3 below. All surveys complied with the required precision and are therefore representative of the project area. The project area includes neighbouring Woredas which were found to have homogenous characteristics in household characteristics, water sources and purification methods in the initial baseline studies conducted.

Field staff are provided training prior to monitoring surveys taking place.

In this Monitoring Period, the minimum recommended sample size of the RSG to meet 90/30 precision was 8 boreholes (see below). The individual participants surveyed, from the RSG are selected at random from the project database using the same random number generator process, in accordance with the minimum sample size requirement for each survey. A snapshot of the random numbers generated for the boreholes is shared below. The same process was carried out to allocate random numbers to the selected households in the borehole sample. The sampling process has been submitted during the project verification.

Sample size calculator

What margin of error can you accept? 30%
5% is a common choice

What confidence level do you need? 90%
Typical choices are 90%, 95%, or 99%

What is the population size? 240
If you don't know, use 20000

What is the response distribution? 50%
Leave this as 50%

Your recommended sample size is 8

The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.

The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.

How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.

For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under **More information** if this is confusing.

This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Online surveys with Vovici have completion rates of 66%!

Alternate scenarios

With a sample size of	100	200	300	With a confidence level of	90	95	99
Your margin of error would be	6.29%	2.38%	0.00%	Your sample size would need to be	8	11	18

Figure 4 The Raosoft Random Sampling Size Calculator shows that with a 90% confidence and 30% precision, 7 boreholes are required in the sample.

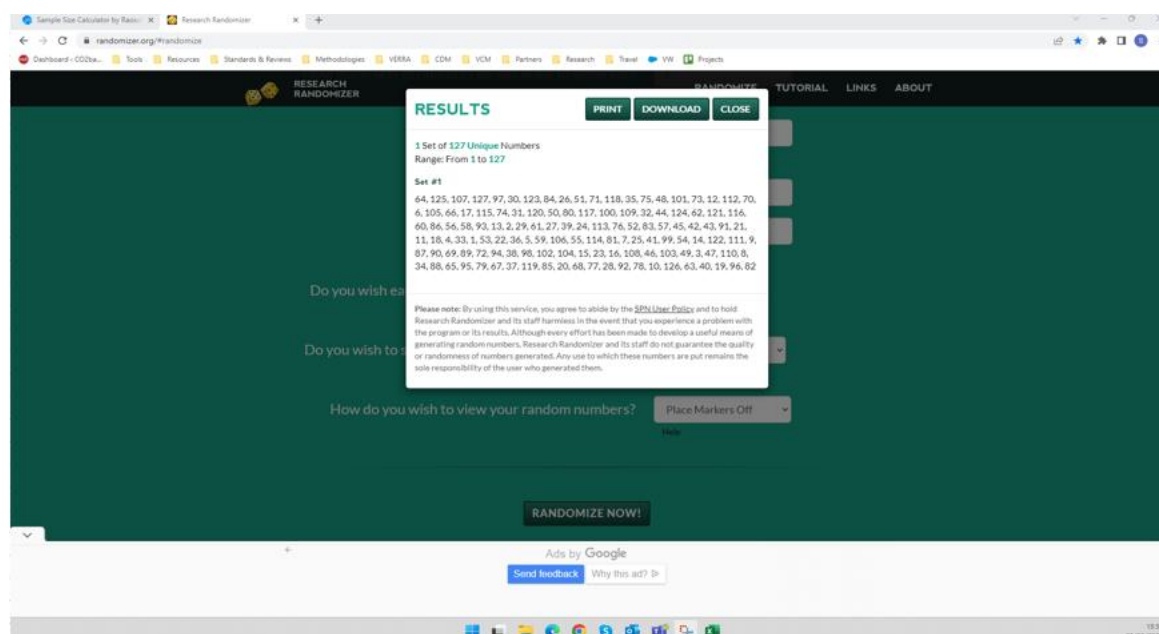


Figure 5 The Random Number Generator provides a list of random numbers that are allocated to the boreholes in the project. These are then ordered and the first 9 are selected for sampling.

Using CDM sampling tool "Guideline: Sampling and surveys for CDM project activities and programmes of activities Version 03.1", the obtained usage rate of 100% capped at 95% was input to calculate the relative precision of the sampling, achieving 3.2%. This demonstrates 90/30 sampling criteria was met as per the methodological requirements. See below:

Calculator to check if the precision has been met or not after a sampling survey is conducted		
Input	Value	Notes
Actual sample size	130	
Sample proportion	0.9500	
Standard error of the proportion	0.0183	
Precision associated with a proportion	0.0302	
Relative precision	3.2%	
Note: If the estimates from the actual samples fail to achieve the target minimum levels of precision (e.g. 10%), measures indicated in para. 16 of the sampling standard (ver. 4.1) shall be followed.		

D.4.1 Water Consumption Field Test

The Water Consumption Field Test was carried out on a randomly selected sample of 40 households from the project database in Manica province. This complies with the required minimum sample size of 30 in the Gold Standard requirements.

The test was carried out over a period of four days (1 day preparation and 3 days measurement) following a similar method as the Kitchen Performance Test, and all tests were conducted between 15/09/2021 – 29/09/2021. For this Monitoring period, PP decided to apply the values gained from previous WCFT survey. According to the methodology, the WCFT tests are representative of project technologies every 2 years; and hence the test can be conducted every other year. The total litres of water consumed each day was measured and divided by the number of people consuming water in that day – this measurement was repeated over 3 consecutive days and an overall average per household was calculated. The results showed that on average 8.15 litres of non boiled clean water used only for drinking, hand washing and food preparation (capped at 7.5l) and 0 litres of boiled clean water is consumed per person per day.

The total amount of water credited for in this monitoring period is equal to the average amount of clean non-boiled water consumed per person per day (7.5l), minus the average amount of boiled clean water consumed per person per day (0).

D.4.2 Usage Survey

The usage survey establishes the proportion of beneficiaries that use the boreholes, a key parameter in the emission reduction calculations. The annual usage survey has been conducted, exceeding the minimum sample size of 100, as there were 130.

The usage surveys in this monitoring period were carried out by field staff between the 17/04/2023-21/04/2023 in Manica province. The households that participated in the survey were randomly selected from the borehole user lists. The results confirmed that 100% of the respondents and their family members use the boreholes that were rehabilitated by the project.

D.4.3 Project Survey

Project surveys were conducted between 17/04/2023-21/04/2023 on 130 randomly selected households from across the VPAs in Manica Province, to explore changes in the project scenario demographics, water use and purification practices etc.) over time.

Data collected during the project surveys includes the following:

- General information - Name, address, telephone number etc.
- Household socio-demographic information.
- Water use and purification characteristics.
- Sources and availability of fuel.
- Time use and time saved information
- Hygiene and Sanitation practices in the households

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

>> Details of equations and indicators used to estimate baseline values for SDG outcomes are explained below. Calculation is provided in the corresponding Emission Reductions calculations in the 'SDG Calculations' Sheet.

SDG 3 (Good Health and Wellbeing):

The outcome for SDG 3 is quantified as the additional number of persons consuming safe water in the project activity compared to the baseline scenario (P_{safe}). The percentage of users who were already consuming safe water in the baseline without boiling it (C_j) is determined through the baseline survey and deducted. Additionally, the percentage of users who consumed safe water by boiling it in the baseline ($P_{b, \text{boil}}$) is deducted. The baseline indicators are detailed in Section D.1 and are as follows:

C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.

$P_{b, \text{boil}}$ Percentage of persons boiling water for purification in the baseline scenario.

SDG 5 (Gender Equality):

The average decrease in hours per household in time spent gathering firewood ($T_{b,y}$) will be taken as a contribution towards the SDG target. The baseline parameter for time spent collecting firewood per household per day is monitored in the baseline project survey. The baseline indicators are detailed in Section D.1 and are as follows:

$T_{b,y}$ Time spent collecting firewood per household per day prior to project (hours)

$T_{b,y} = 3.67$ hours

SDG 6 (Clean Water and Sanitation):

The outcome for SDG 6 is quantified as the additional number of persons having access to safe water in the project activity compared to the baseline scenario. The percentage of users who were already consuming safe water in the baseline without boiling it was determined through the baseline survey. The baseline indicators are detailed in Section D.1 and are as follows:

C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.

$$C_j = 0.79\%$$

SDG 13 (Climate Action)

CO2 emission reductions are the indicator to demonstrate that the project has raised capacity for effective climate change-related planning and management. This outcome is measured using the emission reduction calculations. The baseline indicators are detailed in Section D.1 and are as follows:

Baseline Emissions:

$$BE_{b,y} = B_{b,y} * \left((fNRB_y * EF_{b,fuel,co2}) + EF_{b,fuel,nonco2} \right) * NCV_{b,fuel}^2$$

Example VPA, GS7132: 9,061 = 5,491 * ((0.86 * 112) + 9.46) * 0.0156

See accompanying Emissions Reductions calculations for all VPAs.

Where:

$$B_{b,y} = (1 - C_j) * N_{j,y} * W_{b,y} * (Q_{p,y} + Q_{p,rawboil,y})$$

Example VPA, GS7132: 5,491 = (1 - 0.0079) * 1,845,180 * 0.0004 * (7.5 + 0)

See accompanying Emissions Reductions calculations for all VPAs.

Where:

$N_{j,y}$ Number of person days consuming water supplied by project scenario p through year y .

C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.

$B_{b,y}$ Quantity of fuel consumed in baseline scenario b during the year y in tons.

$Q_{p,y}$ Quantity of safe water in litres consumed in the project scenario p and supplied by project technology per person per day.

$Q_{p,rawboil,y}$ Quantity of raw water boiled in the project scenario p per person per day.

$W_{b,y}$ Quantity of fuel in tons required to treat 1 litre of water using technologies representative of baseline scenario b during the project year y, as per Baseline Water Boiling Test

E.2. Calculation of project value or estimation of project situation of each SDG Impact

>> Details of equations used to calculate project value for SDG outcomes appear below. Calculation is provided in the corresponding Emission Reductions calculations in the 'SDG Calculations' Sheet.

Outcomes for SDG 3 (Good Health and Wellbeing):

The VPAs are premised on generating Emission Reductions by ensuring that water point users have safe water, thereby removing the need for them to burn non-renewable biomass in order to boil water to purify it. Emission reductions are also claimed through the principle of suppressed demand, meaning that some users lacked the resources, time or information necessary to purify their water prior to the project. Therefore, the users for whom ERs are claimed through suppressed demand were forced to use unsafe water for drinking, food preparation and basic personal hygiene prior to the project.

The outcome for SDG 3 is quantified as the additional number of persons consuming safe water in the project activity compared to the baseline scenario (P_{safe}). The calculation is as follows:

$$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$$

Example VPA, GS7132: $6,063 = 9,402 * (1 - 0.0079) * (1 - 0.35)$

See accompanying Emissions Reductions calculations for all VPAs.

Where:

P_{safe} Number of additional persons consuming safe water in the project activity compared to the baseline scenario.

P_y Number of persons having access to safe water in the project activity.

C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.

$P_{b, \text{boil}}$ Percentage of persons boiling water for purification in the baseline scenario.

Outcomes for SDG 5 (Gender Equality):

The overall reduction in time spent collecting firewood by the project activity is calculated as follows:

$$TR_y = T_{b,y} - T_{p,y}$$

All VPAs: $0.39 = 3.67 - (1.79 + 0.44)$

Where:

TR_y Total reduction time spent collecting firewood per day for project activity in year y (hours)

$T_{b,y}$ Baseline time spent collecting firewood and water per household per day (hours)

$T_{p,y}$ Project time spent collecting firewood and water per household per day (hours)

Outcomes for SDG 6 (Clean Water and Sanitation):

The outcome for SDG 6 is quantified as the additional number of persons having access to safe water in the project activity compared to the baseline scenario. Calculations are as follows:

$$P_{access} = P_y * (1 - C_j) * U_{p,y}$$

Example VPA, GS7132: $8,861 = 9,402 * (1 - 0.0079) * 0.95$

See accompanying Emissions Reductions calculations for all VPAs.

Where:

P_{access} Number of additional persons having access to safe water in the project activity compared to the baseline scenario.

P_y Number of persons having access to safe water in the project activity.

C_j Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it.

$U_{p,y}$ Usage rate in project scenario p during year y

Outcomes for SDG 13 (Climate Action):

CO₂e emission reductions are the indicator to demonstrate that the project has raised capacity for effective climate change-related planning and management contributing to SDG 13. The emissions reductions for the current monitoring period can be found in the corresponding Emission reductions excel document and section E.4. below.

E.3. Calculation of leakage

Leakage

The potential sources of leakage listed in the methodology have been investigated, and addressed below:

a) The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.

In all cases the baseline technologies displaced are three stones; these have no market value and are not a product as such. There is nothing limiting the use of three stone cooking across the country (the technology is lowest rung on the energy ladder and the price is zero), which is why this cooking method is so widespread. In any case the primary purpose of these three rocks is for cooking so they will not be replaced/displaced in their entirety as a result of this project - which means they will not be reused outside the project boundary. This leakage source can therefore be discounted.

b) The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.

There is no evidence to suggest significant (if any) use of renewable energy for purifying water in the project region as found in the Baseline Water Surveys. As solar purification devices are not used, renewable energy used for purifying water would likely be animal dung or crop residues which will be used due to ease of availability/proximity to the home rather than due to a shortage of wood fuel, therefore it is an independent factor. This leakage source can therefore be discounted.

c) The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario. As the majority of participants collect wood from within the project boundary, it is not expected that the NRB in other areas will be affected. There are currently no other CDM or VER projects in the project area (defined as Manica Province).

d) The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology.

The space heating effect of boiling water for purification purposes will be minimal, as the predominant use of baseline technology is for cooking. Therefore, it is highly unlikely that another technology will be used for heating when users no longer boil water.

e) By virtue of promotion and marketing of new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.

This project is eliminating the need for a fuel-based technology to deliver pure water. Lower emission technology substitution within households is therefore not possible and this leakage source can therefore be discounted.

Therefore, a value of 0 is applied for leakage.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
3	Additional people consuming safe water	GS7132: 2944	GS7132: 9402	GS 7132: 6063
		GS7133: 2752	GS7133: 9851	GS 7133: 6353
		GS7134: 2728	GS7134: 9021	GS 7134: 5817
		GS7135: 2691	GS7135: 9515	GS 7135: 6136
		GS7136: 2911	GS7136: 10195	GS 7136: 6574
		GS7470: 2856	GS7470: 9357	GS 7470: 6034
		GS7471: 2952	GS7471: 10259	GS 7471: 6616
		GS7472: 2904	GS7472: 9937	GS 7472: 6408
		GS7473: 2850	GS7473: 11042	GS 7473: 7121
		GS7474: 2882	GS7474: 10583	GS 7474: 6825
5	Variation of time spent on firewood collection	3.67 hours spent collecting firewood and water per household per day	2.23 hours spent collecting firewood and water per household per day	1.44 hours saved collecting firewood and water per household per day
6	People gain access to safe water	GS7132: 477	GS7132: 9402	GS 7132: 8861
		GS7133: 446	GS7133: 9851	GS 7133: 9285
		GS7134: 442	GS7134: 9021	GS 7134: 8502
		GS7135: 436	GS7135: 9515	GS 7135: 8968
		GS7136: 471	GS7136: 10195	GS 7136: 9609
		GS7470: 463	GS7470: 9357	GS 7470: 8819
		GS7471: 478	GS7471: 10259	GS 7471: 9669
		GS7472: 470	GS7472: 9937	GS 7472: 9366
		GS7473: 462	GS7473: 11042	GS 7473: 10407
		GS7474: 467	GS7474: 10583	GS 7474: 9974
13	Emissions Reduction tCO ₂ e	Baseline Emission Estimate for each VPA (BE _{b,y}):	Project Emission Estimate for each VPA (PE _{p,y}):	Emissions Reductions for each VPA (ER _y) – also includes leakage and usage rate:

GS7132: 8026	GS7132: 0	GS7132: 9791
GS7133: 7516	GS7133: 0	GS7133: 9982
GS7134: 7709	GS7134: 0	GS7134: 8723
GS7135: 6797	GS7135: 0	GS7135: 6602
GS7136: 5612	GS7136: 0	GS7136: 6460
GS7470: 5810	GS7470: 0	GS7470: 6354
GS7471: 5729	GS7471: 0	GS7471: 6177
GS7472: 5443	GS7472: 0	GS7472: 6314
GS7473: 4927	GS7473: 0	GS7473: 6279
GS7474: 5673	GS7474: 0	GS7474: 6564

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values ³ achieved during this monitoring period
3	GS 7132: 2260	GS 7132: 6063
	GS 7133: 2260	GS 7133: 6353
	GS 7134: 2260	GS 7134: 5817
	GS 7135: 2260	GS 7135: 6136
	GS 7136: 2260	GS 7136: 6574
	GS 7470: 2260	GS 7470: 6034
	GS 7471: 2260	GS 7471: 6616
	GS 7472: 2260	GS 7472: 6408
	GS 7473: 2260	GS 7473: 7121
	GS 7474: 2260	GS 7474: 6825
	Total: 22,600	Total: 63,946 people
5	At least 0.5 hours per trip per household time saved	1.44 hours per trip per household saved

³ Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

6	GS 7132: 3125	GS 7132: 8861
	GS 7133: 3125	GS 7133: 9285
	GS 7134: 3125	GS 7134: 8502
	GS 7135: 3125	GS 7135: 8968
	GS 7136: 3125	GS 7136: 9609
	GS 7470: 3125	GS 7470: 8819
	GS 7471: 3125	GS 7471: 9669
	GS 7472: 3125	GS 7472: 9366
	GS 7473: 3125	GS 7473: 10407
	GS 7474: 3125	GS 7474: 9974
Total: 31,250		Total: 93,460 people
13		GS 7132: 9791 tCO ₂ e
		GS 7133: 9982 tCO ₂ e
		GS 7134: 8723 tCO ₂ e
		GS 7135: 6602 tCO ₂ e
		GS 7136: 6460 tCO ₂ e
		GS 7470: 6354 tCO ₂ e
		GS 7471: 6177 tCO ₂ e
		GS 7472: 6314 tCO ₂ e
		GS 7473: 6279 tCO ₂ e
		GS 7474: 6564 tCO ₂ e
All VPAs: 10,000 tCO ₂ e/y		
Total: 100,000 tCO₂e/y		
		Total: 73,246 tCO₂e

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

Ex-ante estimations are derived from ex ante calculations supplied at Internal Validation and Design Review of the Projects. These calculations use a mix of baseline project survey data and assumptions ahead of annual monitoring data collection to estimate SDG impacts for each VPA.

SDG 3: Good Health and Well-Being

In ex ante calculations, 500 users per borehole are assumed. The remaining parameters, C_j and P_{b,boil}, in the calculation use baseline project survey data and are fixed ex ante, as found in Section D.1. of the MR.

SDG 5: Gender Equality

The parameter $T_{b,y}$ is estimated using the baseline project survey and is fixed ex ante (Section D.1. of the MR). In order to estimate the reduction in time spent collection firewood (TR_y), the ex-ante calculations assumed a 0.5 hour reduction for $T_{p,y}$. This parameter is monitored annually in the project survey.

SDG 6: Clean Water and Sanitation

In ex ante calculations, 500 users per borehole are assumed as well as a 90% usage rate. The remaining parameter, C_j , is fixed ex ante, as found in Section D.1. of the MR.

SDG 13: Climate Action

The ex ante calculations for SDG 13 use a mix of baseline monitored parameters, methodology caps and figures assumed ahead of data collection. The major difference between ex ante estimates and figures reported in the MR is the reported baseline water boiling test value (used for parameters $W_{b,y}$ and $W_{p,y}$ in section D.1. of the MR). In ex ante calculations this was set at 0.00097 tonnes per litre, however this value has subsequently been capped at 0.0004 tonnes per litre in this monitoring period.

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

>> SDG 3: Actual values are above estimates. There has been bundling of boreholes during this monitoring period into all VPAs. This means an increase in the number of people having access to safe water for MP3 even though there is still a max 300 user cap. All project participants now consume safe water without the need to boil. Even those above the cap. Participants are now experiencing fewer illnesses associated with consuming unsafe water.

SDG 5: Actual value exceeds estimate. Time spent collecting firewood and water reduced by 1.44 hours in the project. This presents a reduction in time spent collecting firewood and water compared to the baseline and exceeds the ex-ante estimate of 0.5 (30 minutes) hours saved.

SDG 6: In the project there is a cap of 300 users per borehole and more boreholes were included in each VPA than assumed at ex-antes. Also, usage rate achieved in the project was 99.55% (capped at 95%), whereas the ex-antes are based on 90% usage rate. The remaining parameter, Cj, is fixed ex ante, as found in Section D.1. of the MR

SDG 13: No increase in actual values compared to PDD estimates.

SECTION F. SAFEGUARDS REPORTING

>> The Stakeholder Consultation process identified four individual safeguarding principles as relevant to the project, to be included in the monitoring report.

1. Gender Equality and Women's Rights

Two parameters to be monitored annually were identified. Firstly, the time saved through the collection of firewood, Tp,y, is monitored and presented in Section D.2. of the MR. Secondly, how time saved is used is also monitored annually and this parameter is presented in Section D.2. of the MR. No issues were raised in the monitoring of these two parameters.

2. Corruption

Communities involved in the projects are able to communicate any cases of corruption through the continuous input mechanism established for the projects. No instances of corruption have been reported in the monitoring period.

3. Negative Economic Consequences

Community-orientated trainings on conducting minor maintenance were established at the beginning of the project. All breakdowns are recorded in the monitoring report and average functionality is well above 75%, shows that this initiative has been highly successful. All down days are recorded in Section D.2. of the monitoring report.

4. Community Health, Safety, and Working Conditions

Incidences of water borne illnesses are monitored annually in the monitoring project survey and compared with baseline results. A rate of 0%, as compared to 93% in the baseline shows successful establishment of a clean water supply in the communities.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

>> There are multiple methods for stakeholders to give feedback. Continuous input/Grievance Expression Process log books are held at a water point level on which users can comment on.

In addition, a telephone number for the WATSAN in-country office was provided as well as email addresses for the relevant Village Water UK and CO2balance staff and the Gold Standard were provided. All methods of communication were shared with stakeholders during the LSC.

No Stakeholder feedback or comments have been received during this monitoring period.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

N/A

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

N/A

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption