Monitoring report form

(Version 04.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT	
Title of the project activity	Mwenga Hydro Power Project
Reference number of the project activity	9050
Version number of the monitoring report	1
Completion date of the monitoring report	17 July, 2014
Registration date of the project activity	30 January, 2013
Monitoring period number and duration of this monitoring period	Monitoring Period 1, 30/01/2013 – 29/01/2014
Project participant(s)	Mwenga Hydro Limited, Swedish Energy Agency
Host Party(ies)	United Republic of Tanzania
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	Renewable Electricity Generation for Captive use and Mini Grid (AMS-I.F. ver. 2) Grid connected renewable electricity generation (AMS-I.D. ver. 17)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	11,354 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	9,989 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	Not Applicable
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	9,989 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The purpose of the project activity is to generate electricity via a hydroelectric plant and distribute it to 1) The Mufindi Tea Company (MTC) via a mini-grid (supplementing or replacing current national grid electricity provided to MTC); and 2) the TANESCO national electricity grid. Although these two components of the project use different methodologies (AMS-I.F. and AMS-I.D., respectively), the electricity distributed to the MTC and TANESCO offsets emissions from generating electricity that would otherwise come from the national grid.

Power is also distributed to local villages, but the emissions offset by distribution to villages are not counted toward emissions reductions because of the impracticality of determining valid and verifiable baseline emissions for the villages.

A.2. Location of project activity

Iringa Region in southern Tanzania, Mufindi District.

The hydro power plant site is located on the Mwenga River, at approximately 8°37'18.63" S 35°41'30.54" E for the weir and silt collection, and approximately 8°37'27.07" S 35°41'22.82" E for the powerhouse. The site is about 55km by dirt and gravel road from the MTC headquarters, which in turn is located some 30km by dirt and gravel road from the Mafinga Junction, which is the nearest paved road. Access to the site is available only by dirt and gravel roads in isolated mountainous terrain.

There is a small unpaved airstrip approximately 52 km by air from the site, but the site is still only accessible from there by dirt and gravel roads or by foot. The nearest public airport is the Iringa airport, which is approximately170 km away by road. The nearest train station is at Makambako, about 100 km by air, and 160 km by road. The railway line—without a stop—passes within 20km of the site through the village of Mpanga, but the project site is accessible from there only by foot.

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
United Republic of Tanzania (Host)	Private entity: Mwenga Hydro Limited	No
Sweden	Public entity: Swedish Energy Agency	No

A.4. Reference of applied methodology and standardized baseline

Renewable Electricity Generation for Captive use and Mini Grid (AMS-I.F. ver. 2)

Grid connected renewable electricity generation (AMS-I.D. ver. 17)

A.5. Crediting period of project activity

30 Jan 13 - 29 Jan 20 (Renewable)

A.6. Contact information of responsible persons/ entities

Michael Gratwicke

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SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The project is a 3.486MW (at generator terminals) run-of-river hydro power plant operated by Mwenga Hydro Limited (MHL).

Hydrology: Considerable hydrological data have been recorded since 1957 by various entities, including the Tanzania Ministry of Water and MTC. According to the feasibility study conducted by Niham Shand in July 2008, a flow rate of 7 m^3/s is exceeded 70% of the time (on an annual basis).[1]

Flow and the power potential: Based on a flow of 7m^3/s, using the design recommended in the feasibility study, the estimated annual power generation of 24,000 MWh can be achieved as given in Table A.1[2], for a plant load factor of 82.8%, which was determined in accordance with the ex-ante definition of the plant load factor detailed in EB 48 Annex 11, paragraph 3(a), as substantiated in the Project Design Document (PDD).

The project is a run-of-river scheme diverting water from the main river course to a small water channel running 70m to the forebay tank where water flows through a 340m long steel penstock pipe to the power house. A single unit Francis turbine is installed in the powerhouse. The water drops a gross head of 60m from the forebay tank to the turbine.

The power generation facility is comprised of a diversion weir, a de-silting chamber, approximately 50m of a headrace conduit and a 340m long steel penstock leading to the powerhouse, which is to be located immediately above the return point to the Mwenga River.

The river between the extremities of the scheme includes a steep waterfall and a series of small rapids. The headrace canal effectively bypasses this normal watercourse and facilitates a controlled drop of approximately 60m through the penstock.

The location of the diversion weir is on a natural rock outcrop above the waterfall. A ledge in the rock, some 50m upstream of the falls, forms a natural weir with a solid foundation. This is ideal for the construction of a concrete weir. The valley sides at this position are relatively steep, facilitating a narrow and compact structure. A 2.5 m high concrete gravity weir structure was constructed on top of the natural rock to allow for adequate water draw-off facilities. A tongue wall extends into the hillsides at each end of the weir to provide for seepage cut off around the structure. The total crest length is approximately 25m. Draw off facilities take the form of a top entry grated channel feeding the headrace.

The sides of the valley at the level of the headrace are in the order of 1.5H:1.0V and steeper. Based on observed road cuttings in similar areas, a cutting into the hillside to facilitate the conduit

[1] Mwenga River Hydro Project Feasibility Study Report Niham Shand, July 2008.

[2] This corresponds to net generation output detailed in the financial model submitted to banks to justify financing.

was constructed. A 70m long (2 m x 2 m at a slope of 1V:750H) low-head closed conduit was constructed to convey water from the weir to the top of the penstock. It allows for soil, debris, and storm water flow to pass over the conduit and further provides the benefits of reduced excavation compared to an open canal. The conduit is graded to match the hydraulic losses at the design flow and takes a gently winding route around the hill to the headrace. The conduit is formed of in situ concrete.

The conduit is shallowly excavated. Where necessary, adequate cross drainage at regular intervals to prevent buoyancy, is provided. Drainage takes the form of a no-fines blinding layer and or wick drains on the up-slope side of the structure. Joints are sealed PVC waterbar at 6m intervals. The closed conduit operates as a low pressure conduit and different gradients will only make any significant difference if they are flatter than the energy gradient.

A sediment trap was constructed that slows the flow rate of the water down to 0.25 m/s (from 1.5 m/s) to allow settling to occur within the tank. The tank is equipped with flushing facilities to drain accumulated debris. A spillway was built into the side of the sediment tank in order to cater for varying powerhouse operation conditions which are likely to transmit surges through the penstock to the proposed canal. These surges will drain safely over the spillway back to the nearby river.

The 340m-long penstock is constructed from 1.5m diameter steel pipes, buried in places and provided with regular anchor blocks to ensure stability on the steep slope. This layout is suitable in view of the remoteness of the site for ease of construction.

For run-of-river type hydropower projects where stream flow passes through without much modification, specific flow release requirements are generally not required. However, this specific scheme diverts a portion[3] of the water from the Mwenga River which and reduces flow over a stretch of some 0.45km of waterfalls and rapids. The length of river, which can potentially be deprived of flow during dry season is of the order of 450m and consists mainly of a high waterfall and some subsequent small rapids. After some testing and environmental monitoring, the final Water Use Permit was issued with a requirement of $1m^3/s$ environmental flow for maintenance of the river during periods of low flow.

A Francis type turbine has been chosen for the project. This specific turbine is capable of operating at flow rates below 40% of the rated flow, and is unusually efficient in this regard. The turbine provides significant benefits in terms of space usage, efficiency, ease of installation and operation. Key technical characteristics of the technology applied in this project are given in the Table below:

Table A.1.: Technical characteristics[4]

Hydrology	
Design flow	7 m^3/sec
Design Head	60m
Turbine	
Type	Francis
Number of units	1
Power (turbine axis)@ 100% flow	Originally planned to be 3.612 MW, now estimated at 3.850 MW
Power (at generator Terminals)	Originally planned to be 3.486 MW, now estimated at 3.750 MW

[3] From the flow data of Mwenga River the flow of $7m^3/s$ will be insufficient only in three months i.e. October, November & December. The volume of water to be diverted to the power channel is 7 m^3 running every second. From the EIA conducted it is recommended that since there is no specific In-stream or Environmental Flow Requirements (EFR) defined for Tanzania, it was proposed that 10% of the observed annual minimum flow be left flowing to the normal river course which is $0.45m^3/s$ as indicated in pg 130 of the Environmental Impact Statement, EIS report

[4] Serman Energy S.RL. Technical Specification for Hydroelectric Turbine and Generator Package .Mufindi, Iringa District, Tanzania.

Generator	
Type	Synchronous 3 Phase
Interlinked Voltage	6.6 KV
cosϕ	0.9
Frequency	50 Hz

The site for the powerhouse is on the inside of a curve of the Mwenga River where a slight flattening in the terrain is evident. The powerhouse has a floor plan of 140m^2, and is a conventional concrete and steel portal type structure, with brick infilling and metal sheet roofing, housing the turbine, generator, transformers and the operational control room.

Existing access roads to the power house site consist of dirt and gravel roads that presently provide access to the coffee plantations near the site and that are used for transportation of crops and equipment by 8 ton trucks. The final 10km is a smaller track, generally not provided with gravel wearing course, and has been improved in places to provide more permanent access to the site.

Figure A.1. below presents the layout for the main project components.

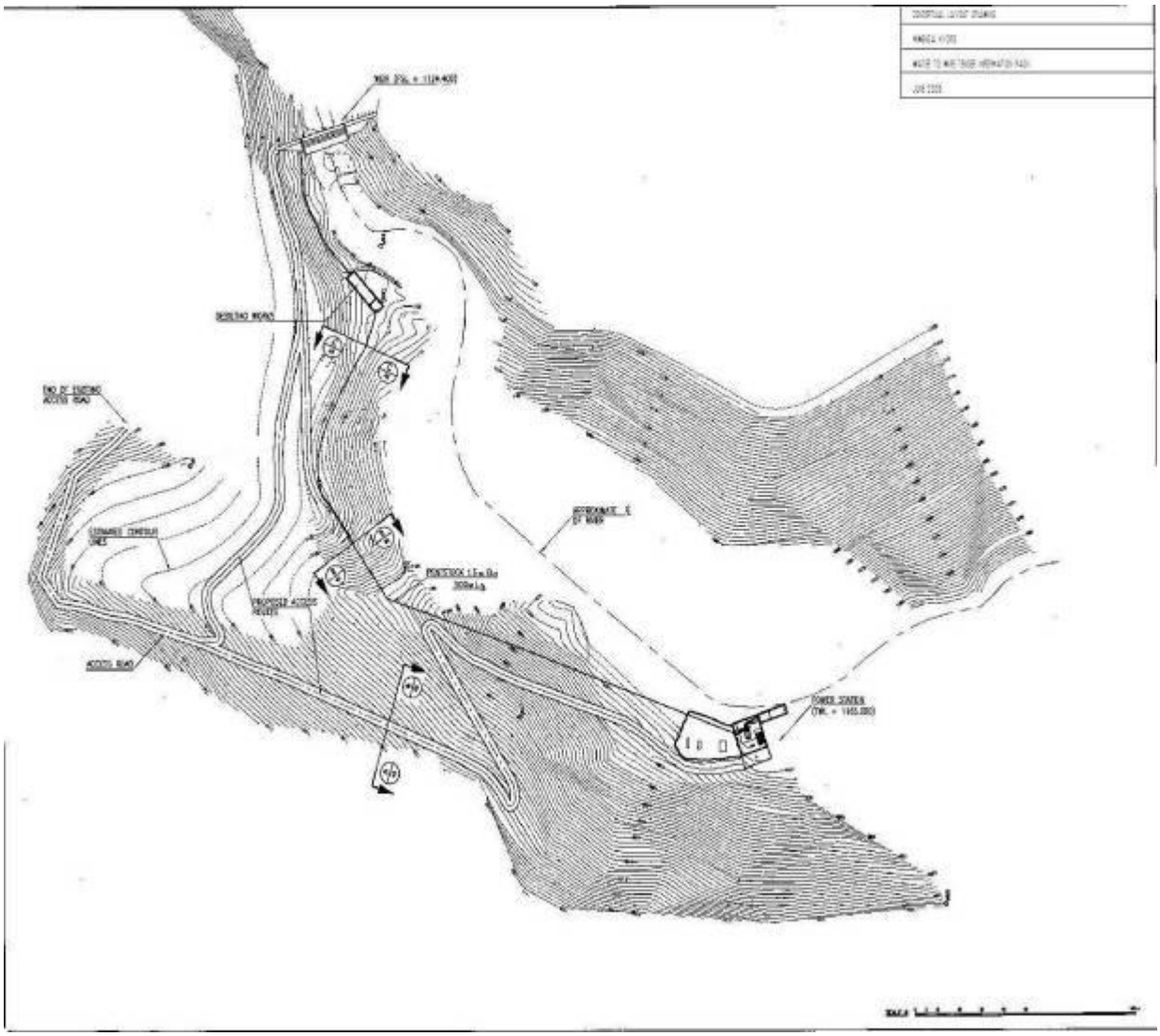

Figure A.1. Mwenga river falls and downstream view of the proposed hydropower plant site[5]

Electricity produced by the Hydropower plant will be transported along a 49.7 km 33 kV line to the MTC Processing Factory. A number of villages along the path of this line will be connected and it is estimated that approximately 35 km of minor spur lines have been installed for this purpose. An estimated 40 km of LV distribution lines has now been installed within the various target villages.

It is estimated that the amount of electricity to be consumed by the end users located in the various villages that will be fed by the Hydropower plant will be approximately 2,500 MWh/yr in the medium term. It is currently only about 300 MWh per year (based on the usage of our current 850 connected customers), but is rising steadily. End users are expected to eventually include approximately 2,600 rural households, 165 Shops, 20 Schools, 13 Clinics/Dispensaries, 1 Hospital and over 100 SME's, amongst other end users.[6]

Interconnection with the TANESCO grid, for export into this grid, takes place at the Mufindi Tea Estate.

This network is presented in a simplified form in Figure A.2.

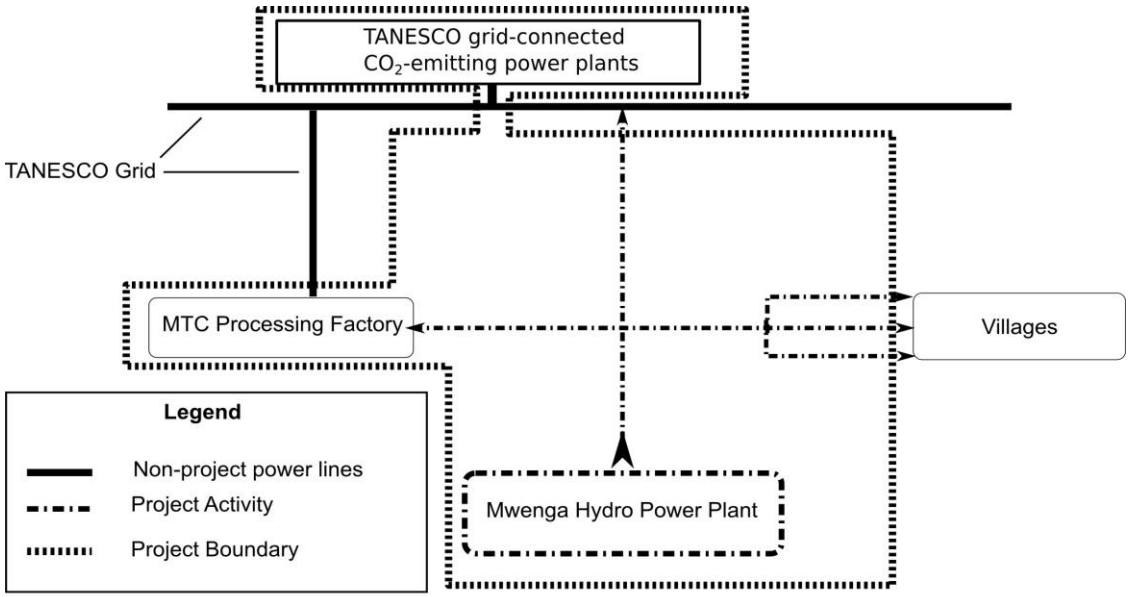

Figure A.2. Simplified schematic diagram illustrating project electricity flow

Using the grid emission factor (GEF) available at the time of PDD submission, the Project was expected to be responsible for reducing approximately 11,354 tCO_2e annually throughout the entire 7-year initial crediting period, thus, generating total reductions of approximately 79,478 tonnes of CO_2e emissions, as shown below.

Years	Estimation of annual emission reductions in tonnes of CO_2e
2013	11,354
2014	11,354

[5] Mwenga Hydropower Environmental Impact Statement. July 2009. Nyinisaeli K Palangyo

[6] Baseline Study for Mwenga Hydroproject – Final Report Tea Research Institute of Tanzania, Annex 9, pg 87

2015	11,354
2016	11,354
2017	11,354
2018	11,354
2019	11,354
Total estimated reductions (tonnes CO_2e)	79,478
Total number of crediting years	7 years (renewable)
Annual average over crediting period of estimated reductions (tonnes CO_2e)	11,354

The project was first interconnected with the TANESCO grid, commencing regular generation output, on the 1st September 2012. The start date of the CDM activity is given as the 30th January 2013, so for the purposes of this monitoring report we will be deeming the production done prior to the 30th January 2013 as not relevant.

Currently the project has not yet connected the Mufindi Tea Company (MTC) to the network, and does not yet supply electricity directly to the MTC factory. This connection is still planned to be implemented, though is still awaiting approval from TANESCO to implement changes to the TANESCO power lines that supply the factory. This is now expected to be implemented during the course of 2014.

We encountered significant difficulties in meeting production targets in both January and February of 2013 owing to repeated problems with the turbine cooling circuit and draft tube – where both the draft tube itself, and the cooling pipes that were mounted in the tail race kept on cracking due to excessive water hammer related vibrations. Significant downtime was incurred over this period whilst repairs and modifications were made to this area to permanently solve the problem.

In April 2013 a significant stoppage resulted from a failure of the overseas based aftersales service provider to remotely reset a PLC fault. This delayed service was a result of the turbine provider declaring bankruptcy, and the contracted aftersales service provider discontinuing service provision. We eventually negotiated a dedicated service provision directly with the service provider.

We also lost a significant amount of production time in both June and July 2013 due to extended grid outages – both within our own network, and in the TANESCO network. We eventually procured a service vehicle to speed up fault reaction times, and engaged some additional reaction staff, as we were unable to obtain acceptable reaction times from our contractor.

November 2013 saw the introduction of load shedding from TANESCO, which resulted in abnormally high plant down time for this month.

December 2013 production was significantly affected by a planned visit by the aftersales service provider to make final performance adjustments to the turbine, and additionally conduct a thorough inspection of the plant at the same time. Retraining of staff was also undertaken. The visit resulted in an additional 100 kW being made available from the turbine. TANESCO outages were also significant over this period, and continued on into January 2013.

On average we lost approximately 5% of available production time to TANESCO related issues, and 7% of available production time to Mwenga Hydro related issues (both grid and plant related) over the period end January 2013 to end January 2014. It is estimated that 5% of Mwenga Hydro related downtime should be considered as unusual, and non recurrent.

During the initial months of the plant's operation, the process for recording daily production logs was still in development. For the first three months of the project activity, only monthly figures are available. Because daily figures were not available for the month of January, 2013, to be

conservative, production figures from January 2013 have been excluded from power production figures to calculate emissions reductions. It is anticipated that daily production logs will be available for the entirety of future monitoring periods.

There were no events that occurred during the course of the monitoring period which could impact on the applicability of the methodology applied.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

The individual village transformer meters that are planned to be installed at each village transformer as a means of measuring electricity losses within each village (and additionally as a fail safe means of measuring power supplied to TANESCO in the event of TANESCO billing and check meter failure) have not yet been installed. The materials for this have however been procured, and these are currently in the process of being installed. These meters are not necessary for the measurement of the CERs claimed by the project, as these only become relevant in the event of failure of both the main TANESCO billing and check meters – which did not occur. Therefore, there has been no substantive deviation from the registered monitoring plan or applied methodology.

B.2.2. Corrections

Not applicable

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

Not applicable

B.2.4. Changes to project design of registered project activity

Not applicable

B.2.5. Changes to start date of crediting period

Not applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

Not applicable

SECTION C. Description of monitoring system

The monitoring plan requires that the parameters indicated in PDD section B.7.1 be monitored for the purposes of CER calculations. However, for operations as a whole, and to provide a backup in case of meter failure at either relevant off-take point, MHL measures, with appropriate meters:

1) Total electricity produced from the power plant
2) Electricity delivered to Mufindi Tea Company (EG¬BL,y,1)
3) Electricity delivered to TANESCO (EGBL,y,2)
4) Electricity delivered to the villages at the transformer for each village. These village supply transformer meters, in conjunction with the total output meter, will be used for internal auditing purposes to monitor residential meter accuracy and transmission or other losses, and additionally allow reconciliation of power produced and distributed, particularly in the case of meter failure at a given off-take point. These meters are not necessary to track output related to CERs provided that all other meters are in working order. As noted above, these meters have not yet been installed, and both the main and check meters are in working order, thus there is no effect on CER calculations for this monitoring period

As noted in the PDD and validation report, for $EFCO_2,y$, MHL will attempt to obtain from TANESCO on an annual basis $EFCO_2,y$ data as calculated based on the most recent three years of available data. Failing this, MHL will attempt to obtain from TANESCO or other reputable sources the weighted average emissions in tCO_2e/MWh in the applicable crediting year. In the event such data are not available, the most recently available figure will be used. This is a conservative approach because the vast majority of grid power added by Tanzania since 2010 has been fossil fuel-based, and the majority of firmly-planned future plants will be fossil fuel-based. Thus, in the absence of more current data, it is likely that a given GEF will likely cause an understatement of emissions reductions.

The following diagram indicates the metering points described in the Monitoring Plan.

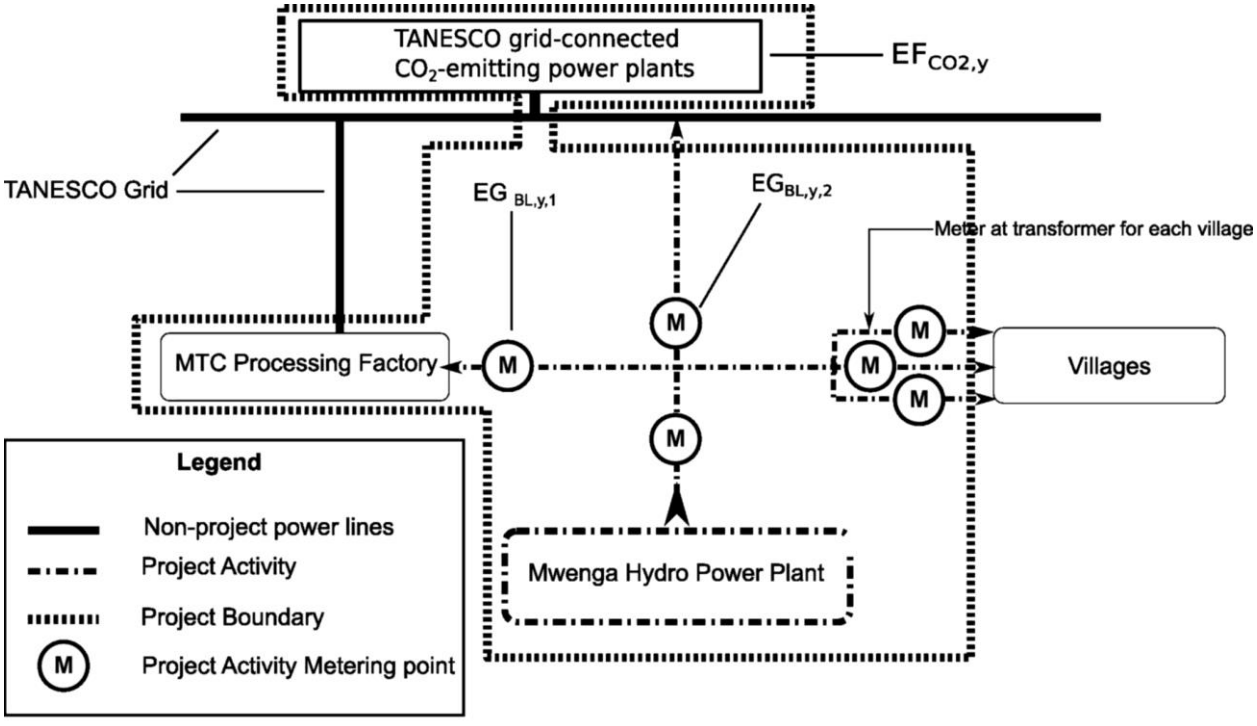

Figure C.1. Simplified Monitoring Diagram indicating location of metering points covered by the monitoring plan

Notes: Diagram is not to scale. There will be a meter at the transformer from the project grid to each village. To keep this figure legible, only three village transformer meters are shown here. As

noted throughout this document and the PDD, emissions reductions are not being claimed for villages because of the impracticality of establishing a valid baseline, thus, the villages fall outside the project boundary. As noted in parameters EGBL,y,1 and EGBL,y,2, the main plant meter and village transformer meters are monitored only as secondary checks against the MTC and TANESCO meters, and are therefore included within the project boundary, but the village transformer meters are not required by the applicable methodologies: They are only necessary in case of failure of the main and check meters that are required by the applicable methodologies. During this monitoring period neither the main nor check meters failed, therefore, the village meters were not necessary to accurately monitor production. Per AMS-I.D and associated guidance, grid-connected power plants with CO_2 emissions are included within the project boundary because they are used as the basis for calculating $EFCO_2$,y. Note that the project boundary does not include non-project power lines, because MHL is not responsible for building or maintaining them.

Metering devices enable the continuous measurement of the electricity supplied to meet the requirements of the MTC factory, the TANESCO grid, and the villages. During this monitoring period, there was no output to the MTC factory, and village transformer meters were not yet installed. As noted above, because all main and check meters for output directed to customers within the project boundary were fully operational throughout the monitoring period, the lack of village transformer meters has no effect on CER calculations.

MHL is responsible for the installation, ownership and maintenance of the metering at the Delivery Point and Off-take Points for the villages and MTC. TANESCO is responsible for the seals on the billing and check meter at the grid interconnection point.

The metering systems are designed such that the overall error of the metering installation, (including instrument transformers, wiring, and metering instruments) are in accordance with manufacturer specifications and national or IEC standards when available and applicable.

MHL shall have its main meter and the MTC and village transformer meters tested and, if necessary, re-calibrated by an independent testing facility at least once every twenty-four months, or whenever MHL or one of its customers has reason to believe that the equipment is no longer performing within the applicable standards of accuracy given in the preceding paragraph. The calibration shall be performed by an individual or entity that is authorized to certify or otherwise attest that the meters have been calibrated in accordance with manufacturer specifications and national or IEC standards when available and applicable.

TANESCO shall have the main and check meters at the grid interconnection point tested and, if necessary, re-calibrated at least once every twelve months or whenever a Party has reason to believe that the equipment is no longer performing to applicable IEC, manufacturer, or national standards.

After completion of any such testing, MHL shall prepare a statement which shall constitute a record of the results of the testing carried out, and the extent to which the meters were performing outside the required limits of accuracy.

If, at any time, it is determined by the MHL or one of its customers as a consequence of a test or as is otherwise manifestly necessary that the meters should be replaced, then MHL shall arrange for a new meter to be furnished. Such action shall be recorded and the relevant documentation held.

The Operations Manager of MHL is responsible for the reading and recording of the respective kWh meter readings on the respective electricity meter(s) on the last day of each calendar month, along with the time of the reading, and the date of reading.

This data have been entered into a hard copy book set aside for this purpose, and kept at the Operations Manager's office. Additionally this data is used to generate invoicing to the respective customers, and is also entered into a computer spreadsheet by the Operations Manager that

mirrors this information. This file forms part of the monthly operations report of MHL. These physical and electronic records will be stored for at least two years after the later of the end of the crediting period or the last issuance of CERs for the project activity.

The Operations Manager is responsible for maintaining records of meter testing and any replacement, as well as any other information relating to the meters' operations.

Internal Audits are conducted annually under the supervision of the Director, Internal Audit of MHL's parent company.

Staff involved in monitoring and reporting are trained to ensure that the relevant monitoring and reporting procedures that need to be followed as part of the above monitoring plan.

Management is responsible for ensuring that staff responsible for monitoring and reporting have received adequate training.

MHL provides the necessary management structure and allocate responsibilities to staff to ensure that the above procedures are adhered to.

SECTION D. Data and parameters

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

Not applicable

D.2. Data and parameters monitored

Data / Parameter:	**$EG_{BL,y,1}$**
Unit:	MWh
Description:	Net electricity generated by the Hydropower plant which is to be delivered to meet the requirements of the MTC Processing Factory, but not including offset emissions from diesel backup generators
Measured/ Calculated / Default:	Measured
Source of data:	Metering equipment
Value(s) of monitored parameter:	0
Monitoring equipment:	Class 2 or better billing meter installed at the MTC tea processing factory and installed, tested, and calibrated in accordance with manufacturer specifications and IEC and/or national standards when available and applicable.
Measuring/ Reading/ Recording frequency:	Not yet implemented
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Not yet implemented
Purpose of data:	To calculate project emissions reductions for component 1 of project.
Additional comment:	Component 1 was not implemented during this monitoring period.

Data / Parameter:	**$EG_{BL,y,2}$**
Unit:	MWh
Description:	Net electricity generated by the Hydropower plant which is delivered to the TANESCO national grid

Measured/ Calculated / Default:	Measured
Source of data:	Billing meter installed at the TANESCO meter interconnection point
Value(s) of monitored parameter:	17,933.76 (adjusted pro rata for partial month of January 2014 and excluding data from January of 2013, to be conservative)
Monitoring equipment:	EDMI Mk10E Class 0.5, installed, tested, and calibrated in accordance with manufacturer specifications and IEC and/or national standards when available and applicable
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures:	• Data from MHL's main power station meter compared with sales receipts and consumption figures obtained from meter readings by TANESCO, and cross-checked against a check meter on the MHL side of the grid interconnection • Data archived electronically • Meters tested and re-calibrated at least once every twelve months or whenever a Party has reason to believe that the equipment is no longer performing to applicable IEC or national standards. TANESCO is responsible for testing and calibration of these meters as per Article 4 h) of the SPPA agreement. All testing and calibration performed in accordance with the manufacturers' specifications and instructions. • Data for the partial month of January 2014 has been adjusted pro rata (i.e., 29/31 of invoice amount) to exclude sales attributable to 30 and 31 January, 2014, which fall outside the monitoring period.
Purpose of data:	To calculate project emissions reductions for component 2 of project.
Additional comment:	

Data / Parameter:	**$EF_{CO2,y}$**
Unit:	**tCO_2e/MWh** (the methodology tables specify tCO_2e/kWh, but MWh will be used as the denominator for compatibility with other parameters)
Description:	Grid emissions factor calculated in accordance with applicable UNFCCC methodologies, guidance, and requirements.
Measured/ Calculated / Default:	Calculated
Source of data:	TANESCO hourly generation data for past three available years
Value(s) of monitored parameter:	0.557
Monitoring equipment:	
Measuring/ Reading/ Recording frequency:	Hourly
Calculation method (if applicable):	See GEF spreadsheet and worksheet; partial or leap years were extrapolated to years of 8760 hours.
QA/QC procedures:	Data from TANESCO are considered to be reliable.
Purpose of data:	
Additional comment:	

D.3. Implementation of sampling plan

Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

Baseline emissions are based entirely on the GEF, as calculated above and in the accompanying GEF worksheet, and applied to the project output distributed to customers. Even though there is significant private generator use that would likely increase the emissions offset, to be conservative, only grid-generated power is being considered for emissions reductions.

E.2. Calculation of project emissions or actual net GHG removals by sinks

Project emissions reductions are given by the formula

$(EG_{BL,y,1}[0]* EF_{CO2,y}[0.557])+ (EG_{BL,y,2}[\underline{17933.76}]* EF_{CO2,y}[0.557])$

Total baseline emissions: 0.557 tCO_2e/MWh
Total project emissions: 0
Total leakage: 0
Total emission reductions: $\underline{17,933.76}MWh*0.557 = 9989.10\ tCO_2e$

E.3. Calculation of leakage

Not applicable

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total	0.557 tCO_2e/MWh	0	0	9,989.10

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	11,354 tCO_2e	9,989.10 tCO_2e

E.6. Remarks on difference from estimated value in registered PDD

The actual output during the portion of the monitoring period used for emissions calculations was 18,889.738MWh, of which 18,078.18 MWh was sold to TANESCO.

To be conservative, because of the fluid state of production record keeping at the beginning of 2013, figures from 30 and 31 January, 2013 are omitted. Additionally, adjusted pro rata for the partial month of January 2014 (1-29 January), a total of 17,933.76 MWh was sold to TANESCO. At a GEF of 0.557, as calculated above and in the attached spreadsheets, this has resulted in emissions reductions of 17,933.76*0.557 = 9989.10 tCO_2e. Although the GEF has increased due to Tanzania's addition of multiple new fossil fuel plants, there was significantly less water available than projected, leading to lower project output during this monitoring period than was originally anticipated.

There was no increase in the actual emissions reductions achieved. However, had there been enough water available for the plant to produce its projected output, there would likely have been an increase in actual emissions reductions achieved. This is because Tanzania has consistently been adding only thermal electricity generation capacity over the past few years, thus raising the GEF from 0.529 as calculated at the time of the original PDD submission to 0.557 during this first monitoring period.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	0	9,989.10 tCO_2e

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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Mwenga Hydro Limited
Street/P.O. Box	PO Box 1
Building	
City	Mufindi
State/Region	Iringa
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Attachment. Instructions for filling out the monitoring report form

1. General instructions

1. When monitoring the project activity and completing the CDM-MR-FORM, in addition to following the the "CDM project standard" (Project standard), the applied approved baseline and monitoring methodology(ies) (hereinafter referred to as the applied methodology(ies)) and, where applicable, the applied approved standardized baseline(s) (hereinafter referred to as the applied standardized baseline(s)), consult the "Rules and References" section of the UNFCCC CDM website <http://unfccc.int/>, which contains all regulatory documents for the CDM, such as standards (including methodologies, tools and standardized baselines), procedures, guidelines, clarifications, forms and the "Glossary of CDM terms".

2. Make any data, values and formulae included in electronic spreadsheets provided accessible and verifiable.

3. Complete the CDM-MR-FORM and all attached documents in English, or contain a full translation of relevant sections in English.

4. Complete the CDM-MR-FORM using the same format without modifying its font, headings or logo, and without any other alteration to the form.

5. Do not modify or delete tables and their columns in the CDM-MR-FORM. Add rows of the tables as needed. Add additional appendices as needed.

6. If a section of the CDM-MR-FORM is not applicable, explicitly state that the section is left blank intentionally.

7. Use an internationally recognized format for presentation of values in the CDM-MR-FORM, for example use digits grouping in thousands and mark a decimal point with a dot (.), not with a comma (,).

8. Complete the CDM-MR-FORM deleting this Attachment "Instructions for filling out the monitoring report form".

2. Specific instructions

1. Indicate on the cover page the following information:
   - (a) Title of the project activity;
   - (b) Reference number of the project activity;
   - (c) Version number of the monitoring report;
   - (d) Completion date of the monitoring report (DD/MM/YYYY);
   - (e) Registration date of the project activity (DD/MM/YYYY);
   - (f) Monitoring period number and duration of this monitoring period (first and last days included (DD/MM/YYYY – DD/MM/YYYY));
   - (g) Project participant(s);
   - (h) Host Party(ies);
   - (i) Sectoral scope(s), applied methodology(ies) and, where applicable, applied standardized baseline(s);
   - (j) Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD;
   - (k) Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period;

(l) Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable);

(m) Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

1. Provide a brief summary of the detailed description given in section B.1 below in terms of:
   (a) Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks;
   (b) Brief description of the installed technology and equipment;
   (c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.);
   (d) Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period.

A.2. Location of project activity

1. Provide the following information on the location of the project activity:
   (a) Host Party(ies);
   (b) Region/ State/ Province, etc.;
   (c) City/ Town/ Community, etc.;
   (d) Physical/ Geographical location.

A.3. Parties and project participant(s)

1. List in the table below Party(ies) and project participant(s) involved in the project activity.

Party involved ((host) indicates host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A (host)	Private entity A Public entity A	
Party B	Private entity B Public entity B	
…	…	

A.4. Reference of applied methodology and standardized baseline

1. Indicate the exact reference (number, title, version) of:
   (a) The applied methodology(ies) (e.g. ACM0001: “Large-scale Consolidated Methodology: Flaring or use of landfill gas” (Version 15.0));
   (b) Any tools and other methodologies to which the applied methodology(ies) refers (e.g. " Methodological Tool: Tool for the demonstration and assessment of additionality" (Version 07.0.0));
   (c) The applied standardized baseline(s), where applicable (e.g. ASB0001 “Standardized baseline: Grid emission factor for the Southern African power pool” (Version 01.0)).
2. Refer to the UNFCCC CDM website for the exact reference of the applied methodologies, tools and standardized baselines.

A.5. Crediting period of project activity

1. Provide the type, start date and length of the crediting period corresponding to this monitoring period.

A.6. Contact information of responsible persons/ entities

1. Provide contact information of the person(s)/ entity(ies) responsible for completing the CDM-MR-FORM and indicate if the person(s)/ entity(ies) is also a project participant(s) in Appendix 1: below.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

1. Provide information on the implementation status of the project activity during this monitoring period in accordance with the applicable provision for description of implemented registered CDM project activity in the Project standard.
2. For the description of the installed technology(ies), technical process and equipment, include diagrams, where appropriate.
3. In the case of a PoA, also provide information on whether a single monitoring report or two monitoring reports are prepared for the monitoring period. When the request for issuance for a monitoring period is to be submitted in two batches, provide separate monitoring reports corresponding to each of the batches, including information on whether the monitoring report covers the first batch or the second batch, and provide the reference numbers of CPAs that are included and not included separately.
4. If applicable, present information on any request for prior approval by the Board of changes to the registered CDM project activity in B.2.1, B.2.2, B.2.3, B.2.4 and/or B.2.5.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

1. Indicate whether any temporary deviations have been applied during this monitoring period. If applied, provide a description of the deviation(s) in accordance with applicable provisions for temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baseline in the Project standard.
2. Include the reasons for the deviation(s), how it deviates from the monitoring plan, applied methodology(ies) and/or applied standardized baseline, the duration for which the deviation(s) is(are) applicable and justification on the conservativeness of the approach.
3. For deviation(s) that require prior approval by the Board, include the date of approval and reference number.

B.2.2. Corrections

1. Indicate whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the correction(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD.

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

1. Indicate whether any permanent changes from the registered monitoring plan, applied methodologies or applied standardized baseline have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD.

B.2.4. Changes to project design of registered project activity

1. Indicate whether any changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD.

B.2.5. Changes to start date of crediting period

1. Indicate whether any changes to the start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the changes and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number.

B.2.6. Types of changes specific to afforestation or reforestation project activity

1. Indicate whether any changes specific to afforestation or reforestation project activities have been applied during this monitoring period based on applicable provisions in the Project standard that do not require prior approval by the Board. If changes were applied, provide the version number and the completion date of the revised PDD.

SECTION C. Description of monitoring system

1. Provide a description of the monitoring system based on the applicable provision for description of monitoring system in the Project standard. Include diagrams of the monitoring system and the information flow where appropriate.

SECTION D. Data and parameters

1. Provide information on all data and parameters in accordance with applicable provisions for data and parameters in the Project standard, using the tables provided in D.1 and D.2 below.
2. For “Purpose of data” in the tables in D.1 and D.2, choose one of the following options: (a) Calculation of baseline emissions or baseline net GHG removals by sinks; (b) Calculation of project emissions or actual net GHG removals by sinks; (c) Calculation of leakage.
3. Where the applied standardized baseline(s) standardizes baseline emissions, apply the standardized value(s) of the parameter(s) in section D.1 and/or D.2 below in accordance with applicable provisions related to data and parameters in the Project standard.

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

1. Include data that are fixed before registration and/or at the renewal of crediting period and are used during this monitoring period under section D.1.
2. For “Value(s) applied”, use one table to report multiple values referring to the same data and parameter, if applicable. Use reference(s) to electronic spreadsheets, if necessary.

(Copy this table for each piece of data and parameter.)

Data / Parameter:	
Unit:	
Description:	
Source of data:	
Value(s) applied):	
Purpose of data:	
Additional comment:	

D.2. Data and parameters monitored

1. For “Monitoring equipment” in the table below, provide information on type, accuracy class, serial number, calibration frequency, date of last calibration and validity.
2. For “Value(s) of monitored parameter”, use one table to report multiple values referring to the same data and parameter, if applicable. Use reference(s) to electronic spreadsheets, if necessary.

(Copy this table for each piece of data and parameter.)

Data / Parameter:	
Unit:	
Description:	

Measured/ Calculated / Default:	
Source of data:	
Value(s) of monitored parameter:	
Monitoring equipment:	
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	
Additional comment:	

D.3. Implementation of sampling plan

1. If data and parameters monitored described in section D.2 above are determined by a sampling approach, provide a description on how project participants implemented the sampling efforts and surveys for those data and parameters according to the sampling plan. Include:
   (a) Description of implemented sampling design;
   (b) Collected data (Attach and reference to electronic spreadsheets, if necessary);
   (c) Analysis of the collected data;
   (d) Demonstration on whether the required confidence/precision has been met.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

1. Provide sample calculations for all formulae used and calculation of baseline emissions or baseline net GHG removals by sinks, applying actual values. Attach electronic spreadsheets to present full calculations in the monitoring report.

E.2. Calculation of project emissions or actual net GHG removals by sinks

1. Provide sample calculations for all formulae used and calculation of project emissions or actual net GHG removals by sinks, applying actual values. Attach electronic spreadsheets to present full calculations in the monitoring report.

E.3. Calculation of leakage

1. Provide sample calculations for all formulae used and calculation of leakage, applying actual values. Attach electronic spreadsheets to present full calculations in the monitoring report.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

1. Summarize the results of sections E.1, E.2, E.3 above and provide GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period, using the table below.

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total				

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

1. Provide a comparison of actual GHG emission reductions or net anthropogenic GHG removal of the project activity achieved during this monitoring period with the estimates in the registered PDD.

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)		

E.6. Remarks on difference from estimated value in registered PDD

1. Explain the cause of any increase in the actual GHG emission reductions achieved during this monitoring period based on the applicable provision for calculation of GHG emission reductions in the Project standard.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

1. If the monitoring period starts before 31 December 2012 and ends anytime thereafter, provide actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved for the following two periods respectively:
(a) Up to 31 December 2012 (1st commitment period); and
(b) From 1 January 2013 onwards.
2. Calculate the achieved GHG emission reductions or net anthropogenic GHG removals by sinks proportionally for each period. In cases where annual caps were applied in the calculations, prorate the annual caps to each period.

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)		

Appendix 1. Contact information of project participants and responsible persons/ entities

1. In accordance with A.6 above, complete the table below, with the following mandatory fields: Project participant and/or responsible person/ entity, Organization, Street/P.O. Box, City, Postcode, Country, Telephone, Fax, e-mail and Name of contact person. Copy and paste the table as needed.

Project participant and/or responsible person/ entity	☐ Project participant ☐ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	
Street/P.O. Box	
Building	
City	
State/Region	
Postcode	
Country	
Telephone	
Fax	
E-mail	
Website	
Contact person	
Title	
Salutation	
Last name	
Middle name	
First name	
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

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Document information

Version	*Date*	*Description*
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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