

MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT

Version 1: 12/01/2012

Humbo Ethiopia Assisted Natural Regeneration Project

Reference number 2712

Monitoring Period 1 (01/12/2006 - 01/12/2011)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions

The afforestation and reforestation activity of the Humbo Assisted Regeneration Project, involves the restoration of indigenous tree species in a mountainous region of South Western Ethiopia. The project zone covers approximately 2728 hectares of land and includes 5 strata. The project contributes to climate change mitigation objectives by creating Greenhouse gas (GHG) sinks through assisted natural regeneration of degraded lands. Furthermore, the project compliments the natural resource management goals of the Ethiopian Agricultural Rural Development and Forestry Coordination Office (ARDFCO), and social development goals of the Ethiopian government, and World Vision Ethiopia, the humanitarian organization implementing the project.

The Humbo Assisted regeneration project has established seven community cooperative societies, which have legal ownership to 2,728 hectares of community land. These groups are managing the areas using the Farmer Managed Natural Regeneration techniques for the purposes of carbon removal, environmental benefits (biodiversity, water quality, and habitat) and income producing activities for the local population. Bylaws agreed upon at project inception form the rules for community cooperative societies to manage the project.

In summary, the implemented project activities are contributing to sustainable development in the following ways:

1. Regeneration of native forest, utilizing the farmer managed natural regeneration (FMNR) and traditional forest establishment techniques.
2. Enhancement of GHG removals by sinks in the project area.
3. Promotion of native vegetation and biodiversity in the project area, which can be utilized as a refuge for local and migratory species and to improve the connectivity of fragmented forest resources.
4. Reduction in soil erosion and flooding and help maintain supply of the subterranean streams to support the region's water supply.
5. Provision of an income stream for communities through sustainable harvesting of forest resources.

2. Brief description of the installed technology and equipment;

The Humbo AR project site was stratified into four strata based on the pre-existing vegetation cover and accordingly the project has been registered in UNFCCC in December 2009 after it had been validated by the DOE JACO in March 2009. The four strata identified in the validation were also adopted in the project scenario, with an additional strata for areas replanted with seedlings. These strata were described below.

- a) **Stratum 1:** - is relatively dense area of the site with some big trees found in different parts. It is located at the South end of the site in a Kebele known as Abela Gefeta.

- b) **Stratum 2:** - is an area with scattered tree/vegetation cover and open land dominated with grass. It is geographically located in the south-east end of stratum 3 bordered by stratum 1 from south. This stratum has high potential for enrichment planting.
- c) **Stratum 3:** -is covered with relatively dense bushes and shrub on hillsides in a Kebele named as Abela Longena, Abala shoya, Bossa, Bolla, Bada and Bongota. Number. It is bounded by stratum 2 from east and stratum 4 from North.
- d) **Stratum 4:** - is situated extreme north, on opposite hillside of stratum 3. The stratum is characterized by scattered vegetation cover grown on very rocky area that is difficult for planting.
- e) **Stratum 5:** this stratum is considered to be open patchy area found scattered in stratum 3 proposed for new plantation.

After four years of intervention, these strata have been revised by as significant changes on growth of vegetation have been observed with in the same stratum (2, 3, and 4). To address these changes, the project site has been re-stratified using the same strata definitions given above. Some part of stratum 2 have been moved to stratum 3. Some areas of stratum 3 covered with rocky and scattered vegetation have been removed and included into stratum 4. The fifth stratum (new plantation area) which was estimated to be 500ha at project inception has been clearly defined after plantation activities have been completed. As a result, the total size of stratum 5 has been reduced to 50.7ha from 500ha estimated at baseline scenario see the size of each stratum before and after revision below.

Table A-1 The total size of each stratum before and after re-stratification

S/N	strata	Strata at project inception	Strata after re-stratification
1	stratum 1	234	233.48
2	stratum 2	745	630.71
3	stratum 3	1154	1698.71
4	stratum 4	95	114.41
5	stratum 5	500	50.7
	Total	2728	2728.01

Species endemic to the area are used to restore the forest and sequester carbon from the atmosphere. These include *Acacia* spp., *Aningeria adolfifericii*, *Podocarpus facutus*, *Olea africana*, *Cordia africana*, *Croton macrostachytus*, *Erthrina* spp., *Ficus* spp, among others. The naturalized species such as *Grevillea robusta* and *Eucalyptus globulus* are also utilised for block planting in open spaces where there are no tree stumps and on individual farmers' lands outside of the project boundary to assist in establishment of their own wood lots. Of the 500ha of land expected to be covered by new seedlings from the project site, only 50.7ha has been planted with naturalized species and delineated as stratum 5 and the remaining area (2677.3 ha) is being managed using farmer managed natural regeneration techniques supported by area closure.

Farmer managed natural regeneration (FMNR) was adopted for the endemic species whilst the naturalised species were produced in nurseries over a 5 year period. FMNR involves area closure for a minimum of 2 years, and training on thinning and pruning of rootstock identified as possible to grow into mature trees. A full description of FMNR and nursery operations is provided in Section A.4 of the Monitoring Report.

No genetically modified organisms or invasive alien species have been used in this project.

3. Relevant dates for the project activity

The start date of the project activity was 1/12/.2006. However, active management of the forest started on 15/07/2007. The following table depicts the details of annual reforestation activities carried out at stratum 5. The species planted at stratum 5 are *Grevelia robusta* and with mixture of *Eucalyptus camaldulensis*. The remaining part of the project site (2677.3 hectares) has been reforested through farmer managed natural regeneration. The natural regeneration area is stratified into four strata (1, 2, 3 & 4). Table A-2 shows the project activities that has been undertaken since the implementation of the project.

Table A-2 Reforestation and Forest management practices carried out over the last five years (area closure affects all strata)

Pruning/ thinning and planting carried out at d/t strata	2007		2008 Ha		2009 Ha		2010 Ha		2011 Ha		Total	
	Pruning/ Thinning (ha)	Planting (ha)	Pruning/ Thinning (ha)	Planting (ha)	Pruning/ Thinning (ha)	Planting (ha)	Pruning/ Thinning (ha)	Planting (ha)	Pruning/ Thinning(ha)	Planting (ha)	Pruning/ Thinning (ha)	Planting (ha)
Strata-1	0	0	40	0	50	0	25		0		115	0
Strata-2	0	0	0	0	0	0	0		0		0	0
Strata-3	0	0	360	0	453	0	85		116.78		1014.78	0
Strata-4	0	0	0	0	0	0	0		0		0	0
strata-5		11.4	0	22.2	0	7.1	0	4	0	6.1	0	50.7

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

4. Total emission reductions achieved in this monitoring period

Considering the minor amendments endorsed by the CDM executive board at meeting EB 63, documented in Annex 27, “Guidelines on accounting of specified types of changes in A/R CDM project activities from the description in registered project design documents” paragraph 3, point p, the project proponents have lowered the minimum dbh of the forest inventory from 4cm to 2cm . Given this, the emission reduction achieved in this monitoring period was 73,138.49 t CO₂e.

A.2. Project Participants

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Name of 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 a project participant (Yes/No)
Federal Democratic Republic of Ethiopia (host)	World Vision Ethiopia	No
The Government of Canada	The International Bank for Reconstruction and Development as Trustee of the BioCarbon Fund	Yes

A.3. Location of the project activity:

The project activity is located in the Humbo Woreda, Wolayita zone, Southern Nations Nationalities and Peoples Region (SNNPR), South Western Ethiopia. The closest town is Humbo (Te Bela). Humbo Woreda is approximately 420km south of Addis Ababa, and 195km south-west of Awassa, the capital city of SNNPRS.



Figure A-1 Location of the project activity within Ethiopia

The GPS Coordinates of the project site is shown below, and a shape file is available of this polygon. The project extends from latitude 6° 46'48.47 to 6° 41'04.28 N and longitude 37° 48'35.44 to 37° 55'14.51 E. A full list of the GPS coordinates taken at each corner points of project boundary is included in strata boundaries annexed to this monitoring report.

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

A.4. Technical description of the project

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The technology employed in this project is Farmer Managed Natural Regeneration (FMNR), and planting of seedlings raised from nursery stock. The FMNR technique has been developed in Niger Republic, West Africa over 20 years where it is now practiced on over 2 million hectares. The technique has also spread to Chad, Burkina Faso and Senegal. FMNR falls within the definition of afforestation / reforestation in the manner articulated in the approved methodology AR-AM0003 version 04.

Farmer Managed Natural Revegetation (FMNR) is a system of reforestation utilised by rural communities to achieve the objective of forest restoration over a short period. They have rights to forests and their products. Professor Chris Reij, of Vrije University in Amsterdam and Dr. Peter Cunningham, SIM International, have documented the technique, and this work is publicly available¹.

Implementation of FMNR

FMNR can be implemented in areas that have root stock that could resprout under protection and management. It works best where annual rainfall is in excess of 650mm and is not suitable for areas with an annual rainfall of less than 200mm. Root stock from trees cleared as long as 60 years can remain in the soil, resprouting periodically. This root stock will develop new shoots each year, and these can be mistaken for small shrubs or broadleaf groundcover species. On farmland, standard practice for farmers has been to slash this regrowth each year in preparation for planting crops. In non-arable areas, such growth is controlled through regular burning, grazing and fuel wood collection. However with training, the local communities could identify young shoots tend and manage them to regenerate the root stock. The proposed Humbo community forest area has been assessed and found suitable for application of the FMNR technique.

FMNR involves area closure for a minimum of 2 years, and training thinning and pruning of rootstock identified as possible to grow into mature trees. In the most basic form of FMNR, all stalks except one are cut from the root stock. Side branches are then pruned half way up the stem. Selecting and pruning five to seven stems can offer more benefits, and this has been the practice in West Africa. Unwanted stems are removed, and the managed stems increase in size each year, protecting the immediate soil environment and providing other useful materials and services such as fodder, humus, habitat, and protection from the wind and shade. On occasions that a stem is harvested, a younger stem is selected to replace it.

Different tree species require different pruning techniques, and these are determined through on site observation. A small handsaw or machete is the only tool used for pruning side branches of young shoots.

Land managers visit the project area every 2-4 months to re-prune as necessary. Heavy equipment is not required as a result there is minimal soil disturbance when this technique is used. Integrated fire management approaches are implemented in cooperation with the local communities. Grazing is prevented during the vulnerable period after pruning. The decision to allow grazing would be depend upon the growth of trees beyond the height that would not be vulnerable to grazing.

Supplemental planting

Supplemental planting was used to augment the FMNR established forests. A nursery was established with capacity to deliver up to 500,000 seedlings per year for the first four years, sufficient to reforest 500 hectares at 1000 stems per hectare. However during project implementation only 50.7 hectares has been planted in stratum 5 not the estimated 500ha of land that was planned for new plantation for the entire project site. The nursery was established in a conventional manner. Seedlings were planted in small pits (0.3m x 0.2m), which were pre-dug through the community participation. Seedlings were planted at the start of the rainy season and follow up weed control was undertaken after each planting.

¹ Farmer Managed Natural Regeneration. Impressions of a short field trip. June 9-11, 2004. Reij. C. Vrije Universiteit, Amsterdam; Reforesting the Sahel: Farmer Managed Natural Regeneration. Cunningham P.J and Abas. T.

Harvest

The project area is expected to be selectively harvested at years 12, 22 and 31 years. The management plan will maintain 50% of the standing biomass for the benefits of biodiversity, environmental protection and other ongoing services. Forest products are transported by donkey. Therefore, no leakage emission from the transport of harvested produce is expected. The forest products will be processed at the city of Sodo, approximately 40km from the project site.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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This project activity uses the approved baseline methodology AR-AM0003, Version 4, *Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing*.

This methodology utilizes *Version 2 of the Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities*

A.6. Registration date of the project activity:

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07/12/2009

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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30 years fixed crediting period starting from date 01/12/2006

A.8. Name of responsible person(s)/entity(ies):

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Responsible Entity

World Vision Ethiopia

Responsible persons

Organization:	World Vision Ethiopia
Street/P.O.Box:	P.O. Box 3330
Building:	
City:	Addis Ababa
State/Region:	Addis Ababa
Postfix/ZIP:	
Country:	Ethiopia
Telephone:	251-1- 29 33 50
FAX:	251-1- 29 33 46
E-Mail:	
Website URL:	http://www.wv africa.org/index.php?option=com_content&view=article&id=137&Itemid=154
Represented by:	Mr. Hailu Tefera Ayele
Title:	Project Manager
Salutation:	Mr
Last Name:	Ayele
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First Name:	Hailu
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Direct tel:	+251-11-6293363
Personal e-Mail:	Hailu_Tefera@wvi.org

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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1. The starting date of operation of the project activity

Actual field activity implementation started on 1/12/2006 (FMNR). But plantation activities starting on 05/6/2007. The annual details of the project schedule are delineated in section A1.

2. The information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc.

1. Plantation activities

The tree species used for supplementary planting have mainly included *Eucalyptus camaldulensis*, *Eucalyptus Globulus* and *Grevillea robusta*. However, small quantities of native tree species such as *Balanatus egyptica* and *Cordia Africana* including exotic ones like *Accacia saligna* have been planted as well. The list of species planted differs slightly from what is stated in the PDD. The reason for planting mostly *Gravillea robusta* species is because it is widely accepted by the community and has been adapted by the community for more than three decade due to its fast growth and adaptability to the local climate. Furthermore some of the seeds listed in the PDD were difficult to obtain and some failed to germinate in the nursery such as the *Podocarpus facutus* due to the poor quality of the seed. Considering the amendments endorsed as being able to be approved by the DOE at verification by the CDM executive board at meeting EB 63, documented in Annex 27, "Guidelines on accounting of specified types of changes in A/R CDM project activities from the description in registered project design documents" paragraph 3, these changes from the PDD are considered minor Amendments to the species planted, and an updated stratification plan are presented in this document.

2. Forest management

Forest management activities mentioned in the PDD such as pruning/thinning/coppice reduction have been carried out for the last four years through community participation. The practice includes removal of branches, twigs and deformed coppices that suppress the growth of main trees. The materials removed are used as fuel wood by the community living adjacent to the project site. These practices are expected mainly to carry out on natural regeneration areas categorized as stratum 1, 2, 3 and 4. For the last four years, thinning and pruning have been carried out on 1129.78 hectares of land.

3. Community engagement activities

The other major activities implemented in the project scenario are capacity building activities to enable them manage the project over the crediting period in a sustainable manner. The practice includes training on forest management, nursery management; soil and water conservation, farmer managed natural regeneration technique (pruning, thinning, coppice reduction and enrichment plantation), livestock management, project management, leadership, conflict resolution, cooperative and union formation, financial management etc. These practices have capacity built the community to undertake the role of project management over the long term and to educate the community about the benefits of the project to ecosystem and to precipitate climate change resilience.

Table B.1 Project Activities

Key Event	Date
Project implementation begins with area closure, application of FMNR technology to project site and establishment of forest cooperatives	01/12/ 2006
Nurseries Established near to project site	01/01/2007
First plantation establishment (118808 seedlings planted)	15/07/2007
Second plantation establishment (345158 seedlings planted)	10/07/2008
Third plantation establishment (168, 676 seedlings planted)	30/07/2009
Forth plantation establishment (75,350)	15/07/2010
Fifth plantation establishment (11,365)	20/07/2011

All the seedlings mentioned above are planted only in patchy areas scattered in stratum three which is considered as stratum five. The survival rate has been carried out three months after plantation. According to the survey result, the survival ranged from 79 to 85% depending on rain fall variability from season to season. However replacement has been done in the following rainy season.

3. Events or situations that occurred during the monitoring period, which may impact the applicability of the methodology and how the issues resulting from these events or situations are being addressed.

No events or situations occurred during the monitoring period which have impacted the applicability of the methodology.

B.2. Revision of the monitoring plan

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The monitoring plan has not been revised

B.3. Request for deviation applied to this monitoring period

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There has been no request for a deviation of the monitoring period applied to this project

B.4. Notification or request of approval of changes

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There has been no request of changes to the registered CDM PDD for this project however considering the minor amendments endorsed as being able to be approved by the DOE at verification by the CDM executive board at meeting EB 63, documented in Annex 27, "Guidelines on accounting of specified types of changes in A/R CDM project activities from the description in registered project design documents" minor amendments are proposed at this verification event.

These minor changes include:

- Changes to the shape and number of hectares planted as part of strata 5
- Changes to species planted in strata 5
- Calculation of carbon stocks using allometric equations rather than BEF
- Precision 10%

SECTION C. Description of the monitoring system

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As per the registered PDD, the project proposes monitoring of:

1. Plantation Establishment and Management
 - a. Project boundaries
 - b. Forest establishment
 - c. Forest management
2. GHG emissions by sinks.

The monitoring system as described in the PDD involves the monitoring of parameters which allow the project emissions, boundaries, and GHG reductions to be accurately measured and net GHG reductions to be calculated.

The following diagram C-1 outlines the relevant monitoring points.

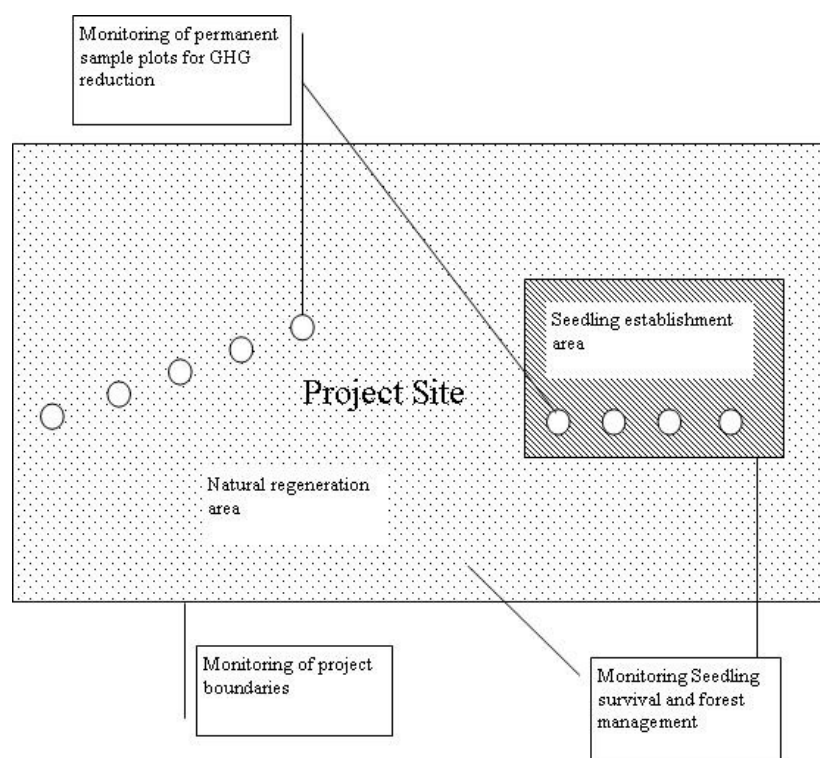


Figure C-1 Diagram of monitoring points

Monitoring of Plantation Establishment and Management

Monitoring of the project boundary

As per the monitoring methodology, a random sample of 10% of boundary points has been monitored for this monitoring period to ensure accuracy of the project boundary. The sample coordinates are annexed with this report

Monitoring forest establishment

To ensure the planting quality and forest establishment, the following monitoring activities were conducted in accordance with the monitoring methodology and Table C-1 below:

- Confirmed that site and soil preparation are implemented based on practice documented in section A of the PDD, no slash and burn and widespread tillage was used on the site and soil preparation.
- Survival rate checking, the initial survival rate of planted trees was checked three months after the planting, and re-planting was conducted where the survival rate is lower than 90%.
- Final survival checking carried out three years after planting.
- Weeding checking to check and confirm that the weeding practice where necessary is implemented.
- Surveying and checking the area of planted species and planting year for each substratum within stratum 5.

Table C-1 Data for monitoring forest establishment

Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of data points / Other measure of number of collected data	Comment
<i>Site preparation</i>	<i>Yes / No</i>	<i>Measured</i>	<i>At planting</i>	<i>Open areas allocated for planting</i>	<i>This involves preparation of a small pit manually with a size of (0.2mx0.3m) no other site preparation has been undertaken</i>
<i>Seedling survival</i>	<i>%</i>	<i>Measured</i>	<i>3-months after planting, then annually up to year 3</i>	<i>Permanent sample plots</i>	<i>Checking carried out by Counting for 100% plants from 12-36 sample plots having a plot size of 100m² each. Replanting has been carried out if less than 90% survival rate is recorded</i>
<i>Weeding efficacy</i>	<i>Yes / No</i>	<i>Measured</i>	<i>Weeding is conducted before the commencement of dry season 2 months after of planting</i>	<i>Permanent sample plots</i>	
<i>Area of planted strata</i>	<i>Ha</i>	<i>Measured</i>	<i>At end of year 1</i>	<i>All boundaries monitored</i>	<i>Boundary is delineated using GPS</i>

Note: Please see Humbo CDM Data Management Template- discrete area data for detail information and annex- for boundary GPS points

Monitoring of forest management

To ensure the forest management is well implemented the following monitoring activities have been conducted since project implementation:

- Site preparation measures: date, location, area and other measures undertaken;
- Planting: date, location, area, tree species (establishment of the stand models);
- Thinning: date, location, area, tree species, volumes or biomass removed;
- Coppicing: date, location, area, tree species, volumes or biomass removed;

- Fuel wood collection: date, location, area, tree species, volumes or biomass removed; and
- Monitoring for disturbances: date, location, area (GPS coordinates and remote sensing, as applicable), tree species, type of disturbance, biomass lost, implemented corrective measures, change in the boundary of strata and stands.

The data required for forest management is shown in table C-2 below.

Table C-2 Data required for monitoring forest management

Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of sample plots at which the data will be monitored / Other measure of number of collected data	Comment
<i>Site preparation – date</i>	<i>Date</i>	<i>Measured</i>	<i>Project start</i>		Humbo CDM Data Management Template
<i>Site preparation – location</i>	<i>Parcel ID</i>	<i>Measured</i>	<i>Project start</i>	<i>All planted plots</i>	Humbo CDM Data Management Template
<i>Site preparation – area</i>	<i>Ha</i>	<i>Measured</i>	<i>Project start</i>	<i>All planted plots</i>	Humbo CDM Data Management Template
<i>Site preparation – biomass loss</i>	<i>tonnes</i>	<i>estimated</i>	<i>Project start</i>	<i>NA</i>	<i>NA</i>
<i>Planting/Replanting – date</i>	<i>Date</i>	<i>Measured</i>	<i>At each planting event</i>	<i>All replanted plots</i>	Humbo CDM Data Management Template
<i>Planting/Replanting – location</i>	<i>Parcel ID</i>	<i>Measured</i>	<i>At project start/rotation</i>	<i>ID of plots requiring replanting</i>	Humbo CDM Data Management Template
<i>Planting/Replanting – area</i>	<i>ha</i>	<i>Measured</i>	<i>At project start/rotation</i>	<i>Area of plots requiring replanting</i>	Humbo CDM Data Management Template
<i>Planting/Replanting – species</i>	<i>Species</i>	<i>Measured</i>	<i>At project start/rotation</i>	<i>All species planted</i>	Humbo CDM Data Management Template
<i>Management – Thinning/coppicing - date</i>	<i>Date</i>	<i>Measured</i>	<i>At project start/rotation</i>	<i>At each thinning event</i>	Humbo CDM Data Management Template
<i>Management – Thinning/coppicing - location</i>	<i>Parcel ID</i>	<i>Measured</i>	<i>periodic</i>	<i>At each thinning event</i>	Humbo CDM Data Management Template
<i>Management –</i>	<i>ha</i>	<i>Measured</i>	<i>Periodically</i>	<i>entire area</i>	

<i>Thinning/coppicing - area</i>			<i>after each thinning</i>	<i>thinned</i>	
<i>Management – Thinning/coppicing - species</i>	<i>species</i>	<i>Measured</i>	<i>Periodically after each thinning</i>	<i>Sample of area to determine species thinned</i>	
<i>Fuel wood collection – date</i>	<i>Date</i>	<i>Estimated</i>	<i>Periodically during collection</i>	<i>Discussion with 7community cooperatives</i>	<i>After one week of pruning/thining activities</i>
<i>Fuel wood collection – location</i>	<i>Parcel ID</i>	<i>Measured</i>	<i>Periodically during collection</i>	<i>Discussion with 7community cooperatives</i>	<i>Abala longena, shoya, Bossa, Bolla, Bada and Bongota</i>
<i>Fuel wood collection – area</i>	<i>ha</i>	<i>Estimated</i>	<i>Periodically during collection</i>	<i>Discussion with 7community cooperatives</i>	<i>Fuel wood has been collected from 1129ha where pruning and thinning has been carried out</i>
<i>Fuel wood collection – species</i>	<i>species</i>	<i>measured</i>	<i>Periodically during collection</i>	<i>Discussion with 7community cooperatives</i>	<i>Terminalia brownii</i> <i>Combretum collinum</i> <i>Terminalia laxiflora</i> <i>Combretum molle</i> <i>R. Br.ex G.Don</i>
<i>Fuel wood collection – volume</i>	<i>m³</i>	<i>Measured</i>	<i>Periodically after one week of pruning</i>	<i>Representative areas from each of 7 Cooperatives</i>	<i>Measured by taking sample from 5plots with a size of 100m2 from each cooperative.</i>

Monitoring of GHG emissions by sinks

GHG removals by sinks have been monitored through the establishment of permanent sample plots throughout the project site. These sample plots have been established in accordance with the sampling design developed according to the procedure in the *Sourcebook for LULUCF projects, approved methodology AM0003 version 4* and monitoring manual developed by World Bank and the data monitored have been recorded in the Humbo CDM Data Management Template developed in collaboration with by the BioCarbon fund.

Sampling Design

Before developing the sampling design, the project site had to be re-stratified due to the change in strata observed as a result of project intervention on some of the base line strata. Once the project strata were revised and the area of each stratum identified, the sampling design was developed following the procedures in the approved methodology AM0003, *Sourcebook for LULUCF projects*, and monitoring manual developed by the World Bank.

In order to determine the actual number of permanent sample plots required to be laid out in each newly established stratum to meet the targeted precision level of 10% with 95% confidence intervals as defined in the PDD, mean carbon stock and standard deviation has been calculated using data taken from preliminary sample plots of each stratum. Using the information above (area of each stratum, mean carbon density, standard deviation), the number

of total sample plots to be laid out in each stratum and the whole project site have been calculated with 90 % confidence interval and ± 10 precision level. Following this procedure, the total sample plots calculated was 77, with 10% contingency the total number of permanent sample plots is 85.

The type of sample plots selected is nested circular sample plots with 1m, 4m, 14m, and 20m radius. In one meter radius, every tree less than 5cm DBH at the height of 1.3m has been measured including their respective height. Trees having a DBH of 5-20cm have been measured in 4m radius circle. In 14m radius, the eligible trees measured are only those trees having a DBH of 20-50cm at a height of 1.3m. All other trees having a DBH more than 50cm are measured in a circle with a radius of 20cm. Height of each tree is measured using graduated pole. The location of sample plots have been overlaid on the map systematically with random start and their respective GPS coordinates, stratum and series number of each plot have been recorded. Each sample plot has been labelled and the respective coordinates have been uploaded into GPS to be fixed actually on the ground through navigation. Once the location of each sample plot is identified on the ground using GPS through navigation, tree data such as DBH, Height, stratum number, series number of each plot and species name in each circle have been recorded to estimate the ex-post emission reduction by sink. Please see the detail of the sampling design annexed to this monitoring report.

Monitoring Organisation and Responsibilities

The project manager has designated a monitoring team responsible for implementing the monitoring plan. The structure of this team is outlined in Table C-3 and Figure C-2.

Table C-3 Roles and responsibilities of project team

Task and Area of Responsibility	Method Used	Frequency	Responsible Role	Contact details
Staff and Community Training in monitoring systems	Application of sourcebook and Standard Operating Procedures for Humbo CDM	Annually and as new staff and community members are recruited	Climate change department manager	+251 (0)11 6293363 Hailu_Tefera@wvi.org
Operation of Monitoring Equipment	As per equipment instructions	Review annually	Field based project manager	+251 (0)46 119 1121 Kebede_Regassa@yahoo.com
Quality control (checking) of monitoring equipment	Standard Operating Procedures for Humbo CDM	Annual	Climate change and environment coordinator	+251 (0)11 6293363 Berhanu_Mekonnen@wvi.org
Collection and Coordination of field data	As per sourcebook and Standard Operating Procedures for Humbo CDM	Annual	Field based project manager and/or trained community members	+251 (0)46 119 1121 Kebede_Regassa@yahoo.com
Calculation of emissions reductions and deviations from	Humbo CDM Data Management	Annual	Climate change and environment	+251 (0)11 6293363 Kibret_Mamo@wvi.org

projections	Template and Standard Operating Procedures for Humbo CDM		coordinator and manager,	
Data cross-check of field measurements	As per sourcebook and Standard Operating Procedures for Humbo CDM	Annual	Climate change and environment coordinator	+251 (0)11 6293363 Kibret_Mamo@wvi.org
Data Storage at field level	As per Standard Operating Procedures for Humbo CDM (Backup to external hard disk drive and hard copy on file)	Annual	Field based project manager	+251 (0)46 119 1121 Kebede_Regassa@yahoo.com
Data Storage at Head office	As per Standard Operating Procedures for Humbo CDM (Backup to external hard disk drive, and hard copy on file)	Annual	Climate change department manager	+251 (0)11 6293363 Hailu_Tefera@wvi.org
Who undertakes Quality Assurance / control	As per sourcebook and SMART template	Annual	Climate change department manager	+251 (0)11 6293363 Hailu_Tefera@wvi.org
Sign off of monitoring reports and ER calculations	As per sourcebook and SMART template	Annual	Climate change department manager	+251 (0)11 6293363 Hailu_Tefera@wvi.org

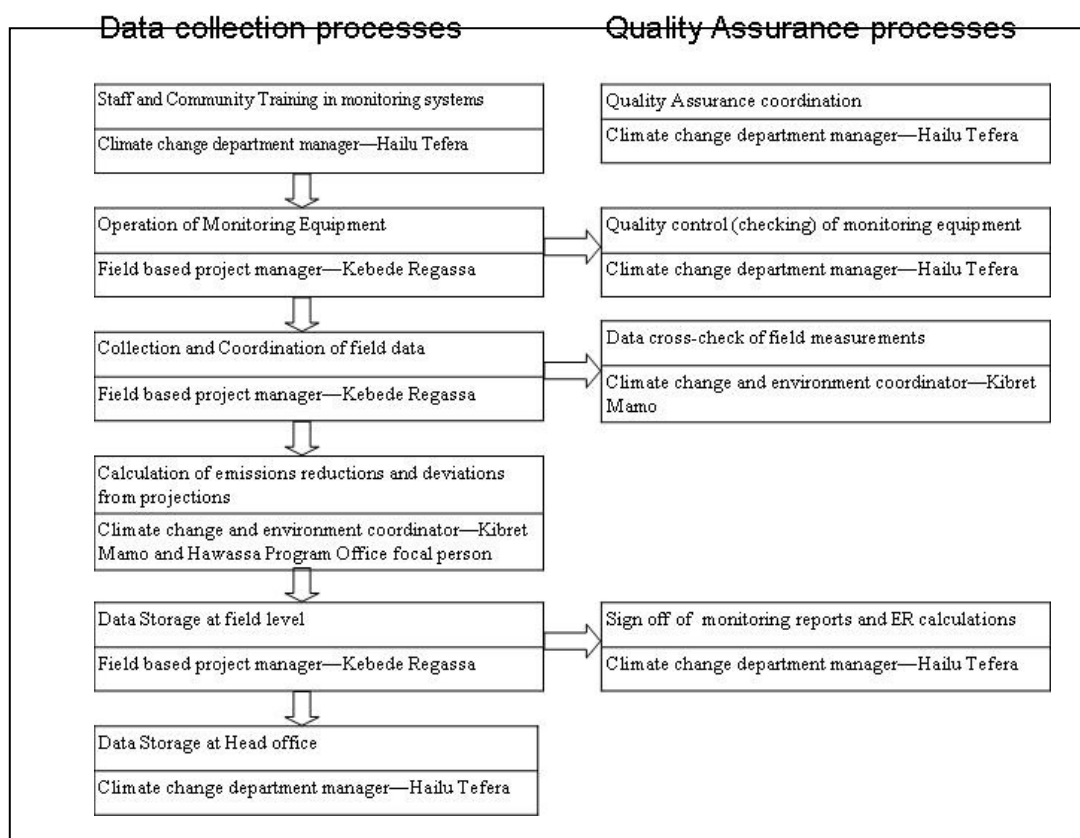


Figure C-2 Structure and responsibilities of the monitoring team

In addition to the above structure developed for quality assessment process, please refer the quality assurance procedure developed and annexed to CDM operational monitoring plan

Emergency procedure for the monitoring system

In the case measuring equipment is damaged and no reliable readings can be recorded, the project owner will purchase replacement equipment and repeat the monitoring procedures.

SECTION D. Data and parameters

This section shall include parameters used to calculate baseline, project, and leakage emissions as well as other relevant parameters required by the approved methodology and the monitoring plan; and specific information on how data and parameters have been monitored during the monitoring period. Data that is determined only once for the crediting period but are used after registration of the project activity should be included here under section D.1.

Provide for each parameter the following information, using the tables provided below:

1. Value of monitored parameter in the period for the purpose of calculating emission reductions. To report multiple values, a table may be used and included in this monitoring report or include references to spreadsheet. For default value (such as an IPCC value), where it is ex-post confirmed, the most recent value shall be applied.
2. Description of the equipment used to monitor each parameter, including details on accuracy class, and calibration information (frequency, date of calibration and validity), if applicable as per monitoring plan.
3. Measuring and recording method: how the parameters are measured /calculated, specifying the measurement and recording frequency.
4. Source of data: logbooks, daily records, surveys, etc.
5. Where relevant, the calculation method of the parameter.
6. The QA/QC procedures applied (if applicable per monitoring plan).
7. Include information about appropriate emission factors, IPCC default values and any other reference values that have been used in the calculation of emission reductions.

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	C_{BSL}
Data unit:	Numeric
Description:	Baseline net GHG removals by sinks
Source of data used:	Determined in PDD.
Value(s) :	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Additional comment:	the accepted baseline approach assumes the continuation of existing changes in carbon stock resulting further loss of regeneration ability hence, assumed to be zero

Data / Parameter:	CF_j
Data unit:	tonnes C
Description:	Carbon fraction of species, j
Source of data used:	Local, national, GPG for LULUCF IPCC
Value(s) :	0.5
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emission calculations
Additional comment:	IPCC default

Data / Parameter:	44/12
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Data unit:	Dimensionless
Description:	Ratio of molecular weights of Carbon and CO ₂
Source of data used:	Universal constant
Value(s) :	44/12
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculation
Additional comment:	-

Data / Parameter:	<i>Confidence level</i>
Data unit:	%
Description:	<i>Confidence level</i>
Source of data used:	defined
Value(s) :	95
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculation
Additional comment:	-

Data / Parameter:	<i>Fi (DBH, H)</i>
Data unit:	kg tree -1
Description:	Allometric equation for species <i>j</i> linking above-ground tree biomass (kg tree-1) to diameter at breast height (<i>DBH</i>) and possibly tree height (<i>H</i>) measured in plots for stratum <i>i</i> species <i>j</i> , time <i>t</i> using a published equation applicable to the project
Source of data used:	As per page 91 of the PDD the allometric equation used for the baseline and for the project is taken from (Pearson and Brown, 2005, Sourcebook for Landuse, Landuse Change and Forestry)
Value(s) :	Aboveground Biomass = 0.2035*(DBH ^{2.3196})
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions calculation
Additional comment:	

Data / Parameter:	<i>iID</i>
Data unit:	Alpha numeric
Description:	Stratum ID
Source of data used:	Stand Map, GIS
Value(s) :	Strata A1, A2, A3, A4, A5 See Humbo CDM Data Management Template.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculation
Additional comment:	

Data / Parameter:	<i>ID ikt</i>
Data unit:	Alpha numeric
Description:	Stand ID
Source of data used:	Stand Map, GIS
Value(s) :	See Humbo CDM Data Management Template to see the GPS coordinates and identify area of each stand for (natural regeneration –stand model-1 and plantation stand model-2)

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculation
Additional comment:	

Data / Parameter:	k ID
Data unit:	Alpha numeric
Description:	Stand model ID
Source of data used:	AR-CDM-PDD and ex-post adjusted strata.
Value(s) :	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	The project area has been re-stratified following the baseline stratification

Data / Parameter:	N
Data unit:	Numeric
Description:	Maximum possible number of sample plots in the project area
Source of data used:	Calculated
Value(s) :	43,644
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	

Data / Parameter:	NaBL
Data unit:	
Description:	Pre-project number of animals from different livestock groups
Source of data used:	Estimated at project start
Value(s) :	3,512
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Additional comment:	Ex-ante estimation – the estimate is fixed for the entire crediting period

Data / Parameter:	Ni
Data unit:	Numeric
Description:	Maximum possible number of sample plots in stratum <i>i</i>
Source of data used:	Calculated
Value(s) :	N1=3737, N2=10079, N3=27090, N4=1819, N5=919
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	project emission calculation
Additional comment:	This can be adjusted every 5 years

Data / Parameter:	P
Data unit:	%
Description:	Desired level of precision
Source of data used:	Defined

Value(s) :	10%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions calculation
Additional comment:	For the purpose of QA/QC and measuring and monitoring precision control. PDD implied both 5% and 10% precision, however the methodology clearly states that 10% precision is required.

Data / Parameter:	Bijt
Data unit:	Tonnes Dry matter per Hectare
Description:	Average above ground biomass stock before burning for stratum i, species j, time t
Source of data used:	Not Monitored
Value(s) :	Not Monitored
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	NA as there is no burning in the project scenario
Additional comment:	

Data / Parameter:	AN ikt
Data unit:	-
Description:	Area of with N applied in stratum i, stand model k, at time t
Source of data used:	Not Monitored
Value(s) :	Not Monitored
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	NA as there is no nitrogen used in t project
Additional comment:	

Data / Parameter:	GWPOCH4
Data unit:	-
Description:	Global warming potential for CH4
Source of data used:	Not Monitored
Value(s) :	Not Monitored
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	NA as there is no biomass burning in the project
Additional comment:	

Data / Parameter:	E
Data unit:	%
Description:	Allowable Error
Source of data used:	Not Monitored
Value(s) :	10%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emission calculation
Additional comment:	

D.2. Data and parameters monitored	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
Data / Parameter:	Sti
Data unit:	-
Description:	Standard deviation for each stratum, i
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	SD for each stratum has been calculated based on precision level of 10%. Refer the value from sampling design attached
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Used for estimating numbers of sample plots of each stratum and stand, as necessary.
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	

Data / Parameter:	A
Data unit:	Hectares
Description:	Total size of all strata
Measured /Calculated /Default:	Measured
Source of data:	GIS and / or GPS
Value(s) of monitored parameter:	2,728
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	GIS and GPS
Measuring/ Reading/ Recording frequency:	Before the start of the project and adjusted there after every 5-years
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	

Data / Parameter:	Ai
Data unit:	Hectares
Description:	Area of stratum i
Measured /Calculated	Measured

/Default:	
Source of data:	GIS and / or GPS
Value(s) of monitored parameter:	A1 = 233.48; A2 = 630.71; A3 = 1698.71; A4 = 114.41; A5 = 50.7
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	GIS and GPS
Measuring/ Reading/ Recording frequency:	Before the start of the project and adjusted thereafter every 5-years
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	

Data / Parameter:	A, ikt
Data unit:	Hectares
Description:	Area of stratum i, stand model k, at time t
Measured /Calculated /Default:	Measured
Source of data:	GIS and / or GPS
Value(s) of monitored parameter:	A1 = 233.48; A2 = 630.71; A3 = 1698.71; A4 = 114.41; A5 = 50.7
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	GIS and GPS
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Review of measured data carried out when data are collected

Data / Parameter:	AB, ijt
Data unit:	Hectares
Description:	Area of slash and burn stratum i, species j, at time t
Measured /Calculated /Default:	Measured
Source of data:	Measurement
Value(s) of monitored parameter:	Zero (there has been no slash and burn for site preparation)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Monitoring equipment (type,	GPS (Not applicable as no areas need to be measured)

accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	AP
Data unit:	m ²
Description:	Sample Plot area
Measured /Calculated /Default:	Measured
Source of data:	Field measurements using nested plots with radius of 1m 4m 14m and 20m. Plots are measured with a fibreglass tape from a fixed central point according to the process commonly used in forest inventories.
Value(s) of monitored parameter:	1m, 4m, 14m and 20m
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Fibreglass tape (Craftech 30m/100ft) and Bouncing RABIT 50/165ft Zhongya measuring tape) Calibrated annually. Last calibration November 2011.
Measuring/ Reading/ Recording frequency:	5 yearly
Calculation method (if applicable):	Measured not calculated
QA/QC procedures applied:	Review of measured data carried out as and when data is collected

Data / Parameter:	Area of planted strata
Data unit:	Ha
Description:	
Measured /Calculated /Default:	Measured
Source of data:	GIS calculations
Value(s) of monitored parameter:	See SMART template 02.1 or strata boundary
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	GPS
Measuring/ Reading/ Recording frequency:	At end of year 1
Calculation method (if applicable):	Using GIS software

applicable):	
QA/QC procedures applied:	

Data / Parameter:	BEF
Data unit:	Dimensionless
Description:	Biomass expansion factor
Measured /Calculated /Default:	Default
Source of data:	Local-derived, national inventory, IPCC GPG LULUCF
Value(s) of monitored parameter:	As per EB 63 decision on minor amendments to AR projects, the Humbo project has modified the project design from BEF to the use of allometric equations
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	

Data / Parameter:	$C_{AB,ijt}$
Data unit:	Tonnes C/ha
Description:	Carbon Stock in above-ground biomass for stratum <i>i</i> species <i>j</i> time <i>t</i>
Measured /Calculated /Default:	Calculated
Source of data:	Calculations using allometric equation selected above
Value(s) of monitored parameter:	See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	NA
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Allometric equation (Aboveground Biomass = $0.2035 \cdot (DBH^{2.3196})$)
QA/QC procedures applied:	

Data / Parameter:	C_{ACTUAL}
Data unit:	Tonnes CO ₂ -e
Description:	Actual net GHG removals by sinks
Measured /Calculated /Default:	Calculated
Source of data:	Calculations

Value(s) of monitored parameter:	See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	NA
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Using allometric equation above i.e. (Aboveground Biomass = $0.2035 \times (DBH^2 \times 3.196)$ for above ground biomass plus below-ground biomass for whole area time t
QA/QC procedures applied:	

Data / Parameter:	$C_{BB,ijt}$
Data unit:	Tonnes C
Description:	Carbon Stock in below-ground biomass for stratum i species j time t
Measured /Calculated /Default:	Calculated
Source of data:	Calculations
Value(s) of monitored parameter:	See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Above ground biomass multiplied by root/shoot ratio
QA/QC procedures applied:	

Data / Parameter:	DBH
Data unit:	cm (living/dead)
Description:	Diameter at breast height of living and standing dead trees
Measured /Calculated /Default:	Measured using a calliper or diameter tape, with 1.3m being measured with a fixed 1.3m measuring implement
Source of data:	Plot measurements
Value(s) of monitored parameter:	See data in permanent sample plots, Humbo data management template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration	Diameter tape (Forestry suppliers, 160cm DBH, Cloth), Equipment calibrated annually, last calibration November 2011.

frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Review of measured data carried out as and when data is collected

Data / Parameter:	Dj
Data unit:	t dm m ⁻³
Description:	Wood density of species <i>j</i> . <i>this parameter is not used to calculate biomass for this monitoring period due to lack of species specific data for such indigenous forest.</i>
Measured /Calculated /Default:	NA
Source of data:	IPCC GPG LULUCF
Value(s) of monitored parameter:	As per EB 63 decision on minor amendments to AR projects, the Humbo project has modified the project design from BEF to the use of allometric equations therefore this parameter is not monitored.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	NA
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	
QA/QC procedures applied:	Local and species specific values have priority

Data / Parameter:	GHG E
Data unit:	Tonnes CO2-e
Description:	Increase in GHG emission as a result of the implementation of the proposed AR CDM project activity within the project boundary
Measured /Calculated /Default:	Calculated
Source of data:	Calculations
Value(s) of monitored parameter:	0.102 t CO2e. See section E below
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	

applicable):	
QA/QC procedures applied:	

Data / Parameter:	Hj
Data unit:	M
Description:	Height of species, j
Measured /Calculated /Default:	Measured
Source of data:	Plot measurements
Value(s) of monitored parameter:	As per EB 63 decision on minor amendments to AR projects, the Humbo project has modified the project design from BEF to the use of allometric equations therefore this parameter is not monitored. See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Measurement stick calibrated at 1cm intervals.
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data reviewed by project manager after data collection has occurred

Data / Parameter:	<i>Hijt</i>
Data unit:	m ³
Description:	Annually harvested volume and fuel wood for stratum <i>i</i> , species <i>j</i> , at a time <i>t</i> .
Measured /Calculated /Default:	calculated from sample plots
Source of data:	Sample plots of Fuel wood harvested
Value(s) of monitored parameter:	No merchantable timber has been harvested; however wood from pruning and thinning have been collected for fuelwood. Sample plots calculations show that between 5.1 and 6.1m ³ of fuel wood has been harvested from thinning and pruning per hectare per year. See Humbo CDM Data Management Template and section E below.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	
QA/QC procedures applied:	Data reviewed by project manager after data collection has occurred

Data / Parameter:	<i>Volume of Fuel wood utilised from thinning and pruning</i>
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Data unit:	m ³
Description:	Annually utilised volume of fuel wood <i>t</i> .
Measured /Calculated /Default:	calculated from sample plots
Source of data:	Sample plots of Fuel wood utilised from pruning and thinning
Value(s) of monitored parameter:	No timber has been harvested, however pruning and thinning generated as a result of the project have been utilised for fuel wood. Sample plots calculations show that between 5.1 and 6.1m ³ of fuel wood has been harvested per hectare per year, and this is evenly distributed across all strata and species. See Humbo CDM Data Management Template and section E below.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	To estimate the amount of fuel wood that has been collected per hectare, sample plots of 100m ² have been taken randomly from four cooperative area. The selected cooperatives are Abela Longena, Bossa Wanche, Hobicha Bada and Hobicha Bongota where major pruning and thinning activities have been carried out. Five plots from each site have been taken for measurement. Branches and twigs removed as a result of this forest management has been collected into a bundle and measured separately. Finally, the average is computed for each cooperative site and converted in to hectare. See the value in table E1.
QA/QC procedures applied:	Data reviewed by project manager after data collection has occurred

Data / Parameter:	<i>J</i>
Data unit:	Latin name
Description:	Tree species.
Measured /Calculated /Default:	Measured
Source of data:	Project List
Value(s) of monitored parameter:	See See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 years
Calculation method (if applicable):	Not applicable

applicable):	
QA/QC procedures applied:	Data cross checked against literature and species identified in Addis Ababa university by project manager after data collection

Data / Parameter:	<i>lat / long</i>
Data unit:	
Description:	Plot location
Measured /Calculated /Default:	Measured
Source of data:	Project and plot map and GPS Locating, GIS
Value(s) of monitored parameter:	X,Y coordinates, see excel sheet permanent sample plot attached See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	GPS equipment Model (Garmin GPS 60) adjusted in WSG 84 projection last calibrated November 2011
Measuring/ Reading/ Recording frequency:	5 years
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Re-measurement of 10% of sample plots

Data / Parameter:	MVijt
Data unit:	M ³ /ha
Description:	Mean merchantable volume per unit area for stratum i, species j, time t.
Measured /Calculated /Default:	Calculated
Source of data:	As per EB 63 decision on minor amendments to AR projects, the Humbo project has modified the project design from BEF to the use of allometric equations therefore this parameter is not required.
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 years
Calculation method (if applicable):	
QA/QC procedures applied:	Not applicable

Data / Parameter:	<i>N</i>
Data unit:	Dimensionless
Description:	Sample size (total number of sample plots required) in the project area
Measured /Calculated	Calculated

/Default:	
Source of data:	Calculation
Value(s) of monitored parameter:	85
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 years
Calculation method (if applicable):	See sampling plan
QA/QC procedures applied:	Not applicable

Data / Parameter:	N_i
Data unit:	Dimensionless
Description:	Sample size (total number of sample plots required) for stratum i
Measured /Calculated /Default:	Calculated
Source of data:	Calculation
Value(s) of monitored parameter:	See sampling design attached to this monitoring report
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Before the project start; adjusted thereafter every 5-year
Calculation method (if applicable):	See Sampling design
QA/QC procedures applied:	Not applicable

Data / Parameter:	nTR_{PLkt}
Data unit:	Numeric
Description:	Number of trees in the sample plot
Measured /Calculated /Default:	Measured
Source of data:	Plot measurement
Value(s) of monitored parameter:	See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment	Chalk used to mark trees which have been measured to avoid double counting. No calibration needed.

(type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data is cross checked with 10% of sample plots remeasured by an independent team.

Data / Parameter:	<i>dNa EGL</i>
Data unit:	Dimensionless
Description:	Number of animals displaced in <i>EGL</i> areas at time <i>t</i>
Measured /Calculated /Default:	Calculated
Source of data:	Government Statistics on livestock numbers
Value(s) of monitored parameter:	Zero, no animals have been displaced in <i>EGL</i> areas at time <i>t</i> . See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	NA
Measuring/ Reading/ Recording frequency:	5 yearly
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	<i>Na EGL t</i>
Data unit:	Dimensionless
Description:	Number of animals present in the sampled <i>EGL</i> areas at time <i>t</i>
Measured /Calculated /Default:	Measured
Source of data:	Government staff have collected data on the number of animals from the entire households in the project area. Number of animals has been taken from the government census results.
Value(s) of monitored parameter:	Survey data attached “no of animals’ taken from government statistics, (15491) see section E.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 yearly
Calculation method (if applicable):	

applicable):	
QA/QC procedures applied:	Data to be reviewed by project manager after data collection has occurred

Data / Parameter:	<i>PLi k</i>
Data unit:	Dimensionless
Description:	Total number of plots in stratum i , stand model k
Measured /Calculated /Default:	Measured
Source of data:	Field measurements
Value(s) of monitored parameter:	ST1= 8, ST2=14, ST3= 57, ST4= 4, ST5 = 2. See sampling design attached to this monitoring report
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	See Sampling design document
QA/QC procedures applied:	Data reviewed by project manager after data collection has occurred

Data / Parameter:	<i>PL ID</i>
Data unit:	alpha numeric
Description:	Sample plot ID
Measured /Calculated /Default:	Measured
Source of data:	Project and plot map, GIS
Value(s) of monitored parameter:	See permanent sample plots attached to this monitoring report and Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data reviewed by project manager after data collection has occurred

Data / Parameter:	Project boundaries
Data unit:	%
Description:	GPS points to be re-measured to ensure accuracy of project boundaries
Measured /Calculated /Default:	Measured
Source of data:	Field measurements

Value(s) of monitored parameter:	See excel sheet 'QA boundary'
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	GPS, +-5m Cannot be calibrated
Measuring/ Reading/ Recording frequency:	At each verification
Calculation method (if applicable):	NA
QA/QC procedures applied:	A random sample of 10% of original GPS points has been monitored at this monitoring period to ensure accuracy of project boundaries.

Data / Parameter:	<i>Ri</i>
Data unit:	Dimensionless
Description:	Root to shoot ratio
Measured /Calculated /Default:	Estimated / Default
Source of data:	IPCC 2003, GPG LULUCF – Annex 3.A1, Table 3A.1.8 Average Belowground to Aboveground Biomass ratio in Natural Regeneration by broad category, page 3.168
Value(s) of monitored parameter:	0.27
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable
Measuring/ Reading/ Recording frequency:	5 years
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	The Root to Shoot ratio will only be updated where third party peer reviewed studies have been undertaken

Data / Parameter:	Seedling Survival
Data unit:	%
Description:	% of seedlings relative to target stocking density
Measured /Calculated /Default:	Measured
Source of data:	Field measurements
Value(s) of monitored parameter:	See SMART template 02.7 Survival rates are 2007: 79% 2008: 79% 2009: 67 % 2010: 85 %

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Not Applicable
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable
Measuring/ Reading/ Recording frequency:	3 months after planting then annually
Calculation method (if applicable):	Number of seedlings surviving / target stocking density
QA/QC procedures applied:	Replanting required if less than 90% survival

Data / Parameter:	Site preparation/pitting/
Data unit:	Yes/No
Description:	Sites that were disturbed during pit preparation (725,357 pits)
Measured /Calculated /Default:	Measured
Source of data:	Field measurements
Value(s) of monitored parameter:	(0.2*0.3)m ² *725357=4.35ha
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Base line emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	At vegetation removal
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data reviewed by project manager after data has been collected

Data / Parameter:	T ID
Data unit:	Years
Description:	Age of plantation
Measured /Calculated /Default:	Measured – counted since tree planted. Trees have different ages as they are planted at different years (2007=118,808, 2008=345,158, 2009= 168,676, 2010=75,350, 2011=17,365)
Source of data:	Date of establishment
Value(s) of monitored parameter:	See Humbo CDM Data Management Template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable

Measuring/ Reading/ Recording frequency:	At stand establishment
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data reviewed by project manager after data collection has occurred

Data / Parameter:	Weeding efficacy
Data unit:	%
Description:	Efficacy of weeding
Measured /Calculated /Default:	Measured
Source of data:	Field measurements
Value(s) of monitored parameter:	Weeding have been carried out in all trees planted (100%)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is only used in project management, to determine whether additional weeding is necessary
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	NA
Measuring/ Reading/ Recording frequency:	Quarterly year 1, then annually
Calculation method (if applicable):	Number of seedlings with insufficient weeding/number of seedlings measured
QA/QC procedures applied:	NA

Data / Parameter:	<i>XF</i>
Data unit:	Dimensionless
Description:	Plot expansion factor from per plot values to per hectare values for plots 1m, 4m, 14m and 20m in diameter.
Measured /Calculated /Default:	Calculated
Source of data:	Calculations
Value(s) of monitored parameter:	Plot expansion factors are made using formula $10,000 / (\pi * \text{radius}^2)$ 1m plot = $10000 / (\pi * 1 * 1) = 10000 / 3.142\text{m}^2 = 3183$ 4m plot = $10000 / (\pi * 4 * 4) = 10000 / 50.265\text{m}^2 = 198.9$ 14m plot = $10000 / (\pi * 14 * 14) = 10000 / 615.75\text{m}^2 = 16.2$ 20m plot = $10000 / (\pi * 20 * 20) = 10000 / 1256.63\text{m}^2 = 8.0$
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non Applicable
Measuring/ Reading/ Recording frequency:	5 year
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$Z\alpha/2$
Data unit:	Dimensionless
Description:	Value of the statistic z (normal probability density function) for $\alpha=0.05$ (implying a 95% confidence interval)
Measured /Calculated /Default:	Default
Source of data:	<i>Sourcebook for LULUCF projects</i> Timothy Pearson, Sarah Walker and Sandra Brown, 2005)
Value(s) of monitored parameter:	1.96
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	5 years
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	$MCAB, ijt$
Data unit:	tonnes C/ha
Description:	<i>Mean carbon stock in above ground biomass per unit area for stratum i, species j, time t</i>
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	See template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions Reductions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$MCBB, ijt$
Data unit:	tonnes C/ha
Description:	Mean carbon stock in below ground biomass per unit area for stratum i, species j, time t

Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	See template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions Reductions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta CAB, ijt$
Data unit:	tonnes C/year
Description:	Annual carbon stock change in above-ground biomass for stratum i, species j, time t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	See template
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions Reductions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta CAB, ikt$
Data unit:	tonnes C/year
Description:	Annual carbon stock change in above-ground biomass for stratum i, stand model k, time t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	See template
Indicate what the data are used for (Baseline/ Project/ Leakage emission	Project Emissions Reductions

calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta CBB, ijt$
Data unit:	tonnes C/year
Description:	Annual carbon stock change in below-ground biomass for stratum i, species j, time t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta CBB, ikt$
Data unit:	tonnes C/year
Description:	Annual carbon stock change in below-ground biomass for stratum i, stand model k, time t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non applicable
Measuring/ Reading/ Recording frequency:	

Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta CLB, ikt (sum) \Delta CP, ikt$
Data unit:	tonnes CO2/year
Description:	(sum of) Annual carbon stock change in living biomass in the project scenario for stratum i, stand model k, time t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta CP, LB$
Data unit:	tonnes CO2
Description:	Mean carbon stock change in above ground biomass for stratum i, stand model k, time t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta MCAB, ikt$
Data unit:	tonnes C/ha/year
Description:	Mean carbon stock change in above ground biomass for stratum i, stand model k, time t

Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta MCAB, ikt$
Data unit:	tonnes C/ha
Description:	Mean carbon stock change in above ground biomass for stratum i, stand model k, between monitoring events
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

Data / Parameter:	$\Delta MCBB, ijt$
Data unit:	year t tonnes C/ha/year
Description:	Mean carbon stock change in below ground biomass for stratum i, species j, at year t
Measured /Calculated /Default:	Calculated
Source of data:	
Value(s) of monitored parameter:	Project Emissions Reductions
Indicate what the data are used for (Baseline/ Project/ Leakage emission	

calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Non applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	
QA/QC procedures applied:	

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>> According to the methodology, the baseline carbon stock changes do not need to be monitored because the accepted baseline approach 22(a) assumes continuation of existing changes in carbon stock resulting in its further loss of regeneration ability. Baseline emissions are conservatively estimated at zero in the PDD.

Verification Period	Baseline Emissions
01/12/2006 – 01/12/2011	0

E.2. Project emissions calculation

>>

According to the PDD the project is not expected to result in emissions for the following reasons: Manual methods are used for carrying out the project tasks. Therefore, no emissions associated with the use of fossil fuels are relevant for the project. Though it is not mandatory to monitor data for such type of project developed according to AM0003-V4 methodology as stated in EB 63 Annex 26 page 3 “Estimation and accounting of emissions from burning of fossil fuel, both within and outside the project boundary, shall not be required to monitor data and parameters related to the above mentioned emissions,”, the project has tried to justify that emission from fossil fuel was negligible see the analysis below section E3.

There is no clearance of vegetation for site preparation. The only emission expected was due to pit preparation for new plantation. The area disturbed while preparing 725,357 pits is only 4.35ha as described above which is below 2% of the actual net green house removals by sinks and therefore considered insignificant.

- Biomass burning is not undertaken in the project
- The project does not use fertilizers
- Live fences are used for fencing. Therefore, wood from project area is not used as the fencing material.

Given these criteria have been met in the monitoring period; the project emissions are therefore identified to be zero.

Actual GHG removals by sinks therefore can be calculated by taking the pre-existing biomass from the project, established at validation (a total of 43,711.7 tonnes of CO₂-e), and subtracting this from the total biomass calculated from the permanent sample plots (116,850.19). Since there are no project emissions, and no emissions from leakage, the total net actual GHG removals by sinks is 73,138.49.

Verification Period	Project Emissions
01/12/2006 – 01/12/2011	0

E.3. Leakage calculation

>>

According to the PDD leakage from fuelwood collection, fencing and vehicle emissions is identified as zero.

Leakage due to fuel wood collection outside project boundary

To determine the amount of fuel wood being collected by the community from the project area is adequate or not, sample plots of 100m² have been taken randomly from four cooperative areas. The

selected cooperatives are Abella Longena, Bossa Wanche, Hobicha Bada and Hobicha Bongota where major pruning and thinning activities have been carried out. Five plots from each site have been taken for measurement. Branches and twigs removed as a result of this forest management has been collected into a bundle and measured separately. Finally, the average fuel wood collected per each year/ha is computed for each cooperative site and converted in to hectare see table E1. The type of species pruned and collected include *Maytenus senegalensis*, *Terminalia brownie*, *Acacia brevispica*, *Grewia bicolour*, *Euclea racemosa*, *Balanites aegyptica*, *Combretum molle*, *Syzygium guineese*.

Table E.1 Fuel wood collected over the last four years

	Abella Longena	Bossa Wanche	Hibicha Bada	Hobicha Bongota	Total	Average
2008	4.2	4.9	5.45	5.85	20.4	5.1m ³ /ha
2009	4.37	4.97	5.94	5.99	21.27	5.3m ³ /ha
2010	4.71	5.16	5.81	6.50	22.19	5.5m ³ /ha
2011	4.97	5.48	6.97	7.07	24.50	6.1m ³ /ha

From this table we can understand that leakage due to fuel wood displacement is zero as per the condition $FG_{BL} < FG_{AR,t}$ described on page 78 of AM0003-V4 where FG_{BL} is average pre-project annual volume of fuel wood gathering in the project estimated ex ante and specified in the AR-CDM-PDD; M^3YR^{-1} and $FG_{AR,t}$ is fuel wood gathered in the project area according to the monitoring result. As it is indicated in the PDD the pre-project annual volume of fuel wood gathering in the project area was 4.3m³/ha. But as shown in the table above, the fuel wood being collected in the project scenario is greater than pre-project volume of fuel wood collected.

Leakage due to livestock displacement is also considered to be zero as it is determined from the census result obtained from the government statistic. The number of existing animals grazing on the non-project area before the project was 8,684 cow/ox/bulls and 2,288 goats. The current number of animals after the five year project intervention is 11,383 (cow/ox/bulls/heifer/donkey) and 4,108 goats according to the government statistics shown in table E2. The farmers are increasing additional numbers of life stocks in the project scenario. The reason is that there was extra existing grazing land under the control of animal owners as described in the PDD that has been used to maintain the displaced animals, better management of the existing land due to various capacity building training events given to the farmers on this sector and ample amount of grasses being harvested from the project site since the closure. Some of the farmers are even selling grasses harvested from the closed project site and generate income out of it. From this one can understand that project activity has not displaced grazing animal population and leakage due to conversion of land to grazing land can be set as zero and no further monitoring step is needed as the condition $NaBL < NaARt$ specified on page 76 of AM0003-V4 is met.

Table E.2 Live stock census of project area during the monitoring period

S/No	KA	Type of livestock									Total
		Ox	Cow	Heifer	Bull	Calf	Goat	Sheep	Donkey	Mule	
1	Abela Longena	459	410	231	258	333	543	598	248	0	3080
2	Abela Shoya	428	390	230	60	187	236	232	276	6	2045
3	Abela Gefeta	423	484	250	313	305	546	282	514	3	3120
4	Bosa Wanchie	287	0	1	120	195	203	183	42	0	1031
5	Bola Wanchie	190	178	112	90	42	103	120	153	2	990
6	Hobicha Badda	490	182	323	377	271	34	112	63	8	1860
7	Hobicha Bongota	585	513	421	277	214	526	390	432	7	3365
	Total	2862	2157	1568	1495	1547	2191	1917	1728	26	15491

Emissions from fossil fuels:

Emission produced from fossil fuel combustion is also considered as zero. The only area expected to create leakage associated with the use of fossil fuel was during transportation of seedlings. The four nurseries were deliberately established closer to the project site to avoid emissions due to transportation. Seedlings were transported by human labour as described in the PDD except for one site called Gefeta. Since the start of the project, only 107,317 seedlings have been transported using pick up vehicle. Gefeta is one of the seven cooperatives located south-east of the project site with a distance of approximately 5-6km from the nursery site. The pick up vehicle carries 4000 seedlings per trip. The total trips the vehicle travelled is 27. The total kilometre covered to transport all the seedlings for the last five years were 324km considering 12 km per round trip. During all this time the fuel consumed was 38.88 litres considering 12litre/100km. The fuel used is diesel. By taking these basic data, leakage due to fossil fuel consumption has been calculated using the equation 83 on AM0003-V4.

$$E_{\text{FuelBurn}} = \sum (\text{CSP}_{\text{dieslt}} * \text{EF}_{\text{diesel}} + \text{CSP}_{\text{gasolinet}} * \text{EF}_{\text{gasoline}}) 0.001$$

Where, CSP diesel t = volume of fuel consumption for year t, Litter (l)

EF_{diesel} = Emission factor for diesel, kgCO₂ l⁻¹, 3.14kg CO₂/litre of diesel. This EF is taken from IPCC default value.

The vehicle uses only diesel. Therefore, emissions from gasoline are zero.

EF_{Fuelburn} = 38.88lit*3.14kgCO₂/lit, = (38.88*3.14kg)/1000, =(0.12208 tCO₂e= 0.1221tCO₂-e. This is the only leakage or project based emissions source, and is below 2% of the actual green house removal by sink and therefore can be considered insignificant.

E.4. Emission reductions calculation / table

>>

This section shall include the formulae used to calculate the emission reductions and the total of the emission reductions achieved during the monitoring period.

Total baseline emissions tCO ₂ e	Total project emissions tCO ₂ e	Total leakage tCO ₂ e	Total emission reductions tCO ₂ e
0	0	0	0

Estimation of baseline carbon stocks tCO ₂ e (pre-existing biomass)	Annual carbon stock change tCO ₂ e/yr	GHG emission by sources tCO ₂ e/yr	Estimation of actual net GHG removals by sinks tCO ₂ e/yr	Estimation of Leakage tCO ₂ e/yr	Estimation of net anthropogenic GHG removals by sinks tCO ₂ e/yr
43,711.7	23,370.04	0	116,850.19	0	73,138.49

tCERs accrued from the project activity in this monitoring period is 73,138.49 tCO₂e .

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO₂e)	69,868.7	73,138.49

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

>>

There is little difference between the ex-ante calculations and the actual values. Given the range of uncertainty associated with LULUCF methodologies it is likely that there is no significant difference between the ex-ante calculation and the actual values reached during the monitoring period.

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Guideline, Form Business Function: Issuance		