Monitoring report form for CDM project activity
(Version 06.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT		
Title of the project activity	Reforestation on Degraded Lands in Northwest Guangxi	
UNFCCC reference number of the project activity	Ref. 3561	
Version number of the PDD applicable to this monitoring report	07	
Version number of this monitoring report	02	
Completion date of this monitoring report	25/02/2018	
Monitoring period number	Second monitoring period	
Duration of this monitoring period	01/07/2012 - 12/11/2017	
Monitoring report number for this monitoring report	1	
Project participants	• Guangxi Longlin Forestry Development Company Ltd. • The International Bank for Reconstruction and Development (IBRD) as Trustee of the BioCarbon Fund • Kingdom of Spain - Ministry of Agriculture, Food and Environment & Ministry of Economy and Competitiveness; • Government of Ireland-Department of the Environment, Community and Local Government • Zeroemissions Carbon Trust, S.A. • Syngenta Foundation for Sustainable Agriculture	
Host Party	People's Republic of China	
Sectoral scopes	14 : Afforestation and reforestation	
Applied methodologies and standardized baselines	• AR-ACM0001/version 03 (applied in PDD) - Afforestation and reforestation of degraded land • AR-ACM0003 ver. 02.0 (applied in MR) - Afforestation and reforestation of lands except wetlands	
Amount of GHG emission reductions or net anthropogenic GHG removals	Amount achieved before 1 January 2013:	Amount achieved from 1 January 2013

achieved by the project activity in this monitoring period	39,945 metric tonnes CO_2 equivalent	**388,721** metric tonnes CO_2 equivalent
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	506,442 tCO_2 e	

SECTION A. Description of project activity

A.1. General description of project activity

>> The A/R CDM project activity, Reforestation on Degraded Lands in Northwest Guangxi, has been under implementation since 2008 in the Guangxi Zhuang Autonomous Region of China. The project has been implemented afforestation and reforestation (A/R) activities to achieve multiple objectives of restoring the degraded areas, including soil, water and biodiversity conservation and poverty alleviation. The specific objectives of the project are:

(1) To control soil and water erosion and land degradation in the selected project areas;
(2) To enhance biodiversity conservation by increasing forest cover and nature habitat connectivity;
(3) To generate income for the local farmers and promote the local community development.

To achieve the objectives, the 6,592.6 ha of multiple-use forests have been established on degraded lands in Longlin County, Tianlin County and Lingyun County of Guangxi Province, compared to 8,671.3 ha planned in registered PDD. The major species covered in the forestation models are: Masson pine (*Pinus massoniana*) 3,018.3 ha, Chinese Fir (*Cunninghamialanceolata*) 2,299.7 ha, Eucalypus (*Eucalyptus* sp.) 404.0 ha, Birch (*Betula luminifera*) 744.8 ha, and Choerospondias (*Choerospondias axillaries*) 125.8 ha.

The A/R CDM project activity has been implemented involving farmers/communities and forest companies. The farmers and communities contribute land and labour and local forest companies invest in planting activities, provide technical input and manage the plantations during the crediting period. The contractual arrangements between the farmers/communities and the companies cover the plantation establishment and management responsibilities, inputs and benefit sharing. The forest companies pay farmers for labour input to the project, providing income to farmers through temporary employment.

The farmers/communities of the project have contracted the forest company to conduct project registration, implementation and monitoring of the A/R CDM project activity, and sale of CERs on behalf of the project.

The A/R CDM project activity has been implemented separately, but linked with a larger umbrella Guangxi Integrated Forestry Development and Conservation Project (GIFDCP), which supports monitoring of environmental and social impacts of the project in relation to natural forest, watershed and biodiversity aspects of the Guangxi Zhuang Autonomous Region.

The project implemented reforestation through direct planting of tree species to restore the degraded lands using environmental-friendly techniques. Good practice guidance of reforestation and experience gained from the World Bank financed forestry projects were adopted in the project. The following technical and regulatory standards have been followed:

- Artificial Afforestation Technical Regulation: GB/T 15776-2006;
- Non-commercial Forest Construction: GB/T 18337.1-2001, GB/T 18337.2-2001, GB/T 18337.3-2001;
- Non-commercial forest construction-verification regulation: GB/T 18337.4-2008;
- Design Code for Afforestation Operation: LY/T 1607-2003;
- Regulations for Tending of Forest: GB/T 15781-1995;
- Tree Seedling Quality Grading of Major Species for Afforestation: GB 6000－1999;
- Technical Regulations for Cultivation of Tree Seedlings: GB/T 6001-1985;
- Technical Standard for Cultivation of Container Seedlings: LY1000-1991;
- Seed Certification Regulations (GB2772-1999);
- Technical regulations for forest harvest and regeneration
- Technical Regulations for Chinese fir plantation in Guangxi
- Technical Regulations for masson pine plantation in Guangxi
- Technical Regulations for birch plantation in Guangxi

The local forestry agencies, i.e., Guangxi Provincial Forestry Department, Longlin, Tianlin and Lingyun County Forestry Bureaus, Guangxi Forestry Inventory and Design Institute and Guangxi Forestry Research Institute provided guidance, and quality control in the implementation of the A/R CDM project activity. The up-to-date technologies and silvicultural models were adopted. No technology has been transferred to the host party.

To prevent soil erosion, reduce GHG emission and protect existing carbon stocks, site burning and overall tillage were not employed. Small pits of diameter 40-50cm and depth of 40cm were dug along the contours. To minimize risk of natural events (fire, pest, insects and disease) and to maximize environmental and social benefits, mixed species arrangements were adopted. All species except eucalyptus are native to the region.

Seedlings of eucalyptus developed using tissue culture method were purchased from Guangxi Dongmen Forestry Farm or Guangxi Institute of Forestry, and then cultured in the nurseries of Tianlin County. Seeds of other species were collected from local seed orchards or parent tree gardens and grown in temporary on-site nurseries. All seed and tissue cultured seedlings were subjected to quality, quarantine and inspection certification. Seedlings of Masson pine, shiny-bark birch and eucalyptus are produced in plastic tubes (5 cm in diameter and 15 cm length). This technique ensured the control of growing conditions in the early stages of planting, and improved the growth and survival of planted seedlings.

- Planting activities were completed over five years, starting in 2008. The major species of the project and their spacing is as follows:
  - *Eucalyptus* sp.: 2 m × 4 m, 2 m ×3 m;
  - *Pinusmassoniana:* 2 m ×3 m;
  - *Cunninghamialanceolata*: 2 m ×2 m;
  - *Betulaluminifera*: 2 m ×3 m;
  - *Choerospondiasaxillarie*: 2 m ×3 m;
- To ensure high survival rates and good growth in the early stages, manual weeding was conducted two to three times a year during the first three years of planting. Survival rates were checked and re-planting was conducted as necessary such as on lands affected from severe drought.
- Phosphorous fertilizer and synthetic compound fertilizer (nitrogen content around 12%) were applied at the time of planting and also after planting.
- 148.3 ha of eucalyptus has been harvested and regenerated during the monitoring period.

A.2. Location of project activity

>>The A/R CDM project activity is located in Longlin County, Tianlin County and Lingyun County in the north-western Guangxi Zhuang Autonomous Region, in southern China (Fig.A-1).

Reforested lands are located in 41 villages of 13 townships and 2 sub-farms of Jinzhongshan Forestry Farms in Longlin County, 22 villages of 11 townships in Tianlin County, and 3 villages of 2 townships and 4 sub-farms of Jiujiang Forestry Farm in Linyun County (Table A-2).

Table A-2 List of Counties, townships and villages involved[1]

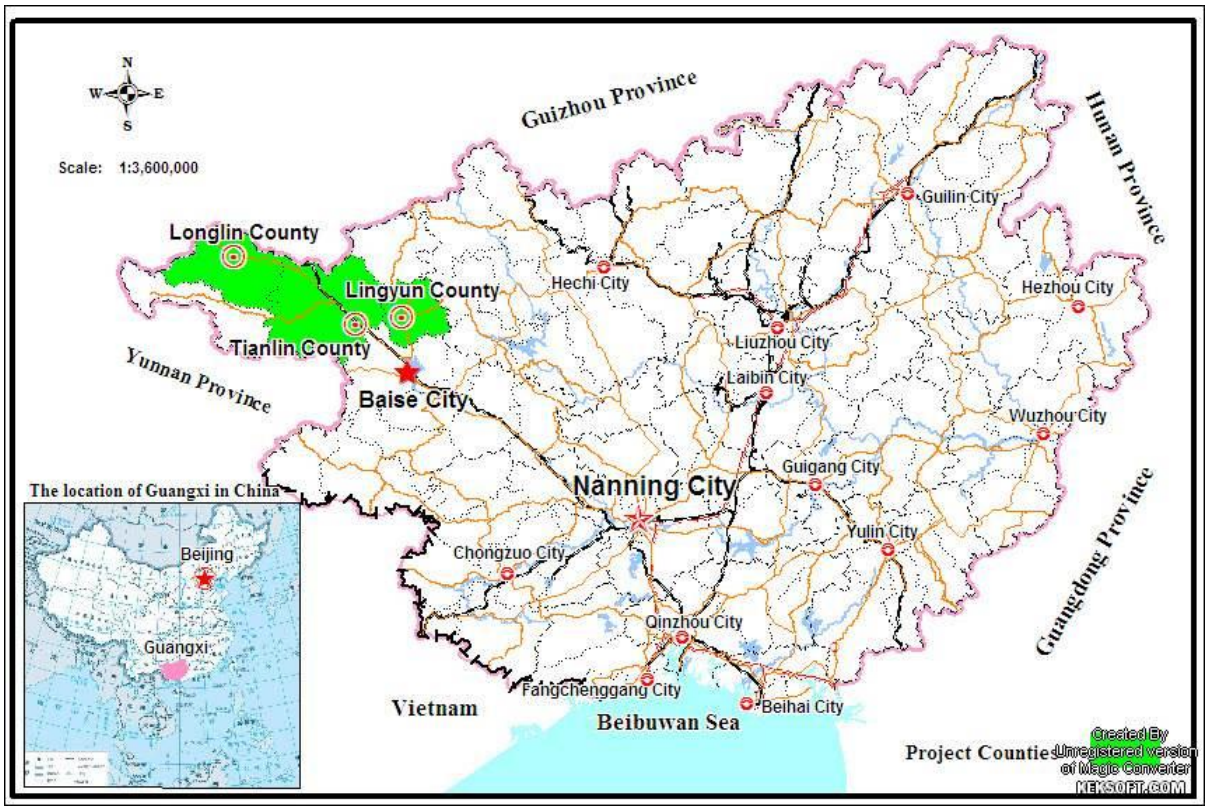
Townships	Villages	Coordinate	
		Longitude (E, degree)	Latitude (N, degree)
Long Lin County			
ShaLi	WeiRao	105.56910-105.614058	24.760254-24.810966
PingBan	WeiLong	105.54662-105.575851	24.754467-24.800739
	BianYa	105.42689-105.497895	24.72101-24.775827
	GongHeChang	105.39289-105.45226	24.702059-24.764923
LongHuo	WeiLing	105.481388-105.54588	24.625555-24.673548
	YuTang	105.50061-105.54518	24.648746-24.701743
ZheBao	TongLiu	105.39191-105.48975	24.827213-24.889658
	NanGuang	105.43109-105.48988	24.82673-24.87393
	BanZhiHua	105.347742-105.45146	24.882029-24.946602
ZheLang	ZheYan	105.26979-105.301313	24.781569-24.823208
GeBu	Zheyan	105.05451-105.13100	24.792719-24.838543
	ZuoTeng	105.05602-105.12148	24.747751-24.807688
	ZheJiang	105.02372-105.07829	24.80899-24.850016
	HongYan	105.098481-105.16709	24.73772-24.804873
De′e	BaKe	105.15746-105.26303	24.58609-24.634993
	YanTou	105.16488-105.229436	24.573357-24.607754
	JinPing	105.12856-105.17163	24.551584-24.603495
	ShuiJing	105.139414-105.21735	24.660671-24.738968
	LongYing	105.25519-105.33508	24.645823-24.706753
Zhuchang	YangJie	105.058853-105.15303	24.706938-24.758263
	NaYan	104.973878-105.0716	24.567415-24.624638
SheChang	LeXiang	105.28477-105.34425	24.527533-24.582968
	XinMin	105.24549-105.29403	24.517004-24.58534
	XinLi	105.34095-105.41039	24.513315-24.576408
	Machang	105.21479-105.27247	24.516352-24.590862
KeChang	HaiChang	105.37226-105.44426	24.554058-24.609339
	HePing	105.39348-105.44412	24.53883-24.578779
	KeNiang	105.43903-105.49259	24.625023-24.675657

[1]The coordinates listed in the table represent the geographical ranges of the villages, which are based on Beijing1954 3 degree zone and Gauss-kruger projection.

	XinHe	105.25155-105.31525	24.577288-24.653303
	XinHua	105.27733-105.33849	24.57481-24.653801
	HouChang	105.31890-105.39149	24.638981-24.717844
	DaQing	105.29261-105.3317	24.671701-24.706352
YanCha	LengDu	105.45530-105.52928	24.438459-24.504124
	PingTai	105.40021-105.49588	24.390295-24.448271
	LongTai	105.37083-105.47046	24.44141-24.491156
	PingBan	105.41013-105.51616	24.500202-24.563868
JieTing	NaDa	105.47292-105.54466	24.381567-24.456039
	NongXi	105.53310-105.62213	24.372391-24.425165
	NaSang	105.510827-105.58971	24.479509-24.544373
XinZhou	NongSang	105.26918-105.35068	24.704311-24.750227
	PoYan	105.458734-105.50881	24.644657-24.695047
Jinzhongshan Forestry centre	WuChong	104.84013-104.93601	24.681383-24.749472
	MaLan	104.93263-104.9908	24.659658-24.70019
Tian Lin County			
lizhou	nanglao	106.364219-106.364219	24.297103-24.338214
	fanchang	106.371444-106.437104	24.325814-24.388769
langping	xiangwei	106.238345-106.271855	24.44079-24.548795
	hongxing	106.238135-106.315628	24.582321-24.651086
lucheng	yingpan	105.976337-106.102209	24.413741-24.501745
	nama	105.79936-105.889628	24.500879-24.569645
baile	baile	106.045501-106.171097	24.633296-24.712869
	genbiao	106.035818-106.156874	24.547235-24.653112
jiuzhou	pinglin	105.824614-105.966449	24.638765-24.709809
	guanglong	105.879844-105.973972	24.602742-24.654942
	yangbai	105.774751-105.833917	24.54016-24.584198
	zhenian	105.661758-105.751817	24.646736-24.749523
Ding'an	anding	105.642281-105.744069	24.299259-24.33888
	namen	105.567093-105.673907	24.323832-24.378311
	yangrong	105.601441-105.667623	24.343642-24.416217
	changjing	105.660084-105.70993	24.359643-24.435266
gaolong	zheche	105.581963-105.637464	24.130679-24.23297
zhemiao	bailong	105.737471-105.807633	24.471013-24.551289
liulong	lietun	106.160643-106.205673	24.059159-24.100444
	zhouma	105.993301-106.069328	24.091652-24.160078

nabi	nala	105.628249-105.762918	24.042485-24.159633
Yangya Field	banyang	105.921254-106.02367	24.51527-24.631275
Lin yun County			
Jiujiang Forestry centre	Yaoma	106.47461-106.53654	24.31401-24.36095
	Shangmeng	106.53236-106.58782	24.27782-24.31509
	Yangnang	106.45436-106.50953	24.26637-24.34819
	Lantai	106.41192-106.48079	24.25961-24.37997
sicheng	Longzhao	106.60063-106.64282	24.34982-24.40664
Jiayou	Moxian	106.68631-106.77443	24.51380-24.58000
	Dongha	106.67946-106.75025	24.55669-24.60651

Figure 1: Location of project in Longlin, Tianlin and Lingyun counties



A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Private Entity: Guangxi Longlin Forestry Development Company Ltd.	No
Spain	The International Bank for Reconstruction and Development (IBRD) as Trustee of the BioCarbon Fund; Kingdom of Spain - Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness Zeroemissions Carbon Trust, S.A.	Yes
Ireland	Government of Ireland-Department of the Environment, Community and Local Government	Yes
Switzerland	Syngenta Foundation for Sustainable Agriculture	No

A.4. Reference to applied methodologies and standardized baselines

>> The consolidated afforestation and reforestation baseline and monitoring methodology "Afforestation and reforestation of degraded land"(AR-ACM0001/version 03) was applied in PDD, while A/R large-scale consolidated methodology "Afforestation and reforestation of lands except wetlands" (AR-ACM0003/version 02.0)[2] is applied in this monitoring report); and methodological tools, guidelines and guidance listed below has been implemented in the project[3].

- A/R Methodological Tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" (Version 02.1.0);
- A/R Methodological Tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 04.2);
- A/R Methodological Tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities" (Version 01.1.0);
- Guidelines on application of specified versions of A/R CDM methodologies in verification of registered A/R CDM project activities (Version 01.1)
- Guidelines on accounting of specified types of changes in A/R CDM project activities from the description in registered project design documents (Version 02.0)
- A/R Methodological Tool "Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" (Version 04.0.0)
- A/R Methodological Tool "Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities" (Version 01.0.0)
- Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant" (version 01)
- A/R Methodological Tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity" (version 02.0)

In addition, relevant technical guidelines for national and local forest inventory followed in the project, include:

- Technical guidelines for forest resource planning and design. State Forestry Administration (SFA), April 2003
- Technical guidelines for national forest inventory. SFA 2004 No.25
- Technical guidelines for forest resource planning and design in Guangxi. Guangxi Forestry Department, Feb 2009
- Standard Operation Procedures for 8th forest inventory in Guangxi. Guangxi Forestry Department, April 2010

A.5. Crediting period type and duration

>>Start date: 01/01/2008
Crediting period: 20 years (from 01/01/2008 to 31/12/2027), renewable.

[2] http://cdm.unfccc.int/methodologies/ARmethodologies/approved

[3] http://cdm.unfccc.int/Reference/tools/index.html

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

>> The project started on August 1st 2008. As outlined in the PDD, 8,671.3 ha was proposed to be planted from 2008 to 2010. However, the actual planted area in the project is 6,592.6 ha.. The details of area planted in each land parcel by year are outlined in Annex I. The comparison of the planted area by year vis-à-vis area proposed for planting in the registered PDD is presented in table B.1 below.

Compared to the first monitoring period (6,849.1 ha including 4,670.8 ha planted and 2,178.3 ha to be planted), the planted area reduced by 256.5 ha including

a) 450.6 ha of land planned to be planted in Longlin County in 2012 was excluded due to land tenure conflicts (387.7 ha) and poor site condition (62.9 ha);
b) land use changed on 114.0 ha of land in Tianlin;
c) 308.1 ha of additional lands was planted (excluded in the first monitoring due to land tenure conflicts that was resolved in the second monitoring period)

As specified in the first monitoring report, the adverse climate events such as snow/ice storms and droughts damaged significant area of the project, resulted in a significant replanting even repeatedly. Since the first monitoring, 249.2 ha of planted lands has been suffered from additional severe drought.

The replanting and gaping filling on planted lands, with low survival rate or after suffering from climate disasters, were conducted throughout the second monitoring period from 2012 to 2017, with a total area of 903.2 ha. In many case different species have to be selected. For example, 25.2 ha of eucalyptus land was replanted with Masson pine or Chinese fir. 145.2 ha of birch land was replanted with Chinese fir, Masson pine and Choerospondia. 265.8 ha of Masson pine was replanted with other species. This resulted in changes of species composition compared to the first monitoring period.

Table B.1 Planted area in project as compared to planting plan in PDD (ha)

Plantation model	Year							
	Total	2008	2009	2010	2011	2012	2013	2014
Masson pine - actual area planted	3,018.3	735.4	480.9	96.6	231.3	1,474.1		
- area in 1st monitoring verification	3259.4	724.6	297.3	96.6	219.9	1,921.0		
- area proposed in the PDD	1,185.1	505.5	446.4	233.2				
Chinese fir - actual area planted	2,299.7	802.7	208.7	162.2	317.3	740.8	38.5	29.5
- area in 1st monitoring verification	2,074.0	757.8	171.0	162.2	316.4	666.6		
- area proposed in the PDD	863.2	863.2						
Shiny-bark birch - actual area planted	744.8	409.1	325.1	6.7		3.9		
- area in 1st monitoring verification	884.3	474.3	391.9	6.7	11.4			
- area proposed in the PDD	3,112.1	1,430.4	1,038.1	643.6				
Choerospondia saxillaris - area planted	125.8	125.8						
- area in 1st monitoring verification	115.3	44.0				71.3		
- area proposed in the PDD	121.4	121.4						
Masson pine＋Schima - area planted								
- area in 1st monitoring verification								
- area proposed in the PDD	929.0	243.2	49.7	636.1				

Masson pine＋Maple - actual area planted								
- area in 1st monitoring verification								
- area proposed in the PDD	408.7	51.5		357.2				
Eucalyptus- actual area planted	404.0	40.0	30.4	61.1	135.2	137.3		
- area in 1st monitoring verification	359.4	41.0	30.4	61.1	135.2	91.7		
- area proposed in the PDD	1,403.5	379.9	608.5	415.1				
Flous- actual area planted								
- area in 1st monitoring verification	156.7		156.7					
- area proposed in the PDD	648.3	222.4	217.5	208.4				
Total area planted	**6,592.6**	**2,113.0**	**1,045.1**	**326.6**	**683.8**	**2,356.1**	**38.5**	**29.5**
- **area in 1st monitoring verification**	**6,849.1**	**2,041.7**	**1,047.3**	**326.6**	**682.9**	**2,750.6**		
- **Total area proposed in the PDD**	**8,671.3**	**3,817.5**	**2,360.2**	**2,493.6**				

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

>> N.A

B.2.2. Corrections

>> N.A

B.2.3. Changes to the start date of the crediting period

>> N.A

B.2.4. Inclusion of monitoring plan

>> N.A

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

>> N.A

B.2.6. Changes to project design

>> N.A

B.2.7. Types of changes specific to afforestation or reforestation project activity

>>As per the “Guidelines on accounting of specified types of changes in A/R CDM project activities from the description in registered project design documents” (Version 02.0) (Annex 24, EB 66), the types of changes from the project description of the A/R CDM project activity in the

PDD as listed below are identified as minor in nature, therefore shall be addressed through the verification stage by the designated operational entity without prior approval by the board.

Table B.2 Types of changes from the description in the registered PDD as outlined in the guidelines (Annex 24, EB66) and their applicability to the implemented project

No.	Types of changes from the project description in the PDD of an A/R CDM project activity	Applicability to the project
a)	Changes in year-wise areas planted, possibly resulting in a part of the project area not being planted;	Yes, as a result of changes in year-wise area planted relative to the schedule of planting proposed in the PDD, about 6,592.6 ha out of 8,671.3 ha was planted. Therefore, 2,078.7 ha of the project area was not planted or will not be planted.
b)	Changes in species composition, if the changes are demonstrated at verification to be consistent with the baseline identification and additionality demonstration made at the validation stage;	Yes, changes in species composition and stand models occurred during the project implementation. It was found that due to poor site conditions and location specific factors, survival and growth rates of most species were not as projected in the PDD (see table B-1 above). In addition, small changes to the stand models needed to be made as per the project implementation requirements, the changes in species and composition of the project are consistent with the baseline identification and additionality demonstration made at the validation stage. **For the baseline identification:** As the changes in project area do not affect the baseline information,the baseline net removals by sinks remain same as PDD, which is conservative. **For the additionality**: - In the project design the revenue from the project activity was expected from the short rotation eucalyptus (6 years). The area of eucalyptus actually planted is 6.0% of total area planted, compared to 16.2% designed in PDD. The revenue will reduce relative to PDD; - Price level (for labours and seedlings) in China has been increasing year after year, while the unit costs in PDD were based on 2007 price level. Data from project stakeholders and county forestry bureau indicates that the actual cost was much higher than those used in PDD; - The adverse climate events damaged significant area of the project. All these damaged plantations had to be replanted. The repeated planting has significantly increased the project cost - In summary, the reduction of project revenue and increase of the project cost would reduce the project internal return rate relative to that estimated in the PDD. Therefore, the change in the project area will not affect the additionality.
c)	Changes in stocking density, if the changes are demonstrated at verification to be consistent with the baseline identification and additionality demonstration	No changes in stocking density

	made at the validation stage;	
d)	Changes in timing and choice of silvicultural operations;	Yes, changes in species composition and stand models resulted in the changes to timing and choice of silvicultural operation.
e)	Changes in timing of harvest occurring before the third verification;	Yes, changes in species composition and stand models resulted in changes to potential timing of harvest before the third verification (harvesting of eucalyptus and thinning for other species).
f)	Changes related to collection of non-timber forest products;	Yes, changes in species composition and stand models resulted in the changes to the collection of non-timber forest products.
g)	Changes in tree/shrubs propagation method;	No
h)	Changes in post-harvest re-planting/regeneration methods;	148.3 ha of eucalyptus has been harvested and regenerated during the monitoring period
i)	Changes in technology employed;	No
j)	Changes in inputs (e.g. fertilizers, certified seeds, watering);	No
k)	Changes in stratification for sampling;	Yes, *ex post* stratification has been implemented taking into account of the changes to *ex ante* strata due to factors related to changes in planting time, growth rates of species, impacts of site conditions, and other location specific factors.
l)	Changes in type of sample plots (e.g. temporary, permanent, point-sampling);	No
m)	Changes in number of sample plots and their allocation to strata;	Yes, as a follow up to ex post stratification, the calculation of number sample plots and their allocation to the project strata has been revised.
n)	Changes in the project boundary (limited to reduction in project area), if the changes are demonstrated at verification to be consistent with the baseline identification and additionality demonstration made at the validation stage;	Yes, Changes in project boundary occurred as a consequence of the reduction in project area by 2,078.7 ha (all actual project boundary fall within the project boundary designed in registered PDD). The changes to project boundary as a consequence of reduction in project area are consistent with the baseline identification and additionality demonstration at the validation stage.
o)	Changes in quality assurance/quality control (QA/QC) procedures, where it can be demonstrated that the changed QA/QC procedures are used by the National Forest Inventory or were applied in another registered A/R CDM project activity;	Yes, Changes in quality assurance/quality control procedures are consistent with procedures used by the national forest inventory.

p)	Changes in parameters, equations, or methods used in tree biomass estimation, if the applicability of the changed parameters, equations, or methods is project activities" when available, or if the changed parameters, equations, or applicability of allometric equations and volume equations in A/R CDM demonstrated at verification using the "Tool for demonstration of methods do not result in a decrease in precision of the estimate of tree biomass;	No changes in the parameters. The equations used in tree biomass estimation are consistent with the A/R Methodological Tool - "Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities" (Annex 29, EB 65)
q)	Changes from provisions regarding shifting of pre-project activities, if the related emissions are estimated at verification using the tool "Estimation of the of pre-project agricultural activities in A/R CDM project activity" and areincrease in greenhouse gas (GHG) emissions attributable to displacement accounted for as leakage;	Not Applicable
r)	Changes in use of fire in site preparation, if the related emissions are estimated at verification using the tool "Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" and are accounted for as project emissions;	Not Applicable
s)	Changes in extent of soil disturbance in site preparation, if the related emissions are estimated at verification using Equation (2) of the "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities" and are accounted for as project emissions;	Not Applicable

t)	Changes in methods of estimation of changes in any carbon pool, if the method applied at verification uses the latest version of the relevant approved tool and the applicability conditions of the methodology applied are consistent with the applicability conditions of the tool.	Yes. AR-ACM0001 ver.03 used in PDD was updated to AR-ACM0001 ver.05.2.0 which was used for the 1st monitoring and adopted in 1st verification and certification. The AR-ACM0003 (version 02.0) applied in this monitoring report has a broader scope of application, e.g., allowing to choose to exclude or include accounting of any of the three carbon pools of dead wood, litter, and soil organic carbon. The project adopts the latest versions of A/R methodological tool(s) and the applicability conditions of the methodology are consistent with the applicability conditions of the tool(s).

As per the "Guidelines on application of specified versions of A/R CDM methodologies in verification of registered A/R CDM project activities" (Version 01.1), several early versions of methodologies applied in registered A/R CDM project activities contain requirements that were withdrawn during revisions/improvements of these methodologies as part of the improvement process of the standards, and the guidelines allow a registered A/R CDM project activity to apply, at the time of verification, the improvements in the methodology that occurred after the date of registration of the project activity. The applicability of these guidelines to the implemented project are listed in table B.3 below.

Table B.3 Applicability of guidelines to the implemented project

Requirement	Methodology	Guidelines	Applicability to the project
Monitoring of data and parameters	AR-AM0003 v.03, et al	(i) Only data and parameters obtained from field measurement are required to be monitored; (ii) Monitoring is not required for data, parameters, or variables appearing as intermediate values in calculation steps and those taken from existing sources (e.g. published literature)	Not applicable to the methodology applied
Sampling design, sample plot lay-out, and marking of permanent sample plots	AR-ACM0001 v.03 et al	(i) Use of temporary sample plots; (ii) Random lay-out of sample plots; (iii) A maximum allowable relative margin of error of the mean, for estimation of above ground tree biomass, of ± 10% at 90%confidence level shall be allowed.	Yes, 90% confidence level was applied
Accounting for uncertainty	AR-ACM0001 v.03 et al	Requirements related to uncertainty assessment, uncertainty analysis, methods of combining uncertainties, and uncertainty inexpert judgement is superfluous and compliance with these requirements shall not been forced.	Yes, uncertainty analysis was conducted following the latest version of methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"
Field	AR-AM001 v.02	(i) Instead of field measurement of soil	Not applicable to

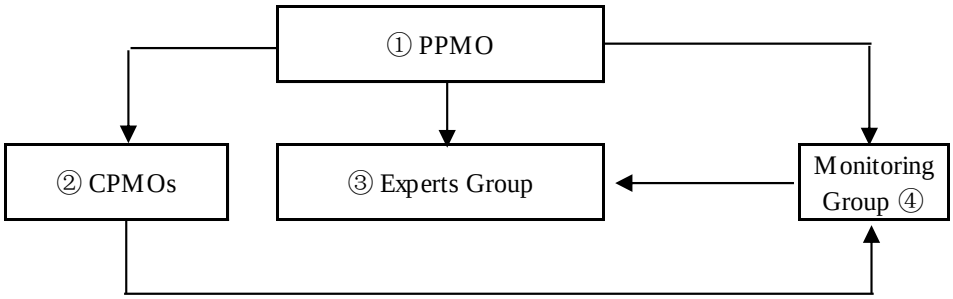
measurement of soil organic carbon	et al	organic carbon, the "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities" shall be used for areas which meet the applicability conditions of the tool; or (ii) The value of change in soil organic carbon shall be set to zero. Consequently, monitoring of data and parameters related to estimation of changes in soil organic carbon shall not be required.	the methodology applied
Clearance or burning of herbaceous vegetation	AR-AM001 v.02 et al	(i) Changes in carbon stocks resulting from clearance of herbaceous vegetation shall beset to zero; (ii) Emissions resulting from clearance or burning of herbaceous vegetation shall be set to zero. Consequently, monitoring of data and parameters related to (i) and (ii) above shall not be required.	Not applicable to the methodology applied
Estimation of emissions of nitrous oxide from use of fertilizers	AR-AM001 v.02 et al	Estimation and accounting of emissions of nitrous oxide from use of fertilizers shall not be required. Consequently, monitoring of data and parameters related to the above-mentioned emissions shall not be required.	Not applicable to the methodology applied
Burning of fossil fuel	AR-AM001 v.02 et al	Estimation and accounting of emissions from burning of fossil fuel, both within and outside the project boundary, shall not be required. Consequently, monitoring of data and parameters related to the above mentioned emissions shall not be required.	Not applicable to the methodology applied

SECTION C. Description of monitoring system

>>For the purpose of the monitoring, standard operating procedures have been developed and followed throughout the monitoring process. The monitoring system is summarized as follows.

1. Organizational structure, roles and responsibilities of personnel

The figure below shows the organizational structure with responsibilities for the management of the project.



Responsibility and roles

① Provincial Project Management Office (PPMO)

(1) Organization of project management works;

(2) Coordination the related participants;

(3) Communicating with World Bank Carbon Finance team and country representative staff;

(4) Supervising and facilitation of project implementation;

(5) Organization training for CPMO, entities/farmer households;

(6) Review of monitoring schedule and annual monitoring reporting;

(7) Coordination of key technical and economic issues encountered during project implementation;

(8) Organization of monitoring and verification arrangements;

(9) Quality assurance for monitoring.

② County Project Management Office (CPMOs)

(1) Organization of project implementation on the sites located in the county;

(2) Supervising project implementation progress of the areas located in the county;

(3) Development and implementation of annual plan of operations;

(4) Supervision and facilitation of entities/farmer households to raise funds;

(5) Reporting of project implementation progress on the sites in the county;

(6) Organization of trainings for forest farms/farmer households participating in the project;

(7) Provision of technical guidance and supervision of project activities;

(8) Survival check of planted areas in the first three years;

(9) Organization of technical staff for field measurement;

(10) Archival and management of data at county level (including farmer groups);

(11) Coordinating of communication with the forest farms/companies and communities/households;

(12) Management of the carbon revenue sharing among the farmers

(13) Coordination to resolve technical problems in project implementation.

③ Experts Group

(1) Development of guidance manuals to support project monitoring and verification, standard operational guidelines for measuring forest growth, etc;

(2) Provision of technical training and consultation to the monitoring personnel;

(3) Checks of field data collected, e.g., data on survival rates of planted areas;

(4) Review of quality control and quality assurance procedures of field measurement;

(5) Preparation of monitoring report.

④ Monitoring Group

The monitoring group is composed of forestry experts and technicians from Guangxi Forestry Planning and Inventory Institute, and is responsible for:

(1) Periodical monitoring of project boundaries;

(2) Project stratification;

(3) Development and implementation of the sampling scheme;

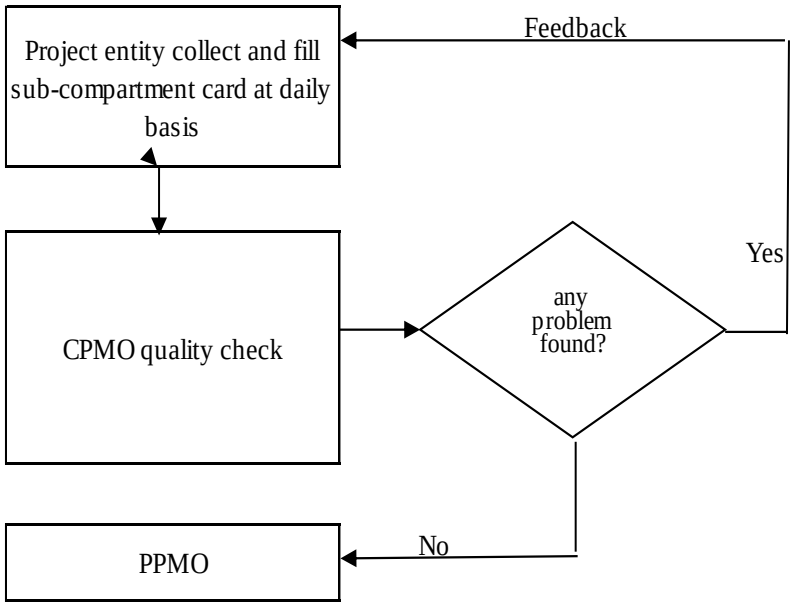
(4) Development of SOP for field measurement;

(5) Preliminary analysis of field measurement;

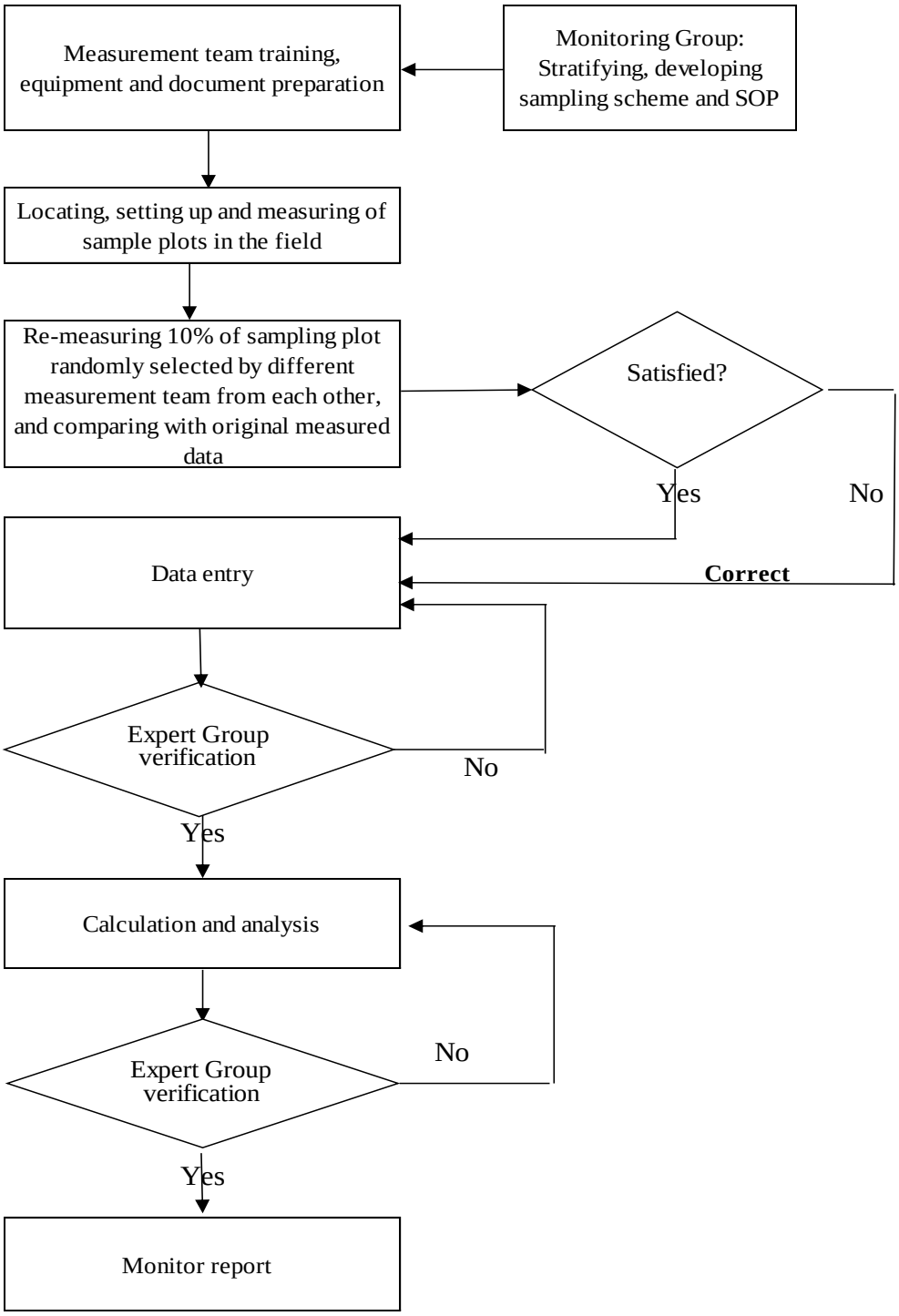
(6) Assistance to the expert group in the analysis of measured data;

(7) Assistance to expert group in the preparation of monitoring report.

2. Flow chart for monitoring of project implementation



3. Flow chart for field measurement of sampling plots and data entry/analysis



4. QA/AC procedures

Quality assurance and quality control (QA/QC) procedures are implemented to ensure the net anthropogenic GHG removals by sinks are measured and monitored precisely, credibly, and transparently.

a) Quality checks on field measurements

To ensure the reliable field measurements,

- Standard Operating Procedures (SOPs) followed for each step of the field measurements, including all phases of the field measurements enable collection of data for preparing monitoring report and supporting documentation for verification purposes.
- Training courses on the field data collection data entry, analysis and archival were held for persons involving in the field measurement work. The training courses were conducted to ensure that each field-team member is fully aware of all procedures and the importance of collecting data as accurately as possible.
- A document showing implementation of the QA/QC steps has been presented as part of the project documents. The document lists the names of the team leader and personnel involved in field level monitoring;

b) Quality checks of field data collected

To verify that the plots have been installed and the measurements taken correctly, the following measures have been undertaken:

- Re-measurement of at least one (randomly selected) plot per every 10 plots by another team, and comparison of the measurements to check for errors; any errors found are recorded, resolved and corrected.
- Key re-measurement elements include the location of plots, DBH and tree height of all trees present. The procedures implemented as part of the re-measurement are checking of the field record of both original measurement and re-measurement. If any calculation error is found, it is checked and corrected.

c) Quality checks of data entry and analysis

To minimize the possible errors in the process of data entry, the entry of field data was reviewed by expert group. Communication among personnel involved in measuring and analyzing data was used to resolve any anomalies in the monitoring data.

d) Data maintenance and archival

Data were archived in both electronic and paper forms, and copies of all data shared with each project participant. All electronic data and reports were copied on durable media such as CDs and copies of the CDs and stored in multiple locations. The archives include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheet;
- Estimates of the carbon stock changes in all pools and non-CO_2GHGemissions covered by the project and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

(Copy this table for each data or parameter.)

Data / Parameter	$BEF_{2,j}$
Unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above-ground biomass for tree species j
Source of data	GHG inventory in LULUCF sector for national communication on GHG inventory
Value(s) applied	*Tree species* $BEF_{2,j}$

	Pinus massoniana *Cunninghamia lanceolata*and *Eucalyptus sp.* *Betula luminifera* *Choerospondias axillaris*	1.54 1.74 1.43 1.37 1.59
Choice of data or measurement methods and procedures	NA	
Purpose of data/parameter	Calculation of actual net GHG removals	
Additional comments		

Data / Parameter:	D_j	
Unit	t d.m. m^{-3}	
Description	Basic wood density for tree species *j*	
Source of data	GHG inventory in LULUCF sector for national communication on GHG inventory	
Value(s) applied	Tree species	D_j
	Pinusmassoniana *Cunninghamialanceolata*and*Taiwaniaflous* *Eucalyptus* sp. *Betulaluminifera* *Choerospondiasaxillaris*	0.380 0.307 0.578 0.541 0.443
Choice of data or measurement methods and procedures	NA	
Purpose of data/parameter	Calculation of actual net GHG removals	
Additional comment		

Data / Parameter:	R_j	
Unit	Dimensionless	
Description	Root-shoot ratio for tree species *j*	
Source of data	GHG inventory in LULUCF sector for national communication on GHG inventory	
Value(s) applied	Tree species	R_j
	Pinusmassoniana *Cunninghamialanceolata*and*Taiwaniaflous* *Eucalyptus* sp. *Betulaluminifera* *Choerospondiasaxillaris*	0.200 0.219 0.218 0.231 0.289
Choice of data or measurement methods and procedures	NA	
Purpose of data/parameter	Calculation of actual net GHG removals	
Additional comment		

Data / Parameter:	$V_{TREE,j,p,i,t}$
Unit	m^3/tree
Description	Stem volume of trees of species *j* in sample plot *p* of stratum *i* at a point of time in year *t*, estimated by using the tree dimension(s) as entry data into a volume table or volume equation
Source of data	Guangxi forest inventory manual or yield table, which are appropriate based on A/R Methodological Tool “Demonstrating

	appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities" (Version 01.0.0)
Value(s) applied	Tree species $V_{TREE,j,p,i,t}$
	P.massoniana $V = 0.0000714265437 \cdot DBH^{1.867010} \cdot H^{0.9014632}$ *C.lanceolata* $V = 0.000065671 \cdot DBH^{1.769412} \cdot H^{1.069769}$ Other broadleaves $V = 0.0000667054 \cdot DBH^{1.8479545} \cdot H^{0.9665750}$ *Eucalyptus* sp. $V = 0.000109154145 \cdot DBH^{(C_1 - C_2 \cdot (DBH+H))} \cdot H^{(C_3 + C_4 \cdot (DBH+H))}$ C_1=1.8789237; C_2=0.00569185503 C_3=0.65259805; C_4=0.00784753507
Choice of data or measurement methods and procedures	NA
Purpose of data/parameter	Calculation of actual net GHG removals
Additional comment	It represents the parameter $V_{l,j,i,sp,t} = f(DBH, H)$ in PDD.

Data / Parameter:	CF_j
Unit	dimensionless
Description	carbon fraction of species j
Source of data	PDD and IPCC default
Value(s) applied	0.5
Choice of data or measurement methods and procedures	NA
Purpose of data/parameter	Calculation of actual net GHG removals
Additional comment	

Data / Parameter:	$A_{p,i}$
Unit	ha
Description	Area of sampling plot in stratum i
Source of data	PDD
Value(s) applied	0.04
Choice of data or measurement methods and procedures	NA
Purpose of data/parameter	Calculation of actual net GHG removals
Additional comment	

D.2. Data and parameters monitored

(Copy this table for each data or parameter.)

Data / Parameter:	*DBH*
Unit	**cm**
Description	the diameter at breast height of the tree (1.3 m)
Measured /Calculated /Default	Measured
Source of data	Field measurement
Value(s) of monitored parameter	

Monitoring equipment	Vinyl tape, wooden stake
Measuring/ Reading/ Recording frequency	Every five years since the year of the initial verification
Calculation method (if applicable):	
QA/QC procedures	Manual/guidelines for national and local forest inventory and Manual for Monitoring of CDM Afforestation and Reforestation Projects: Part I - Standard Operational Procedures by World Bank (also section C.4 above)
Purpose of data/parameter	Calculation of actual net GHG removals
Additional comment	

Data / Parameter:	*H*
Unit	**m**
Description	Height of tree
Measured /Calculated /Default	Measured
Source of data	Field measurement
Value(s) of monitored parameter	
Monitoring equipment	- HypsometerCGQ-1: accuracy 1%, last calibration: November 09 2017, valid. - metric tape
Measuring/ Reading/ Recording frequency	Every five years since the year of the initial verification
Calculation method (if applicable):	
QA/QC procedures	Manual/guidelines for national and local forest inventory and Manual for Monitoring of CDM Afforestation and Reforestation Projects: Part I - Standard Operational Procedures by World Bank (also section C.4above)
Purpose of data/parameter	Calculation of actual net GHG removals
Additional comment	

D.3. Implementation of sampling plan

>>

1. Monitoring of the baseline net GHG removals by sinks

The baseline net GHG removals by sinks do not need to be monitored as per the applied methodology AR-ACM0003/version 02.0.

2. Monitoring of the boundary of the implemented A/R CDM project activity

Monitoring of the project boundary is done using the below procedures.

- Field survey of the discrete areas of the project on which tree planting was undertaken.
- Confirmation of the geographical boundary of the sites using GPS. In case that the boundary of land parcel overlaps with existing land management unit (compartment and/or sub-compartment), latitude and longitude of major corner of the land parcels were confirmed using GPS.
- Checking to ensure that the actual boundary is consistent with the description in the PDD section A.

- If the actual boundary falls outside of the boundary referred in section A of the PDD, the part of lands that are outside the designed boundary would not be accounted as a part of the implemented A/R CDM project activity.
- Input the measured geographical positions into GIS system and calculate the eligible area of each stratum.
- The project boundary will be monitored periodically through the crediting period. If the boundary is changed during the crediting period, the boundary will be modified and reported to DOE for subsequent verifications. The area will then be excluded from the project monitoring. Similarly, if the planting on certain lands within the project boundary fails, and other land uses take the place, these areas will be documented and excluded from the project.

3. Monitoring of the project implementation

To ensure the project implementation and the practices described in section A of the PDD are well-implemented, the monitoring covered following activities:

- Confirmation that the site preparation practices as per those outlined in the PDD, and no slash and burn and overall tillage are used in the site and soil preparation.
- Confirmation that site preparation does not cause significant longer term net emissions from soil carbon. This is done by checking and confirming that site preparation techniques are as described in Section A.4.8 of the PDD. As the area disturbed through site preparation accounts for only 2-5% of the total area of the discrete areas, it is inferred that there are no significant long-term net emissions from site preparation activities.
- Survival checking
  - The initial survival rate of planted trees waschecked1-3 months after the planting, and re-planting was conducted if the survival rate was lower than 90%.
  - Final survival checking was conducted for each plantation site after three years of planting.
- Confirmation that the weeding and fertilizer application practice are implemented as planned.
- Checking the area of planted species and planting year for each stratum.

The project implementation was monitored through sub-compartment monitoring card.

4. Stratification

The ex ante stratification was done based on the information on the site conditions (soil type, soil organic matter and nitrogen content, etc) and planting years available prior to the start of the project. In the first monitoring, a revision to the *ex ante* stratification has been conducted taking into account the changes in the area, species/stand models included in the project, the schedule of planting adopted during project implementation, and growth rates of species relevant to site conditions and disturbance of natural disaster (snowstorm/drought). Based on pre-assessment of the growth and harvest of plantation, existing stratification has been further adjusted in the second monitoring, so that the within-stratum variance would be minimized. The new stratification map was created on a GIS platform. The project area was stratified into 15 strata (see table D.1 for the detailed ex post stratification). The boundary of strata was determined using PDA and GPS by going along the demarcation line of two connected strata.

Table D.1 ex post stratification for living biomass

Species /models	Stratum ID	Area (ha)	comments
Masson pine	S-1	489.6	Mean DBH over 10cm
	S-2	197.2	Mean DBH 8-10cm

	S-3	231.5	Mean DBH 5-8cm
	S-4	747.6	Mean DBH 2-5cm
	S-5	1367.8	Mean DBH below 2cm
Chinese fir	S-6	592.4	Mean DBH over 10cm
	S-7	170.6	Mean DBH 8-10cm
	S-8	119.2	Mean DBH 5-8cm
	S-9	595.5	Mean DBH 2-5cm
	S-10	894.5	Mean DBH below 2cm
Eucalyptus	S-11	312.6	Mean DBH over 2cm
	S-12	91.6	Mean DBH below 2cm
Shiny-bark birch	S-13	544.8	Mean DBH over 8cm
	S-14	199.6	Mean DBH 5-8cm
Choerospondiasaxillaris	S-15	125.8	
Total		**6849.1**	

Note: Tree growth not measured on strata with sample plots with trees that have tree diameters below minimum measurable threshold (2 cm)

The carbon stock changes in mineral soils was estimated following the A/R Methodological Tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities" (Version 01.1.0) and the spreadsheet"ARWG30_SOC_Tool_Multizones". For the purpose of estimating the carbon stock changes in mineral soils, the project area was stratified into five strata based on planting year (Table D.2).

Table D.2 Ex-post stratification for soil carbon in mineral soil

Planting year	Stratum ID	Area (ha)
2008	SOC-1	2,113.0
2009	SOC-2	1,045.1
2010	SOC-3	326.6
2011	SOC-4	683.8
2012	SOC-5	2,356.1
2013	SOC-6	38.5
2014	SOC-7	29.5
Total		6,592.6

5. Sampling scheme

Permanent sample plots were used for sampling over time to measure and monitor changes in carbon stocks of the relevant carbon pools. The plots were located with GPS and are invisible so as to be treated in the same way as other lands within the project boundary, e.g., during fertilization, tending, thinning, harvesting, etc.

5.1 Determining sample size

A/R Methodological Tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" (Version 02.1.0) was applied to re-calculate the number of sample plots for each stratum outlined in the PDD.

$$n = \frac{N \cdot t_{VAL}^2 \cdot (\sum_i w_i \cdot s_i)^2}{N \cdot E^2 + t_{VAL}^2 \cdot \sum_i w_i \cdot s_i^2} \quad \text{(D.1)}$$

$$n_i = n \cdot \frac{w_i \cdot s_i}{\sum_i w_i \cdot s_i} \quad \text{(D.2)}$$

Where

n	Number of sample plots required for estimation of biomass stocks within the project boundary, dimensionless
n_i	Number of sample plots allocated to stratum i for estimation of biomass stocks within the project boundary, dimensionless
t_{VAL}	Two-sided Student's t-value, at infinite degrees of freedom, for the required confidence level; dimensionless
N	Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless
w_i	Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless
s_i	Estimated standard deviation of biomass stock in stratum i; t d.m. ha^{-1}
E	Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. ha^{-1}

The standard deviation of biomass stock for each stratum (s_i) was conservatively determined as 30%. The t_{VAL} was determined based on the 90% confidence level. A default value equal to 10% of the mean biomass stock was used as the acceptable margin of error. The mean biomass stock is the expected biomass at the time of monitoring, which was estimated based on preliminary measurement.

For the purposes of statistics, if calculated n_i<3, then n_i=3. Furthermore, to ensure that 10% of the precision level can be achieved, the minimum area represented by each sample plots was set as 50 ha for some strata based on expert judgement, and additional sampling plots are added for strata with relative high variation based on pre-assessment. The sample plots were allocated to each stratum based on size of each stratum relative to the total project area. The number of sampling plots used for monitoring and measurement are listed in table D.3below. The sampling size is larger than the first monitoring due to the re-stratification and the recalculation.

Table D.3number of sampling plots

Stratum ID	Area (ha)	Number of sampling plots
S-1	489.6	14
S-2	197.4	7
S-3	231.3	5
S-4	747.8	15
S-5	1,352.2	30
S-6	592.5	15
S-7	170.6	5
S-8	119.0	3
S-9	595.4	12
S-10	822.2	22
S-11	312.4	12
S-12	91.6	3
S-13	545.2	17
S-14	199.6	5
S-15	125.8	6
total	**6,592.6**	171

5.2 Locating sampling plots

To avoid subjective choice of plot locations (plot centres, plot reference points, movement of plot centres to more "convenient" positions) and to ensure that the sampling plots evenly spread in each stratum as much as possible, the permanent sample plots were laid out systematically with a random start. This was achieved by procedures below:

Step 1: 100 m × 100 m grids was created on ArcGIS platform and overlapped on the project area. The number of cross points (potential plot centre) was counted for each stratum. A series number starting at 1 was assigned to each cross point in a stratum.

Step 2: A random number was produced using function "ROUND (RAND()*(N),0) in excel spread, where N is the total number of cross points in the stratum. The cross point in series number that corresponds to the random number was assigned as the centre of the first sampling plot in a stratum.

Step 3: Starting at the first plot and moving along the cross points following a fixed direction of west-east-south-north, one sample plot was assigned for a fixed interval of cross points. The interval is dependent on the total number of cross points and the number of sample plots in a stratum.

The size of sample plots is 400 m^2 (20m × 20m). However, if the shortest distance between sampling plot boundary and project boundary is less than 10 m, or if the plot is across the project or stratum boundary, the sample plot shall be moved toward the centre of the parcel of land. The geographical coordinates of all sample plots were listed in table D.4 below. The sampling plots for the first monitoring remained in the second monitoring. Additional sampling plots were added in the respective strata.

As per the monitoring procedures, if after the field measurement, the precision level is over 10%, the number of sample plots would need to be recalculated using above mentioned method, based on measured standard deviation of biomass stock to layout the additional sampling plots.

Table D.4 GPS coordinates of sampling plots

Strata ID	Plot ID		Coordinates		Strata ID	Plot ID		Coordinates	
	2nd monitoring	1st monitoring	Longitude	Latitude		2nd monitoring	1st monitoring	Longitude	Latitude
S1	LL82	LL8	105.1236	24.80493	S7	LL02	LL85	105.5506	24.50967
S1	LL99	LL33	104.8834	24.71285	S7	LL28	LL73	105.4027	24.56159
S1	LL100	LL31	104.8824	24.71917	S7	LL60	LL42	105.2935	24.69816
S1	LL101		104.8784	24.71916	S7	LL66		105.2827	24.71173
S1	LY02	LY3	106.6361	24.36099	S7	LY05	LY8	106.569	24.28004
S1	TL01	TL40	105.6281	24.23402	S8	LL32		105.3978	24.55258
S1	TL02	TL39	105.6282	24.23763	S8	LL63		105.2883	24.57901
S1	TL03	TL38	105.6291	24.23853	S8	LL68	LL35	105.2787	24.70722
S1	TL05	TL41	105.6468	24.22401	S9	LL03	LL98	105.5403	24.40679
S1	TL25	TL23	105.9486	24.56727	S9	LL04	LL97	105.5393	24.4095
S1	TL26	TL22	105.9486	24.56817	S9	LL30		105.3978	24.54806
S1	TL29	TL20	105.9497	24.579	S9	LL34	LL82	105.3948	24.54898
S1	TL42	TL28	106.2337	24.44696	S9	LL35	LL80	105.3928	24.55349
S1	TL43	TL27	106.2407	24.45954	S9	LL41	LL72	105.3564	24.56713
S2	LL88	LL13	105.088	24.77967	S9	LL42		105.3281	24.69538
S2	LL95	LL19	104.8932	24.73904	S9	LL43	LL45	105.3251	24.69358

S2	LL102	LL25	104.8765	24.72819	S9	LL52		105.3054	24.70265
S2	LY03		106.7256	24.57119	S9	LL69	LL39	105.2688	24.70092
S2	LY04		106.7505	24.55244	S9	LL71	LL65	105.2587	24.57726
S2	TL28	TL17	105.9496	24.57268	S9	LY13	LY7	106.481	24.34635
S2	TL35	TL48	106.1286	24.04427	S10	LL01	LL86	105.5644	24.50871
S3	LL84	LL6	105.1167	24.81035	S10	LL24	LL74	105.4254	24.56153
S3	LL94	LL21	104.8942	24.73452	S10	LL29	LL83	105.4007	24.54445
S3	LL98		104.8844	24.73993	S10	LL44	LL59	105.3209	24.58255
S3	LY01	LY1	106.7425	24.5632	S10	LL45	LL40	105.3212	24.69991
S3	TL27	TL21	105.9496	24.56907	S10	LL46		105.3202	24.69811
S4	LL19	LL5	105.4413	24.84675	S10	LL48	LL38	105.3123	24.70174
S4	LL31		105.1562	24.71913	S10	LL49	LL63	105.31	24.58077
S4	LL33		105.1552	24.72274	S10	LL51	LL41	105.3063	24.69904
S4	LL61	LL37	105.2925	24.70448	S10	LL53		105.3044	24.70446
S4	LL70		105.2658	24.70544	S10	LL55		105.3024	24.70085
S4	LL77	LL32	105.1571	24.71823	S10	LL56	LL36	105.3024	24.70627
S4	LL78	LL28	105.1532	24.72546	S10	LL58	LL58	105.3001	24.58621
S4	LL83	LL17	105.1167	24.74445	S10	LL87	LL15	105.1078	24.74987
S4	LL89	LL10	105.087	24.79683	S10	LL90	LL54	105.0464	24.6181
S4	LL96		104.8873	24.73542	S10	LY07	LY5	106.4811	24.35267
S4	LL97		104.8853	24.73181	S10	LY12	LY2	106.4733	24.36177
S4	LL103	LL30	104.8735	24.71916	S10	TL36		106.1305	24.04696
S4	LL106	LL27	104.8725	24.72548	S10	TL45		106.4041	24.34077
S4	TL30	TL24	105.9585	24.5636	S10	TL47	TL34	106.4078	24.32449
S4	TL51		105.8568	24.57053	S10	TL49	TL37	106.4106	24.30821
S5	LL36	LL1	105.3921	24.93446	S10	TL50	TL36	106.4117	24.31542
S5	LL37	LL2	105.3861	24.92996	S11	TL08	TL1	105.6919	24.72484
S5	LL38	LL3	105.3821	24.92455	S11	TL10	TL45	105.7011	24.06759
S5	LL39	LL75	105.3761	24.56076	S11	TL11	TL44	105.7148	24.06933
S5	LL47	LL70	105.3149	24.57264	S11	TL12	TL33	105.7173	24.33925
S5	LL73	LL56	105.233	24.59174	S11	TL13	TL46	105.7168	24.06661
S5	LL75	LL57	105.1629	24.59093	S11	TL14	TL43	105.7178	24.07383
S5	LL81	LL7	105.1246	24.80763	S11	TL15	TL25	105.744	24.52238
S5	LL85	LL22	105.1137	24.73271	S11	TL16	TL26	105.7469	24.51424
S5	LL86	LL16	105.1127	24.74716	S11	TL17	TL19	105.851	24.57598
S5	LL104	LL24	104.8735	24.72999	S11	TL18	TL18	105.851	24.57869
S5	LL105	LL23	104.8735	24.7318	S11	TL19	TL16	105.8559	24.58046
S5	LL107	LL20	104.8725	24.73722	S11	TL34	TL49	106.1256	24.04339
S5	TL04	TL29	105.6446	24.36937	S12	TL21	TL8	105.9227	24.66221
S5	TL06	TL30	105.6731	24.35209	S12	TL23	TL11	105.9374	24.65039
S5	TL07	TL31	105.674	24.34848	S12	TL32	TL12	106.1151	24.64466
S5	TL09	TL5	105.6928	24.71491	S13	LL20		105.43	24.7511
S5	TL20	TL6	105.8924	24.71114	S13	LL21		105.4291	24.752
S5	TL22	TL9	105.9236	24.6586	S13	LL23		105.4271	24.75111
S5	TL24	TL10	105.9443	24.65396	S13	LL25	LL81	105.4096	24.55164

S5	TL31	TL42	106.0319	24.1262	S13	LL26	LL79	105.4086	24.55435
S5	TL33	TL13	106.1181	24.64013	S13	LL27	LL78	105.4086	24.55706
S5	TL37		106.1463	24.04594	S13	LL50	LL67	105.306	24.57717
S5	TL38	TL7	106.1571	24.69399	S13	LL54	LL71	105.3031	24.57085
S5	TL39	TL47	106.1531	24.04499	S13	LL57	LL68	105.3011	24.57537
S5	TL40	TL15	106.2155	24.60958	S13	LL59	LL64	105.2991	24.57989
S5	TL41	TL14	106.2333	24.61124	S13	LL62	LL12	105.2897	24.78845
S5	TL44	TL35	106.4019	24.32093	S13	LL67	LL11	105.2809	24.79117
S5	TL46		106.4059	24.32811	S13	LL74	LL34	105.167	24.7128
S5	TL48	TL32	106.4099	24.3362	S13	LL76	LL60	105.1599	24.581
S6	LL08	LL87	105.4784	24.46748	S13	LL79	LL29	105.1433	24.72095
S6	LL09	LL88	105.4774	24.46297	S13	LL91	LL47	104.9654	24.68671
S6	LL10	LL89	105.4744	24.46208	S13	LL92	LL48	104.9625	24.68129
S6	LL12	LL92	105.4734	24.45035	S13	LL93	LL49	104.9605	24.67768
S6	LL14	LL91	105.4675	24.45307	S14	LL05	LL46	105.5207	24.68852
S6	LL15	LL90	105.4645	24.45669	S14	LL22	LL76	105.4274	24.55972
S6	LL16	LL93	105.4635	24.43864	S14	LL64	LL66	105.2873	24.5772
S6	LL17	LL95	105.4615	24.43052	S14	LL65	LL62	105.2824	24.58082
S6	LL18	LL94	105.4566	24.43415	S15	LL06	LL52	105.4949	24.64257
S6	LL80	LL26	105.1324	24.72638	S15	LL07	LL53	105.4929	24.64167
S6	LY06	LY6	106.479	24.34908	S15	LL11	LL50	105.4752	24.65888
S6	LY08	LY4	106.485	24.35534	S15	LL13	LL51	105.4722	24.65528
S6	LY09		106.4594	24.26894	S15	LL40	LL77	105.3731	24.55896
S6	LY10	LY10	106.4604	24.27254	S15	LL72	LL84	105.2408	24.54298
S6	LY11	LY9	106.4635	24.27883					

Notes: The coordinates are based on Beijing1954 3 degree zone and Gauss-kruger projection.

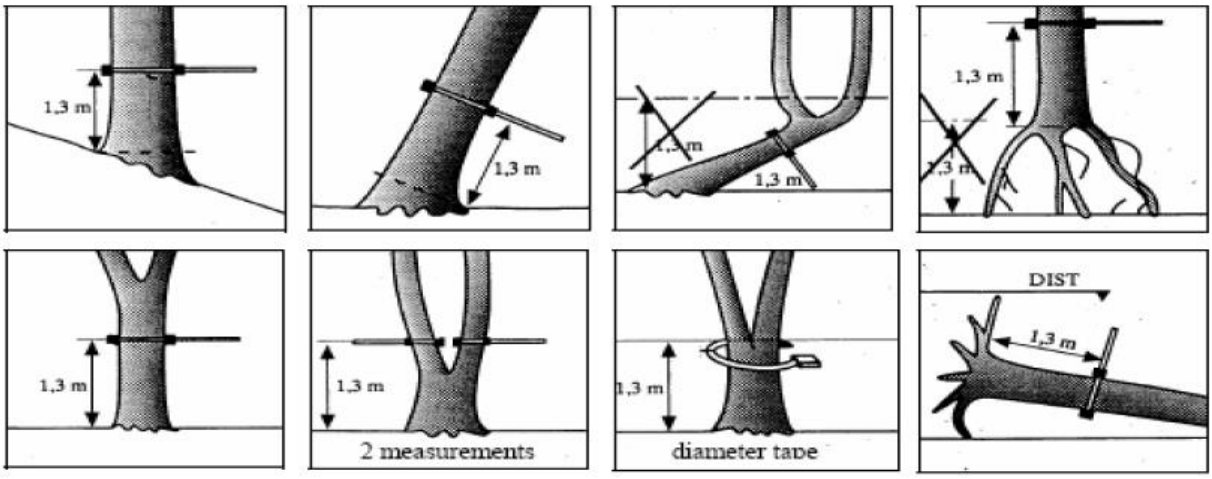
5.3 Field measurements

The field measurements are accomplished using the GPS to identify the geographical position (GPS coordinates) of sample plots and their location and stratum information are recorded and archived.

After the four corners of sample plots were located, a permanent marker (a PVC pipe with 5cm in diameter and 30cm in length) was put at the centre and four corners of the sample plot (placed vertically up to 20 cm deep in soil and 10 cm above soil surface), to enable the location of the sample plot at the future monitoring events.

The minimum diameter at breast height (DBH) measured is 2.0 cm. The DBH of many young trees especially those planted with delay have not reached the threshold. If over 2/3 of trees in a sampling plot have DBH less than 2.0 cm, then the plot was not measured and its carbon stock in living biomass was assumed to be zero.

DBH and height of each tree with DBH equal or over 2.0 cm in all sample plots were measured. DBH was measured at 1.3 m above the ground in the manner as shown in figure below. After measuring the DBH of trees, their respective height measurements were conducted. The measured DBH and height were recorded on the field form (Annex III).



6. Pre-project tree and shrub biomass

6.1 Pre-project shrub biomass

Destructive method has been used to measure the pre-project shrub biomass in 2008 (Section 5.2 in PDD Annex 3) and relevant carbon stocks per hectare were presented in PDD table Annex 3-6. The measured carbon stock in shrub biomass (7,356.4 tC as specified in Table D.5 of the 1st MR) was used to calculate the biomass loss of pre-project shrub due to the project activity in the first monitoring and verification. Due to the changes of project area in the second monitoring, the carbon stock in pre-project shrub biomass is recalculated to be 6,947.2 tC.

6.2 Pre-project tree biomass

Sampling of pre-project trees was conducted in 2008 (Section 5.2 in PDD Annex 3) and relevant carbon stocks per hectare were presented in PDD table Annex 3-7. The measured carbon stock in pre-project tree biomass (266.4 tC as specified in Table D.6 of the 1st MR) was used to calculate the biomass loss of pre-project tree due to the project activity in the first monitoring and verification. Due to the changes of project area in the second monitoring, the carbon stock in pre-project tree biomass is recalculated to be 258.7 tC.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>The baseline net removals by sinks were fixed as the ex ante estimation. The total of the baseline net removals by sinks during the monitoring period (from 30/06/2012 to 12/11/2017) were 3,752 tCO_2 (Table E-1).

Table E-1 Baseline net GHG removals by sinks[4] for the second monitoring period

Year No.	Years	Baseline net GHG removals by sinks (t CO_2)	Cumulative Baseline net GHG removals by sinks (t CO_2)
1	July 1st–Dec 30th 2012	293	293
2	2013	631	924
3	2014	675	1,599
4	2015	716	2,315
5	2016	754	3,069

[4]Data drawn and calculated from PDD table A-7

6	Jan 1st–Nov 12th 2017	684	3,752
Total of the 2nd monitoring period		3,752	

E.2. Calculation of project emissions or actual net removals

>> The actual net GHG removals by sinks were estimated as the change in the carbon stocks in project occurring in the selected carbon pool, minus the increase in non-CO2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity (Equation (2) in the applied methodology). The change in the carbon stocks in project was estimated as the change in carbon stock in tree biomass following methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2), as described below.

1. ***Estimation of carbon stock in trees biomass***

(1) Volume equations (listed in Section D.1) were used to convert measured DBH and height to stem volume of trees for each tree with sampling plot.

(2) Stem volume of each tree in sample plot was converted to above-ground tree biomass using basic wood density and biomass expansion factors, and the above-ground tree biomass was expanded to total tree biomass using root-shoot ratios. Thus, biomass of trees of species *j* in sample plot *p* is estimated as (Equation (3) and (5) in Appendix 1 Methods of plot biomass measurement in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$B_{TREE,j,p,i,t} = \sum_{l}^{L} V_{TREE,l,j,p,i,t} \times D_j \times BEF_{2,j} \times (1 + R_j) \quad \textbf{(E.1)}$$

where:

$B_{TREE,j,p,i,t}$	Biomass of trees of species *j* in sample plot *p* of stratum *i* at a given point of time in year *t*; t d.m.
$V_{TREE,l,j,p,i,t}$	Stem volume of trees *l* of species *j* in sample plot *p* of stratum *i* at a given point of time in year *t*, estimated by using the measured DBH and height as entry data into a volume equation; m^3
D_j	Basic wood density of tree species *j* (listed in Section D.1); t d.m. m^{-3}
$BEF_{2,j}$	Biomass expansion factor for conversion of stem biomass to above-ground tree biomass, for tree species *j* (listed in Section D.1); dimensionless
R_j	Root-shoot ratio for tree species *j* (listed in Section D.1); dimensionless
l	*1, 2, 3, …* trees *l* of species *j* in sample plot *p*
j	*1, 2, 3, …* tree species in plot *p*
p	*1, 2, 3, …* sample plots in stratum *i*
i	*1, 2, 3, …* tree biomass estimation strata within the project boundary
t	*1, 2, 3, …* years counted from the start of the A/R CDM project activity

(3) Tree biomass in sample plot *p* of stratum *i* was estimated as follows (Equation (2) in Appendix 1 Methods of plot biomass measurement in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$B_{TREE,p,i,t} = \sum_{j} B_{TREE,j,p,i,t} \quad \textbf{(E.2)}$$

where:

$B_{TREE,p,i,t}$	Tree biomass in sample plot *p* in stratum *i* at a given point of time in year *t*; t d. m.
$B_{TREE,j,p,i,t}$	Biomass of trees of species *j* in sample plot *p* of stratum *i* at a given point of time in year *t*; t d.m.
j	*1, 2, 3,* … species in plot *p*
p	*1, 2, 3*, … sample plots in stratum *i*
i	*1, 2, 3,* … strata used for tree biomass estimation within the project boundary
t	*1, 2, 3, …* years counted from the start of the A/R CDM project activity

(4) Tree biomass per hectare in plot *p* in stratum *i* was estimated as follows (Equation (1) in Appendix 1 Methods of plot biomass measurement in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$b_{TREE,p,i,t} = \frac{B_{TREE,p,i,t}}{A_{p,i}} \quad \textbf{(E.3)}$$

where:

$b_{TREE,p,i,t}$	Tree biomass per hectare in sample plot *p* in stratum *i* at a given point of time in year *t*; t d.m. ha^{-1}
$B_{TREE,p,i,t}$	Tree biomass in sample plot *p*in stratum *i* at a given point of time in year *t*; t d.m.
$A_{p,i}$	Area of sample plot *p* in stratum *i*; ha
p	*1, 2, 3*, … sample plots in stratum *i*
i	*1, 2, 3,* … tree biomass estimation strata within the project boundary
t	*1, 2, 3, …* years counted from the start of the A/R CDM project activity

(5) Mean tree biomass per hectare in stratum *i* and the variance of tree biomass per hectare in the stratum were estimated as follows (Equation (16) and (17) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$b_{TREE,i,t} = \frac{\sum_{p=1}^{n_i} b_{TREE,p,i,t}}{n_i} \quad \textbf{(E.4)}$$

$$s_i^2 = \frac{n_i * \sum_{p=1}^{n_i} b_{TREE,p,i,t}^2 - \left(\sum_{p=1}^{n_i} b_{TREE,p,i,t} \right)^2}{n_i * (n_i - 1)} \quad \textbf{(E.5)}$$

where:

$b_{TREE,i,t}$	Mean tree biomass per hectare in stratum *i* at a given point of time in year *t*; t d. m. ha^{-1}

$b_{TREE,p,i,t}$ Tree biomass per hectare in sample plot *p* in stratum *i* at a given point of time in year *t*; t d.m. ha^{-1}

n_i Number of sample plots in stratum *i*

s_i^2 Variance of tree biomass per hectare in stratum *i* at a given point of time in year *t*; (t d.m. ha^{-1})^2

(6) Mean tree biomass per hectare within the project boundary and its variance were estimated as follows (Equation (14) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$b_{TREE,t} = \sum_{i=1}^{M} w_i * b_{TREE,i,t} \quad \textbf{(E.6)}$$

$$s_{b_{TREE}}^2 = \sum_{i=1}^{M} w_i^2 * \frac{s_i^2}{n_i} \quad \textbf{(E.7)}$$

where:

$b_{TREE,t}$ Mean tree biomass per hectare within the project boundary at a given point of time in year *t*; t d. m. ha^{-1}

w_i Ratio of the area of stratum *i* to the sum of areas of biomass estimation strata; dimensionless

$b_{TREE,i,t}$ Mean tree biomass per hectare in stratum *i* at a given point of time in year *t*; t d. m. ha^{-1}

$s_{b_{TREE}}^2$ Variance of mean tree biomass per hectare within the project boundary at a given point of time in year *t*; (t d. m. ha^{-1})^2

s_i^2 Variance of tree biomass per hectare in stratum *i* at a given point of time in year *t*; (t d. m. ha^{-1})^2

n_i Number of sample plots in stratum *i*

M Number of tree biomass estimation strata within the project boundary

(7) uncertainty of the mean tree biomass per hectare within the project boundary was estimated as (Equation (15) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$U_C = \frac{t_{VAL} \times S_{b_{TREE}}}{b_{TREE}} \quad \textbf{(E.8)}$$

where:

U_C Margin of error of the mean tree biomass per hectare within the project boundary; t d. m. ha^{-1}

t_{VAL} Two-sided Student's *t*-value for: (i) Degrees of freedom equal to *n* – *M*, where *n* is total number of sample plots within the project boundary, and *M* is the total number of tree biomass estimation strata; and (ii) The confidence level required by the methodology applying this tool (e.g. 90% or 95%); dimensionless.

E.g. Two-sided Student's *t*-value for a probability value of 10% (which implies a 90% confidence level) and 140degrees of freedom can be obtained in Excel spreadsheet as "=TINV(0.10,155)" which returns a value of 1.65474.

$s_{b_{TREE}}$ Square root of the variance of mean tree biomass per hectare within project boundary at a given point of time in year *t* (i.e. the standard error of the mean); t d. m. ha^{-1}

(8) Total tree biomass within the project boundary at a given point of time in year *t* was estimated as follows (Equation (13) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$B_{TREE,t} = A * b_{TREE,t} \quad \textbf{(E.9)}$$

where:

$B_{TREE,t}$ Total tree biomass within the project boundary at a given point of time in year *t*; t d. m.

A Sum of areas of the biomass estimation strata within the project boundary; ha

$b_{TREE,t}$ Mean tree biomass per hectare within the project boundary at a given point of time in year *t*; t d. m. ha^{-1}

(9) Carbon stock in tree biomass within the project boundary at a given point of time in year *t* was estimated as follows (Equation (12) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$C_{TREE,t} = \frac{44}{12} * B_{TREE,t} * CF_{TREE} \quad \textbf{(E.10)}$$

where:

$C_{TREE,t}$ Carbon stock in tree biomass within the project boundary at a given point of time in year *t*; t CO_2-e

$B_{TREE,t}$ Total tree biomass within the project boundary at a given point of time in year *t*; t d. m.

CF_{TREE} Carbon fraction of tree biomass; t C t d.m.$^{-1}$

A default value of 0.50 is used unless transparent and verifiable information can be provided to justify a different value

Table E-2 carbon stock in project trees

Strata	mean tree biomass $b_{TREE,i,t}$ (t d.m./ha)	Strata area (ha)	Variance of tree biomass (t d. m. ha^{-1})^2	Carbon stock in tree biomass and the margin of error
S－1	104.37	489.6	2,528.6	$b_{TREE,t}$ =31.7330 t d.m.ha^{-1} $B_{TREE,t}$ =209,202.8 t d.m. $C_{TREE,t}$ =383,538.6 tCO$_2$-e $s_{b_{TREE}}$ =1.8236 t d.m.ha^{-1} t_{VAL} =1.65468 U_C=9.51%
S－2	43.39	197.4	126.6	
S－3	19.78	231.3	22.3	
S－4	6.98	747.8	111.9	
S－5	0.00	1,352.2	-	
S－6	87.28	592.5	1,135.0	
S－7	77.21	170.6	2,280.0	
S－8	40.36	119.0	337.3	
S－9	6.25	595.4	40.4	
S－10	0.00	822.2	-	
S－11	70.15	312.4	4,687.5	
S－12	0.00	91.6	-	
S－13	65.34	545.2	618.6	

S－14	20.11	199.6	176.8	
S－15	37.99	125.8	1,170.1	
TOTAL		**6,592.6**	2,528.6	

2. ***Carbon stock changes in living biomass of planted trees in the project***

Change in carbon stock in tree biomass within the project boundary in year *t* is calculated as follows (Equation (11) in methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"(Version 04.2):

$$\Delta C_{TREE,t} = \frac{C_{TREE,t_2} - C_{TREE,t_1}}{T} \times 1\ year \quad \textbf{(E.11)}$$

where:

$\Delta C_{TREE,t}$	change in carbon stock in trees within the project boundary in year *t*; t CO_2e[1]
C_{TREE,t_2}	Carbon stock in tree biomass within the project boundary at a point of time in year t_2; t CO_2e
C_{TREE,t_1}	Carbon stock in tree biomass within the project boundary at a point of time in year t_1; t CO_2-e
T	Time elapsed between two successive estimations (T=$t_2 - t_1$); yr

Carbon stock in biomass of planted trees for 6,592.6 ha within the project boundary on November 12th 2017 for the second monitoring and verification was 383,538.6 tCO_2e. It was measured and estimated in the first monitoring and verification that C_{TREE,t_1} =39,177.8 tCO_2e. Therefore,

$\Delta C_{TREE,t}$ **=(383,538.6 - 39,177.8)/5.36575 = 64,177.5 t CO_2-e**

3. ***Carbon stock changes in biomass of pre-project trees and shrubs***

In the first verification, 977.1 tCO_2e and 26,973.3 t CO_2e carbon stock in pre-project trees and shrubs on 6,849.1 ha of lands was assumed to be died out. The recalculated carbon stock in pre-project trees and shrubs for the second monitoring are smaller than the first monitoring and verification (Section D.3.6 above), therefore for the second monitoring and verification it was conservative to set carbon stock changes in biomass of both pre-project trees and shrubs as zero**.**

4. ***Carbon stock changes in soil organic matter***

Carbon stock changes in soil organic matter is estimated using the "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities". The project activities comply with applicability conditions set in the tool and in the approved methodology applied as follows:

(a) The areas of land to which this tool applied:

  (i) Do not fall into wetland category as defined in Annex A: Glossary of IPCC, Good Practice Guidance for Land Use, Land-use Change and Forestry (IPCC, GPG-LULUCF);

  (ii) Are not subject to any of the land management practices and application of inputs as listed in the Tables 1 and 2 of the tool;

(b) In the implementation of the A/R CDM project activity:

  (i) Litter remained on site and was not collected;

(ii) Soil disturbance attributable to the A/R CDM project activity, if any, is in accordance with appropriate soil conservation practices, e.g.

- The holes dug during site preparation was made following land contour;
- Limited to soil disturbance for site preparation before planting and such disturbance is not repeated in less than twenty years.

Using the Column L of spreadsheet calculation tool developed by the Executive Board following the "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", the estimated carbon stock changes in soil organic matter is presented in Table E.3 below.

Table E.3 Carbon stock changes in soil organic matter

Year	Carbon stock changes ($tC.yr^{-1}$)	Carbon stock changes ($tCO_2.yr^{-1}$)	Cumulative carbon stock changes (tCO_2)
July 1st–Dec. 31st 2012	1,469.4	5,387.8	5,387.8
2013	4,599.8	16,866.1	22,253.9
2014	4,627.0	16,965.6	39,219.5
2015	4,647.8	17,041.9	56,261.4
2016	4,647.8	17,041.9	73,303.2
Jan 1st–Nov 12th 2017	4,023.8	14,754.1	88,057.3
Total	24,015.6	88,057.3	

Change in carbon stock in soil organic carbon within the project boundary in year t ($t_1 \leq t \leq t_2$) was calculated as follows:

$$\Delta SOC_t = dSOC_{(t_1,t_2)} * 1year \quad \text{for } t_1 \leq t \leq t_2 \qquad \textbf{(E.15)}$$

= 88,057.3/5.36575 =16,411.0 t CO_2e

where:

ΔSOC_t	Change in carbon stock in soil organic matter within the project boundary in year t; t CO_2-e
$dSOC_{(t_1,t_2)}$	Rate of change in carbon stock in soil organic matter within the project boundary during the period between a point of time in year t_1 and a point of time in year t_2; t CO_2-e yr^{-1}

5. ***Project emissions***

There has been no biomass burning during site preparation and no forest fire during the verification period. Therefore, the project GHG emissions were set as zero.

6. ***Actual net GHG removals by sinks***

(1) **The actual net GHG removals by sinks were calculated as**:

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E \qquad \textbf{(E.16)}$$

where:

ΔC_{ACTUAL}	Actual net GHG removals by sinks; t CO_2-e
ΔC_P	Sum of the changes the carbon stock in the selected carbon pools within the project boundary; t CO_2-e
GHG_E	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity; t CO_2-e

(2) **The verifiable changes in the carbon stock in the selected carbon pools within the project boundary are estimated using the following equation:**

$$\Delta C_P = \sum_{t=1}^{t^*} \Delta C_t \qquad \textbf{(E.17)}$$

where:

ΔC_P	Sum of the changes in carbon stock in all selected carbon pools, since the start of the project; t CO_2-e
ΔC_t	Change in carbon stock in all selected carbon pools, in year *t*; t CO_2-e
t	*1, 2, 3, … t** years elapsed since the start of the A/R project activity; yr

Change in carbon stock in all selected carbon pools, in year *t*, is calculated as:

$$\Delta C_t = \Delta C_{TREE,t} + \Delta C_{SHRUB,t} + \Delta SOC_t \qquad \textbf{(E.18)}$$

= 64,177.5 + 0.0 + 16,411.0 = 80,588.5 tCO_2e

ΔC_P =80,588..5 ◊5.36575 = 432,418 tCO_2^e

1. where:

ΔC_t	Change in carbon stock in all selected carbon pools in the project scenario, in year *t*; t CO_2-e
$\Delta C_{TREE,t}$	Change in carbon stock in tree biomass in project, in year *t*; t CO_2-e
$\Delta C_{SHRUB,t}$	Change in carbon stock in shrub biomass in project, in year; t CO_2-e
ΔSOC_t	Change in carbon stock in soil organic matter in project, in year *t*; t CO_2-e
t	*1, 2, 3, … t** years elapsed since the start of the A/R CDM project activity

E.3. Calculation of leakage emissions

>> In accordance with the registered PDD, the potential leakage due to the implementation of the registered A/R CDM project activity is GHG emissions due to displacement of pre-project grazing activity. However, based on PDD section D-2 the leakage from the displacement of the pre-project grazing is nil, hence set as zero.

E.4. Calculation of emission reductions or net anthropogenic removals

The net anthropogenic GHG removals by sinks shall be calculated as follows (equation (3) in applied methodology:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad \textbf{(E.19)}$$

Where:

$\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG removals by sinks, in year *t*; t CO_2-e

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year *t*; t CO_2-e

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks, in year *t*; t CO_2-e

LK_t = GHG emissions due to leakage, in year *t*; t CO_2-e

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	3,752	432,418	0	39,945	388,721	428, 666

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante[5] (t CO_2e)
428, 666	506,442 tCO_2 e in total (94,384 tCO_2 e annually)

E.6. Remarks on increase in achieved emission reductions

>> The actual value of the net anthropogenic GHG removals by sinks is smaller than ex ante estimate in the registered CDM-PDD because of the reduction of actually planted area, delayed planting schedule and slow growth of species planted, as outlined below

1. Reduction of planted area

The actual planted area is 6,592.6 ha compared to the project area in the registered CDM-PDD (8,671.3 ha), amounted to 76% of planned area. Main causes for the reduction are (also summarized in table E.2 below):

a) *Poor site conditions that prevented planting on 430.6 ha*: The high altitude, steep slopes, strong winds and rocky soils lacking adequate soil depth made site conditions of 430.6 ha unsuitable for reforestation. Even repeated replanting was not able to result in desired survival of planted seedlings. Considering the geography of the region, the poor site conditions could not be fully assessed at the project design stage. As a result of detailed assessment of site conditions during project implementation, the sites with poor site conditions were excluded from the project area.

b) *Land tenure conflicts on 1,132.4 ha of lands*: From legal point of view, the land ownership is clear. *However*, as project lands are barren without revenue generation, the farmer households did not care about the tenure of the lands at the time of tenure settlement. During project preparation stage, farmers didn't foresee the legal disputes with regard to land tenure. With the implementation of the project, some farmers in the vicinity of the project lands claimed land tenure right on lands legally owned by other farmers. As a result of the disputes pertaining to land tenure, farmers that legally own the lands and the forestry companies that are implementing the project did not want to take the risk of planting trees on disputable lands.

c) *Exclusion of area from project:* Strips of lands within 5-10 m from crop lands and the washed gully covering 284.9 ha was not planted for the purpose of protecting crop lands outside but bordering the project lands.

[5] Estimated using data of table A-7 in registered PDD

d) *Land use changes:*230.8 ha of land was used for other non-forestry purposes.

Table E.4 Summary table on area excluded from the designed project lands

No	Reason for exclusion	Area (ha)
a)	Poor site condition	430.6
b)	Land tenure disputes	1,132.4
c)	Leave for cropland protection	284.9
d)	Land use changes	230.8
	Total	**2,078.7**

2. Delayed planting schedule

The actual planting progress was much slower than planned schedule (see table B.1 above for detail) due mainly to slow process for addressing land tenure conflict, unavailability of sufficient seedlings, poor site condition, and extreme climate event (snow storm in early 2008 and drought in 2009-2015). Many lands have been repeated planted due to low survival rate resulted from poor site conditions and extreme drought, and due to damage by snow storm and drought.

Attachment. Instructions for completing this form

1. General instructions

1. When reporting on monitoring results and completing this form, in addition to applying the "CDM project standard for project activities" (hereinafter referred to as the project standard), the selected methodologies and, where applicable, the selected standardized baselines, consult the "Rules and Reference" section of the UNFCCC CDM website. This section contains all regulatory documents for the CDM, such as standards (including methodologies, and standardized baselines), procedures, tools, guidelines, clarifications, forms and the "Glossary: CDM terms".

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

3. Complete this form in English. Prepare all attached documents in English, or if their originals were prepared in another language, provide a full translation of the relevant sections of these documents in English.

4. Complete this 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 this form. Add rows to the tables as needed. Add additional appendices as needed.

6. If a section of the form is not applicable, explicitly state that the section is left blank intentionally.

7. Use an internationally recognized format for presentation of values. For example, use digit grouping in thousands and mark a decimal point with a dot (.), not with a comma (,).

8. Complete this form deleting this attachment.

2. Specific instructions

1. Indicate the following information on the cover page:
   (a) Title of the project activity;
   (b) UNFCCC reference number of the project activity;
   (c) Version number of the PDD applicable to this monitoring report;
   (d) Version number of this monitoring report;
   (e) Completion date of this monitoring report: Indicate the date in DD/MM/YYYY;
   (f) Monitoring period number: The monitoring period number is an ordinal number referring to the chronological order of monitoring periods (e.g. "first monitoring period");
   (g) Duration of this monitoring period: Indicate the duration with the first and last dates in DD/MM/YYYY – DD/MM/YYYY;
   (h) Monitoring report number for this monitoring period: Applicable when preparing multiple separate monitoring reports for the monitoring period for different batches of small-scale project activities in the registered bundle of small-scale project activities. To distinguish between such multiple separate monitoring reports, assign an ordinal number from 1 upwards (e.g. 1, 2, 3…*n*) to each monitoring report in the consecutive order;
   (i) Project participants;
   (j) Host Party;
   (k) Sectoral scopes: List all sectoral scopes applicable to the project activity;
   (l) Applied methodologies and standardized baselines: List all the methodologies and combination of methodologies, and where applicable, the standardized baselines, applied to the project activity;
   (m) Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period: Provide the total amount in tonnes of CO_2 equivalent;
   (n) Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD: Provide the total amount in tonnes of CO_2 equivalent based on the ex ante estimation in the PDD, with adjustment for the comparable period, as appropriate.

SECTION A. Description of project activity

A.1. General description of project activity

1. Provide a brief summary of the project activity in terms of the purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals.

A.2. Location of project activity

1. Provide details of the physical/geographical location of the project activity, including physical address (host Party, region/state/province, city/town/community, street name and number) and a map, and if necessary, other information allowing for unique identification of the project activity (e.g. geographic coordinates).
2. Do not exceed one page for the description of location.

A.3. Parties and project participants

1. List in the table the Parties and the project participants involved in the project activity.

A.4. Reference to applied methodologies and standardized baselines

1. Indicate the exact reference (number, title, version) of:
   (a) The applied methodologies or combination of methodologies (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 methodologies refer (e.g. "Methodological tool: Tool for the demonstration and assessment of additionality" (version 07.0.0));
   (c) The applied standardized baselines, 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 type and duration

1. Provide the type (fixed or renewable), and the duration (with the start and end dates in DD/MM/YYYY – DD/MM/YYYY) of the crediting period corresponding to this monitoring period.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

1. Provide information on the implementation status of the project activity in accordance with the applicable provisions on the description of implemented registered CDM project activities in the project standard, including:
   (a) Description of the installed technology, technical processes and equipment;
   (b) Information on the implementation and actual operation of the project activity, including relevant dates (e.g. construction, commissioning, start of operation).
2. For the description of the installed technologies, technical processes and equipment, include diagrams, where appropriate.
3. If applicable, present information on any post-registration changes to the project activity in section B.2 below.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

1. Indicate whether there are temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines during this monitoring period.
2. If there are such deviations, for each deviation, provide a description of the nature, extent and duration of the non-conforming monitoring period, and:
   (a) Propose alternative monitoring arrangements for the non-conforming monitoring period in accordance with the applicable provisions in the project standard; or
   (b) Apply the most conservative values approach in accordance with the applicable provisions in the project standard.
3. Provide the version number and the completion date of the DOE verification report.

B.2.2. Corrections

1. Indicate whether there are corrections to project information or parameters fixed at the registration or renewal of crediting period of the project activity.
2. If there are such corrections, list all the corrections since the registration of the project activity, separating them into the following categories:
   (a) Corrections that have been approved by the Board as applicable from the period prior to this monitoring period;
   (b) Corrections that have been approved by the Board as applicable from this monitoring period;
   (c) Corrections that are being submitted with this monitoring report as part of the request for issuance (post-registration change – issuance track) as applicable from this monitoring period.
3. For the corrections referred to in 1(a) and 1(b) above, provide the approval dates and reference numbers of the post-registration changes.
4. For the corrections referred to in 1(c) above, provide the version number and the completion date of the revised PDD and of the DOE validation report.

B.2.3. Changes to the start date of the crediting period

1. Indicate whether there are changes to the start date of the crediting period fixed at the registration of the project activity.
2. If there are such changes, list all the changes since the registration of the project activity, separating them into the following categories:
   (a) Changes that have been approved by the Board or notified to the secretariat and that do not affect the start of this monitoring period (i.e. any of the changed start dates are prior to the start of this monitoring period);
   (b) Change that has been approved by the Board or notified to the secretariat and that affects the start of this monitoring period (i.e. the changed start date is the start of this monitoring period);
   (c) Change that affects the start of this monitoring period and is being submitted with this monitoring report as part of the request for issuance (post-registration change – issuance track) and that affects the start of this monitoring period.
3. For the changes referred to in 1(a) and 1(b) above, provide the approval dates and reference numbers of the post-registration changes, or provide the notification date.
4. For the changes referred to in 1(c) above, provide the version number and the completion date of the revised PDD and of the DOE validation report.

B.2.4. Inclusion of monitoring plan

1. Indicate whether there is a post-registration change to include a monitoring plan into the PDD, for which the delayed submission of the monitoring plan was chosen by the project participants at the time of the registration of the project activity.
2. If there is such change, indicate which one of the following categories that the change falls under:
   (a) Inclusion has been approved by the Board as applicable from the period prior to this monitoring period;
   (b) Inclusion has been approved by the Board as applicable from this monitoring period (i.e. this is the first monitoring period for the project activity); or
   (c) Inclusion Is being submitted together with this monitoring report (post-registration change – issuance track) as applicable from this monitoring period.
3. For the case referred to in 1(a) or 1(b) above, provide the approval date and reference number of the post-registration change.
4. For the case referred to in 1(c) above, provide the version number and the completion date of the revised PDD and of the DOE validation report.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

1. Indicate whether there are permanent changes to the registered monitoring plan, or permanent deviation of monitoring from applied methodologies, applied standardized baseline, or other applied standards or tools.
2. If there are such changes, list all the changes since the registration of the project activity, separating them into the following categories:
   (a) Changes that have been approved by the Board as applicable from the period prior to this monitoring period;
   (b) Changes that have been approved by the Board as applicable from this monitoring period;
   (c) Changes that are being submitted with this monitoring report as part of the request for issuance (post-registration change - issuance track) as applicable from this monitoring period.
3. For the changes referred to in 1(a) and 1(b) above, provide the approval dates and reference numbers of the post-registration changes.
4. For the changes referred to in 1(c) above, provide the version number and the completion date of the revised PDD and of the DOE validation report.

B.2.6. Changes to project design

1. Indicate whether there are any changes to the project design of the project activity.
2. If there are such changes, list all the changes since the registration of the project activity, separating them into the following categories:
   (a) Changes that have been approved by the Board as applicable from the period prior to this monitoring period;
   (b) Changes that have been approved by the Board as applicable from this monitoring period;
   (c) Changes that are being submitted with this monitoring report as part of the request for issuance (post-registration changes - issuance track) as applicable from this monitoring period.
3. For the changes referred to in 1(a) and 1(b) above, provide the approval dates and reference numbers of the post-registration changes.
4. For the changes referred to in 1(c) above, provide the version number and the completion date of the revised PDD and of the DOE validation report.

SECTION C. Description of monitoring system

1. Provide a description of the monitoring system in accordance with the applicable provisions on the description of monitoring system in the project standard and the monitoring plan in the registered PDD. Include line diagrams showing all relevant monitoring points.

SECTION D. Data and parameters

1. Provide information on all data and parameters in accordance with the applicable provisions on data and parameters in the project standard, using the tables provided in sections D.1 and D.2.
2. For “Purpose of data/parameter” 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;
   (b) Calculation of project emissions or actual net GHG removals;
   (c) Calculation of leakage.
3. Where the applied standardized baselines standardize baseline emissions, apply the standardized values of the parameters in sections D.1 and/or D.2 in accordance with the applicable provisions related to data and parameters in the project standard.

D.1. Data and parameters fixed ex ante

1. Include data that are fixed at the registration or at the renewal of crediting period of the project activity, and were used during this monitoring period, by replicating the information from the registered PDD.
2. For “Value(s) applied”, use one table to report multiple values referring to the same data and parameter, if applicable.

D.2. Data and parameters monitored

1. Include data and parameters that were monitored during this monitoring period.
2. For “Monitoring equipment” in the table, provide information on type, accuracy class, serial number, calibration frequency, date of last calibration and validity.
3. For “Value(s) of monitored parameter”, use one table to report multiple values referring to the same data and parameter, if applicable.
4. Describe details in spreadsheets if appropriate, attach them to the monitoring report, and provide the reference to the spreadsheets in this section.

D.3. Implementation of sampling plan

1. If a sampling plan was implemented to determine parameter values, provide a description of how the sampling for those parameters was implemented in accordance with the sampling plan in the registered monitoring plan, including the following information:
   (a) Description of implemented sampling design;
   (b) Collected data (attach and provide reference to spreadsheets, if necessary);
   (c) Analysis of the collected data;
   (d) Demonstration that the required confidence/precision has been met;
   (e) Demonstration that the samples were randomly selected and are representative of the population.
2. Attach to the monitoring report any spreadsheets to present full calculations or detailed information.

SECTION E. Calculation of emission reductions or net anthropogenic removals

1. For the parameter global warming potentials (GWPs), from 1 January 2013, apply the values adopted by decision 4/CMP.7 to calculate GHG emission reductions or net anthropogenic GHG removals achieved in the second commitment period of the Kyoto Protocol in accordance with the applicable provisions in the project standard.

E.1. Calculation of baseline emissions or baseline net removals

1. Provide sample calculations for all formulae used to calculate baseline GHG emissions or baseline net GHG removals, applying actual values. Attach spreadsheets to the monitoring report to present full calculations for this monitoring period.

E.2. Calculation of project emissions or actual net removals

1. Provide sample calculations for all formulae used to calculate project GHG emissions or actual net GHG removals, applying actual values. Attach spreadsheets to the monitoring report to present full calculations for this monitoring period.

E.3. Calculation of leakage emissions

1. Provide sample calculations for all formulae used to calculate leakage GHG emissions, applying actual values. Attach spreadsheets to the monitoring report to present full calculations for this monitoring period.

E.4. Calculation emission reductions or net anthropogenic removals

1. Summarize the results of sections E.1, E.2 and E.3 above, and provide GHG emission reductions or net anthropogenic GHG removals for this monitoring period, using the table.
2. If the monitoring period starts before 1 January 2013 and ends anytime thereafter, provide GHG emission reductions or net anthropogenic GHG removals achieved for the following two periods separately by allocating the raw data into the two periods in accordance with the applicable provisions in the project standard, and multiplying them with the applicable GWPs:
   (a) Before 1 January 2013 (first commitment period);
   (b) From 1 January 2013.

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

1. Provide a comparison of the GHG emission reductions or net anthropogenic GHG removals achieved by the project activity during this monitoring period with the amount based on the ex ante estimation in the registered PDD.

E.6. Remarks on increase in achieved emission reductions

1. State whether the actual GHG emission reductions achieved is greater than the amount based on the ex ante estimation in the registered PDD. If so, explain the cause of any increase in the actual GHG emission reductions achieved by the project activity during this monitoring period, including all information that is different from that stated in the registered PDD.
2. This section is not applicable for afforestation and reforestation (A/R) project activities.

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Document information

Version	*Date*	*Description*
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.

Version	*Date*	*Description*
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
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 GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, 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).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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