



Monitoring Plan

Form Ghana 2023

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1. Introduction

This document describes the monitoring framework and the activities that will be undertaken this year to monitor the company's performance and gather the necessary data. At the end of the year, the monitoring activities will be presented in the Annual Monitoring Report. The public version of this document is published online and sent to relevant parties. This plan concerns the sites of Akumadan and Berekum.

2. Monitoring Framework

The monitoring system consists of several activities aimed at the collection of different types of information. The monitoring methods used depend on what is best suited per type of information. The system is set up in a hierarchical manner to assure that the information collected provides information on the management goals. The hierarchy of the information is shown in the following table.

Project module	General objective	Sub-objective	Verifier	Action	Monitoring frequency
Form Ghana regular	1 Establish and manage the timber plantation in an ecologically sustainable manner with a maximum of 90% Teak and at least 10% of mixed local species with conservation of natural, riparian forest	1.1 Forest extent and regeneration	1.1.1 Area planted with Teak	Map Teak plantation	Annual
			1.1.2 Area managed as forest plantation/buffer zone	Map indigenous plantation and buffer zones	Annual
			1.1.3 Changes in the planted area (FSC™ 7.1e)	Compile joint map	Annual
		1.2 Forest ecosystem (FSC™ 8.2.2)	1.2.1 Extent of protected area	Map protected areas	Annual
			1.2.2 Fauna population and diversity in the plantation	Inventory fauna	Every five years
			1.2.3 Flora diversity in the plantation (FSC™ 8.1.2c)	Inventory Flora	Every five years
			1.2.4. Identification and protection of endangered, rare and threatened species (flora and fauna) (FSC™ 7.1g)	Analysis of inventory data	Annual
		1.3 Forest condition and regeneration	1.3.1 Check of the growth rate of the plantation (FSC™ 7.1e and 8.1.2b en 8.2.1)	PSP monitoring	Biennial
			1.3.2 Check of the growth rate of the Buffer zones (FSC™ 8.1.2c)	Flora monitoring	Every five years
			1.3.3 Check forest health (disease, insect outbreaks etc.) (FSC™ 10.4)	PSP monitoring	Biennial
			1.3.4 Protection of the forest against fire	Fire management plan + activities	Annual
		1.4 Soil protection	1.4.1 Procedures to protect soil productivity and avoid erosion	Check procedures and application	Annual
			1.4.2 Effectiveness of activities undertaken to avoid soil erosion	PSP monitoring	Biennial
		1.5 Water protection	1.5.1 Procedures to protect forest and vegetation along water courses	Check procedures and application	Annual
			1.5.2 Check water quality (FSC™ 10.6.3)	Water quality monitoring (streams and bore holes)	Quarterly for boreholes and streams
	1.5.3 Rain fall monitoring		Measure daily rain fall	Daily	
	2 Guarantee financial and economic sustainability through the generation of income from the produced round-wood and carbon sequestration	2.1 Forest production (FSC™ 8.1.2e and 8.2.4)	2.1.1 Expected and actual harvest of round wood (FSC™ 5.6.1 and 8.1.2a)	Harvest monitoring	When relevant
			2.1.2 Comparison of yield with yield tables	Harvest monitoring	When relevant
			2.1.3 Calculation of carbon stored in the plantation	Carbon verification	Biennial
			2.1.4 Calculation of carbon stored in the buffer zones	Carbon verification	Every five years

			2.1.5 Waste collection and treatment	Report by Zoomlion	Quarterly
			2.1.6 Chemical usage and stock	Report on stocks and usage	Monthly
		2.2. economic aspects (FSC™ 8.1.2e en 8.2.4)	2.2.1. Cost/benefit of plantation	Update valuation	Annual
			2.2.2 Value of wood sales and carbon credits.	Report on sales and benefit sharing paid	When relevant
			2.2.3 Nursery development	Report on plants in nursery and germination success	Monthly
	3 Provide social benefits by offering good economic conditions for employees and the surrounding communities	3.1 Social impact (10.8.1)	3.1.1 Number of people (partially) depending on the plantation for their livelihood (employees, inter croppers).	Social survey	Annual
			3.1.2 Impact of plantation operations on men and women (FSC™ 4.4.5) in surrounding communities (FSC™ 8.1.2d).	Social survey / employee statistics	Annual
			3.1.3 Training and capacity building for employees and inter croppers.	Training register	Annual
			3.1.4 Informing the public	Stakeholder meeting + reports	Biennial
			3.1.5 Health and safety	Infirmity statistics	Quarterly
			3.1.6 Illegal activities in the plantation	Patrols + reports on patrols	Monthly
			3.1.7 Number of employees	Detailed table specifying workers also according to gender	Monthly
			3.1.8 Union membership	Detailed table showing union membership also according to gender	Monthly
			3.1.9 RAP	Monitoring RAP implementation and settlement of people in Kotaa	Quarterly
			3.1.10 Intercroppers	Monitoring numbers of intercroppers and area per person	Monthly
	3.1.11 Stakeholder engagement procedure	Update on the implementation of stakeholder engagement plan	Quarterly		
	3.1.12 Community Development Plan	Update on the implementation of the community development plan	Quarterly		
	3.1.13 Complaint Response Mechanism	Update on the complaint and redress system	Monthly		
	4.2.2 Farmer family income improved	Report containing statistics on household income and the part generated by participating in project activity	Annual		

Integrated Community Fire Management Programme	7: 5000-hectare under community fire management	7.1 Improve effectiveness of fire management efforts and operations of relevant stakeholders	7.1.1 Fire awareness raising	Report describing the number of communities and area covered by fire awareness raising activities	Annual
			7.1.2 Fire management capacity assessment	Number of communities and area covered by the fire management capacity assessment	Annual
			7.1.3 Fire risk assessment per F-block	Area covered by the fire risk assessment	Annual
			7.1.4 Community fire teams trained and created	Report describing the training and creation of community fire team	Annual
			7.1.5 Community Fire team annual reports	Annual report describing the activities concerning the community fire teams	Annual

3. Monitoring activities

3.1 Mapping and map analysis

This activity is largely done by Form Ghana's GIS expert. External consultants assist where necessary and ensures proper back-up of information.

Sub-objective	1.1 and 1.2
Verifier	<ul style="list-style-type: none"> - Map of exact location and size of teak plantation - Map of exact location and size of indigenous plantation - Planting composition of indigenous species and planting design - Monitoring plan on indigenous plantation
Timeline	Annually
Planning	2 days

3.2 Fauna diversity

The goal is to measure the effect of Form Ghana's activities on the fauna population in the forest reserves. Monitoring is done at least once every five years. Activities are subcontracted to local experts (see P13)

Sub-objective	1.2
Verifier	<ul style="list-style-type: none"> Reports on species diversity in different vegetation types Reports on population density in different vegetation types
Timeline	2026 (Asubima and Afrensu Brohuma FR) 2026(Tain II FR)
Planning	Dry season

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Timeline	2026 (Asubima and Afrensu Brohuma FR) 2026 (Tain II FR)
Planning	Dry season

3.4 Buffer Zone PSPs- Akumadan plantations

Monitoring is done at least once every five years by a Form Ghana monitoring team with a local botanist. Next buffer zone monitoring will be in 2026. *When issuing a new contract in 2021 it is*

necessary to include the original description of the work done by Noor de Laat as technical reference. Currently the subplots are not done right.

Sub-objective	1.3.1, 1.3.2 and 1.3.3
Verifier	A monitoring report including: <ul style="list-style-type: none"> - Basic statistics - Frequency distribution for D and H - Tree stock analysis - Dominant height - Species composition - Reliability PSP sampling - Biodiversity index
Timeline	November 2026
Planning	2 days training, 15 days reporting

3.5 Timber plantation PSPs

Forest health and soil protection is monitored in permanent sample plots (PSPs). Commonly half of the plots are measured every year. PSPs will be measured in 2023 within 2001, 2006, 2008, 2009 2010, 2011, 2012, 2014, 2015, 2016, 2017 and 2018 stands.

Plantations	Stratum	Area (ha)	# PSPs	Sampling density	
Akumadan	Teak 2001	5.78	4	>1%	
	Teak 2006	65.10	11	>1%	
	Teak 2008	143.84	24	>1%	
	Teak 2009	511.66	76	>1%	
	Teak 2010	619.49	92	>1%	
	Teak 2011	845.57	122	>1%	
	Teak 2012	691.08	102	>1%	
	Indigenous 2010	47.68	11	>2%	
	Indigenous 2011	181.49	8	>2%	
	Indigenous 2012	80.43	21	>2%	
	Gmelina 2022	7.15	2	>1%	
Berekum	Teak 2013	573.78	87	>1%	
	Teak 2014	1849.91	275	>1%	
	Teak 2015	1098.14	159	>1%	
	Teak 2016	87.63	41	>3.5%	
	Teak 2017	566.99	83	>1%	
	Teak 2018	1597.50	233	>1%	
	Teak 2019	863.17	130	>1%	
	Teak 2020	272.74	35	>1%	
	Gmelina 2018	8.6	8	>2%	
	Gmelina 2019	25	5	>2%	
	Gmelina 2020	28.68	8	>2%	
	Indigenous 2013	26.73	5	>2%	
	Indigenous 2014	194.19	53	>2%	
	Indigenous 2015	93.25	18	>2%	
	Indigenous 2017	82.55	18	>2%	
	Indigenous 2018	306,51	68	>2%	
	Indigenous 2019	363.060	103	>2%	
		Indigenous 2020	302.36	84	>2%
		Quality control		149	10%
	Total number of plots		1413		

Data from the PSPs are also used to verify the amount of carbon sequestered for VCS. 1% sampling density is aspired for teak and 2% for indigenous plantation.

The Form Ghana monitoring team is trained yearly by Form Ghana management. As a first cross-check the number of trees found in a plot during the previous monitoring round is checked before going to the plot. This will help the monitoring team to do an additional check if a higher number of trees is found this time.

PSP monitoring activities are cross-checked to assess if the monitoring is carried out according to protocol, and a report is written on this activity. Data are entered in Excel and sent to the monitoring manager. During the monitoring activities every 10th plot of a monitoring team is remeasured by another monitoring team as quality control procedure. These procedures are described in detail in protocol 13.

The findings are compared to former PSP measurements to determine actual height growth and compare this to predicted height growth according to yield tables. This allows to determine also the yield class for the sites that have had a bad start due to weed competition.

Sub-objective	1.3.1, 1.3.3 and 1.4.2
Verifier	A yearly monitoring report for the teak and indigenous plantation including: <ul style="list-style-type: none"> • Basic statistics (tree stock, survival, dominant height, basal areas and volume, Teak die-back, Beetle damage) • Frequency distribution for D and H • Tree stock analysis • Beating up analysis • Dominant height • Yield classification • Reliability PSP sampling
Timeline	Field monitoring- Mid April 2023
Planning	15 days reporting, 8 weeks field monitoring

3.6 Water

3.6.1 Water quality monitoring

Form Ghana will undertake quarterly water quality monitoring. Water samples will be sent to accredited water analysis institution such as Ghana Water Company Limited (GWCL) for analysis. Various water quality parameters such as Dissolved oxygen, Nitrate, Ammonia, Phosphate, COD and BOD will be analysed in the laboratory.

The outcome of the water quality analysis will be interpreted and shared with relevant stakeholders. At the end of the year, various results for open water (streams) will be compared to baseline parameters as shown in Table 1.1 below.

No.	Parameter	Baseline- Asubima/ Afrenso Brohuma
1	Dissolved Oxygen	0.80
2	pH	6.72
3	Temperature	-
4	Nitrate	24.70
5	Ammonia	-
6	Phosphate	-
7	Turbidity	6.15
8	Conductivity	97.90
9	COD	-
10	BOD	-

3.6.2 Water consumption monitoring

Water consumption meters are installed on boreholes in Form Ghana. Consumption data will be calculated on monthly basis by Form Ghana. Quarterly reports on quantity of water consumed on boreholes will be reported to relevant stakeholders. The height of water table is taken and recorded whenever needed.

Pump ID	Location	Capacity	Action time
Pedrollo	Site Berekum	2Hp	Daily
Ground FOS	BII Berekum	1 Hps	Daily
Ground FOS	B46 Berekum	1.5Hp	Daily
Ground FOS	A24 Berekum	1.5Hp	Daily
Pedrollo	Site Akumadan	2Hp	Daily
Saer	Site irrigation Akumadan	30Hp	Daily

3.6.3 Borehole water quality and water table height

- Bore hole water quality (see water quality) (quarterly; March, June, September, December)
- Water table (whenever there is a need, water table is being recorded and documented).

Sub-objective	1.5.2
Verifier	Report with data on quality of water entering and exiting the plantation + boreholes
Timeline	Quarterly except for stream water quality from Akumadan
Planning	4 days

3.7 Rain fall

Rainfall is measured daily and reported per month for each of the locations where it is recorded.

Sub-objective	1.5.2
Verifier	Report with data on quality of water entering and exiting the plantation.
Timeline	Daily, with monthly summary
Planning	

3.8 Fire incidence

Fire monitoring is extremely important to form Ghana. With the help of the fire towers / fire hawk system all locations of fire reported are recorded. Monthly an overview of these reported fires is produced.

Sub-objective	1.3.4
Verifier	Fire report
Timeline	monthly

Planning	1 hour per month
Planning	12 hours

3.9 Illegal activities

The Form Ghana security is to record all illegal activities that occur within Form Ghana lease areas. This information needs to be summarized monthly into a report. The monitoring of illegal activities is described in protocol 2 (prevention of illegal activities).

Indicator	3.1.6
Verifier	Report on illegal activities that occurred and actions undertaken.
Timeline	monthly
Planning	1 hour per month
Planning	12 hours

3.10 Soil texture

Indicator	1.4
Verifier	Report of sample analyses.
Timeline	Not foreseen in 2023
Planning	Throughout PSP monitoring, 1/2 day for delivering samples to CSIR.
Planning	1 day

3.11 Waste collection and treatment

Form Ghana has a contract with Zoomlion Ghana Limited to collect and dispose waste in line with standard practices. Zoomlion has an obligation to report on the waste collected and the disposal mechanism including treatment/ recycling.

Zoomlion reports on waste need to include:

- Waste classification (hazardous / non-hazardous etc.)
- Weight of waste collected at Form Ghana per type / class
- Disposal / treatment / recycling per type of waste

Indicator	2.1.5
Verifier	Reports of Zoomlion received and integrated in monthly monitoring report
Timeline	quarterly
Planning	1 hour per month
Planning	12 hours

3.12 Chemical usage

Form Ghana uses chemicals for weed control. The use of these chemicals needs to be closely monitored and the monthly consumption of the products in use reported upon. In line with FSC™

requirements, it is important not to use any banned substances, the chemicals in use need to be screened against list of banned chemicals whenever the pesticide list / policy is updated.

Reporting on the chemicals is monthly.

Indicator	2.1.6
Verifier	Reports
Timeline	monthly
Planning	1 hour per month
Planning	12 hours

3.13 Section analysis of trees

Section analysis of trees is done to update and verify yield tables, to determine value of the plantation and to provide specific information on wood quality. As these properties have a large impact on the actual value of the plantation, these measurements are done before each thinning operation to get data for every growth class. Section analysis will be done in the thinning areas in 2023.

Indicator	2.2.1
Verifier	For different growth years and yield classes: <ul style="list-style-type: none"> • Form factor • Relative proportions of bark, sap and heart wood
Timeline	Before every thinning operation.
Planning	1 day of monitoring team and one chainsaw operator

3.14 Timber and carbon sales

Analysis of costs, productivity and efficiency of plantation management. The overall operational costs of plantation establishment and maintenance are compared to productivity in order to come to an analysis of the efficiency of the company. Outcomes of this study are processed in order to improve future efficiency.

Logs and volumes sold to whom and at what price are recorded by the Site Accountant at Form Ghana and analyzed by Form Ghana/consultant. Sold carbon credits are also recorded and analysed. See protocol 13 for procedures.

Indicator	2.2
Verifier	Yearly records of timber sold
Timeline	Yearly in December
Planning	1 day

3.15 Economic aspects

The objective is to show that Form Ghana is/will be a profitable enterprise. To this effect a brief summary is made of the yearly valuation, showing investments so far, investments projected, income generated and income projected.

Indicator	2.2.1
Verifier	In the yearly monitoring report, an overview will be given of the key economic data.

Timeline	Yearly in December
Planning	2 days

3.16 Nursery development

In order to keep track of nursery productivity, the Form Ghana nursery supervisor is responsible for the delivery of a monthly nursery report based on sample plots and counts.

Indicator	2.2.3
Verifier	Yearly nursery report - Total production teak stumps - Total production indigenous.
Timeline	Twice a year end of May and end of September
Planning	2 days

3.17 Social impact

The impact that Form Ghana has on the livelihood of people that live near and inside the plantation is monitored. Social evaluation of people living near the area is done to be better acquainted with the people and to get a better idea on how Form Ghana is perceived by the population. There is also room for informal discussion during these evaluations and is done apart from the stakeholder meetings.

3.17.1 *Number of employees*

Verifier 3.1.7

Monthly the number of employees is reported in a simple table.

3.17.2 *Union membership*

Verifier 3.1.8

Monthly the number of union members is reported in a simple table.

3.17.3 *Resettlement Action Plan (RAP)*

Verifier 3.1.9

A number of monitoring activities concerning the Resettlement Action Plan (RAP) are being performed. This is mostly in Berekum. This was audited independently and recommendations have been implemented. Monitoring activities for RAP beneficiaries will be limited to regular engagements/consultations.

- Cattle herd inventory and interview

3.17.4 *Intercroppers*

Verifier 3.1.10

Information on intercroppers is collected concerning their intercropping agreement, the area and location farmed.

3.17.5 Stakeholder engagement procedure

Verifier 3.1.11

Stakeholder engagement as described in the stakeholder engagement plan needs to be monitored as well. Not only the actual interaction with the stakeholders but also whether all activities have been implemented according to plan. The following outputs need to be monitored:

- Output: documents and summaries prepared for stakeholders
- Output: Annual report ready for dissemination
- Output: Annual Monitoring report ready for dissemination
- Output: Stakeholder meeting held
- Output: Meetings held with stakeholders
- Output: FSC™ audit passed and continued certification
- Output: Website up to date
- Output: Company Newsletter disseminated
- Output: Stakeholder engagement evaluated and reported upon
- Output: Stakeholder engagement plan reviewed and plan updated

3.17.6 Community Development Plan

Verifier 3.1.12

A community development plan is in place for both sites. Annually the activities need to be reported upon.

3.17.7 Complaint Response Mechanism

Verifier 3.1.13

The complaint response mechanism is in place to help solve issues between various parties and Form Ghana. Monthly the list of issues under scrutiny and those resolved is reported upon.

The E&S officer at Form Ghana performs this monitoring in January and November.

Indicator	3.1.1 to 3.1.13
Verifier	monthly report with: <ul style="list-style-type: none"> - number of intercropping agreements - number of permanent employees - number of casual employees - results social survey - Social projects (overview, reports) - Reports/minutes of stakeholder meetings RAP status of people moved to Kotaa.
Timeline	Yearly in November
Planning	60 days fieldwork and 24 days reporting.

3.18 Training and capacity building

Yearly training and capacity building is done by Form Ghana and external consultants. Form Ghana conducts yearly training overview and (evaluation) report. See protocol 11 for more information.

Indicator	3.1.3
Verifier	Monthly update on the trainings that have been given.

Timeline	Monthly
Planning	2 days

3.19 Health and safety

Health and safety issues are recorded by the nurse of Form Ghana. This information is used to assess workplace safety (illnesses and accidents analysis). The nurse at Form Ghana is responsible for the reporting. Procedures are described in protocols 8 and 10. Reporting is quarterly but data collection should be monthly.

Indicator	3.1.5
Verifier	Medical report from the nurse with: <ul style="list-style-type: none"> - Number and type of accidents during work. - Illness: number of incidents and disease type. - Treatments dealt with on site, cases forwarded to hospital in Nkenkansu, Akumadan, Techiman and Berekum - Report on specific programmes: e.g., AIDS prevention, malaria awareness and prevention, etc. - times of medical treatment total/per worker - issuance of sick report during work - Main disease time of Malaria/musculoskeletal pain. - Corrective actions taken to reduce/prevent accidents or illness - Review of the risk assessment
Timeline	Yearly in December
Planning	1 day for reporting

3.20 Reporting

The Environment and Social Manager of Form Ghana is responsible for the reporting of all monitoring activities in an Annual Monitoring Report. Each subject described in the monitoring plan should be included in this report. The public version of this report is published on the Form Ghana website.

Indicator	
Verifier	Annual Monitoring Report
Timeline	Annually in December
Planning	3 days for reporting

Activity	Area affected by the fire program
<i>General objective(s)</i>	7.1
<i>Verifier(s)</i>	<ul style="list-style-type: none"> • Number of communities and area covered by fire awareness raising activities • Number of communities and area covered by the fire management capacity assessment • Area covered by the fire risk assessment
<i>Method</i>	Record keeping at Form Ghana E&S office

Responsible Form Ghana E&S team

Subject Fire control

General objective(s)	7.1.5
Verifier(s)	<ul style="list-style-type: none"> Implemented control measures # controlled fires vs. # uncontrolled fires
Method	Fire data recording at Form Ghana OPS room Record keeping on control measure implementation at Form Ghana E&S office
Responsible	Form Ghana E&S team

4. Work plan 2023

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mapping												
Fauna and Flora												
Buffer zone PSPs												
Plantation PSPs	X	X	X	X								
Fungal disease												
Water quality – Stream			X			X			X			X
Water quality – Borehole			X			X			X			X
Rain fall	X	X	X	X	X	X	X	X	X	X	X	X
Fire incidence	X	X	X	X	X	X	X	X	X	X	X	X
Illegal activities	X	X	X	X	X	X	X	X	X	X	X	X
Soil texture												
Waste collection	X	X	X	X	X	X	X	X	X	X	X	X
Chemical usage			X	X	X	X	X	X	X	X	X	X
Tree sectioning				x	x						x	
Timber / carbon sales	X	X	X	X	X	X	X	X	X	X	X	X
Economic aspects												
Social Impact											X	
Training and cap. Building reporting												X
Health and safety	X	X	X	X	X	X	X	X	X	X	X	X
Nursery Development						X				X		
Reporting												X
Mapping											x	
Area affected by the fire program						X						
Fire control	X	X	X	X								X