
**ANNUAL ENVIRONMENTAL REPORT FOR TAIN II FOREST
REESERVE NEAR BEREKUM IN THE BEREKUM
MUNICIPALITY OF BONO REGION**



Prepared by: **FORM Ghana Limited**

Submitted to: **Environmental Protection Agency (EPA), Ghana**

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2020 Annual Environmental Report for Tain II Forest Reserve

*This is an Annual Environmental Report for Tain II Forest Reserve near Berekum in the Berekum
Municipality of Bono Region, Ghana*

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INTRODUCTION

FORM Ghana Limited is a reforestation company established in 2007 with the aim of large-scale reforestation of degraded forest reserves in Ghana, while conserving and restoring natural, riparian forest. FORM Ghana has established plantations within the Asubima & Brohuma Forest Reserves at Akumadan in the Offinso North District of Ashanti Region and the Tain II Forest Reserve in the Berekum Municipal of Bono Region.

In line with Ghana's environmental requirements for new undertakings of specified scales as contained in the Environmental Assessment Regulations 1999 (LI 1652), Form Ghana conducted independent environmental impact assessments on the degraded reserves that were acquired for the plantation establishment. The Environmental Protection Agency operating under the legal mandate of Environmental Protection Agency Act, 1994 (Act 490) granted Form Ghana a permit (CA: 470.2/LG/FO/02) to carry out its operations.

As part of the conditions for the grant of permit, FORM Ghana is expected to annually update the Agency on the status of its operations and the environment. This Annual Environmental Report thus seeks to meet this requirement. The report specifically presents environmental and production details of the year 2020 in FORM Ghana's Tain II Forest Reserve plantation near Berekum. The report is structured according to the specific requirements by EPA as outlined in the Annual Environmental Report (Form AER1) for Forest and Wood Sector Projects.

1.0 COMPANY PROFILE

	Information Required	Information Provided
1.1	Name of Company	FORM Ghana Limited
1.2	Type of Undertaking	Reforestation /Forest Plantation Management
1.3	Year of establishment of Project	2012
1.4	Location (Town/District/Region)	Tain II FR (Kotaa, Berekum East, Bono)
1.5	Contact Person Position Tel. No. Email	Mr. Willem A. Fourie Managing Director +233 544441440 w.fourie@formghana.org
1.6	Address of Correspondence	P.O Box SYI 211, Sunyani - Ghana

1.7 Permits/Licenses and Certificates obtained

S/N	Institution	Permit		Permit No/License No/Date of Issue/Expiry
		Yes	No	
1	Environmental Protection Agency	X		CA: 470.2/LG/FO/02 Exp. 14-08-2021
2	Water Resources Commission	X		FGLID 409/18 exp. 31-12- 2021
3	Forestry Service Division		X	
4	Wildlife Division		X	
5	Others			
	Ghana National Fire Service Certificate	X		BC20002A Exp. 07-01-2021
	Forest Stewardship Council		X	

1.8 Workforce Category

Table 1.1: Form Ghana Workforce as at December 2020

Division	General Workers			Management Workers			Total
	Male	Female	Total	Male	Female	Total	
Sunyani (HQ)	4	2	6	8	2	10	16
Akumadan P	120	48	168	11	1	12	180
Akumadan C	83	82	165	1	1	2	167
Allanblakia P	1	0	1	1	0	1	2
Allanblakia C	2	0	2	0	0	0	2
Berekum P	177	43	220	22	6	28	248
Berekum C	223	72	295	0	0	0	295
Palladium P	0	1	1	2	1	3	4
Grand Total	610	248	858	45	11	56	914
Percentage (%)	71.09	28.9	100	80.35	19.64	100	
Permanents Staff (P) - 450							
Casuals Staff (C) - 464							

2.0 SITE DESCRIPTION

2.1 Location and Major landmarks

The Tain II Tributaries forest reserve is found in the Bono Region close to the border with Ivory Coast. The Reserve is found south of the River Tain, which constitutes most of its northern border. To the south the town of Berekum is found.

2.2 Geographical Coordinates of Concession (vertices of the concession to define land area)

The plantations are located within the Tain II Tributaries Forest Reserves in the Berekum Municipality of the Bono Region. Coordinates (WGS 84 - UTM) for the reserves are:

<i>Point</i>	<i>X-coordinate</i>	<i>Y-coordinate</i>
1	538.389,80	848.675,76
2	551.079,34	846.983,81
3	552.831,69	837.859,44
4	543.767,75	836.409,21
5	536.274,87	842.995,68

2.3 Total Land Take of concession

The total land take for the Tain II Tributaries Forest Reserve is 14,576 hectares GIS area.

2.4 Actual area forested

The actual area forested by Form Ghana in the Tain II Tributaries Forest Reserve is 8731.35 hectares. Details of actual forested area are shown in the table below:

RESERVE	LEASE AREA (ha)	YEAR (ha)	TOTAL AREA (ha)	INDIGENOUS (ha)	TEAK (ha)	UNPRODUCTIVE (ha)	GMELINA (ha)
TAIN II	14.576,00	2013	637.11	19.06	582.31	35.74	
		2014	2098.86	194.67	1886.87	17.32	
		2015	124.28	72.10	1042.93	130.25	
		2016	125.69	-	92.63	33.06	
		2017	707.79	82.87	559.04	65.88	
		2018	1941.69	306.51	1610.17	25.01	5.00
		2019	1283.37	363.04	878.34	41.99	27.64
		2020	691.62	406.14	283.26	2.22	
		TOTAL	8731.35	1444.39	6935.55	351.47	32.64

The hectares presented in the table above are updated including the 2020 planting. A slight difference between the total area and the areas in the individual columns is due to teak found in situ that was not cut. This is a total of 32.7 hectares

2.5 Area under conservation

Area under conservation	386.5 hectares
Type of Conservation: Strict	0
Type of Conservation: Partial	368.5 hectares
List some species found:	Species monitoring within the conservation areas is undertaken within every 5-year interval. From the last survey in 2015 & 2018, the following floral, mammal and avifauna species were identified.
Flora:	<i>Azelia africana, Albizia ferruginea. Antiaris toxicaria, Ceiba pentandra, Hildegardia bar-teri, Erythrophleum ivorense, Khaya an-thoteca, Khaya grandifoliola, Milicia excelsa, Triplochiton scleroxylon, Terminalia superba.</i>
Mammals:	Civet, Cusimanse Mongoose, Genet, Marsh Mongoose, Brush-tailed Porcupine, Giant Rat, Grasscutter, Ground Squirrel, Bushbuck, Maxwell duiker, Red River Hog, Royal Ante-lope
Birds:	Sixty (60) species, belonging to 23 families were recorded on transects (Table 13 and Appendix F). More than 10% of the species recorded belongs to the Weavers and Malimbés family (Ploceidae). Other families included Flycatchers (Muscicapidae), Bulbuls and Greenbulbs (Pycnonotidae) and Pigeons and doves (Columbidae) with a record of 8% of the species each. The White-throated Bee-eater (relative abundance of 13.861), Black-winged Bishop (7.129), Red-eyed Dove (5.743), Common Bulbul (4.752), Zitting Cisti-cola (4.752), Viellot's black Weaver (3.960) and Grey-backed Cameroptera (3.960), were the most recorded and widespread bird species. The Families Alcedinidae and Accipitri-dae accounted for about less than 1% of the specimen recorded and also produced the least number of species. Most bird species were recorded in the forest vegetation (38), followed by degraded areas (33), teak plantations (21) and then farm-lands (19)

2.6 List any River(s) / Stream(s) traversing or within 100m of the Concession

Tain River forms the northern border. Some effluents find their source inside the reserve in the wet season. They dry up in the dry season. One of such affluent is the Owusutaka.

2.6.1 What is the buffer distance maintained between the concession and rivers?

The buffer distance between the teak plantation and the streams, which have about 4-5m wide stream beds is thirty meters (30m).

2.7 Approximate distance of River(s) to nearest settlement to the concession

The villages close to the reserve are: Akroforo, Arkokrom, Asantekrom, Dadease, Domeabra, Ampenkrom, Kojoakokrom, Kotaa, Kutre#1, Kutre#2, Meremano, Mpatapo, Mpataase, Namasua, Nfodwokrom, Oforikrom, Pepaase and Tainso. These villages are all found within 10 kilometres from the Tain II Reserve.

2.8 Adjacent land Uses

North	Agriculture
South	Agriculture
East	Agriculture
West	Agriculture

2.9 What ancillary facilities do you have on site (List them)

The site has the following facilities:

- 3 staff houses,
- 1 guesthouse
- 3 office blocks
- 1 workshop
- 1 training centre
- 1 canteen
- 1 store
- 1 fuel station
- 1 sanitary block
- 4 lockable sea containers (as stores)
- 1 guard house
- On the boundaries of the plantations there are several guard shelters
- 3 fire towers (inside the plantation)
- 3 camera towers

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2.10 Distance between the concession and the nearest town /village

Distance to Berekum is about 10kilometres. Some villages are within a distance of 1kilometre.



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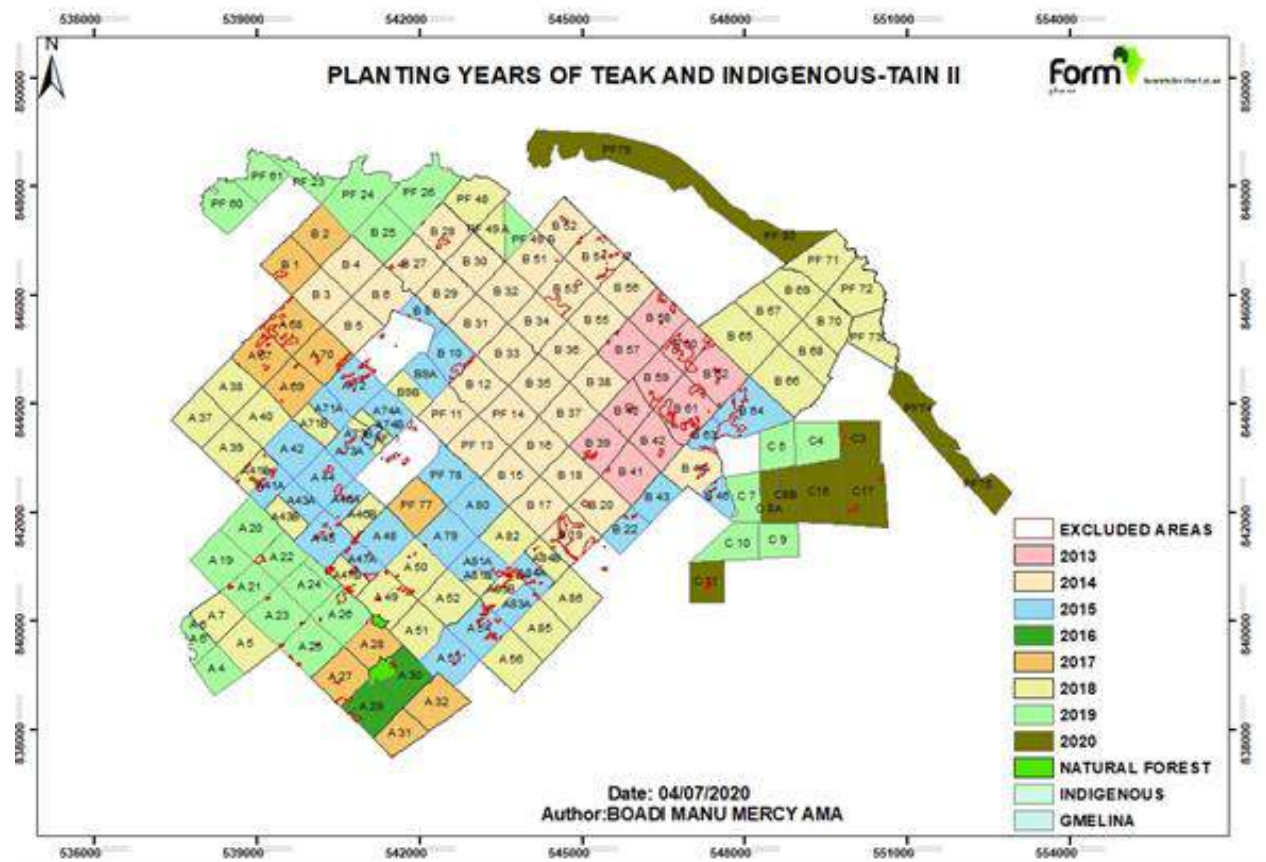


Figure 1.0: Map of project location

3.0 COMPANY OPERATIONS

3.1 Type of Forestry Development

- 1) **Production Management:** FORM Ghana carries out production of teak and various indigenous seedlings in its nursery facility.
- 2) **Plantation:** FORM Ghana's has a plantation within the Tain II Forest Reserve.

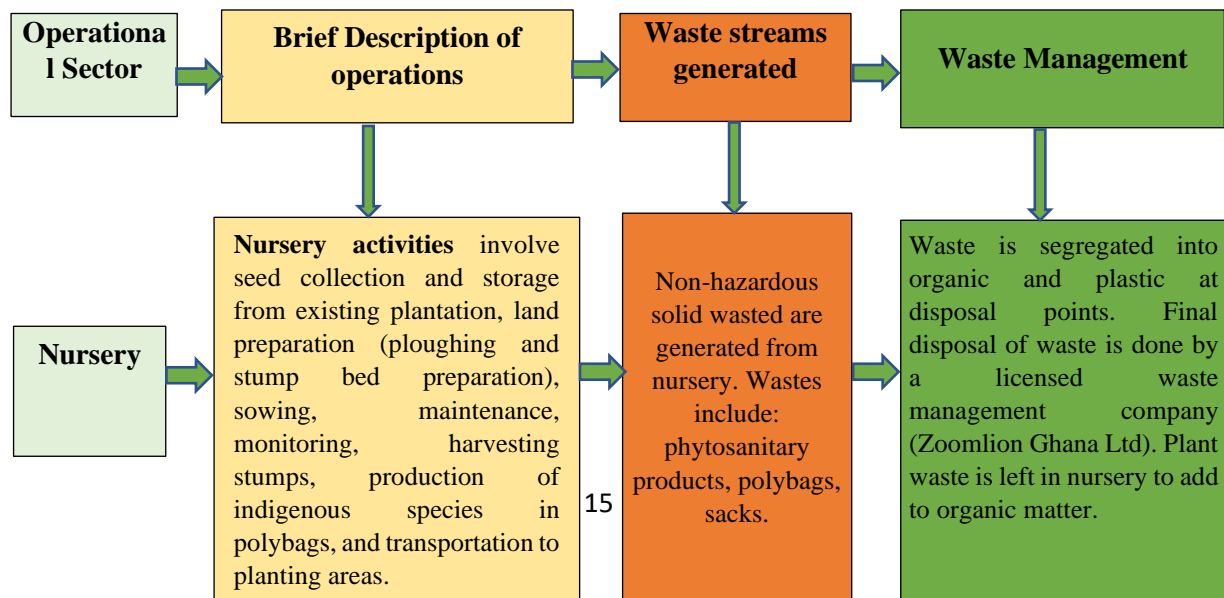
3.2 Answer the following section for forest establishment

3.2.1 Production Details: Planting Material Information

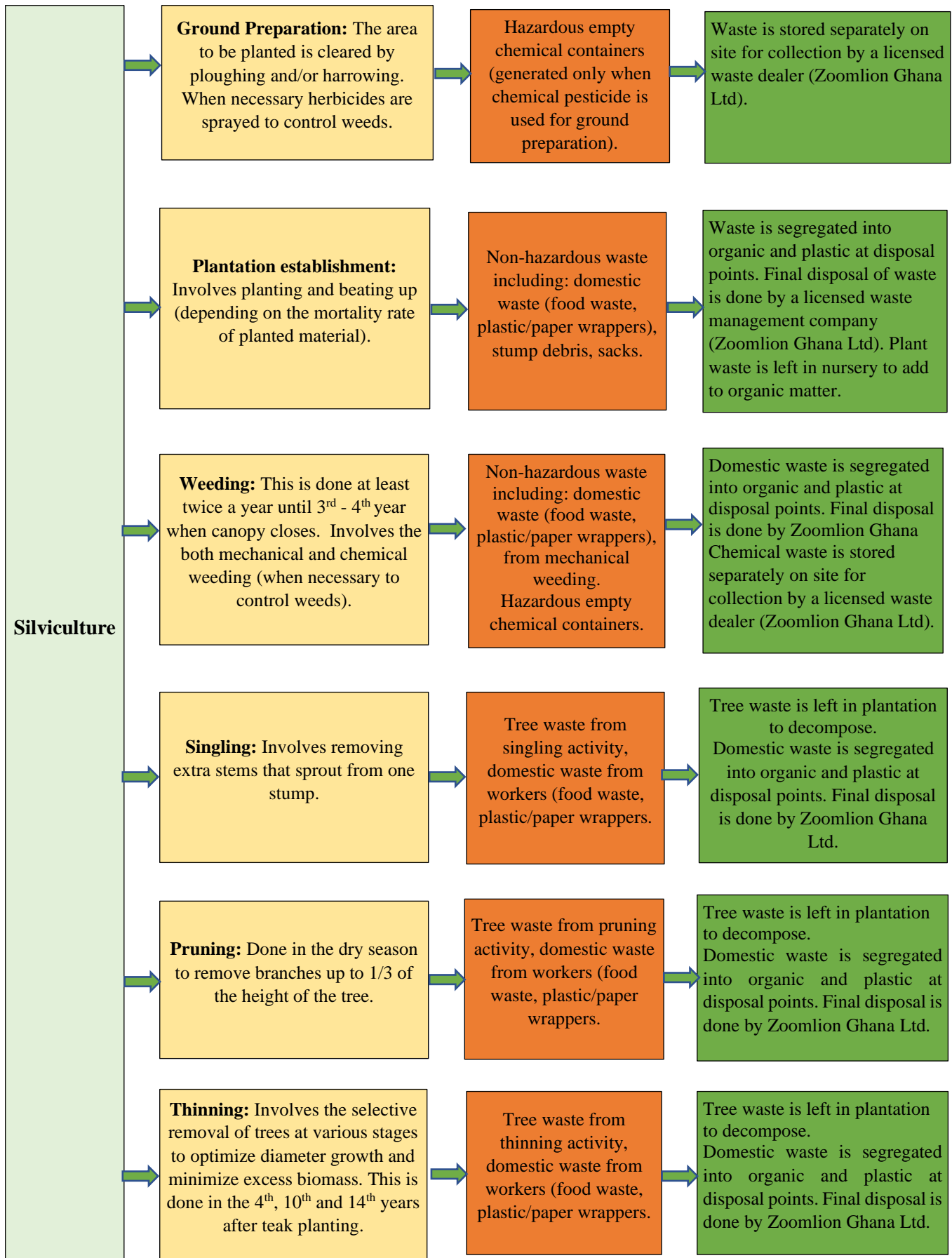
<i>Species cultivated/Planted</i>	<i>Source</i>	<i>Area (Ha)</i>	<i>% of Planted Area</i>
Teak	Own nursery	6935.55	82.43%
Indigenous: <i>Ofram, Awiem-fosamina, Kokrodua, Potrodom, Onyina, Emeri, Watapuo</i>	Own nursery and contract nursery	1444.39	17.16%
Gmelina	Own nursery and contract nursery	32.64	0.38%
b) Expected Products from the development		Teak billets/saw logs	
		Teak poles	
		Carbon Credits	

3.2.2 Brief description of operations

Brief description of operations from nursery to harvesting (attached is an environmentally based process flow chart, indicating waste streams) and how waste is managed.



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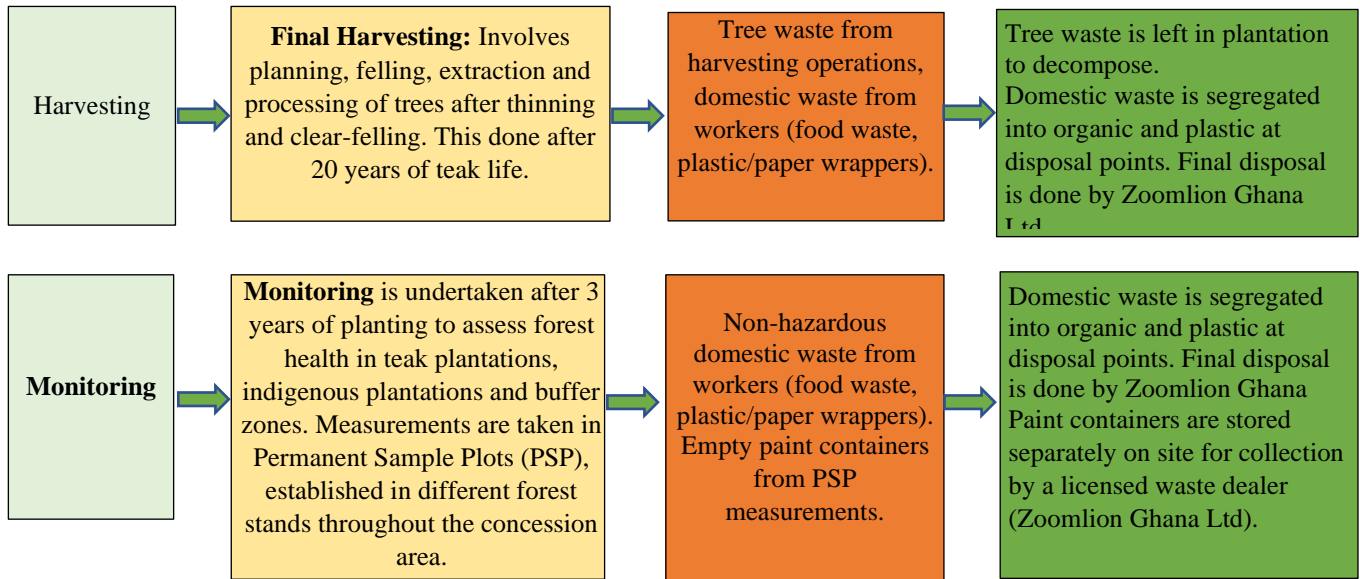


Figure 1.2: An environmental-based flow chart of FORM Ghana’s operations from nursery to harvesting.

3.2.3 Indicate the type, source, quantities and mode of application of chemicals (herbicides/weedicides) if applicable.

3.2.4 Table 1.2: Type, source, quantities and mode of application of chemicals by FORM Ghana in 2020

Type	Source	Quantity used	Mode of Application
Glyphosate (Kalach/ Sunphosate/ Glyphader)	<ul style="list-style-type: none"> • Cali Ghana Ltd, • Louis Dreyfus Company Ltd • Wynca Sunshine Company Ltd 	15242 kg	Manual Foliar application
Clethodium (Se-lect EC 120)	<ul style="list-style-type: none"> • Cali Ghana Ltd • Graobeng Ventures 	2819 Litres	Manual Foliar application
Corta 240 EC (Triclopyr)	<ul style="list-style-type: none"> • Louis Dreyfus Company Ltd 	348 Litres	Manual Foliar application

This chemical product used is a weedicide. Form Ghana uses FSC approved chemical pesticides as contained in the FSC Lists of highly hazardous pesticides (FSC-POL-30-001a EN, updated 1st May 2019).

*MSDS for chemical attached in Appendix

3.2.5 What area of your land has been planted for the year under review?

A total of 691.62ha of land have been planted in 2020.

3.2.6 Briefly describe harvesting and post-harvest operations

Currently only thinning has been undertaken. This was described under (sub-section 3.2.2.)

3.3 This section applies to the extractive sector/Production Forest

S/N	Information Required	Information Provided
3.3.1	Type/name of forest	Tain II Tributaries Forest Reserve/ Teak plantation
3.3.2	Type of forestry product harvested	None in 2020
3.3.3	Quantity of forest product collected or harvested per annum	None in 2020
3.3.4	State the purpose/use of the forest product.	N/A
3.3.5	How do you collect or harvest these product (mechanism)	Until 2033 all products are part of a thinning. All harvesting operations are part of thinning. During thinning, trees are inspected by Forestry Commission (FC). Harvesting operations are carried out by a team. Felling of trees carried out with motor and manual techniques. After felling, extraction is done using tractor/winch combination to the road side.
3.3.6	Do you work manually or use equipment?	Equipment (chainsaws and tractors) are used for felling and extraction.
3.3.7	List equipment	Husqvarna 365 chainsaws, New Holland 6610S tractor, Igland 5002 Winch
3.3.8	Area operated/Size of land area covered	No extraction in 2020

4.0 ENVIRONMENTAL, HEALTH AND SAFETY POLICY

What were your main environmental, occupational health and safety policy objectives for the year? List them

For the year 2020, FORM Ghana set out to achieve the following objectives on environmental, occupational health and safety policy:

Environmental Objectives:

- To ensure that our operational activities throughout 2020 are in conformance with the specified standards by local regulators such as Environmental Protection Agency, Water Resources Commission, Forestry Commission; and international organizations such as Forest Stewardship Council and African Development Bank.
- To achieve best environmental performance through periodic monitoring of water quality, biodiversity restoration and conservation in the year 2020.
- To continuously improve waste segregation, disposal and reporting throughout 2020.

Occupational Health and Safety Objectives:

- To attain a Disability Injury Frequency Rate of not more than 1.0 by the end of 2020.
- To ensure the regular use of appropriate PPE's by employees throughout the year 2020.
- To conduct monthly Occupational Health and Safety trainings for employees throughout 2020.

4.2 What were your main environmental, occupational health and safety policy targets for the year? List them

For the year 2020, FORM Ghana set out to achieve the following targets on environmental, occupational health and safety policy:

Environmental Targets:

- To achieve minimal environmental pollution from waste and operational activities of the Company throughout 2020.
- Meet all environmental monitoring and reporting timelines for both local and international regulators/ institutions.
- To restore biodiversity by planting not less than 350ha of indigenous tree species in 2020.

Occupational Health and Safety Targets:

- A reduction in the number of work-related accidents and incidents throughout the year 2020
- An improvement in the investigation and reporting of incidents (major and minor accidents)
- Increased awareness among employees on Occupational Health and Safety.

5.0 ENVIRONMENTAL MANAGEMENT ACTIVITIES

5.1 What types and quantities of waste does your operation generate e.g., liquid, farm waste (plastics). List them

Table 1.3: Waste Generation and management in FORM Ghana

Origin	Type	Reduction	Hazard Classification	Disposal	Tracing	Tracing
Workshop	Tyres	Reduced travel distance	non-hazardous	Stored on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Batteries (dry cell)	Use rechargeable batteries.	Hazardous	Stored in a designated container on site and collected by licensed waste management company (Zoomlion)	Keep way-bills	Zoomlion
	Batteries (vehicle) (lead-acid)	Quality brand choice	Hazardous	Stored on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Used oil	Scheduled servicing	Hazardous / potential for recycling	Stored on site and returned to supplier/licensed dealers	Keep waybills	Supplier (Total Petroleum Ghana Ltd – Akumadan).
	Oil filters	Scheduled servicing	Hazardous/ partial potential for recycling	Stored in a designated container on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Used cables, wreckage and other metal waste (scrap)		Hazardous / potential for recycling	Stored in a designated container on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
Plantation	Non-hazardous domestic waste (plastic)		Non-hazardous / potential for recycling	Stored in a designated container on site labelled Plastic (P) and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Non-hazardous waste (organic waste)		Non-hazardous/ potential for recycling	Stored in a designated container on site labelled Organic (O) and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Hazardous waste (paint, thinner containers)	Reduced use	Hazardous	Stored in a designated container on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion

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Origin	Type	Reduction	Hazard Classification	Disposal	Tracing	Tracing
	Hazardous waste (pesticide package/container)	Bulk purchase	Hazardous	Stored separately on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Waste from silvicultural/harvest operations	Adopting best silvicultural/harvesting techniques.	Non-hazardous	Left in field to decompose		
Office buildings	Fluorescent and other electric bulbs	Best possible quality.	Hazardous	Stored in a designated container on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
	Used Printer cartridges	Efficient printing practices, use of electronic documents	Hazardous	Stored in a designated container on site and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
Stores	Plastic waste (containers)	Reusing containers	Non-hazardous / potential for recycling	Stored in a designated container on site labelled Plastic (P) and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
Nursery	Plastic (Planting bags)	Use of teak stumps for planting	Non-hazardous / potential for recycling	Stored in a designated container on site labelled Plastic (P) and collected by licensed waste management company (Zoomlion)	Keep waybills	Zoomlion
Site Clinic/ First Aid Box	Medical waste		Hazardous	Are stored in a medical waste container on site and collected by a licensed waste management company (Zoomlion) upon request.	Keep waybills	Zoomlion

Table 1.5: Quantities of Waste Produced

Waste Streams		Quantity produced in 2020
a) Solid		
• Plastic		3900kg
• Organic		2436kg
• Used vehicle battery (number)		28
• Used tyres (number)		114
• Chemical waste/containers		342.36kg
• Medical		31.5kg
b) Liquid		
• Used oil		3322 litres

5.2 How do you manage the waste streams listed in 5.1 above (handling, treatment and disposal)?

FORM Ghana through its operational protocol on Waste Management (Protocol 04) continues to adopt stringent measures in handling and disposal of all waste. In the year under review (2020), a waste haulage and disposal contract with Zoomlion was renewed for all solid waste from FORM Ghana. Reports on quantity and management of all solid waste are produced by Zoomlion periodically. Used oil (liquid) is effectively managed by a licensed service provider (JOPONAP Waste Management Solutions - Sunyani).

Waste stream	Handling/Treatment	Disposal
Solid	Waste is sorted and stored in designated containers on site (Organic, Plastic, Medical, HazMat)	Zoomlion Ghana Limited.
Liquid		
Used oil	Stored separately on site	JOPONAP Waste Management Solutions - (Sunyani).
Effluents from workforce	Channelled into a septic tank	Licensed liquid waste management company when needed.

5.3 Provide brief information on the following:

a) Measures put in place to prevent bushfires

FORM Ghana has an intensive fire prevention program. The program is based on:

- Awareness raising among the neighbouring villages and the workers
- The creation of fire breaks
- Fire surveillance using fire towers (manned towers (3) and electronic detection tower systems (3))
- Continuous posting of rapid response teams that have been specifically trained in firefighting.

b) Practices employed to control weeds and pest

Weeding is an intensive operation which takes place 2 to 3 times a year. The terrain is weeded manually with cutlasses twice and weeded chemically once. Regular surveillance in line with an operational protocol on integrated pest management (Protocol 29) guides the control of pest in the plantation. For the year 2020, no pest that required control were identified in the plantation.

b) Practices employed to conserve biodiversity

Biodiversity conservation is ensured by FORM Ghana through the protection of buffer zones within indigenous vegetation, prohibition of hunting and through fire prevention. The monitoring of the effect of these conservation measures is undertaken periodically within every 5years (latest report on flora monitoring is available at www.formghana.com).

5.4 List soil management practices undertaken (mulching, soil erosion control etc)

FORM Ghana protects the soil through reforestation practices and erosion control. Erosion control is mainly along the roads.

5.5 How did these practices contribute to increase in production levels?

No increase in production is detected or expected from soil management practices. However, management practices continue to conserve and stabilize the soil for suitable growth of the plantation.

5.6 Did you experience disease/pest infestation?

No disease/pest infestation was experienced in the Tain II Forest Reserve for the year 2020.

a) If yes indicate the type(s) of disease(s)

b) How were the diseases/pest treated/managed?

No disease/pest infestation was experienced.

c) Practices employed to manage admitted farms

All admitted farms in the reserve are not inhabited. They do however present a potential fire risk. FORM Ghana ensures that the admitted farms are managed in a way to prevent fire from starting from there.

d) Practices employed to manage neighbouring communities

FORM Ghana actively engages neighbouring communities through the organisation of stakeholder meetings and sensitisation fora. FORM Ghana believes in the building and maintenance of good relations with neighbouring communities and has several protocols to help staff in the interaction with the communities.

e) Practices employed to manage livestock grazing/fire

Life stock grazing is a threat in the Tain II Reserve. Interaction with community leaders, officials and the Forestry Commission has led to sensitisation and action for the eviction of herds of cattle from the reserve. Fire was discussed under (sub section 5.3.a)

5.7 Provide brief information on the following:

5.7.1 Chemical management.

a) Quantity of chemicals utilised and final disposal of containers, unused or expired products

Type of Chemical	Source	Quantity used 2020	Disposal of Containers	Qty of unused or expired products
Glyphosate (Sunphosate/Glyphader)	<ul style="list-style-type: none"> • Cali Ghana Ltd • Louis Dreyfus Company Ltd • Wynca Sunshine Company Ltd 	15242 kg	Stored separately on site for final disposal by Zoomlion	None
Clethodium (Select EC 120)	<ul style="list-style-type: none"> • Cali Ghana Ltd • Graobeng Ventures 	2819 Litres	Stored separately on site for final disposal by Zoomlion	None
Corta 240 EC (Triclopyr)	<ul style="list-style-type: none"> • Louis Dreyfus Company Ltd 	348 Litres	Stored separately on site for final disposal by Zoomlion	None

***MSDS for chemical attached in Appendix**

b) Management practices in place to prevent/ control discharges of chemicals contaminants into the environment

FORM Ghana through its protocols and procedures continues to adopt best practices to prevent/control chemical contaminants from being discharged into the environment. Key practices as outlined in Protocol 05 on Responsible use of pesticides, Protocol 04 on Waste Management and P16 on Storage of Fuels, lubricants and toxins, include:

- Chemicals are stored separately from oils, fuels and lubricants in a secured and watertight place.
- In case of a minor leakage of fuels, lubricants or chemicals the spillage is soaked up with sawdust until the floor is dry. The saturated sawdust is disposed of into a designated waste bin for hazardous materials.
- All major spillages drain into ponds and are collected into containers. The remaining spillage is soaked up with sawdust until the floor is dry.

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- All storage areas are furnished with impermeable materials (concretized, metallic) to prevent all spills from contaminating the soil.
- Empty chemical containers/wastes are stored separately on site and disposed of in accordance with acceptable practices.

5.8 Indicate resource use (water and energy) for reporting year

Table 6: FORM Ghana Resource Use for 2020

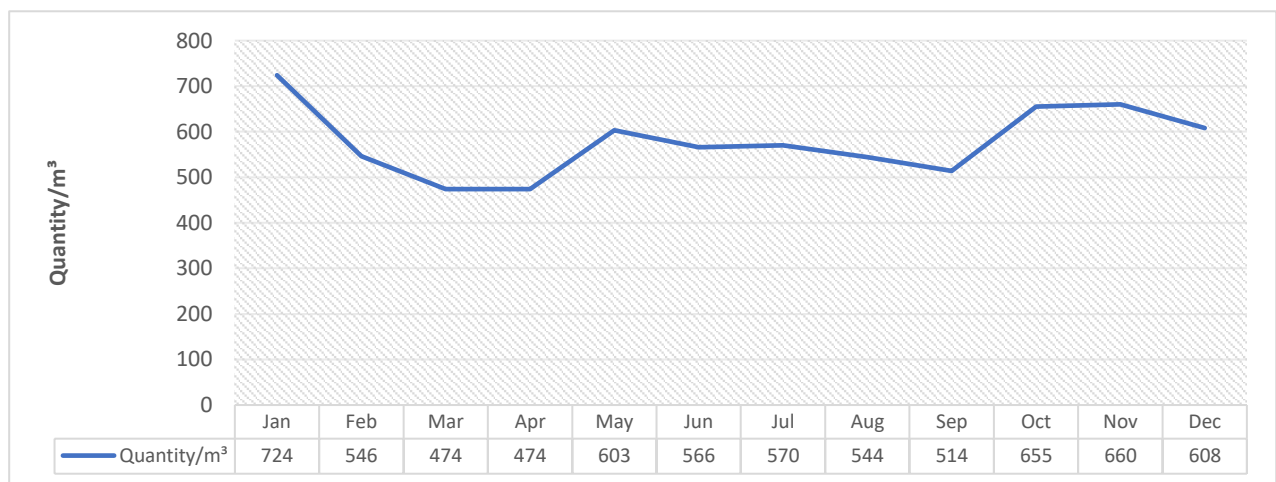


Figure 1: Water Consumption for 2020

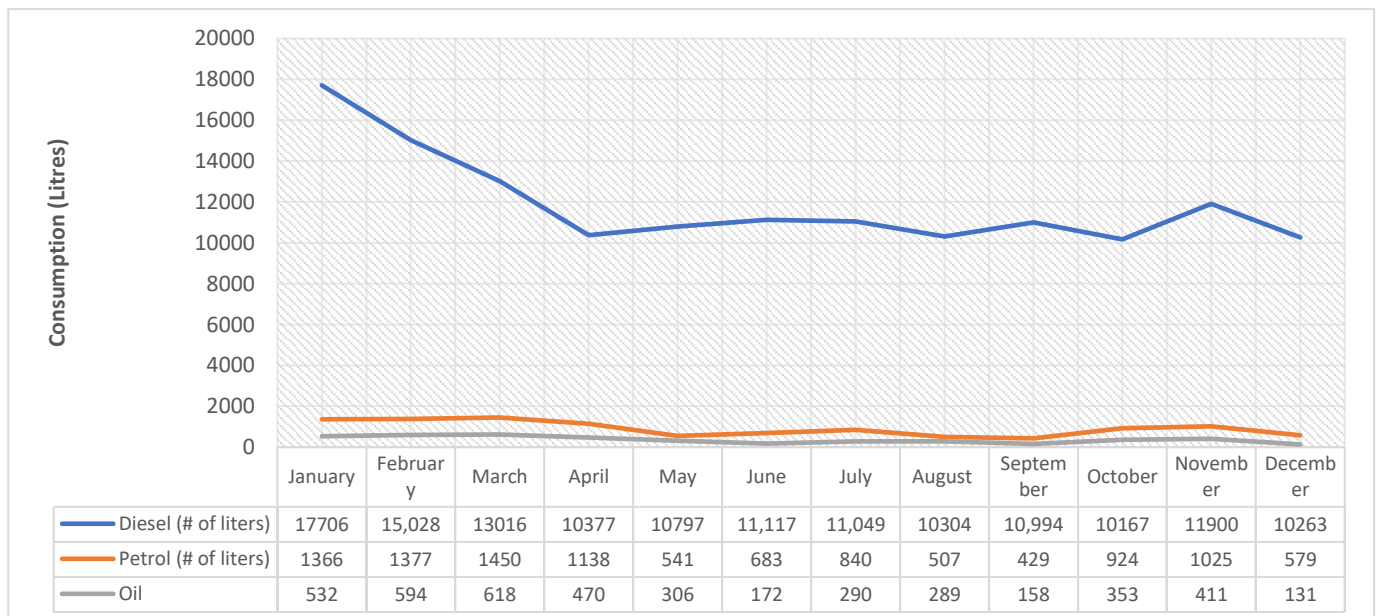


Figure 2: Fuel Consumption for 2020

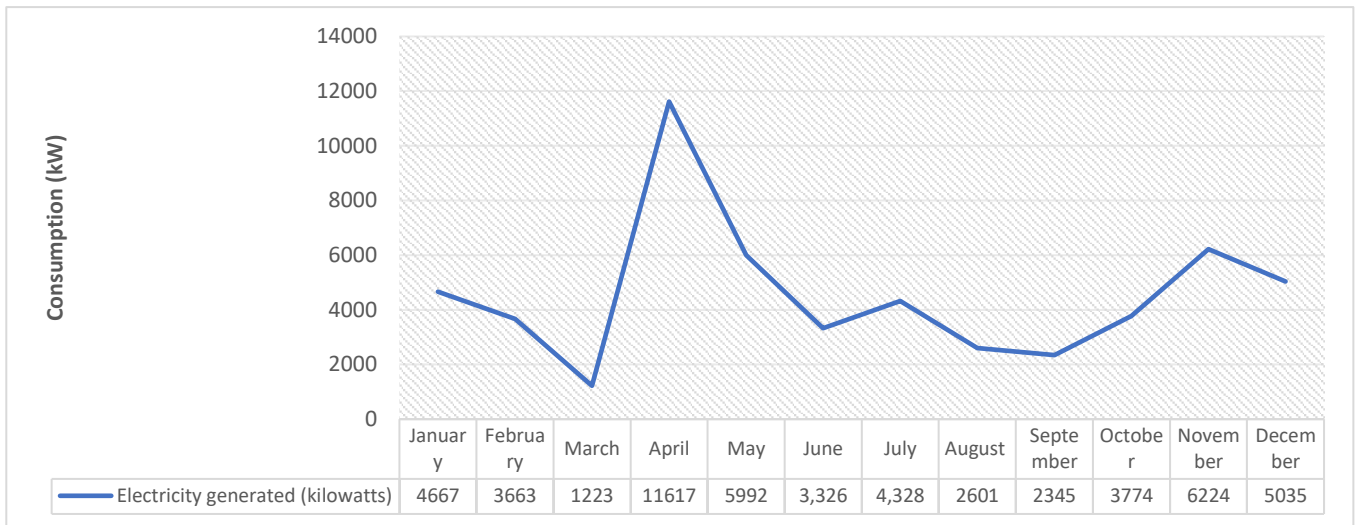


Figure 3: Electricity Consumption for 2020

5.9 Explain the variation (increase/decrease) in trend

Water Use:
 The variation in water use is largely dependent on seasonal changes. Thus, weather conditions such as raining season and the dry season lessen vis-à-vis increase water demand respectively. From the consumption graph (see Figure 1 above), water demand is high between October and January. The increase demand is largely due to the higher number of work force coupled with the preparatory measures for the fire season. Water consumption is comparatively low between February and September.

Fuel Consumption:
 FORM Ghana uses petrol, diesel and oil to operate various machinery in the plantation. Majority of the machinery in FORM Ghana including operational vehicles and generator are powered by diesel and hence, the graphical peak of diesel throughout the year in the fuel category as seen in Figure 2. Other machines such as motorcycles, chainsaw machines, Bakkie-Sakkies and vehicle washing machine also use petrol. This explains why the consumption of petrol is the second highest in the fuel category. On the other hand, oil (consisting of lubricants, stroke oil, engine oil) are low throughout the year due to interval usage such as during vehicle servicing or during the operation of chainsaws.

Electricity Consumption:
 FORM Ghana generates its own electricity from solar at the Berekum site. There are sharp fluctuations in the monthly power consumptions. The sharp increase in power consumption in April is as a result of high workshop operations involving welding. Welding operations account for the high-power consumptions in the operations of the company.

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6.0 OCCUPATIONAL HEALTH AND SAFETY (OHS)

6.1 Indicate any OHS training undertaken during the year under review

Table 7: FORM Ghana OHS Trainings undertaken in 2020

DATE	TOPICS	PARTICIPANTS
09/01/2020	Pruning	58Casuals
15-16/01/2020	Crew leader -initial attack fire boss	3Casual
20-22/01/2020	Extended attack fire boss-incident command system	5Permanent
3-4/02/2020	Establishment and Monitoring of Permanents sample plots	16Permanents 3Casuals
17/02/2020	Marking for thinning	5Permanent 2Casual
16/03/2020	COVID- 19	205Permanent 147Casual
17-19/03/2020	Baseline Construction Techniques	22Permanent 25Casual
30/03/2020	Lining and Pegging Techniques	25Casual
31/03/2020	COVID- 19	206Permanent 64Casual
1-9/04/2020	Chainsaw operators Refresher Training	19Permanent
27/04/2020	Teak stump cutting training	15Permanent 50Casual
28/04/2020	Teak planting	11Permanent
29/04/2020	General teak planting training	46Casual
22/06/2020	First Aid refresher training	6Permanent 1Casual
26/06/2020	Education on employee retirement plan	37Permanent
08/07/2020	Fleet Users Assessment	27Permanent
21/07/2020	Waste Management Training	16Permanent 3Casual
21/07/2020	Personal Hygiene	173Permanent 138Casual
27/07/2020	Waste Management Training	9Permanent
28/07/2020	Fleet Users Assessment	27Permanent
30/07/2020	Workman Compensation Act	176Permanent
6-7/08/20	Grader Training	4Permanent
11-13/08/20	Nursery Monitoring	14Permanent
12/08/2020	Defensive Driving Fundamental	19Permanent

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17-21/08/20	Fire training	36Permanent
28/08/2020	HIV/AIDS and Blood Pressure Awareness training and screening	138Permanent
28/09/2020	FORM Ghana Transport Protocol	20Permanent
29/09/2020	FORM Ghana Internal Accounting Policies	6Permanent
5-6/10/2020	Pruning	55Casual
28/10/2020	Ghana Road Traffic Regulations	22Permanent
30/10/2020	Communicable Diseases	188Permanent

6.2 Did you undertake medical check-up for staff? If yes, indicate the number of staff and frequency.

Medical check-up was carried out for 58 chemical sprayers.

6.3 Have you registered staff under any health insurance scheme? If yes, name scheme

Yes, FORM Ghana workers are registered under the National Health Insurance Scheme of Ghana.

6.4 Do you have the following?

Washrooms	Four (7) units are available on site for use
Personal Protective Equipment	Specific PPE's are provided for various job roles in line with Form Ghana's Protocol on Personal Protective Equipment (P10).
First aid kit	Each team in the field has a first aid kit and a trained first aider. All vehicles have first aid kits. In addition to the First aid kits, a Clinic is available on site to provide first hand medical service.
Fire extinguisher and other safety equipment	Fire extinguishers are kept at strategic locations on buildings at site. All vehicles are also equipped with fire extinguishers. Other safety equipment includes smoke detectors, firefighting equipment and emergency assembly point.

6.5 Did you record any accidents during the year? If yes, indicate the type(s) of accident and frequency

Throughout 2020, eighty-eight (88) work related minor accidents were recorded in the plantation. Also, four (25) major accidents were recorded. Majority (64) of the accidents were recorded during manual weeding. The table below gives details of the accident records for the year:

<i>Type of accident</i>	<i>Frequency</i>	<i>Nature of accident (Major/Minor)</i>
Insect bites	20	All Minor
Cut	64	40 Minor 24 Major
Laceration	2	1 Minor 1 Major
Blister	1	All Minor
Splinter	1	All Minor
Total	88	<p><i>*Major: Accidents requiring suturing either at site clinic or hospital.</i></p> <p><i>*Minor: Accidents which are managed either with first aid or at the site clinic and do not require suturing.</i></p>

6.6 What accounted for these accidents?

Accidents from cuts were often as a result of accidental slip-off of cutlass. Insect bites mostly resulted from bees in the plantation while lacerations occurred during weeding when a piece of sharp wood pricked the skin. The single case of blister resulted from weeding.

6.7 How were the accidents managed?

FORM Ghana places priority on occupational health and safety of its workforce. Hence, the company has laid down procedures to conduct investigation on all accidents that result in injuries. After investigations are conducted, corrective/remedial actions are put in place to forestall the recurrence of similar accidents. Victims of work-related accidents are usually attended to by trained first aiders and transferred to the site clinic. A trained health practitioner at the clinic assesses the injury and treats the victim or refer to the hospital.

6.8 Provide a brief on Company’s emergency response plan?

FORM Ghana has a protocol which outlines the actions to be taken in the case of an emergency. This is Protocol 08 First Aid Procedures & Emergency Evacuation. The protocol makes provisions for first aid training, usage and composition of the first aid kit and handling of accidents.

In addition to the protocol, Form Ghana has put in place emergency control measures such as installation of smoke detectors, creation of assembly point, posting of warning/caution signages on buildings and equipping every vehicle and building with fire extinguishers.

6.9 Provide a brief on community social responsibility

As part of FORM Ghana’s social sustainability principle, the enhancement of the wellbeing of communities within the fringes of the reserve is key. The Company thus strives to maintain a cordial relationship through regular engagement and aiding in projects as part of its corporate social responsibility. For the year 2020, the table underneath gives details of the various activities carried out in line with the Company’s community social responsibility:

<i>Date</i>	<i>Activity</i>	<i>Location</i>	<i>No. of Participants</i>
12/02/2020	Community fire education	Oforikrom	17
15/02/2020	Community Fire Management and discussion on repair of damaged borehole	Arkokrom	34
15/02/2020	Community Fire Management/Assessment of a borehole mechanization request	Asantekrom	25
20/02/2020	Community fire management trainings/sensitization	Kojoarkokrom	21
21/02/2020	Community fire management education	Oforikrom	14
24/02/2020	Community fire management training/ Controlled burning activity	Kojoarkokrom	20
25/02/2020	Community fire management talk: the role of community members in fire management.	Kotaa	28
13/03/2020	Meeting with cattle herdsmen- Discussions on the construction of a kraal to restrict the movement of their cattle into the plantation	Form Ghana site- Berekum	8
11/09/2020	Stakeholders meeting	Berekum	30
07/10/2020	Technical assistance training conducted for participants	Arkokrom, Kojoarkokrom, Kotaa, Meremanu, Domeabra,	19

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		Ampemkrom, Kyekyewere	
06&13/10/2020	Signing of MoU communities- Community Fire Management Programme	Jaman North District Assembly, Suman Traditional Council	9
7-9/10/2020	Community Fire Management Programme-Signing of MoU with communities	Yaw-twenekrom, Asantikrom, Arkokrom, Kojoarkokrom, Oforokrom, Akrofro, Ampemkrom	58
14/10/2020	Fire Squad Training	Namasua,Asantikrom, Yaw-twenekrom	51
13-22/12/2020	Community fire education	Community (Berekum- Akroforo, Kotaa, Oforikrom and Kojoarkokrom, Meremano, Abuokrom & Jejemereja)	120

7.0 ENVIRONMENTAL MONITORING

7.1 Water Quality Monitoring data (complete the table below) if applicable. Provide coordinates of sampling points.

Table 8: Water Quality Monitoring Data for Site Borehole – Berekum

Parameter	Standard Specification	Quarter 1				Quarter 2				Quarter 3				Quarter 4			
		Site Berekum	B4 6 BK	B1 1 BK	A2 4 BK	Site Berekum	B4 6 BK	B1 1 BK	A2 4 BK	Site Berekum	B4 6 BK	B1 1 BK	A2 4 BK	Site Berekum	B4 6 BK	B1 1 BK	A2 4 BK
Total Dissolved Solids	1000 mg/l	105.00	63.00	185.00	214.00	118.00	250.00	184.00	7.00	95.00	228.00	182.00	63.00	99.00	229.00	166.00	59.00
pH	6.5-8.5	5.84	6.30	6.58	6.88	6.50	7.00	6.70	6.00	7.34	7.42	7.73	7.52	6.00	6.33	6.28	6.02
Temperature (°C)	-	31.60	31.40	31.20	31.20	28.10	28.10	28.20	28.30	29.50	29.40	29.60	29.50	30.20	30.10	30.40	30.20
Nitrate (mg/l)	50	0.90	0.80	0.80	0.90	02.50	2.30	2.00	1.70	0.25	0.00	0.00	0.25	1.20	1.10	0.30	3.70
Ammonia (mg/l)	1.5 mg/l	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.04	0.05
Phosphate (mg/l)	0.3 mg/l	0.75	0.20	0.50	0.25	0.75	0.22	0.50	0.24	9.23	6.87	8.44	4.05	2.58	4.16	4.16	2.58
Turbidity (NTU)	5	0.00	0.00	0.00	0.00	0.11	0.01	0.23	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COD																	

7.2 Explain if values were not provided.

7.3 Use the table below to determine variations (trends) between the baseline and current values of rivers that traverse the plantation.

Not applicable

8.0 INDICATE MEASURES TO IMPROVE ON YOUR PERFORMANCE (ENVIRONMENTAL QUALITY AND OPERATION).

For the ensuing production year 2021, FORM Ghana will continue to improve its performance in conformity with national and international requirements. The Company's Environmental and Social Management Plan (ESMP) and operational protocols in line with FSC Principles and Criteria shall provide a guiding framework for continuous improvement. As part of environmental quality and operational performance measures, the Company shall:

- Continue strict adherence to standard recommendations for the use of approved chemical pesticides with adequate measures to minimize the impact on biotic and abiotic environmental media.
- Conduct regular trainings on appropriate waste management approaches in line with the Company's protocol on waste management (Protocol 04).
- Continue to enforce periodic monitoring of environmental parameters within the Company's area of influence.
- Continue to conserve biodiversity and assess the impact of conservation measures through a flora and fauna survey.


CONCLUSION


In the year 2020, FORM Ghana just as the rest of the world had to strategically plan its operations to avoid the contraction and spread of the novel COVID-19. As part of strategic decisions, conscious efforts were made to ensure that various requirements for environmental, social, health and safety safeguards were stringently complied with. Guided by operational protocols, FORM Ghana's environmental aspects such as biodiversity conservation, waste management, chemical use, resource use and others were monitored. The Company as well undertook projects to fulfil its social responsibility mandate. Also, in line with an OHS Policy, FORM Ghana in the year 2020 pursued the health and safety of its employees through measures such as safety trainings, medical screening, health insurance and provision of safety materials.

APPENDICES

Appendix A: Material Safety Data Sheet for Glyphosate Chemical Pesticide

MSDS for Sunphosate

 <p>SUNSHINE[®]</p>	<p>WYNCA SUNSHINE AGRIC PRODUCTS & TRADING CO. LTD</p>
	<p>ADD: BLOCK 2A, PLOT NO.10, DADEBAN ROAD, NORTH INDUSTRIAL AREA, ACCRA, GHANA. P.O.BOX: CT1883 ACCRA</p> <p>FAX: 0302-221132 TEL: 0302-221132</p>
<p><u>SUNPHOSATE GRANULAR 757SG</u></p>	
<p><u>PRODUCT USAGE AND SAFETY PRECAUTIONARY MEASURES</u></p>	
<p>WARNING</p>	
<ul style="list-style-type: none"> • Read label first before using product 	
<p>PRECAUTION</p>	
<ul style="list-style-type: none"> • Do not eat, drink or smoke when handling the product. • Avoid contact with eyes or skin • Wear suitable protective clothing/keep product away from food, feed and drinks. • Do not contaminate any water body with left over spray solution • Do no use empty containers, punch and destroy them. • Wash hands, face and change clothes after use. 	
<p>FIRST AID</p>	
<ul style="list-style-type: none"> • Get medical aid immediately • If in EYES, flush eyes with plenty of water for 15 minutes. • If on SKIN, wash skin thoroughly with soap and plenty of water for 15 minutes. • If SWALLOWED, immediately dilute by drinking milk or water. 	
<p>ANTIDOTE</p>	
<ul style="list-style-type: none"> • No special antidote. 	
<p>CAUTION</p>	
<ul style="list-style-type: none"> • Safely keep out of reach of children. 	
<p>GENERAL INFORMATION</p>	
<ul style="list-style-type: none"> • SUNPHOSATE-G is a systemic, non-selective foliar herbicide which when applied is absorbed by the green parts of the plan. It translocates into the plant and kills it entirely. • It is used in forestry, tree crops and the control of aquatic weeds. • SUNPHOSATE-G has no residual soil activity and it is used in “zero tillage” in maize production. 	
<p>DIRECTION FOR USE</p>	
<ul style="list-style-type: none"> • Apply product on active growing weed. • Do not apply product if rain threatens 	



SUNSHINE[®]

**WYNCA SUNSHINE AGRIC PRODUCTS & TRADING CO.
LTD**

ADD: BLOCK 2A, PLOT NO.10, DADEBAN ROAD, NORTH INDUSTRIAL AREA,
ACCRA, GHANA. P.O.BOX: CT1883 ACCRA

FAX: 0302-221132 TEL: 0302-221132

- Avoid spray drift to nearby crops
- Spray at a low pressure to give uniform average droplets on the target weeds.

EQUIPMENT

- Apply with knapsack or mounted boom sprayers.

RECOMMENDATION

- Rate of application for annual grasses with the height of 30cm – apply 2.25kg/ha to cover 10000m², For perennial grasses – apply 3kg/ha. For sedges and other difficult weeds e.g. Imperata sp etc. Apply 4kg/ha.
- Do not enter field 7 hours after spray
- Water volume: Apply 450 – 600 litres of water per hectare depending on the weed density.
- With knapsack sprayers. Apply 50g – 80 g in 15 – 16litres of water.

MSDS for Glyphader

GLYPHADER® 75		Date created : 15/05/07	
MATERIAL SAFETY DATA SHEET			
Page 1 / 4			
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION			
SUPPLIED BY :	SCPA SIVEX INTERNATIONAL 83-85 Boulevard Vincent Auriol 75013 Paris - FRANCE TEL. +33 1 44 06 53 00 FAX. +33 1 44 06 54 66		
PRODUCT :	Glyphosate		
CHEMICAL NATURE	Water Soluble Granule (SG)		
CHEMICAL FAMILY/USE:	Glyphosate 680 g/Kg a.e. = 757 g/Kg Ammonium salt of Glyphosate Aminophosphonic ; Glycine derivative/ Herbicide		
FORMULA:	C ₃ H ₈ N O ₅ P		
CHEMICAL SYNONYMS:	IUPAC: N-(phosphonomethyl) glycine		
2. COMPOSITION/INFORMATION ON INGREDIENTS			
	Ingredients	Content	CAS NO
	Active Ingredient: GLYPHOSATE Salt of ammonium :	75.7 % w/w min	1071-83-6
	Other ingredients: Surfactant and formulating ingredients. Sodium sulphite	24.3 % w/w 0.5 % w/w max	
3. HAZARDS IDENTIFICATION EMERGENCY OVERVIEW			
EMERGENCY OVERVIEW: WARNING-POISON. Keep out of reach of children. Avoid contact with skin, eyes and clothing. Do not inhale fumes. Severely irritating to eyes. May cause skin irritation. Harmful if absorbed through the skin. Harmful if swallowed or inhaled.			
EFFECTS OF ACUTE EXPOSURE:			
INGESTION:	Harmful if swallowed. May cause nausea, vomiting, abdominal pain, decreased blood pressure, muscle weakness, and muscle spasms.		
SKIN CONTACT:	May cause slight transient irritation. Overexposure by skin absorption may cause nausea, vomiting, abdominal pain, decreased blood pressure, muscle weakness, and muscle spasms.		
INHALATION:	Contains materials that may be moderately toxic. Vapours could cause headache, dizziness, respiratory irritation and symptoms similar to those from ingestion.		
EYE CONTACT:	Causes severe eye irritation including corneal opacity and irreversible eye damage. Causes redness and tearing. Vapours and mist can cause irritation.		
MEDICAL CONDITIONS AGGRAVATED: Skin exposure may aggravate preexisting skin conditions. Inhalation of mist may aggravate preexisting respiratory conditions.			
PRINCIPLE ROUTES OF EXPOSURE: Eye contact. Skin absorption. Inhalation. Oral.			
CHRONIC EFFECTS/CARCINOGENICITY: No effect			
REPRODUCTIVE TOXICITY: No effect			
GENOTOXICITY: No			
TOXICOLOGICALLY SYNERGISTIC MATERIALS: NA.			
OTHER: None known.			
4. FIRST AID MEASURES			
CROP PROTECTION DEPARTMENT			

GLYPHADER® 75

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MATERIAL SAFETY DATA SHEET

INGESTION: Never give anything by mouth to an unconscious person. Get medical attention and show the product label.

SKIN: In case of contact, remove contaminated clothing and wash skin thoroughly with soap and water.

INHALATION: If inhaled, remove to fresh air and get medical attention or contact a Poison Control Centre.

EYES: For eye contact, flush with plenty of water for at least 15 minutes. Get immediate medical attention.

NOTE TO PHYSICIAN: Symptomatic treatment.

5. FIRE FIGHTING MEASURES

FLASH POINT:	No object
CONDITIONS OF FLAMMABILITY:	No Flammable
FLAMMABLE LIMITS IN AIR - Upper (%):	NA.
FLAMMABLE LIMITS IN AIR - Lower (%):	NA.
AUTOIGNITION TEMPERATURE:	NA.
SENSITIVITY TO MECHANICAL IMPACT (Y/N):	NA.
SENSITIVITY TO STATIC DISCHARGE:	NA.
EXTINGUISHING MEDIA:	Dry powder, carbon dioxide, water or foam.
SPECIAL FIREFIGHTING PROCEDURES:	<p>Special fire fighting procedures: Isolate fire area. Evacuate the employees and evacuate downwind.</p> <p>Avoid spreading of contaminated extinguishing agent in the environment. Minimize use of water to prevent environmental contamination. Do not breathe smoke, gases, or vapour generated. Keep fire exposed containers cool by spraying with water. Wear full protective</p> <p>Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires. Minimize and contain water runoff. Equipment should be thoroughly decontaminated after use.</p>

6. ACCIDENTAL RELEASE MEASURES

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Use safety equipment and procedures appropriate to the size of the spill. Keep unnecessary people away. Avoid runoff to natural waters and sewers. Surround and absorb spills with inert material such as perlite, sawdust, clay granules, vermiculite, sand or dirt. Contain all affected material in a closed, labelled container for proper disposal. Isolate from other waste materials. Clean contaminated area such as hard surfaces with detergent and water, collecting cleaning solution for proper disposal. Large spills to soil or similar surfaces may necessitate removal of top soil. Clean contaminated floors and objects thoroughly, observing environmental regulations. Do not discharge into the drains/surface water/groundwater. Keep people and animals away.

7. HANDLING AND STORAGE

HANDLING: Avoid contact with the eyes, skin and clothing and avoid inhalation of product or spray mist. If in eyes, wash it immediately with water. After handling and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water.

STORAGE: Store in the closed, original container in a dry, cool, well-ventilated area, out of direct sunlight. Store in locked room or place away from children, animals, food, animal feed, seed and fertilizers. Keep away from all ignition sources and protect from extreme heat and cold.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

GLYPHADER® 75

Date created : 15/05/07

MATERIAL SAFETY DATA SHEET

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ENGINEERING CONTROLS:	Use in a well ventilated area. General ventilation with a good source of make-up air recommended as minimum for indoor situations. Ventilation should be adequate to maintain air concentrations below exposure limits.
RESPIRATORY PROTECTION EQUIPMENT:	Use an approved pesticide respirator if ventilation is not adequate or exposure to sprays, mists or vapours is likely.
PROTECTIVE GLOVES:	All types of chemical-resistant gloves for handling chemicals are acceptable, provided that they can be cleaned. Rinse gloves before removal. Gloves are not required for applicator in enclosed tractor or airplane cockpit.
EYE AND FACE PROTECTION:	Goggles or face shield when handling concentrate.
OTHER PROTECTIVE EQUIPMENT:	Long sleeved shirt, long pants, socks and shoes are minimum work clothing. Coveralls or a chemical-resistant apron should also be worn when open pouring from containers greater than 5L. Use other equipment appropriate to specific situation.
VENTILATION:	Use only in well ventilated area.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT:	> 190 °C
VAPOR PRESSURE:	9 x 10 ⁻³ mPa (25°C)
VAPOR DENSITY (air = 1):	NA.
FREEZING POINT:	NA.
MELTING POINT:	> 190°C
PHYSICAL STATE:	Slightly yellow to white granular
ODOUR:	Specific odour
COLOUR:	Slightly yellow to white
ODOR THRESHOLD (ppm):	NA
EVAPORATION RATE (butyl acetate = 1):	NA.
SPECIFIC GRAVITY (water = 1):	NAp
DENSITY (20°C):	550 g/L ± 50 (bulk density)
pH:	4.0 – 6.0
SOLUBILITY IN WATER (25°C):	144 ± 19 g/l (pH 3,2)
COEFFICIENT OF WATER/OIL DISTRIBUTION:	K _{ow} logP= < - 3.7

Note: Physical data are typical values, but may vary from sample to sample. A typical value should not be construed as a guaranteed analysis or as a specification.

10. STABILITY AND REACTIVITY

STABILITY:	Stable.
HAZARDOUS POLYMERIZATION:	Not known to occur.
HAZARDOUS THERMAL DECOMPOSITION/COMBUSTION PRODUCTS:	None known
INCOMPATIBILITY (MATERIALS TO AVOID):	Can induced a reaction with metal (do not store or use this product in iron, galvanized steel or no varnish)
CONDITIONS TO AVOID:	None known.

11. TOXICOLOGICAL INFORMATION

ORAL LD50	Rat	4230	mg/kg
DERMAL LD50:	Rat	> 5000	mg/kg
4 HOURS INHALATION LC50:	Rat	> 5	mg/L
EYE IRRITATION:	Rabbit	Mild eye irritant	
SKIN IRRITATION :	Rabbit	Mild skin irritant	
SKIN SENSITIZATION :	Guinea pig	Not sensitizing	

Note : Data are from laboratory studies conducted on **GLYPHOSATE**.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:

GLYPHADER® 75

Date created : 15/05/07

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MATERIAL SAFETY DATA SHEET

96-HOUR LC50:	Rainbow trout	86	mg/L
96-HOUR LC50:	Bluegill sunfish	120	mg/L
48-HOUR EC50:	Daphnia magna	780	mg/L
LD50:	Bobwhite quail	>3851	mg/kg
ORAL LD50:	Bees	100	µg/bee
CONTACT LD50:	Bees	100	µg/bee

Note : Data on Active Ingredient.

ENVIRONMENTAL FATE INFORMATION:

In mammals, following oral administration, glyphosate is very rapidly excreted unchanged and does not bioaccumulate. In plants, slowly metabolised to aminomethylphosphonic acid, which is the major plant metabolite. In soil (field), DT50 1-30 days, depending on edaphic and climatic conditions. In water, DT50 varies from a few to 91 days. Photodegradation in water occurs under natural conditions, DT50 33-77 days; no substantial photodegradation in soil was recorded over 31 days. In a lab. whole system with water and sediment, DT50 27-146 days (aerobic), 14-22 days (anaerobic). The major metabolite in soil and water is aminomethyl phosphonic acid.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD:

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Disposal should be made in accordance with federal, provincial and local regulations. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean up of spills.

Emptied container retains vapor and product residue. Observe all labelled safeguards until container is cleaned, reconditioned or destroyed. Do not reuse container for any purpose. If applicable, return container in accordance with return program. If a recyclable container, dispose of at a container collection site. Contact local distributor, dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site, triple or pressure rinse the empty container adding rinsing to spray tank, and make container unsuitable for further use. If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

14. TRANSPORT INFORMATION

RAIL/ROAD (RID/ADR):	9
SEA (IMDG):	9
AIR (ICAO/IATA):	9
U.N. NUMBER:	3077
DG CLASS:	NA.
HAZCHEM CODE:	9
PACKING GROUP:	III

15. REGULATORY INFORMATION

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

16. OTHER INFORMATION

ADDITIONAL INFORMATION:


Abbreviations used throughout the MSDS are: NA = Not available
 NAp = Not applicable
 N/E = None Established.

This MSDS summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company. Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.

GLYPHADER®: Registered Trademark of SSI

END OF MSDS

MSDS Kalach Extra

	Product Name: Kalach 700 WSG Page 1 of 5																								
SECTION 1 - PRODUCT & COMPANY IDENTIFICATION																									
<table style="width: 100%; border: none;"> <tr> <td style="width: 70%; border: none;"> ARYSTA LifeScience South Africa (Pty) Ltd Co. Reg. No.: 2009/019713/07 7 Sunbury Office Park, Off Douglas Saunders Drive, La Lucia Ridge, South Africa, 4019 </td> <td style="width: 30%; border: none; text-align: right;"> Tel: 031 514 5600 Fax: 031 514 5611 e-mail: info@arysta.co.za Web address: arystalifescience.co.za </td> </tr> </table>		ARYSTA LifeScience South Africa (Pty) Ltd Co. Reg. No.: 2009/019713/07 7 Sunbury Office Park, Off Douglas Saunders Drive, La Lucia Ridge, South Africa, 4019	Tel: 031 514 5600 Fax: 031 514 5611 e-mail: info@arysta.co.za Web address: arystalifescience.co.za																						
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SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS																									
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SECTION 4 - FIRST AID MEASURES AND PRECAUTIONS																									
<p>Symptoms of glyphosate poisoning include: headache, vomiting and diarrhoea.</p> <p>Inhalation: Remove source of contamination, or move victim to fresh air. Keep affected person warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention if effects persist.</p>																									
MATERIAL SAFETY DATA SHEET																									
Issued by: Arysta Lifescience South Africa Phone: 031 514 5600 Poison Information Centre: 082 446 8946; Tygerberg: (021) 931 6129; Poison Emergency Enquiry: (021) 689 5227																									



Product Name: Kalach 700 WSG

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Skin contact:

Move the victim to fresh air and remove all contaminated clothing, shoes and leather goods. Gently wipe off excess chemical. Wash affected skin areas gently and thoroughly with water and non-abrasive soap. Do not rub the skin. If irritation persists, seek medical advice.

Eye contact :

Immediately flush the eyes with clean, gently flowing lukewarm water or saline solution for 20 minutes, holding the eyelid(s) open. If irritation persists, seek medical advice.

Ingestion:

Have victim rinse mouth thoroughly with water. Do not induce vomiting. Seek medical advice immediately showing container and label.

Advice to physician:

There is no specific antidote. Treat symptomatically and supportively as and when required. Remove by gastric lavage and catharsis, but not if victim is unconscious. Give oxygen if respiration is depressed.

SECTION 5 - FIRE-FIGHTING MEASURES

Keep fire exposed containers cool by spraying with water.

Fire and explosion hazard:

Flash point: None. This material is not flammable.

Extinguishing agents:

Extinguish fires with carbon dioxide, dry powder, or alcohol-resistant foam. Water spray can be used for cooling of unaffected stock, but avoid water coming in contact with the product. Use as little water as possible. Use spray or fog. Solid stream may cause spreading. Contain water used for fire fighting for later disposal.

Fire fighting:

Remove spectators from surrounding area. Remove container from fire area if possible. Contain fire control agents for later disposal. Use a recommended extinguishing agent for the type of surrounding fire. Avoid inhaling hazardous vapours and fumes from burning materials. Keep upwind.

Personal protective equipment:

Fire may produce irritating or poisonous vapours (toxic fumes of carbon monoxide, phosphorous oxides and nitrogen oxides), mists or other products of combustion. Fire fighters and others that may be exposed should wear full protective clothing and self-contained breathing apparatus.

SECTION 6 - ACCIDENTAL RELEASE MEASURES (SPILLAGE)

Personal precautions:

Do not breathe in mist or fumes. Avoid contact with skin and eyes. For personal protection see Section 8.

Environmental precautions:

Do not allow entering drains or watercourses. Spillage or uncontrolled discharges into water courses (or public waters) to be reported immediately to the Police and to the Department of Water/Environmental Affairs.

Occupational spill:

Remove all sources of flames and sparks. Adsorb spillage onto sand, earth or any suitable adsorbent material. Transfer to a container for disposal. Wash the spillage area with water. Washings must be prevented from entering surface water drains. Do not flush spilled material into drains. Keep spectators away.

Containers:

Emptied containers retain material residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

SECTION 7 - HANDLING AND STORAGE REQUIREMENTS

Handling:

Avoid contact with eyes, prolonged contact with skin, and inhalation of spray and fumes. Handle product with caution. Use with adequate ventilation. Wash hands before eating, drinking, chewing gum, smoking or using the toilet. Remove clothing immediately if the herbicide gets inside. Then wash skin thoroughly using a non-abrasive soap and put on clean clothing. Operators should change and wash clothing after use. Do not apply directly to areas where surface water is present, or to intertidal areas below the mean high water mark. Water used to clean equipment must be disposed of correctly to avoid contamination.

Storage:

Store in its original, labelled and closed container in dry, cool, shaded, well-ventilated area, away from heat, sparks and other sources of ignition. Do not store with other pesticides, fertilizer, seeds, foodstuffs and water supplies. Store away from incompatible substances. Product is incompatible with galvanized steel or unlined mild steel. Keep out of reach of unauthorized persons, children and animals. Local regulations should be complied with.

MATERIAL SAFETY DATA SHEET

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Phone: 031 514 5600

Poison Information Centre: 082 446 8946; Tygerberg: (021) 931 6129; Poison Emergency Enquiry: (021) 689 5227



SECTION 8 - EXPOSURE CONTROL/PERSONAL PROTECTION

It is essential to provide adequate ventilation. The measures appropriate for a particular work site depend on how this material is used and on the extent of exposure. Ensure that control systems are properly designed and maintained. Comply with occupational safety, environmental, fire and other applicable regulations.

Exposure standards:

The ADI for Glyphosate is set a 0.3 mg/kg/day. The corresponding NOEL is set at 30 mg/kg/day.

PERSONAL PROTECTIVE EQUIPMENT:

In industrial situations, concentration values below the TWA value should be maintained. Values may be reduced by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods. If you believe air borne concentrations of mists, dusts or vapours are high, you are advised to modify the process or environment to reduce the problem.

Respirator:

It is usually safe to use the product without a mask or respirator. If the product is used in dusty or confined conditions, a mask or respirator suitable for protection from dusts and mists of pesticides is adequate. Limitations of respirator use specified by the approving agency and the manufacturer must be observed.

Clothing:

Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance.

Gloves:

Employee must wear appropriate synthetic protective gloves to prevent contact with this substance.

Eye protection:

Wear safety goggles or face shield.

Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance, the employer should provide an eye wash fountain or appropriate alternative within the immediate work area for emergency use.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Water Soluble Granules.
Odour:	White
Bulk density:	0.65 ± 0.01 g/cm ³
Solubility in water:	Miscible
Flash point:	None. Does not flash.
pH:	3.0→5.0
Oxidizing properties:	Not oxidizing
Corrosiveness:	Corrosive to galvanized steel and mild steel.

SECTION 10 - STABILITY AND REACTIVITY

Stability:

Stable under normal temperatures and pressures. Glyphosate reacts strongly (possibly violent exothermic reaction) with strong alkalis. Photodecomposition is negligible. Is stable to light and also stable up to 60 °C. Product is unlikely to spontaneously polymerise or decompose. Decompose only after heating to dryness followed by further heating.

Glyphosate may be photolabile in natural waters, with calcium or other metal ions acting as catalysts for the process.

Dilution stability:

Stable in aqueous solutions at 20 °C.

Storage stability:

Stable for 2 years under normal warehouse conditions. Store at temperatures below 50 °C and above -15 °C. Stable to light. Partial crystallization may occur on prolonged storage below -15 °C.

Incompatibility:

Product is relatively stable in neutral, weakly acidic and weakly alkaline media, but reacts strongly (and possibly violently) with strong alkalis. Mixing with other products may reduce the activity of glyphosate. Incompatible with galvanized steel and unlined mild steel materials for storage.

Thermal decomposition:

Toxic oxides of carbon, nitrogen and phosphorus are released when the product decomposes on heating.

SECTION 11 - TOXICOLOGICAL INFORMATION

Acute oral LD₅₀:	10740mg/kg in rats.
Acute dermal LD₅₀:	> 4000 mg/kg in rats.
Inhalation:	Technical: LC ₅₀ (4 hours): > 12,2 mg/ℓ.

MATERIAL SAFETY DATA SHEET



Arysta LifeScience

Product Name: Kalach 700 WSG

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Acute skin irritation:

Not irritating to skin (rabbit). Not skin sensitizer.

Acute eye irritation:

Slightly irritating to eyes (rabbit).

Carcinogenicity:

Animal studies did not detect any carcinogenic effects.

Teratogenicity:

Animal studies did not detect any teratogenic effects.

Mutagenicity:

Animal studies did not detect any mutagenic effects.

Reproductivity:

Reproductive changes in test animals only occur at very high doses. It is unlikely that glyphosate would produce effects in humans.

SECTION 12 - ECOLOGICAL INFORMATION

Degradability:

Glyphosate is moderately persistent in soil, with estimated half-life of 47 days. Microbes are primarily responsible for breakdown. Glyphosate is strongly adsorbed to suspended organic and mineral matter in water, and broken down primarily by microbes. Half-life ranges from 12 days to 10 weeks.

Mobility:

The product is practically immobile. It is strongly absorbed to most soils. It does not leach appreciably, and has low potential for runoff.

Accumulation:

The product shows little or no tendency to bioaccumulate and poses no long term threat to wildlife.

ECOTOXICOLOGY:

Birds: Slightly toxic.

LC ₅₀ (5-day diet):	Mallard duck:	> 4500 mg/kg diet
	Bobwhite quail:	> 4500 mg/kg diet

Fish: Not toxic.

LC ₅₀ (96 hours):	Bluegill sunfish:	> 1000 mg/l
	Trout:	> 1000 mg/l
	Fathead minnows:	97 mg/l

Due to surfactant, GLYPHOSATE 360 is moderately toxic to fish.

Bees: Not toxic.

LD₅₀ oral & dermal: > 0.1 mg/bee

Daphnia:

LC₅₀ (48 hours): 930 mg/l

Earthworms:

LC₅₀ (14 days): *Eisenia foetida*: > 5000 mg/kg soil

Other Beneficial organisms:

No effect on carabid beetles. Harmless to slightly harmful to green lacewing, parasite species, mites/spiders and insects. Moderately harmful to *Bembidion lampros*.

SECTION 13 - DISPOSAL CONSIDERATION

Pesticide disposal:

Open dumping or burning of this pesticide is prohibited. Waste resulting from the use of this product that cannot be reused or reprocessed. Never pour untreated waste or surplus products into public sewers or where there is any danger of run-off or seepage into water systems. Do not contaminate rivers, dams or any other water sources with the product or used containers. If wastes cannot be used according to label instructions or chemically reprocessed, dispose of in a landfill approved for pesticide disposal or bury under at least 500 mm of soil in a non-crop, non-pasture area away from water sources of homes. Dispose of in accordance with all applicable local and state laws.

Container disposal:

Emptied containers retain vapour and product residues. Observe all labelled safeguards until container is destroyed. manner. Do not re-use the empty container for any other purpose but destroy it by perforation and flattening and bury in an approved dump site. Prevent contamination of food, feedstuffs, drinking water and eating utensils. Comply with local legislation applying to waste disposal.

SECTION 14 - TRANSPORT INFORMATION

UN NUMBER: 3077

Road Transport ADR/IRD:

Class: 9

MATERIAL SAFETY DATA SHEET

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Phone: 031 514 5600

Poison Information Centre: 082 446 8946; Tygerberg: (021) 931 6129; Poison Emergency Enquiry: (021) 689 5227



Arysta LifeScience

Product Name: Kalach 700 WSG

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Packing group: III
 Shipping name: Environmentally hazardous substance, solid, N.O.S. (herbicide - glyphosate)
Maritime Transport IMDG/IMO:
 Class: 9
 Packing group: III
 Shipping name: Environmentally hazardous substance, solid, N.O.S. (herbicide - glyphosate)
Considered a Marine Pollutant.

SECTION 15 - REGULATORY INFORMATION

Symbol: N
Indication: Environmentally dangerous substance.
Risk phrases:
R20/22 Harmful by inhalation or if swallowed
R 36 Irritating to eyes.
R 52 Harmful to aquatic organisms.
R 54 Toxic to flora.
Safety phrases:
S 2 Keep out of reach children.
S 2425 Avoid contact with skin and eyes.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 61 Avoid release to the environment

SECTION 16 - OTHER INFORMATION

Packaging and Labelling:

Packed in 10, 15, 50, 100, 430, 500g sachets & 1 kg carton & 5, 10, 15, 20 and 25 kg paper bags or Carton with inner plastic sachet with outer plastic lining and labelled according to South African regulations and guidelines.

Disclaimer:

The information on this sheet is not a specification; it does not guarantee specific properties. The information is intended to provide general guidance as to health and safety based upon our knowledge of the handling, storage use of the product. It is not applicable to unusual or non-standard uses of the product nor where instructions or recommendations are not followed. All information is given in good faith but without guarantee in respect of accuracy, and no responsibility is accepted for errors and omissions or the consequence thereof.

2020 Annual Environmental Report for Tain II Forest Reserve

Appendix B: Water Quality Analysis Reports

Borehole Water Quality Analysis for First Quarter of 2020

GHANA WATER COMPANY LIMITED

Main Bankers: Social Security Bank
Ghana Commercial Bank



Brong Ahafo Region
Post Office Box 88
Sunyani - B/A

My Ref. No.:

10th March, 2020

Your Ref. No.:

Attn: FORM GHANA LIMITED, P.O.BOX 211, SUNYANI, BONO-REGION

CERTIFICATE OF ANALYSIS

Sample Description: Borehole	
Brand Name: Form Ghana Boreholes	
Country of Origin: Ghana	Expiry date: 10/02/2021
Town/Community: Berekum (SAC/Agromotations)	Batch No.
Packaging Type:	

TEST RESULTS

PHYSICO-CHEMICAL ANALYSIS:				DATE OF ANALYSIS: 02/03/2020			
PARAMETER	TEST METHOD	METHOD DETECTION LIMIT/UNIT	GHANA STANDARD SPECIFICATION	RESULTS			
				Site	A24	B11	B46
Temperature		°C	-	31.60	31.40	31.20	31.20
pH	Electrometric	-	6.5-8.5	5.84	6.30	6.58	6.88
Residual free chlorine	Colorimetric	mg/l	0.0	0.00	0.00	0.00	0.00
Colour	Platinum-cobalt	Pl.Co	0-15	4.00	4.00	5.00	5.00
Turbidity	Nephelometric	NTU	5	0.00	0.00	0.00	0.00
Conductivity	Electrometric	µs/cm	-	207.00	124.00	364.00	418.00
Total Dissolved Solids	Electrometric	mg/l	1000	105.00	63.00	185.00	214.00
Total Hardness	Titrimetric	mg/l	500	43.00	30.00	80.00	264.00
Calcium Hardness	Titrimetric	mg/l	-	28.00	21.00	78.00	151.00
Magnesium Hardness	Titrimetric	mg/l	-	15.00	9.00	2.00	113.00
Alkalinity	Titrimetric	mg/l	-	75.00	48.00	159.00	190.00
Chloride	Argentometric titration	mg/l	250	27.00	17.00	19.00	22.00

2020 Annual Environmental Report for Tain II Forest Reserve

Nitrite	Diazotization	mg/l	3.0	1.02	1.13	0.95	1.11
Nitrate	Cadmium reduction	mg/l	50	0.90	0.80	0.80	0.90
Ammonia(Nitrogen)	Nessler	mg/l	1.5	0.00	0.01	0.00	0.00
Fluoride	Spands	mg/l	1.5	0.66	0.42	0.74	0.64
Iron	FerroVer	mg/l	0.3	0.09	0.02	0.10	0.11
Sulphate	Sulfaver 4	mg/l	250	0.23	0.44	0.02	1.48
Manganese	Periodate oxidation	mg/l	0.4	0.50	0.80	0.50	0.60
Phosphate	PhosVer 3	mg/l	0.3	0.75	0.20	0.50	0.25
Aluminium	Aluminon method	mg/l	0.2	0.17	0.20	0.18	0.16
Cyanide	Pyridine-pyrazolone	mg/l	0.07	0.00	0.00	0.00	0.00
Arsenic	2822800(EZ arsenic)	mg/l	0.01	0.00	0.00	0.00	0.0

MICROBIOLOGICAL ANALYSIS:				DATE OF ANALYSIS: 02/03/2020			
PARAMETER	TEST METHOD	UNIT	SPECIFICATION -N/ METHOD DETECTION LIMIT	RESULTS			
				Site	A24	B11	B46
Fecal coliform	Multiple tube fermentation	MPN Index/ 100mL	<1.1	>8.0	<1.1	4.6	<1.1
E. Coli	Indole Test	Present (P)/ Absent(A)	Absent	Absent	Absent	Absent	Absent
Total Viable Count	Total plate count	CFU	0-3	2	0	1	0

REMARKS: All the water samples did not meet the standards for Manganese. Water samples, Site and B11 failed the tests for Phosphate and Fecal coliform. Also, low pH was recorded for samples, Site and A24. pH correction is recommended for samples, Site and A24 source water, whereas disinfection is recommended for samples, Site and B11. Manganese removal for all the boreholes is also recommended before use.

Note: These results are only applicable to the sample(s) submitted to the laboratory.

Regional WQA Manager
{Janel Atebiya}



Board of Directors: Hon Alexander A. Afeyee-Markie (Chairman), Ing. Dr. Clifford Braimah (Managing Director), Mr. Joseph Obeng-Poku, Mr. Michael Ayisa, Nana Sigi Gensong, Hon. Kwame Twumasi Anparfo, Mr. Clement Aboviano Kaba, Dr. Forster Kum-Ankum Sarpong, Madam Marie Abu Lovelace-Johnson, Mr. Alexander K. B. Bowoye, Mrs. Serene Kwakye-Mintah
Registered Office: 28th February Road, (Near Independence Square)
Telephone: 233-6302-666781-7 Fax: 233-6302-665552 Telegram: DIRWAT
Website: www.gwcl.com.gh E-mail: info@gwcl.com.gh

Borehole Water Quality Analysis for Second Quarter of 2020

GHANA WATER COMPANY LIMITED

Main Bankers: Social Security Bank
Ghana Commercial Bank



Brong Ahafo Region
Post Office Box 88
Sunyani - B/A

My Ref. No.:

1st July, 2020

Your Ref. No.:

Attn: FORM GHANA LIMITED, P.O.BOX 211 SUNYANI, BONO-REGION

CERTIFICATE OF ANALYSIS

Sample Description: Boreholes	Expiry date: 19/05/2021
Country of Origin: Ghana	
Net Volume: 1.5L Each	
Name of Community: Berekum	

TEST RESULTS

PHYSICO-CHEMICAL ANALYSIS:				DATE OF ANALYSIS: 19/06/2020			
PARAMETER	TEST METHOD	METHOD DETECTION LIMIT/UNITS	GHANA STANDARD SPECIFICATION	RESULTS			
				Site BK	BLK B4-G BK	BLK B11 BK	A24 BK
Temperature		°C	-	28.10	28.10	28.20	28.30
pH	Electrometric	-	6.5-8.5	6.50	7.00	6.70	6.00
Residual free chlorine	Colorimetric	mg/l	0.0	0.00	0.00	0.00	0.00
Colour	Platinum-cobalt	Pt.Co	0-15	5.00	5.00	5.00	5.00
Turbidity	Nephelometric	NTU	5	0.11	0.01	0.23	0.04
Conductivity	Electrometric	µs/cm	-	228.00	490.00	359.00	42.00
Total Dissolved Solids	Electrometric	mg/l	1000	118.00	250.00	184.00	7.00
Total Hardness	Titrimetric	mg/l	500	64.00	214.00	130.00	39.00
Calcium Hardness	Titrimetric	mg/l	-	40.00	162.00	78.00	33.00
Magnesium Hardness	Titrimetric	mg/l	-	24.00	52.00	52.00	6.00
Alkalinity	Titrimetric	mg/l	-	91.00	262.00	182.00	53.00
Chloride	Argentometric titration	mg/l	250	34.00	23.00	24.00	25.00

2020 Annual Environmental Report for Tain II Forest Reserve

Nitrite	Diazotization	mg/l	3.0	1.20	1.00	0.92	0.85
Nitrate	Cadmium reduction	mg/l	50	2.50	2.30	2.00	1.70
Ammonia(Nitrogen)	Nessler	mg/l	1.5	0.00	0.00	0.01	0.00
Fluoride	Spands	mg/l	1.5	0.50	0.52	0.53	0.43
Iron	FerroVer	mg/l	0.3	0.00	0.06	0.00	0.01
Sulphate	Sulfaver 4	mg/l	250	0.00	0.00	0.00	0.00
Manganese	Periodate oxidation	mg/l	0.4	0.01	0.00	0.03	0.01
Phosphate	PhosVer 3	mg/l	0.3	0.75	0.22	0.50	0.24
Aluminium	Aluminon method	mg/l	0.2	0.00	0.01	0.01	0.00
Cyanide	Pyridine-pyrazolone	mg/l	0.07	0.00	0.00	0.00	0.00
Arsenic	2822800(EZ arsenic)	mg/l	0.01	0.00	0.00	0.00	0.00

MICROBIOLOGICAL ANALYSIS:				DATE OF ANALYSIS: 19/06/2020			
PARAMETER	TEST METHOD	UNIT	SPECIFICATION / METHOD DETECTION LIMIT	RESULTS			
				Site BK	BLK B4-6 BK	BLK B11 BK	A24 BK
Fecal coliform	Multiple tube fermentation	MPN Index/ 100mL	<1.1	<1.1	<1.1	<1.1	<1.1
E. Coli	Indole Test	Present/Absent (P/A)	Absent	Absent	Absent	Absent	Absent

REMARKS: Water sample A24 BK, did not meet the standards for pH, Site BK and BLK B11 BK, did not meet the standards for Phosphate. pH correction is recommended for A24 BK and Phosphate removal is recommended for Site BK and BLK B11 BK

Note: These results are only applicable to the sample(s) submitted to the laboratory.

Regional WQA Manager
{Janet Atebiya}


REGIONAL W. Q. A. MANAGER
GHANA WATER CO. LTD.
SUNYANI BRONG AHMAFO

Board of Directors: Hon. Alexander A. Afenyi-Markin (Chairman), Ing. Dr. Clifford Brumak (Managing Director), Mr. Joseph Obang-Poku, Mr. Michael Ayem, Nana Sigi Gbewong, Hon. Kwame Tsamami Amporfu, Mr. Clement Aketebano Kaba, Dr. Forster Kum-Akpana Sarpong, Madam Maria Aha Lovelace Johnson, Mr. Alexander K. B. Bawogy, Mrs. Serrette Kwakye-Musuah

Registered Office: 28th February Road, (Near Independence Square)
Telephone: 233-0302-660781-7 Fax: 233-0302-663352 Telegram: DIRWAT
Website: www.gwcl.com.gh E-mail: info@gwcl.com.gh

2020 Annual Environmental Report for Tain II Forest Reserve

Borehole Water Quality Analysis for Third Quarter of 2020

GHANA WATER COMPANY LIMITED

Main Bankers: Social Security Bank
Ghana Commercial Bank



Bong Aho Region
Post Office Box 84
Sunyani - B/A

My Ref. No.:

30th September, 2020

Your Ref. No.:

Attn: FORM GHANA LIMITED, P.O. BOX 211 SUNYANI, BONO-REGION

CERTIFICATE OF ANALYSIS

Sample Description: Boreholes	Expiry date: 28/09/2021
Country of Origin: Ghana	
Net Volume: 1.5L Each	
Name of Community: Barenum	

TEST RESULTS

PHYSICO-CHEMICAL ANALYSIS:				DATE OF ANALYSIS: 28/09/2020			
PARAMETER	TEST METHOD	METHOD DETECTION LIMIT/UNITS	GHANA STANDARD SPECIFICATION	RESULTS			
				Site BK	BK B46 BK	BK B13 BK	A24 BK
Temperature		°C	-	29.50	29.40	29.60	29.50
pH	Electrometric	-	6.5-8.5	7.34	7.42	7.73	7.52
Residual free chlorine	Colorimetric	mg/l	0.0	0.00	0.00	0.00	0.00
Colour	Platinum-cobalt	Pt-Co	0-15	4.00	5.00	4.00	6.00
Turbidity	Nephelometric	NTU	5	0.00	0.00	0.00	0.00
Conductivity	Electrometric	µ/cm	-	195.00	447.00	358.00	123.00
Total Dissolved Solids	Electrometric	mg/l	1000	95.00	228.00	182.00	63.00
Total Hardness	Titrimetric	mg/l	500	62.00	101.00	140.00	56.00
Calcium hardness	Titrimetric	mg/l	-	25.00	85.00	96.00	42.00
Magnesium Hardness	Titrimetric	mg/l	-	37.00	106.00	51.00	14.00
Alkalinity	Titrimetric	mg/l	-	74.00	209.00	188.00	31.00
Chloride	Argentometric titration	mg/l	350	39.00	42.00	34.00	43.00

2020 Annual Environmental Report for Tain II Forest Reserve

Parameter	Method	Unit	Standard	Sample 1	Sample 2	Sample 3	Sample 4
Nitrate	Diazotization	mg/l	1.0	1.08	0.04	0.02	0.01
Nitrate	Cadmium reduction	mg/l	50	0.25	0.00	0.00	0.25
Ammonia (Nitrogen)	Nessler	mg/l	1.5	0.00	0.00	0.00	0.00
Fluoride	Spreads	mg/l	1.5	0.34	0.45	0.43	0.37
Iron	FerroVer	mg/l	0.3	0.01	0.03	0.01	0.01
Sulfate	Sulfaver 4	mg/l	250	0.00	0.00	0.00	0.00
Manganese	Periodate oxidation	mg/l	0.4	0.25	0.50	0.25	0.00
Phosphate	PhosVer 3	mg/l	0.3	0.23	0.83	0.84	4.05
Aluminum	Aluminum method	mg/l	0.2	0.05	0.02	0.00	0.04
Cyanide	Pyridine-pyrazolone	mg/l	0.02	0.00	0.00	0.00	0.00
Arsenic	2813800 (F2, Arsenic)	mg/l	0.01	0.00	0.00	0.00	0.00

MICROBIOLOGICAL ANALYSIS				DATE OF ANALYSIS: 28/09/2020			
PARAMETER	TEST METHOD	UNIT	SPECIFICATION / METHOD DETECTION LIMIT	RESULTS			
				Site BK	BLK B-6 BK	BLK B-11 BK	A24 BK
Total coliform	Multiple tube fermentation	MPN index / 100mL	<1.1	<1.1	<1.1	<1.1	<1.1
E. Coli	Indole Test	Present/Absent (P/A)	Absent	Absent	Absent	Absent	Absent

REMARKS: Sample B4-6 did not meet the standards for Manganese. All four samples exceeded the range for Phosphate. Manganese removal is recommended for B4-6, and Phosphate removal is recommended for all four water systems.

Note: These results are only applicable to the sample(s) submitted to the laboratory.

Regional WQA Manager

REGIONAL W. Q. A. MANAGER

GHANA WATER CO. LTD.

SIXYANI BRONG AHAFO

Janet Akpavua

Chief Executive: Hon. Alexander A. Agyemang-Marku (Chairman), Eng. Dr. Clifford Brumah (Managing Director), Mr. Joseph Obeng-Poku
 Richard Agye, Nando Ngor Gbewee, Hon. Evans Tsumasi Amponsah, Mr. Clement Ametenu Kuba, Dr. Forster Kumi-Antwi Sarpong,
 Mr. Mena Abo Larikwa-Jobson, Mr. Alexander B. Bonye, Mrs. Serena Kwakye-Muquah

Registered Office: 28th February Road, (Near Independence Square)
 Telephone: 233-0102-664781-7 Fax: 233-0102-663552 Telegrams: DIBH GH
 Website: www.gwcl.com.gh E-mail: info@gwcl.com.gh

2020 Annual Environmental Report for Tain II Forest Reserve

Borehole Water Quality Analysis for Fourth Quarter of 2020

GHANA WATER COMPANY LIMITED

Main Bankers: Social Security Bank
Ghana Commercial Bank



Brong Ahafo Region
Post Office Box 88
Sunyani - B/A

My Ref. No.:

16th December, 2020

Your Ref. No.:

Attn: FORM GHANA LIMITED, P.O.BOX 211-SUNYANI, BONO-REGION

CERTIFICATE OF ANALYSIS

Sample Description: Boreholes	Expiry date: 16/12/2021
Country of Origin: Ghana	
Net Volume: 1.5L Each	
Name of Community: Berekum	

TEST RESULTS

PHYSICO-CHEMICAL ANALYSIS:				DATE OF ANALYSIS: 16/12/2020			
PARAMETER	TEST METHOD	METHOD DETECTION LIMIT/UNITS	GHANA STANDARD SPECIFICATION	RESULTS			
				Site BK	BLK B46 BK	BLK B11 BK	A24 BK
Temperature		°C	-	30.20	30.10	30.40	30.20
pH	Electrometric	-	6.5-8.5	6.00	6.33	6.28	6.02
Residual free chlorine	Colorimetric	mg/l	0.0	0.00	0.00	0.00	0.00
Colour	Platinum-cobalt	Pt.Co	0-15	4.00	5.00	4.00	5.00
Turbidity	Nephelometric	NTU	5	0.00	0.00	0.00	0.00
Conductivity	Electrometric	µs/cm	-	195.00	451.00	328.00	118.00
Total Dissolved Solids	Electrometric	mg/l	1000	99.00	229.00	166.00	59.00
Total Hardness	Titrimetric	mg/l	500	100.00	186.00	114.00	168.00
Calcium Hardness	Titrimetric	mg/l	-	57.00	150.00	68.00	85.00
Magnesium Hardness	Titrimetric	mg/l	-	43.00	36.00	46.00	83.00
Alkalinity	Titrimetric	mg/l	-	178.00	238.00	353.00	114.00
Chloride	Argentometric titration	mg/l	250	26.00	52.00	22.00	24.00
Nitrite	Diazobization	mg/l	3.0	0.00	0.00	1.00	1.00

2020 Annual Environmental Report for Tain II Forest Reserve

Nitrate	Cadmium reduction	mg/l	50	1.20	1.10	0.30	3.70
Ammonia(Nitrogen)	Nessler	mg/l	1.5	0.05	0.04	0.04	0.05
Fluoride	Spands	mg/l	1.5	0.34	0.68	0.54	0.39
Iron	FerroVer	mg/l	0.3	0.04	0.01	0.00	0.04
Sulphate	Sulfaver 4	mg/l	250	0.00	1.00	0.00	0.00
Manganese	Periodate oxidation	mg/l	0.4	0.00	0.60	0.20	0.00
Phosphate	PhosVer 3	mg/l	0.3	2.58	4.16	4.16	2.58
Aluminium	Aluminon method	mg/l	0.2	0.03	0.01	0.23	0.03
Cyanide	Pyridine-pyrazolone	mg/l	0.07	0.00	0.00	0.00	0.00
Arsenic	2822800(EZ arsenic)	mg/l	0.01	0.00	0.00	0.00	0.00

MICROBIOLOGICAL ANALYSIS:				DATE OF ANALYSIS: 15/12/2020			
PARAMETER	TEST METHOD	UNIT	SPECIFICATION / METHOD DETECTION LIMIT	RESULTS			
				Site BK	BLK B46 BK	BLK B11 BK	A24 BK
Fecal coliform	Multiple tube fermentation	MPN Index/ 100ml	<1.1	4.6	<1.1	<1.1	<1.1
E. Coli	Indole Test	Present/Absent [P/A]	Absent	Present	Absent	Absent	Absent

REMARKS:

Note: These results are only applicable to the sample(s) submitted to the laboratory.

Regional WQA Manager

{Janet Atebiya}

Board of Directors: Hon Alexander K. Afenyo-Marku (Chairman), Ing. Dr. Clifford Brimah (Managing Director), Mr. Joseph Obeng-Poku, Mr. Michael Agya, Nana Sigi Gbewong, Hon. Kwame Tsutsi Ampofo, Mr. Clement Alosebwa Koku, Dr. Forster Kum-Ankama Sanyang, Madam Maria Ada Lovelace-Johnson, Mr. Alexander K. B. Bonney, Mrs. Serena Kwakye-Mintah

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2020 Annual Environmental Report for Tain II Forest Reserve

DECLARATION:

I _____ hereby declare that the information provided on this form is true to the best of my knowledge and shall provide any additional information that shall come to my notice in the course of processing this application.

Signature _____ Date _____