PROJECT: FORM GHANA LIMITED

COUNTRY: GHANA

SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

<table>
<thead>
<tr>
<th>Project Appraisal Team</th>
<th>FUSI R., OPSD2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KAYODE-ANGLADE S., OPSD2</td>
</tr>
<tr>
<td></td>
<td>KINANE M. L., ONEC.3</td>
</tr>
<tr>
<td></td>
<td>AUER E., ONEC.3</td>
</tr>
<tr>
<td></td>
<td>AZEVEDO L. ONEC.3</td>
</tr>
<tr>
<td></td>
<td>MECCA A., GECL</td>
</tr>
<tr>
<td></td>
<td>AISHA B., FFMA</td>
</tr>
<tr>
<td></td>
<td>BEMPONG G. EDRE</td>
</tr>
<tr>
<td></td>
<td>OSEI-BOAKYE D. ORPF</td>
</tr>
<tr>
<td></td>
<td>NDIAYE M., FTRY4</td>
</tr>
</tbody>
</table>
1. INTRODUCTION
This ESIA summary is prepared in accordance with the African Development Bank’s (AfDB) Integrated Safeguard System (ISS) and Environmental Assessment Procedures (ESAP). It fulfills the ISS requirements for category 1 projects. It provides information on project activities; anticipated impacts of the project activities; measures to be put in place to mitigate identified adverse impacts; and institutional arrangements to facilitate implementation and monitoring of the Environmental and Social Management Plan (ESMP).

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK
The ESIA has been prepared in line with the Ghanaian Environmental Law, Environmental and social policies and procedures of the AfDB. Below are the key requirements applicable to the project.

2.1 National requirements
2.1.1 Main applicable policies
The main policies applicable to this project are: (i) Ghana Forest Policy of 1995 which provides a solid basis to develop a national forest estate and a timber industry in a manner that is ecologically sustainable and that conserves Ghana’s environmental and cultural heritage; (ii) Forest and Wildlife Policy of 1994, aiming at conservation and sustainable development of the nation's forest and wildlife resources for maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society; (iii) National Land Policy of 1999, seeking to address some of the fundamental problems associated with land management in the country; (iv) Farm Lands (Protection) Act of 1962 (Act 107) which describes the land ownership by farmers which is of specific interest regarding the admitted farms in Forest Reserves and when trying to purchase land; (v) Ghana’s Environmental Policy which aims at managing the environment to sustain society at large. This vision is based on an integrated and holistic management system for the environment in Ghana. It is aimed at sustainable development.

2.1.2 Other applicable regulations
The following are the main applicable acts: (i) Forest Protection Act (N.R.C.D 243) of 1974 provides for the functions of forest officers and offences relating to forest reserves and other related matters; (ii) Timber Resource Management Act (Act 547) of 1998 provides for the grant of timber rights in a manner that secures the sustainable management and utilization of the timber resources of Ghana and creates forest offences and punishment regime; (iii) Forestry Commission Act (Act 571) of 1999 re-establishes the Forestry Commission and brings under the Forestry Commission the main public bodies and agencies: implementing the functions of protection, development, management and regulation of forests and wildlife resources; (iv) Wild Animals Preservation Act (Act 43) of 1961 consolidates and amends the law relating to wild animals, birds and fish and to continue the observance of the international Convention for the preservation of wild animals signed at London on the nineteenth day of May, 1900; (v) Environmental Protection Agency Act (Act 490) of 1994 establishes the Environmental Protection Agency with functions to inter alia issue environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of pollutants and of substances which are hazardous or potentially dangerous to the quality of the environment or a segment of the environment; (vi) Plants and Fertilizer Act (Act 803) of
provides for plant protection, seeds and fertilizer control and for related matters and provides for the regulatory framework for the importation of plants and plant materials. The Act also provides for the efficient conduct of plant protection, to prevent the introduction; (vii) Social Security Law (P.N.D.C.L. 247) of 1991 which seeks to provide social protection for the working population for various contingencies such as old age, invalidity, and such other contingencies as may be specified by law; (viii) Environmental Assessment Regulations, 1999 (LI 1652) which prohibit commencing an ‘undertaking’, without prior registration and environmental permit (EP).

2.2 International requirements

2.2.1 African Development Bank

AfDB’s ISS with its five operational safeguards as indicated in table 1 below, as well as other applicable policies.

<table>
<thead>
<tr>
<th>Operational Safeguards applicable to the project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational Safeguards (OSs)</strong></td>
</tr>
<tr>
<td>OS1. Environmental and Social Assessment</td>
</tr>
<tr>
<td>OS2. Involuntary resettlement land acquisition, population displacement and compensation</td>
</tr>
<tr>
<td>OS3. Biodiversity and Ecosystem Services</td>
</tr>
<tr>
<td>OS4. Pollution prevention and control, hazardous materials and resource efficiency</td>
</tr>
<tr>
<td>OS5. Labour conditions, health and safety</td>
</tr>
</tbody>
</table>

Source: Adapted from the ESAP (2015)

2.2.2 Other international requirements

Other international requirements include those of the following conventions which have been ratified by Ghana:

- **United Nations Framework Convention on Climate Change of 1992** The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system;

- **African Convention on the Conservation of Nature and Natural Resources 1969** Its objectives are "to encourage individual and joint action for the conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.";
• **RAMSAR Convention** on the Preservation of wetlands is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources;

• **International plant protection convention (IPPC)** is an international plant health agreement, established in 1952, that aims to protect cultivated and wild plants by preventing the introduction and spread of pests.

• **CITES Convention on International Trade of Endangered Species**; listing species not to be traded, or to be traded with special documentation. Appendix I lists 20 animals and 1 plant, Appendix II lists 161 animals and 40 plants, Appendix III lists 162 animals. Trade in these species is subject to regulations or prohibited;

• **ILO Code of practice ‘Safety and health in forestry work’**; An ILO code of practice; Geneva, International Labour Office, 1998”This ILO Code of Practice is taken into account in the risk assessments of forestry work and the subsequently appropriate health and safety measures that are being taken.

The project will also comply with the Forest Stewardship Council (FSC) National Standard for Ghana (FSC-STD-GHA-01-2012 Natural and Plantations).

Finally, international standards such as those of FAO (for soil assessment) and WHO (for drinking water quality) are used for the baseline assessment.

2.3 Institutional Framework

The entities below are the key institutions that will be involved in preparing and approving the ESIA for this project as well as in implementing, monitoring and auditing the ESMP as required:

• **Ministry of Lands and Natural Resources**: This is the state agency in charge primarily of the management and administration of state and vested lands. It is responsible for advising on policy framework for development of particular areas so as to ensure that development of such areas is coordinated. The functions of Lands Commission are spelt out in Article 256 of the 1992 Constitution and the Lands Commission Act (Act 483) 1994. The Ministry has the oversight responsibility for the land and natural resources sector and its functions include: Policy formulation, Coordination, Monitoring and Evaluation, Validation of Policies, Programs and Projects, Supervision of Sector Departments and Agencies; and Negotiations with Development Partners;

• **Forestry Commission**: The Forestry Commission of Ghana is responsible for the regulation of utilization of forest and wildlife resources, the conservation and management of those resources and the coordination of policies related to them. The Commission embodies the various public bodies and agencies that were individually implementing the functions of protection, management, the regulation of forest and wildlife resources. These agencies currently form the divisions of the Commission: (i) Forest Services Division (FSD); (ii) Wildlife Division; (iii) Timber Industry Development Division (TIDD); (iv) Wood Industries Training Centre (Forestry Commission Training School); (v) Resource Management Support Centre (RMSC);

• **Local Government Authorities**: The Regional Coordinating Council (RCC) and the District Assembly (DA) are responsible for the overall development of the region and district respectively and their functions include: to prepare and submit development
plans and budgets to superior institutions for approval and implementation. These institutions were set up by an Act of Parliament, to serve as the planning authority for the region and district respectively;

- **District Environmental Management Committees (DEMC):** With regard to environmental management at the district level, the DEMC has been set up by law (Act 462) to among other things: (i) Promote and provide guidelines for the establishment of community level environmental committees to put into effect the environmental programs of the Assembly in the community; (ii) Plan and recommend to the DA, strategies and activities for the improvement and protection of the environment with emphasis on fragile and sensitive areas, river courses etc.

- **Environmental Protection Agency (EPA):** As the law stipulates, the EPA is statutorily mandated to ensure that the implementation of all undertakings do not harm the environment. The Agency has eleven (11) regional offices, which are accessible and staffed and equipped to perform its functions. It is expected that sub-projects that will require the preparation of ESIA will abide by statutory requirements and the implementing institutions will liaise sufficiently with the Agency to ensure compliance. The EPA is the National Focal Point for Climate Change and is responsible for all national communications to the UNFCCC.

- **Berekum and Nkenkasu Fire Offices:** They have the responsibility of preventing and fighting fire in their respective districts.

- **Traditional Authorities:** Traditional authorities encompass chiefs or traditional rulers, and traditional councils. In Ghana, the traditional authority system comprises: (i) Chiefs; (ii) Queen Mothers; (iii) Linguists; (iv) Family/lineage/clan heads; (v) Head of ‘asafo’ companies; and Priests and priestesses;

- **Form Ghana:** Project company. Form Ghana LTD. is a private forestry plantation company and is reforesting in Asubima, Afrensu Brohuma and Tain II Forest Reserves. Form Ghana is FSC™ for sustainable forest management and VCS certified for carbon credits.

- **Form international:** consultant to project company. Form international is a forestry consultancy firm based in the Netherlands. Form international is specialized in plantation establishment, forest management, forest certification, forest valuation, reduced impact logging and operates predominantly in tropical Africa.

### 3. PROJECT DESCRIPTION AND JUSTIFICATION

#### 3.1 Location

The project sites are located in three forest reserves: Asubima, Afrensu Brohuma and Tain Tributaries Block II (Tain II).

The reserves Asubima and Afrensu Brohuma are fringing and are managed as one unit, further referred to as Akumadan, the name of the closest town. The reserves are located within the dry semi-deciduous forest zone. The terrain is undulating and covered with savannah vegetation with a very open canopy, alternating with forested and open sandy-rock patches. Asubima and Tain II were reserved in 1934, Afrensu Brohuma in 1945. This was done to protect the remaining forest in Ghana from overexploitation.
The other site is located in Tain Tributaries Block II Forest Reserve, further referred to as Tain II Forest Reserve (Tain II FR) in Berekum District, Brong-Ahafo region. Tain II FR lies around a grid reference of 7N35 2W30. The Akumadan site is located in Offinso North District near Akumadan, in the Ashanti region. It lies around the grid references of 7N222W53 and 7N272W52 respectively for Afrensu Brohuma and Asubima.

**Figure 1: Form Ghana Plantation Areas**

![Map of Ghana Plantation Areas](image)

### 3.2 Project description

The project aims to establish and manage 11,700 ha of sustainable commercial forest plantation composed of 10% indigenous tree species and 90% teak. It is being implemented by Form Ghana Ltd (Project Company) in close collaborating with the Government of Ghana through the Forestry Commission and is the first FSC\textsuperscript{TM} certified Plantation Company in Ghana and West Africa, and is already producing Carbon Credits as per VCS standards.

A pilot for teak as a short rotation hardwood was implemented on 64ha of land in 2001 before the actual project started in 2007 with a large scale nursery to support the plantation operations. As at end 2014, over 4,140ha had been planted and it is projected that 6,900ha would have been planted by end 2015. As planting progresses, commercial thinning will begin in 2016 initially on the older stands while plantation maintenance will be continuous till 2021 when exploitation and commercial harvesting will have begun in all stands. The project will initially focus on production of billets, poles and high quality round logs for local and export markets.

A 50 years renewable land lease accompanied by tripartite Agreements for Benefit Sharing Agreements (BSA) between the GoG, the local communities and the project company has been signed for each of the forest reserves. For Tain II this was signed for a total area of 14,000 ha of degraded forest land. For Asubima this was for 1750 hectares and for Afrensu Brohuma this was also for 1750 hectares (based on a 2006 legislation on the land lease concept for Forest Reserves).

---

1 Forest Stewardship Council (FSC) is the most globally recognized and internationally accepted certifying body for Sustainable Forest Management Standards
3.2 Project inputs

The following inputs are required:

- **Planting material:** The main inputs for the project are Teak stumps and potted seedlings of indigenous trees. These are produced in the Form Ghana nursery at Akumadan and in a dryland nursery located at the Berekum site. The annual need is about 3,000,000 seedlings / stumps. These can be readily produced in the nurseries;

- **Water:** In the Akumadan nursery water is used for irrigation purposes. This water is taken from a stream which flows past the Akumadan nursery. Annual intake of water is about 30,000 m$^3$. The nursery of Tain is rain-fed and uses no additional water;

- **Equipment:** Equipment for the project is either locally sourced or imported. The equipment to be used include but is not limited to the following: (i) 5 ton trucks (6); (ii) Tractors (4); (iii) Pick-ups (5); (iv) Towed grader (1); (v) Motor bikes (8); (vi) Bakkie sakkies (fire-fighting equipment) (4); (vii) Fire towers (5); (viii) Containers (6); (ix) Chain saws (20); (x) Solar system; (xi) Water drums; (xii) Safety gear; (xiii) Small materials such as cutlasses, pruning, etc.

- **Quantity of pesticides:** Annually about 15 m$^3$ of glyphosate is needed for chemical weeding in support of manual weeding.

- **Site establishment:** The company has set up the company site to house among others the following: (i) Offices; (ii) Workshops; (iii) Stores; (iv) Fuel storage; (v) Truck / tractor parking yards; (vi) Nursery; (vii) Management residential quarters, close to the Tain Reserve and close to the Asubima Reserve (two sites).

3.3 Project activities

The main activities involve: (i) **Terrain preparation:** Terrain preparation is done in several separate activities; land demarcation, clearing, spraying, ploughing, road construction and pegging; (ii) **Plant production:** Plant production takes place in the two nurseries. The nursery at the Tain site is a rain fed nursery, which means no irrigation takes place. In Akumadan the nursery is irrigated; (iii) **Pegging** which entails the placement of sticks at intervals of 3 by 3 meters in the terrain; (iv) **Planting stumps** which consists of digging a small hole of 20 centimeters diameter and 25 centimeters depth; (v) **Weeding** which consists in the removal of vegetation growing up around the Teak or indigenous trees; (vi) **Pruning** and **Thinning** the branches that the tree produces have to be removed at regular two year interval. The first thinnings have no commercial value and are left to decompose and enrich the soil. In subsequent thinnings the stems are taken to the road side for loading on trucks; (vii) **Final felling:** At the end of the rotation the trees will be harvested. This activity consists of the felling and cross-cutting of the trees. This activity will be done using harvesters; (viii) **Waste disposal:** Waste produced during all processes of the company is sorted and disposed of in a way depending on the nature of the waste. Waste like paper and plastics will be incinerated. Used oils are stored and sold to licensed entities; old tires can be sold to authorized entities or stored (see waste disposal protocol).

The planning for the implementation of the project covers several years. Form Ghana is leasing areas to a total of 18,000 hectares which will be planted at a speed of 1,500-2,000 hectares per year.

4. DESCRIPTION OF THE ENVIRONMENT OF THE PROJECT

4.1 Overview of Methodological approach
4.1.1 Physical environment

Data for the hydrological survey are obtained from the hydrological assessment of Asubima Forest Reserve, executed in 2011. Hydrological samples were taken in Tain II Forest Reserve in 2012. Samples were taken at strategic points at outlets and inlets of waterways and analyzed in a laboratory. The following parameters were measured and the values compared to the maximum values for safe drinking water according to the WHO guidelines (fourth edition): pH, Turbidity (FAU), Dissolved Oxygen/(m/l), Conductivity (μs/cm), Dissolved solids, Alkalinity, Hardness, Calcium Hardness, Magnesium Hardness, Calcium, Magnesium, Chloride, Nitrate, Phosphate, Iron. It can be assumed that the results for the water in Asubima Forest Reserve are representative for Afrensu Brohuma Forest Reserve.

Data for the soil survey were obtained from the soil reconnaissance assessment in Tain II Forest Reserve, executed in September/October 2012 by a soil survey team from Soil Research of Ghana. The soil boundaries were drawn by interpolation with the aid of a topographic map of the area. The soils were classified using the World Reference Base for Soil Resources (WRB) of FAO (2006) and United State Department of Agriculture (USDA, 2007) soil classification system. The measured parameters included soil texture, structure, consistency, colour, drainage, coarse fragments content and land use.

4.1.2 Biological Environment

A biodiversity assessment was conducted in the project area in 2012. Using GIS applications, a grid consisting of cells, each 1-km of length or breadth was superimposed on a map of the project area. An appropriate number of transects of 1km in length were systematically distributed over the various compartments based on the number or cluster of compartments found at a particular place. Determination of the survey transect system set-up was based on three basic requirements: (i) a length of transect long enough to cover animals with large territories and home ranges (ungulates, carnivores); (ii) a transect system sufficiently fine-grained to determine the habitat preferences and density estimation of species with restricted range and small territories; (iii) a length of transect long enough to include most vegetation and farm types typical of the study area.

As a basis for comparing flora and fauna relationships, each transect was associated with a vegetation plot. The definition of High Conservation Value Forests (HCVFs) provided by the Forest Stewardship Council (FSC) has been adopted.

HCVFs possess one or more of the following attributes:

1. Forests containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia);
2. Forests containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;
3. Forests that are in or contain rare, threatened or endangered ecosystems;
4. Forests that provide basic services of nature in critical situations (e.g. watershed protection, erosion control);
5. Forests fundamental to meeting basic needs of local communities (e.g. subsistence, health);
6. Forests critical to local communities’ traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).
For the correct interpretation of the six HCVFs, the national HCVF toolkit developed for Ghana was applied to all the sites. The study employed field research, literature review and stakeholders consultation to obtain the required data for these analyses.

4.1 Socioeconomic Environment

The Socio Economic baseline assessments were done through literature review, interviews with community members, discussion with traditional landowners, and discussion with institutions. Secondary data were collected for 34 villages around the project sites (three different studies).

The primary data from households were gathered from questionnaires filled out by 170 household heads. In the selected communities and group discussions held with a number of focal people and village representatives in each community (refer to the consultation section for more details).

4.2 Physical environment

4.2.1 Climate

The Tain II Forest Reserve has a bi-modal rainfall pattern with a major and minor peak in June and October respectively. The main dry season is from November to March and there is a second dry spell in August. The mean annual rainfall is 1200 mm and the maximum and minimum annual temperature is 23.6°C and 26°C.

The Akumadan zone has a tropical monsoon climate with alternating wet and dry seasons. The long wet season starts around mid-March and ends in mid-July. It is followed by a short dry season until the end of August. From September till the end of October, there is a short rainy season, followed by a long dry season from November till mid-March. Total annual rainfall is 1227 mm on average. Mean annual temperature lays around 26°C.

Air quality in the area is generally unaffected by industry and heavy traffic and can be called good. During the peak of the dry season dust particles in the air can be irritating to the respiratory system.

4.2.2 Topography

The topography in the project area is gentle undulating with moderately steep slopes between 5 to 12%. The summits are nearly flat and broad with slopes of 0 to 4%.

4.2.2 Water quality

Water quality in Tain is generally not unsafe for drinking, based on the parameters measured in this study, except for sites where the WHO guideline value for copper (about half the samples taken) has been exceeded. However, the turbidity level is very high and the PtCo value for apparent color exceeds the WHO recommended value by ten-fold.

Several streams drain the Ashiman site. Measurements of turbidity and chemical composition of the water show that nearly all streams are polluted quite severely. Forest degradation in Asubima is so extensive that it has affected the existing water bodies. Analysis of samples of the water bodies shows severe deterioration of quality parameters such as pH, turbidity, dissolved oxygen (DO), conductivity and nitrate content. This situation is a major concern to the project, and much effort is being put in the restoration of the 30 meter buffer zones along
the water courses in order to remedy this problem. The data from Afrunso Brohuma show that
the water in the streams is of drinking quality (according to WHO standards) for all factors
except iron, colour and turbidity. It shows that the contamination of the water is minimal.

Ground water in the areas has been assessed for drinking quality for reasons of borehole
implantation. Ground water at the site near Kotaa and near Akumadan was found to be safe for
drinking.

4.2.3 Soils
The soil survey in the Tain area exposed five different soil series present in the area; Bekwai,
Nzema, Kokofu, Oda and Wenchi, three of which are suitable for teak cultivation, despite a
relatively low nutrient content. A total of 12,240 ha or 84% of the total soil surface is suitable
for planting teak. The major soils encountered have no physical restriction to the root
movement, but they are susceptible to erosion and therefore will require effective soil
conservation and management practices such as contour ploughing, strip cropping, mulching
leaving of vegetal strips between fields and establishing of cover crops at the initial stages of
planting.

The same soil series as found in the soil survey of the neighboring Asubima forest reserve have
been observed in Afrensu Brohuma. These series are the deep soils of the Bediesi and Sutawa
series, and the shallow soils of the Pimpimso series. The well drained soils, the Bediesi series,
are dusky red to reddish brown at the surface, and red in deeper horizons. The moderately
drained soils, the Sutawa series, are dark brown to brown at the surface to strong brown in
deeper horizons. The Pimpimso series are soils which are found in places where sandstone is at
or near the surface. These soils are quite shallow and have highly weathered rock or rock
fragments within 50 cm from the surface.

4.2 Biological environment

4.2.1 Flora
Four main vegetation types were identified in Tain and classified as forest, teak plantation,
farmlands and degraded areas. In the degraded areas (basal area of less than 10 m²/ha) the
vegetation consists predominantly of human-induced grassland containing the invasive species
Pennisetum purpureum, Chromolaena odorata, Broussonetia papyfera and Imperata
 cylindrica. There was no clear pattern in the distribution of degraded areas and teak plantation;
farmland was recorded mostly towards the fringes of the reserve. Although the percentage of
actively farmed land for food crops varied across the study area, fallowed areas (farm bush)
was more or less evenly distributed.

Indigenous trees representing 22 Families and 56 Species were confirmed in the study area.
Tectona grandis (teak) was concentrated in isolated local plantations but ranked highest in
abundance, followed by Ficus exasperata, Albizia adianthifoia, Cola gigantea, Antiaris
toxicaria, Holarrhena floribunda, Newbouldia leavis, Aningeria altissima, Trema orientalis,
Morus mesozygia and Albizia ferruginea. Very rare species included Mareya micrantha,
Piptadeniastrum africanum and Mucuna pruriens.

A survey executed in September 2011 recorded a total of 138 plant species belonging to 47
families in the Asubima area. The most represented plant families with between five to eight
species were the Euphorbiaceae, Fabaceae, Leguminosae, Malvaceae (Sterculiaceae),
Meliaceae, Moraceae and Sapindaceae. Fourteen families were represented by only a single
species each. The most commonly occurring plant life-form was tree which made up 60.14%
of the total recorded species.
4.2.2. Fauna

In total, individuals of four species of terrestrial small mammals were captured in the Tain II FR. Two species were endemic to West Africa: Tullberg’s soft furred mouse (*Proamys tullbergi*) and the shrew *Crocidura grandiceps*. Sixty species, belonging to 23 families were recorded on transects. More than 10% of the species recorded belongs to the Weavers and Malimbes family (Ploceidae). Other families included Flycatchers (Muscicapiidae), Bulbuls, Greenbulbs (Pycnonotidae), Pigeons and doves (Columbidae). Fourteen frog species consisting of 62 individuals were found during the study in Tain II FR.

Biodiversity monitoring in 2010 and 2011 revealed that several species of medium sized mammals, small mammals, birds, reptiles, amphibians and insects are present in the area Akumadan area. During a survey conducted in 2011 32 bird species, belonging to 32 different families, were encountered in Asubima FR. Nearly all birds were typical for savannah vegetation or open woodlands. Five uncommon species were recorded: Togo paradise-whydah (*Vidua togoensis*), Tit hylia (*Pholidornis rushiae*), Western Violet-backed Sunbird (*Anthreptes longuemarei*), black coucal (*Centropus grillii*) and African baza (*Aviceda cuculoides*). The dwarf crocodile (*Osteolaemus tetraspis*) was spotted once in the buffer zone of Asubima FR by FORM Ghana staff.

No High Conservation Value Forest has been identified in none of the project area.

4.3 Socioeconomic environment

4.3.1 Communities around the project sites

Tain II Forest Reserve is located at the border of 4 districts: Jaman North, Jaman South, Seikwa and Berekum. The towns of Seikwa in the north and Berekum in the south are the nearest locations for facilities like markets, hospitals and higher levels of education. In the social assessment conducted 2013 as part of the social environmental impact assessment, 18 fringe communities were selected to represent the social environment around the reserve. Only one community was found to be located within the reserve, on an admitted farm area.

The parts of Asubima and Afrenso Brohuma Forest Reserves managed by Form Ghana are located in the Offinso district. Nearest big town is Techiman, smaller nearby town is Akumadan. In both Techiman and Akumadan there are markets, hospitals and higher levels of education. In the social assessment conducted in 2012 as part of the social environmental impact assessment, in Asubima 9 fringe communities were selected to represent the social environment around the reserve. In Afrenso Brohuma 7 communities were selected.

4.3.2 Population characteristics in the surrounding districts

The population in all three reserves are predominantly farmers, who grow maize, yams, beans, okra and several other agricultural crops. In the Tain reserve pastoralists can also be found. The population is generally young (about half the population is under 35 years of age). The 2010 census of Ghana showed that the Offinso North district is home to 57,000 people while the estimates show the Berekum district is home to 113,650 people. About 50% of the people interviewed in the Akumadan area are literate at a level ranging from basic to post-basic. In the Tain II area about 80% of the people interviewed are literate,

4.3.3 Access to basic facilities and services

In the Akumadan areas, few of the people have access to electricity or medical assistance. The nearest medical service can be found in towns at some distance. Few of the villages have a
primary school, but secondary education can only be found in larger towns. The same goes for markets. About half the villages have access to drinking water through boreholes. In the Tain area, about ¾ of the households have access to electricity and to borehole water. For most of the communities medical assistance can be obtained within 5 kilometers distance though for some it is as far as 12 kilometers away. Most of the communities have a primary and junior high school close by. Secondary education is only available in the larger towns.

4.3.4 Agriculture and access to natural resources
All communities are strongly agricultural in nature. Main crops cultivated are maize, plantain, yams, tomatoes, beans, okra and several other agricultural crops. People have access to land outside the forest reserve through traditional channels (renting from owners). Degraded forest reserves are another source of agricultural land that, though illegal is of some importance. Traditionally the forest was available for subsistence hunting and gathering. After the forest has become degraded this role has reduced dramatically.

Details about socioeconomic characteristics of project affected people can be found in the summary of the resettlement action plan attached in annex.

5. PROJECT ALTERNATIVES AND RESULTS OF THE COMPARISON

Three project alternatives were analysed: indigenous tree species plantation, alternative site and no project option.

5.1 No project option
Before Form Ghana became active in the Forest Reserves, it was severely degraded due to several factors: illegal farming, illegal chainsaw operations and overexploitation by logging companies. Despite the illegal nature of these activities, they continued unhampered due to lack of law enforcement. In a no-project scenario there is no reason to assume that this situation would change. If Form Ghana were not to plant the Forest Reserves, but left them as they were, forest cover would not be restored. Bush fires and agriculture would maintain the land in a savannah condition. Farmers could continue to farm there with a constant risk of eviction when the law gets enforced. Degradation of the site would continue unhampered as chainsaw loggers are likely to continue to harvest the remaining trees that can be sawn into boards. The annual fires would continue to blaze through the area, reducing the vegetation and impoverishing the soils by degrading the soil moisture content and the destruction of the soil organic matter. Water quality would continue to degrade as a consequence of bush fires and farming practices. Some of the smaller streams may even cease to exist. Concerning wildlife, only animals that thrive in open agricultural land / savannah vegetation can continue to thrive in such an environment, thought the hunting pressure would keep the numbers of the larger species down. Rare plants and animals that were living on the remnants of the original vegetation would disappear as these woods are cut for creating new agricultural land.

5.2 Project option
Indigenous tree scenario
Form Ghana has investigated the possibilities of plantation establishment in Ghana in depth. Experience gained through projects executed by Form international in Cameroon and Ivory Coast has shown that the establishment of plantations with indigenous species is feasible. The growth of indigenous species in Ghana is unfortunately mostly unknown. Very little literature is available on the growth of species such as Offram (Terminalia superba), Emeri (Terminalia ivorensis), Wawa (Triplochiton scleroxylon) and Papao (Afzelia africana). Experience in Ivory Coast and Cameroon has shown that growth is slower than that of Teak.
From the ecological perspective there are both advantages and disadvantages to planting indigenous trees on a large scale. Indigenous trees represent components of the original ecosystem in an area and as such can potentially play an important role in the preservation of the local genetic variety of these specific tree species. Also many species of both flora and fauna may be linked to the indigenous species and planting them on a larger scale may help in their preservation. As none of the cited species are important fruit trees for larger fauna such as mammals, their role in the preservation of these species is probably very limited, but smaller mammals may make use of them for shelter or eat the leaves. Species such as insects pollinating the trees or living of the foliage will probably benefit from the planting of indigenous trees.

Risks associated with the planting of indigenous species include outbreaks of pests and diseases. Pests that occur incidentally in the natural habitat of the planted trees may develop into large-scale pest outbreaks in monocultures. Experience from Ivory Coast has shown that large scale plantations of Emeri and Ofram (Terminalia ivorensis and Terminalia superba) suffered from defoliating insect attacks. Chemical interventions were needed to avoid losing the plantations. As an exotic tree, Teak suffers from very few pests. Experience from the same area has shown that the susceptibility of many indigenous species to fire is a major risk. The large-scale forest fires that occurred during the 1983 to 1985 destroyed large tracts of indigenous plantation. Mature Teak is fire-resistant. In Ivory Coast this was a reason for the large scale development of Teak in plantations. The long rotation cycle of most of the indigenous trees species increases the risks associated with indigenous tree plantations.

From a social perspective no difference is expected between a plantation of Teak or indigenous trees, unless species are selected that provide fruits or other services to the people living close to the plantation. For instance, the bark of Mahogany (Khaya ivorensis, K. anthotheca or K. grandifoliola) has a medicinal value and can be used as a dye. This species can however not be planted in monocultures due to the shoot borer Hypsiphiila sp.

**Other site scenario**

Form international has conducted extensive research into alternative sites for planting. With the objective of planting Teak in mind, several Forest Reserves were assessed for suitability. The area should be a Forest Reserve because the legal status and ownership status of Forest Reserves is clear. The development of plantations in private land is possible but there is a large risk of problems with land ownership and conflicts over land. Private land is typically in the hands of many land owners and even with all caution and good conduct it is difficult to avoid conflicts over land ownership. Some land owners can be absent for longer periods of time which makes it extremely difficult to assure all landowners are heard before a land transaction is made. Form Ghana therefore chooses to work on Forest Reserves only.

The following criteria were used to assess for suitability:

- The site should have a rainfall of between 1200-1500 mm per year with a dry season of at least five months.
- The soil should be deep and fertile.
- The soil should ideally consist of a mixture of clay, loam and sand be of neutral ph.
- The area should allow work for several years and therefore not be smaller than 1500 hectares, though with the development of the company the minimum size is now at least 5000 hectares.
Several pieces of land have been investigated for the suitability for planting Teak before selecting the current areas. For instance, extensive research has gone into the Bandai Hills Forest Reserves in 1998-1999. The Pru Shelterbelt Forest Reserves has been studied in 2010-2011. The studies consisted of site visits by experts (soil specialists, plantation specialists) who produced reports concluding the sites were not suitable for planting Teak. FORIG has also studied the Forest Reserves that are in need of regeneration to see which are the most suitable for planting Teak. Both of these Forest Reserves did not meet the criteria established by Form. The reserves currently planted by Form have undergone similar scrutiny and were found to be suitable for planting.

6. POTENTIAL IMPACTS

This chapter lists the various (potential) impacts of the proposed reforestation project on the various environmental components: the ecology, hydrology, soil and socio-economic situation of the project-affected area. For every component, the negative and positive impacts are summarized in a table and the importance of the impact is analyzed. Further explanation of the impact and importance is given in a description below the table. A distinction is made between the impacts originating from the forest plantation establishment and the impacts that entail the construction of the support facilities (buildings, roads, etc.).

6.1 Negative impacts from forest plantation establishment and management

6.1.1 Impact on landscape

The project will definitely cause disturbance in the landscape in the balance of the local ecosystem, as well as a loss of (savannah) habitat because the degraded land will be transferred into plantation forest. However, a new balance will be established after plantation establishment, with a closer resemblance of the original forest ecosystem, so the disturbance is short term and the impact is moderate.

6.1.2 Flora, Fauna and Biodiversity

The Analysis of the High Conservation Value Forest areas of the three sites concluded that none of them contains a HCVF. However, activities will definitely distribute the existing fauna in the project sites as well as a loss of (savannah) habitat because the degraded land will be transferred into plantation forest. However, it is expected that after the establishment phase, wildlife will return and new flora and fauna species and will get the chance to colonize the project area.

The negative impact of most of the project activities does not exceed project boundaries. However, planting can have effects on a regional level as it may introduce new pests and diseases, which will not be contained within the project boundaries. The risk of the introduction and/or spreading of pests and diseases, will only cease after project closure. The planting of 90% of allocated area with Tectona grandis is of concern for ecological balance and floral diversity. Unexpected invasive behavior is however unlikely because Teak is already a common and known plantation species in Ghana before project establishment. The impact is therefore rated as moderate.

The establishment and improvement of roads may lead to a better access to natural resources within the reserve. This could lead to an increase in illegal activities like logging or poaching.

6.1.3 Negative impact of plantation establishment on the Soil and water
The negative impacts on soil and water resources is minimal given that the buffer zones protecting the water courses are conserved and will be enhanced as part of the project. In addition, clearing is done mainly manually, not with heavy machinery which will avoid increases in soil compaction, erosion, or turbidity of streams.

However, chemical weeding with Glyphosate, even though allowed and considered ‘non-hazardous’ by FSC guidelines, may leach into streams and groundwater. Glyphosate is bound to soil particles and broken down quickly in hot climates which reduces the risk. The period during which this herbicide is used is limited for a given area of plantation. As the tree crowns begin to shade out the weeds, the use of glyphosate ceases (approximately after 3 to 4 years). The cumulative effect of repeated use of round-up is discussed under the cumulative section.

In addition, the company will make use of pollutants such as fuel, grease, etc. which when not properly handled could be sources of pollution of soil and water.

Soil erosion and compaction can become problems when harvesting will start. In addition, upon plantation establishment, waste could become a source of impact which will require attention in order to meet sustainability objectives and FSC requirements.

6.1.3 Negative impacts on health and safety

Workers in the project are exposed to various health and safety risks including: (i) injury accident from falling objects; (ii) accidents involving powered (hand) tools; (iii) injury and illnesses from improper application of pesticides including Glyphosate-based pesticides glyphosate.

There is a serious risk of encountering venomous snakes, scorpions and centipedes while working in the nursery and in the plantation areas. Rabid animals also form a serious threat to the workers. People may be bitten or stung by either venemous or rabid animals, causing serious or less serious damage to their health. Akumadan lies at the transition zones between evergreen forest, semi-deciduous forest and woodlands. In this zone, 13 venomous snake species can be identified that may be dangerous to humans.

6.1.4 Negative impact on the socio-economic environment

Based on the results of the Resettlement Action Plan (RAP), the project involves physical displacement of 27 households from the Akumadan project area. A total of 31 buildings were identified in the total project area. The impacts of the project on these households include: (i) Loss of houses; (ii) Loss of farmland; (iii) Loss of original living environment.

A total of 420 households are directly impacted through loss of farmland in both Akumadan and Tain II. The loss of farmland will happen gradually, as the trees will only hamper growth of farm products after a number of years. Also, planting will be done in a phased approach, with 1,500-2,000ha per year. The total farmland was 1853 ha within the project areas (assessed in 2015). The impacts on these affected households are: (i) loss of farmland; (ii) loss of grazing land; (iii) loss of sheds, tents and other structures.

A number of cattle herders reside close to the project area, south of Tain II Forest Reserve. Their cattle grazes outside Form Ghana land and drink water from a drinking pond close to their settlement. However, during 2 months in the dry season, the drinking pond dries up and
the herders take their cattle to the Tain River, the northern border of the reserve. The cattle herders must therefore cross the forest reserve. The Form Ghana project area may be in the way of the route that is commonly used to cross to the Tain River. However, because of the fragmented nature of the Form Ghana project area, it does not block access to the river. The impact of Form Ghana on the cattle herders is therefore potential change of access route to the Tain River for cattle watering purposes.

6.2 Positive impact of plantation establishment and management

6.2.1 Positive impact on flora, fauna and biodiversity

As part of the project, buffer zones will be enriched and protected, indigenous trees will be planted and the project area will be patrolled to control hunting and poaching. It is likely that this will reduce hunting and poaching and increase the biodiversity and conservation value of the area. Protection of the existing natural ecosystems and providing wildlife refugia are definite.

Trees will definitely decrease fire hazard when compared to the current savannah vegetation, which is also expected to have a major impact in the region. The long rotation cycle will ensure that the carbon is sequestered for a long period of time. And the durable product that is produced with final harvest is likely to be a sustainable source of carbon sequestration. Also, the soil organic carbon is expected to increase. This has been studied for the VCS certification of Asubima and Afrensu Brohuma Forest Reserves.

6.2.2 Positive impact on the hydrology

A number of positive impacts is expected on hydrology. Major impacts are the reduction of pollution and human disturbance of water bodies, as the project area will restore and protect the buffer zones. This has a large effect, not only on the project site but also further downstream as many communities are dependent on the river for their drinking water.

As a consequence of improved soil structure and increased soil organic matter the infiltration of water and water holding capacity of the soil improve. The litter layer decreases soil run-off of water and thus also erosion. Reduced erosion minimizes water turbidity and reduces eutrophication. The increased water holding capacity of soil and vegetation cause a slowed and delayed release of rainwater which stabilizes the flow in streams.

6.2.3 Positive impact on the soil

Planting deciduous forest creates a shaded and cool environment in the wet season and an important flux of leaf litter at the onset of the dry season. These two factor limit evaporation and increase biological activity in the soil. The soil fauna will break down the leaf litter and branch material which increases the soil organic matter content. The structure of the soil is also improved because of the increased biological activity. As a consequence of improved soil structure and increased soil organic matter the infiltration of water and water holding capacity of the soil improve. The litter layer decreases soil run-off of water and thus also erosion. A note must be made that timely thinning of the plantations is needed to assure undergrowth in the plantations which further reduces the erosion risks.

Tree coverage is likely to decrease erosion at the project site compared to the current situation with savannah and fallow land. Implementation of practices will likely decrease the risk of soil
erosion during harvest. Other impacts, such as reduced surface run-off and increased soil infiltration are less likely to happen.

**Positive impact on the socioeconomic environment**
The project is expected to create 860 jobs (320 permanent workers and 540 casual/contract workers) mostly for the fringe communities where livelihoods are predominantly subsistent, hence improving household incomes. This increase in people with stable wages will increase local spending and create an inductive environment for the development of services. The same goes for the return of part of the benefit from the plantation through benefit sharing. People with stable wages will have better access to credit facilities.

On the job training increases the capacities of the people. Form Ghana has an open structure that rewards effort and talent. People showing potential have the possibility to grow in the company and occupy different positions.

**6.8 Cumulative Impacts**

**6.8.1 Similar projects**

Projects that have similar objectives as the Form Ghana Reforestation activities are:

- The restoration project in Pamu Berekum with a planting target of 800 ha/year for HIPC (Heavily Indebted Poor Countries) funded plantations. As this project focused on a different forest reserve the cumulative impacts between the Form Ghana and the Pamu project are limited;
- A planting target of 1,000 ha/year has been set under the Forest Services Division led modified Taungya system;
- An annual planting target of 20 ha for farmers involved in the IT-TO/FORIG community collaborative restoration project was set. It is not certain what the status of this project is at the moment;
- ABTS is a timber company that planted trees in the Tain II Forest Reserve as well. The company is currently not planting anymore.

**6.8.2 Positive cumulative impacts of other projects in the region can be**

Additional reforestation activities can contribute to climate stabilization in the area and create opportunities for the timber sector by increasing the production of logs for local use. Then populations of forest animals may also benefit positively from more projects at different locations. More reforestation projects in the same area allow more of the students of natural resources management education of the KNUST in Sunyani to find employment in the region thus reducing the “brain drain” of educated people to larger cities.

**6.8.2 Negative cumulative impacts**

Negative cumulative impacts of the proposed reforestation project may be: (i) competition for land may increase the prices for plantation establishment by increasing the prices for land rent; (ii) it may become more difficult to find sufficient labor when more projects are active in the region; (iii) the available land for agriculture will reduce in the region when more projects are establishing plantations at the same time.

The cumulative effect of repeated use of Glyphosate may still cause environmental damage. Many studies have been done on the properties of Glyphosate, the way it remains in the environment and the negative side effects. Studies have shown that Glyphosate is immobilized
in the soil, but can subsequently be mobilized again. As a consequence, it is possible that the active component moves to water bodies. As an active component in the soil or in water bodies, roundup can have a negative effect on soil and aquatic organisms respectively. The relatively short degradation time combined with the droplet applicator make it unlikely that cumulative effects of Roundup should affect the environment in the project area.

7. MITIGATION/ENHANCEMENT MEASURES AND COMPLEMENTARY INITIATIVES

The ESMP addresses the recommendations and mitigation measures proposed by prescribing appropriate technologies and systems in protocols to be used during the execution of the work and by monitoring the effects of the measures. The environmental and social management plan is composed of plans and protocols that describe the techniques and methods to be used and the way work is monitored. It was agreed with AfDB to try as much as possible to keep the structure of the various protocols that have already been used and proven effective in the context of the Ghana project.

7.1 Environmental and Social Management System (ESMS) and Forest Management plan

Form Ghana has developed a system of separate protocols that describe the process of environmental and social management. Together with the Management Plan, these documents form the Environmental and Social Management System. The management system is based on the FSC Principles and Criteria.

The forest management plan describes the sustainability approach of the company. It presents the following: (i) An overview of the physical environment and social-economic environment; (ii) The forest management objectives, elaborating on each of the three sustainability pillars (ecological, economic and social) and it describes the way land-use is impacted on the long-term; (iii) The organization of the managed areas including the plantation infrastructure and field planting program; (iv) the tree species selection and forest type allocation; (v) Tree nursery practices; (vi) The various silvicultural practices that will be carried out during the entire plantation rotation cycle; (vii) Risk management, including prevention of illegal activities, fire management and control of pests; (viii) A social plan that covers the involvement of stakeholders, benefit sharing, employment and intercropping by local farmers; (ix) Environmental management, concentrating on soil and water, biodiversity and High Conservation Value Forests; (x) The various monitoring activities.

7.2 prevention of illegal activities

Form Ghana is determined to prevent illegal activities, e.g. intrusion, hunting, trapping, felling, burning, etc. from taking place on the plantation. Protocol 8 describes the different ways Form Ghana adopts to realize this goal:

- Sensitization: Form Ghana will provide information to local people with insight in Form Ghana’s activities so that they’ll cooperate in preventing illegal activities;
- Surveillance: Surveillance of the boundaries is done by patrolling on foot and by vehicle and watching from the fire towers. All guards have radios for communication. Boundaries are constantly patrolled by Form Ghana’s security and management;
- Regulations: Farmers are allowed to practice intercropping according to Form Ghana regulations. These regulations describe the type of crop, planting density, restrictions for the farmer, harvesting regulations, farmer’s responsibilities etc.

7.3. Waste management and responsible use of pesticides Protocols
Protocol 4 on Waste management describes FORM Ghana’s strategy on waste management with waste produced on its various sites. It indicates the waste types and means of disposal. The Plantation Manager is responsible for waste management, collection and disposal. Regarding mitigation of impacts related to use of pesticides, Form Ghana’s company policy is to minimize the use of pesticides and to avoid possible risks for the safety and health of the employees. This is also valid for situations in which dangerous or toxic material is used. As indicated in protocol 5, FORM International reviews the weedicides and pesticides in use to verify whether they still comply with FSC standards. Other protocols contribute to reducing pollution of soil and water resources such as protocol 16 and 18. This protocol describes procedures for the purchase, storage and distribution of all fuels and chemicals used by Form Ghana and maintenance of machines respectively.

7.4 Health and safety management

FORM Ghana as developed a First Aid Procedures & Emergency Evacuation protocol (protocol 8). This protocol describes the procedures for first aid training, usage and composition of the first aid kit and handling of accidents. This document prescribes how to deal in cases of emergency. Protocol 9 focuses on procedures for the safe transportation of personnel. Protocol 10 assesses the risks related to the various work places and prescribes the safety gear people need for various jobs. Regarding the risk of encountering venomous snakes, scorpions and centipedes while working in the nursery and in the plantation areas, FG has developed protocol 23 on Envenomation by snakes and insects. This protocol identifies all the risks and for each risk how to act and manage the situation. Regarding the health risks related to improper application of pesticides, protocol 5 indicates the measures to be taken for a responsible use. In addition, protocol 10 is defined to ensure the use of protective equipment in line with the ILO Standard ‘Health and Safety in Forestry Work. As indicated in 3.2, these chemicals are used in support to manual weeding. All these measures will ensure minimal exposure of workers to health risks related to the use of pesticides.

Protocol 27 on contagious diseases was elaborated to assist FG in the information of people on contagious diseases. The information is tailored to the workforce, to regular and to occasional visitors to FG and to people wanting to visit FG while coming from an area where there is a contagious infection. Avoidance of problems with contagious diseases at FG is done by informing the people, training medical staff to recognize and act when a contagious disease is observed and by avoiding visits from people who may spread contagious diseases.

7.5 Fire prevention and fire-fighting

Prevention of fires entering the plantation is done in 3 ways: educating people, monitoring activities and creating fire breaks. The activities are regulated with protocol 21 which includes all mitigation measures specific to this subject. Please refer to environmental hazard for more details.

7.6 Resettlement Action Plan

A specific Plan has been elaborated by Form Ghana to address the needs of people who were farming on the land in the Reserves, but are no longer able to do so due to forest growth and plantation expansion. Through socio-economic surveys the people eligible for such support have been identified. Central to the plan is the possibility for farmers in the Asubima and Afrenso Brohuma area to move to the Tain II area to continue farming activities there. A new place to live has been agreed upon with traditional land owners near to the Tain II Reserve. The plan also structures the way in which people that are already farming in Tain can continue their work. People will be further prepared for the decrease in available land which will happen
when plantation establishment covers most available land by training on alternative livelihoods.

### 7.7 Stakeholder engagement plan
For both areas, stakeholder engagement plans have been developed. Form Ghana engaged with its stakeholders since the beginning of activities. It was core to the companies activities and has now been further organized in a specific document. The documents identify the relevant stakeholder for each of the areas, and the way these stakeholders are affected by the project, and the project might be affected by the stakeholders. The way stakeholders are kept informed or engaged more closely is described and the basis for the Form Ghana communication strategy described. The main activities are regular meetings. The qualification of the people interacting with the stakeholders and the budget for the activities are presented in the plans as well.

### 7.8 Community Development Plan
For both areas community development plans have been developed. These plans describe activities that have been undertaken for community development so far (road rehabilitation, bore hole, school projects etc. Also these plans describe how Form Ghana wishes to engage with the stakeholders to identify potential projects. Potential projects can be proposed by stakeholders and will be pre-screened by Form Ghana before they are discussed in the stakeholder meeting. When more stakeholders indicate they are interested in furthering the project, means are sought to realize it. For Form Ghana it is important that the projects are always a result of cooperation between the company and the stakeholders. Form Ghana also realizes other development activities which are aimed mainly at the workforce. Through the Benefit Sharing Agreement, funds are made available from the sales of timber (through the Forestry Commission), which will go to the district council for local development.

### 7.9 ESMP cost estimates

The ESMP cost is estimated to 673533 USD (table 2).

**Table 2: ESMP cost estimates**

<table>
<thead>
<tr>
<th>Main items of the ESMP</th>
<th>Annual cost (GHC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Management Plan</td>
<td>21,375</td>
</tr>
<tr>
<td>Waste management Plan</td>
<td>8,550</td>
</tr>
<tr>
<td>Stakeholder engagement plan including the grievance redress mechanisms</td>
<td>74,800</td>
</tr>
<tr>
<td>Resettlement Action Plan</td>
<td>348,390</td>
</tr>
<tr>
<td>Community Development Plan</td>
<td>413,915</td>
</tr>
<tr>
<td>Health and safety management (excluding Fire management)</td>
<td>539,500</td>
</tr>
<tr>
<td>Fire prevention and fire-fighting</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Monitoring Plan</td>
<td></td>
</tr>
<tr>
<td>• Internal</td>
<td>15,000</td>
</tr>
<tr>
<td>• external</td>
<td>171,570</td>
</tr>
<tr>
<td>Total GHC</td>
<td>2,593,100</td>
</tr>
<tr>
<td>Total USD (3.85 cedi to the dollar)</td>
<td>673,533</td>
</tr>
</tbody>
</table>

*Source: FORM accounting data*
8. EXPECTED RESIDUAL EFFECTS AND ENVIRONMENTAL HAZARD MANAGEMENT

8.1 Residual effects

No residual effects of significance is expected after mitigation measures have been properly implemented.

8.2 Environmental hazard

The plantations of Form Ghana are situated in a landscape with savannah characteristics. Grass species such as Elephant grass, Guinea grass and Spear grass, that grow up to 5m tall, cover most of the area. This vast area of combustible material easily catches fire in the dry season (November-March), either naturally or human induced. Due to a strong desert wind from the North, the harmattan, these fires can spread extremely fast. Several villages have been struck by the fires in the past years; e.g. Kotoa and Pruso. Everybody knows about the great fire of 1983 in the Akumanda, in which the whole reserve was burnt. After the fire, the forest was further depleted by illegal loggers. Fire is the greatest risk for the plantation. Mature teak can withstand some fire but young plants are not yet resistant. Most of the native forest species cannot withstand fire at all.

Fire-fighting and fire prevention are therefore a major part of Form Ghana’s operations. Proper instructions and appropriate fire-fighting tools are crucial to prevent the plantations from burning and to stop bush fires before they reach the plantations.

Prevention of fires entering the plantation is done in 3 ways:

- educating people: Risks of fire in the plantation are discussed with local communities and intercroppers through the following media: (Stakeholders meetings, Intercropper meetings, visits to fringe communities and neighbours)
- monitoring activities: Form Ghana security guards monitor all activities that take place in and around the plantation. Three rapid response fire teams and one back-up rapid response team patrol the plantation and guards look out over the terrain from the 4 permanently manned watch towers. They enforce a no-fire rule in plantation, identify high risk areas and notify management. All observed fires are recorded and analysed as described in monitoring plan.
- creating fire breaks: The purpose of firebreaks is to stop or slow down fires. In addition to natural firebreaks such as rivers and indigenous forest, two types of man-made firebreaks are constructed: primary and secondary fire breaks. For primary firebreaks, a 10 meter wide belt is constructed around all planted areas. This belt is cleared of any combustible material through weeding and clearing, early burning and, if possible, ploughing. The belts are located 5m inside and 5m outside of the plantation. Secondary firebreaks are 10 meter wide belts along all plantation roads, 5 meter on each side of the road. This area is cleared of all combustible material except planted trees by weeding and clearing.

Fire fighting

Once a fire is close to or inside the plantation, a number of measures are in place to fight it;

- Fire towers: The security guards in the fire towers detect smoke or fire and report size and compass direction to the main gate via radio communication;
- Training: All Form Ghana employees that are involved with fire-fighting are trained in fire-fighting practices before the start of the dry season;
• Fire teams and Equipment: There are 3 operational fire teams with appropriate equipment that rotate shifts so that every week one team is on duty for 24 hours a day.

9. MONITORING PROGRAM

Monitoring and evaluation of forest conditions and management performance are necessary to assure the sustainability of forest management. A system was designed for regular monitoring of the plantation. The collected data are incorporated in the management plan and used in management decisions and implementation. The planning of the monitoring is a separate document. Monitoring is an essential part of the management cycle at Form Ghana. The collected information is bundled yearly and published in annual monitoring reports. It is also used to make adjustments to the management plans and the management protocols. This process follows the cycle of plan, do, check, act.

9.1 Monitoring roles and responsibilities

The responsibility for implementing the ESMP lies with Form Ghana who delegates part of the responsibilities to Form international, regarding monitoring, training and document maintenance. Form Ghana commits itself to different types of monitoring: Biodiversity, Forest Condition, Water Quality, Forest Production, Economic Aspects and Social Benefits. Applied methods of monitoring depend on the purpose of each monitoring activity. Every year, a monitoring plan for Form Ghana is elaborated by Form international, including all monitoring activities that are expected for that year. Included in the monitoring plan is a list of indicators and verifiers that Form Ghana adheres to.

The document structure is depicted in the figure below.
9.2 Components of the Monitoring Program

9.2.1 Flora, Fauna and Biodiversity monitoring

Three aspects of biodiversity are included:

- Floral diversity in the buffer zones
- Small and medium sized mammal diversity
- Bird diversity

Two indicators have been developed to measure biodiversity in the plantation:

- Increase of buffer zone woody biomass stocks up to 350 m$^3$/ha with at least 2 m$^3$/ha/y
- Tree species richness of the project area will remain equal or increase compared to the baseline situation

In order to verify these indicators, flora in buffer zones is measured by a Form Ghana monitoring team, trained by Form international. Procedures are the same as for indigenous plantation, described in the Forest Health section below. Buffer zones are monitored every 5 years. Mammal and bird diversity is measured every 5 years by external experts along transects for systematic data collection. Transects are positioned in a 1km x 1km grid in the North-South direction. The fauna team consists of at least two expert for birds, mammals and reptiles. As birds are only active in the morning and late afternoon, data collection takes place from 6.00am to 10.00am and 15.00 to 18.00. The shrew *Crocidura grandiceps* will be followed more specifically through targeted trapping and release exercises to get a better view of the population in the Tain forest reserve.

9.2.2 Fire monitoring

Fires are recorded as they occur by the main gate security. Fires are reported by the fire towers who indicate a direction in which they see a fire. Fire data contain the directs from the various towers, whether it was inside or outside the plantation and how the fire was stopped. The records can be plotted on a map for analysis of the sensitive areas.

9.2.3 Water quality

Water quality is monitored by Form Ghana to assess the effect of the various stages of plantation establishment on the rivers and streams on the plantation. The quality of the water is expected to improve due to the restoration of buffer zones and reduction of erosion on the plantation surface. As part of Form Ghana’s commitment towards FSC, Form Ghana should be able to proof that water quality is not degrading due to plantation establishment (FSC Requirement 10.6.3: Plantation activities shall not degrade water quality, and impact negatively on local hydrology). Form Ghana will measure water quality 2 times a year: once during the dry season, once in the rainy season (after rainfall). The following parameters are measured:

- pH
- Temperature
- Total Dissolved Solids (TDS)
- Conductivity
- Turbidity

In addition to this system, samples will be analysed in the lab for their chemical composition, to assess relevant components such as Glyphosate, which is used for weed control.

9.2.4 Social

Impact of Form Ghana operations on surrounding communities is monitored every year by means of standardized group discussions with community representatives (men and women).
Based on previous monitoring sessions and on SEIA data, a description of the surrounding communities is made. Every 5 years, Form Ghana’s plantation manager will do a more extensive social monitoring to update this information.

The monitoring results are reported in an annual monitoring report. All topics included in the monitoring plan are recorded in this report. A public version of this report is published on the Form Ghana website.

10. PUBLIC CONSULTATIONS AND DISCLOSURE

10.1 Stakeholders consultation as part of the ESIA preparation and approval

Groups consulted

During the field work for the Impact Assessments, 34 communities / groups were consulted. In addition to that several government institutions, traditional rulers and other organisations active in the regions were consulted.

Issues discussed

During the fieldwork of the socio-economic study, structured stakeholder consultation meetings were organized in the settlements surrounding the project area to capture the views of the parties affected. These intensive stakeholders’ consultations aimed to obtain the opinions and views of stakeholders and local communities on the proposed project with the main focus on social, cultural, economic and conservation aspects as well as the perceived associated impacts. Stakeholders were also asked about any concerns and expectations they have regarding the project.

Main concerns

People voices several concerns during the consultations rounds. The concerns are presented below:

- Company will promise many things and not keep promises
- Company may be linked to political parties
- Information from discussions with communities will not reach management
- Company will not hire locally
- Influx of people from outside the communities will threaten community stability
- Loss of available land for planting crops
- Destruction of perennial crops and eviction of cattle herders
- No more possibility for (illegal) chainsaw lumbering in the reserve

How the key concerns were addressed

Most of the concerns are based on assumptions that are inspired by previous bad experiences with outside organisations. Form Ghana has explained what it will do and what the consequences of the activities are. Form Ghana has made clear that there will be an end to illegal activities, but that those that will be impacted by that can find jobs at Form Ghana as the company is hiring several hundreds of individuals on a permanent and temporary basis. It was also made clear that the company has a way of working that does make it possible for comments form the people to reach management. Through the intercropping the availability of farm land is assured for several years. Concerns are addressed at every opportunity (village meeting, stakeholder meeting etc.)
10.2 Further Consultation Activities

Stakeholder engagement is a continuous process for Form Ghana. Stakeholder engagement is done through a number of activities:

- **In depth sharing: provision of reports and meetings with individuals:** Form Ghana shares in depth information with partners such as the Forestry Commission and the African Development Bank. FSC™ collects the information itself and will perform and annual audit to assure it obtains the information needed to continue allowing Form Ghana to use the trademark of that organisation;

- **Active engagement: community representatives:** Form Ghana has selected representatives in the communities. The company communicates through these volunteers to the community and also builds their capacity on forestry protection issues to assist the company;

- **Active engagement: central stakeholder meetings:** Form Ghana will organise at least two stakeholder meetings per year;

- **Active engagement: inter-cropper meetings:** Form Ghana organizes meetings with the inter-croppers twice a year;

- **Active engagement: school visits:** Form Ghana has done a round of visits to schools in the vicinity of the project area.

- **Information sharing: company website and newsletters:** Form Ghana’s website is kept up to date to assure it reflects the actual situation of the company. Reports such as the public monitoring report, the Social and Environmental Impact Assessments and reports of studies are available to download;

- **Grievance and redress mechanism:** Although due care is taken to avoid that grievances arise, it should not be forgotten that all the work is done by people, and conflicts and grievances may arise. Form Ghana has a special procedure to deal with grievances and conflicts (protocol 7 “grievance and redress mechanism” provides all the details regarding this procedure);

- **Capacity building company:** The company will organise a training for the people that deal with stakeholders directly to assure professional conduct.

10.3 Public Grievance Mechanism

In case of grievances or complains within Form Ghana or between Form Ghana and an external party, Form Ghana will follow fixed procedures with fixed timelines to solve the matter. As a general rule, grievances and complaints should be discussed at an early stage to prevent conflict situations.

The Grievance and Redress protocol also applies to complaints and grievances that may arise between Form Ghana’s settler population and their host community. Any issues will first be discussed between the settlers and the community, but should any conflict arise, Form Ghana can be notified and the normal grievance procedure applies. The procedure follows clear steps:

1. Administering grievances and complaints
2. Written response
3. Mediation by a Complaints and Grievances Committee
4. Appeal in court

Appeal in Court is a last resort when grievances cannot be redressed. All efforts are focused in solving grievances in an equitable manner to avoid having to resort to court cases.
11 CLIMATE CHANGE

**Vulnerability analysis:** The Bank’s climate change screening system does not include the Forestry sector; therefore a climate change category has not been assigned to the project. Nevertheless, an analysis of possible risks as been carried out. As part of Ghana’s climate change (CC) country studies for the second communication on CC various models and projections have also been applied. Their conclusions vary enormously, but they show clear signs of climate change and confirm the country’s vulnerability. First, there are clear signals of warming in all models. An increase of 1°C has been seen over the past 30 years. One recent projection estimated temperature increases of 1.7°C to 2.04°C by 2030 in the Northern Savannah regions, with average temperatures rising as high as 41°C. Secondly, there is uncertainty on rainfall it may increase, or decrease as a result of CC.

In summary there is no history of flooding in the area and chances of flooding are further reduced by the planting activities. A temperature increase of 1.7°C to 2.04°C is not expected to affect the project’s activities. However, longer period of dry seasons coupled with dry wind may affect the water requirements of the trees.

**Adaptation:** The Form Ghana nursery site is designed to produce teak stumps and indigenous seedlings in polybags. The following structures are present: (i) uncovered, irrigated area for teak stump production; (ii) Irrigated shade sheds for germination and growth of indigenous seedlings; (iii) Water pump station near the pond. In the Akumadan nursery water is used for irrigation purposes. This water is taken from a stream which flows past the Akumadan nursery. Annual intake of water is about 30,000 m³. In case of longer period of dry seasons, groundwater may complement the required water for the various project sites.

The planting will reduce the risks identified above in the project area as follow: (i) reduction of evaporation from soil and stream in the planted area; (ii) reduction of flooding risks; (iii) reduction in the strength of wind.

**Mitigation:** The sequestration of carbon is significant and will be a net sequestration from the age of 4 years of the plantation. An estimated climate change mitigation potential of 4.79 MtCO2e over 25 years. Methodology used is the CDM consolidated methodology “Afforestation and Reforestation of Degraded Land” AR-ACM0001. This methodology describes how areas eligible for carbon certification are identified and how the calculations are done. The report on VSC certification is available on the Form Ghana and VCS websites.

To safeguard against the potential significant reversal of the accrued environmental and climate change benefits from forest restoration, the following activities are important: (i) minimizing fire risks; (ii) no harvesting of trees in the restored buffer zones; (iii) avoiding erosion and pollution during harvesting; (iv) ensuring a timely replanting after the final harvest; (v) a mosaic of buffer-zones and indigenous plantation will ensure that key parts of the forest landscape remain in place.

12 INSTITUTIONAL CAPACITIES AND STRENGTHENING PLAN

All new employees at Form Ghana will receive an introduction training on general company policy as well as on their specific job requirements, such as nursery techniques or plantation management techniques

Training of personnel is essential for the safety on the work floor and the quality of the work. Trainings are given on various subjects and some types of training will be periodically refreshed to assure the highest level of capacity. Some types of training are specific to certain
posts (chainsaw operator) whereas other trainings concern everybody (safety and FSC certification).

FORM Ghana is planning to recruit an environmental and social expert to strengthen its team and to ensure a better implementation of the ESMP in 2016.

13 CONCLUSION

The ESIA has evaluated the potential environmental impacts during establishment and management of the project. The assessment indicates that no significant environmental impacts will occur as a result of the project and, when taken together, the overall environmental and social impact will not be significant. The ESIA reports and relevant annexes have been submitted to EPA Ghana for approval and issuance of the environmental license.
REFERENCES AND CONTACTS

List of documents consulted


- Tollenaar, M.L. and Wanders, T.H.V., 2015, Social and Environmental Impact Assessment: Form Ghana reforestation project in Tain Tributaries Block II Forest Reserve, Ghana


- Tollenaar, M.L., 2013, HCVF Analysis: Analysis of the High Conservation Value Forest areas of Afrensu Brohuma Forest Reserve, Ashanti Region, Ghana


- Westerlaan, P., and Tollenaar, M.L., 2014, HCVF Analysis; Analysis of the High Conservation Value Forest areas of Tain Tributaries Block II Forest Reserve, Brong Ahafo Region, Ghana

- Tollenaar, M.L., 2015, Socio-Economic Impact Mitigation Action Plan; Form Ghana Reforestation Project

For further information, contact:

For Form Ghana
- **Willem Fourie, Managing Director Form Ghana**
  Form Ghana Head Office Sunyani, Ghana, E-mail: *w.fourie@formghana.org*

For the African Development Bank
- **Richard Fusi, Senior Investment Officer**, AfDB Headquarters, Cote d’Ivoire, E-mail: *r.fusi@afdb.org*
- **Modeste Kinane, Principal Environmental Specialist**, AfDB Headquarters, Cote d’Ivoire, E-mail: *m.kinane@afdb.org*
- **Erika Auer, Senior Social Development Specialist**, AfDB Headquarters, Cote d’Ivoire, E-mail: *e.auer@afdb.org*