

CSR and Mine Closure in Ghana, West Africa

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Abstract

Golden Star Resources operates four mines and two processing plants in Ghana, West Africa with an annual production of about 350k ounces of gold. As part of the legal requirements within Ghana, every mine must have a rehabilitation and closure plan at the start of operations. This is gradually refined as the development continues through to closure.

As part of our closure and rehabilitation planning, we complete a series of stakeholder consultations aimed at identifying the post closure needs of our communities. We had recent experience with some closed out areas that were forested that were then cut down by local stakeholders so that they could develop farms. This disturbance of a rehabilitation project makes the final hand over to the Government of Ghana and the Traditional Authorities difficult as there are criteria to be met.

The development of a more productive economic base is, therefore, factored into our development and closure planning. We understand that our operations will eventually close, resulting in a reduction in net income in our stakeholder communities. Therefore, we have established an oil palm project on disturbed lands that aims to provide longer-term benefits to our communities post closure. This is, of course, coupled with ongoing infrastructure development that is passed to the relevant government authority for ongoing operation and maintenance (e.g. health clinics, hospital wards and schools).

Our closure planning builds on the current experience and involves extensive community consultation. As we advance our projects, we develop a mosaic approach to closure, based primarily on land use capability but aimed at our ongoing corporate social responsibility (CSR) work. We aim to close our tailings impoundments as oil palm plantations, flooded pits as aquaculture and other areas as a mix of farmland and firewood – all of which have been either trialed or tested as part of our ongoing efforts. By building our closure plans into our CSR efforts, we can ensure that our operations leave a lasting positive legacy in Ghana.

1 Introduction

Golden Star Resources Ltd. (GSR) operates four mines and two processing plants in Ghana, West Africa. GSR transitioned from an exploration company to a gold producer in 1999 with the purchase of the Bogoso gold mine. Through a subsidiary Golden Star (Bogoso/Prestea) Ltd. (GSBPL), GSR owns and operates the Bogoso/Prestea gold mining and processing operation (Bogoso/Prestea) located near the town of Bogoso, Ghana. Through a subsidiary, Golden Star (Wassa) Ltd. (GSWL), GSR also owns and operates the Wassa gold mine (Wassa), located approximately 35 km east of Bogoso/Prestea. Wassa mines ore from pits near the Wassa plant and also processes ore mined at our Hwini-Butre and Benso (HBB) mines located south of Wassa. GSR holds interests in several gold exploration projects in Ghana, elsewhere in West Africa including Sierra Leone, Burkina Faso, Niger and Côte d'Ivoire, and in Brazil and Suriname in South America.

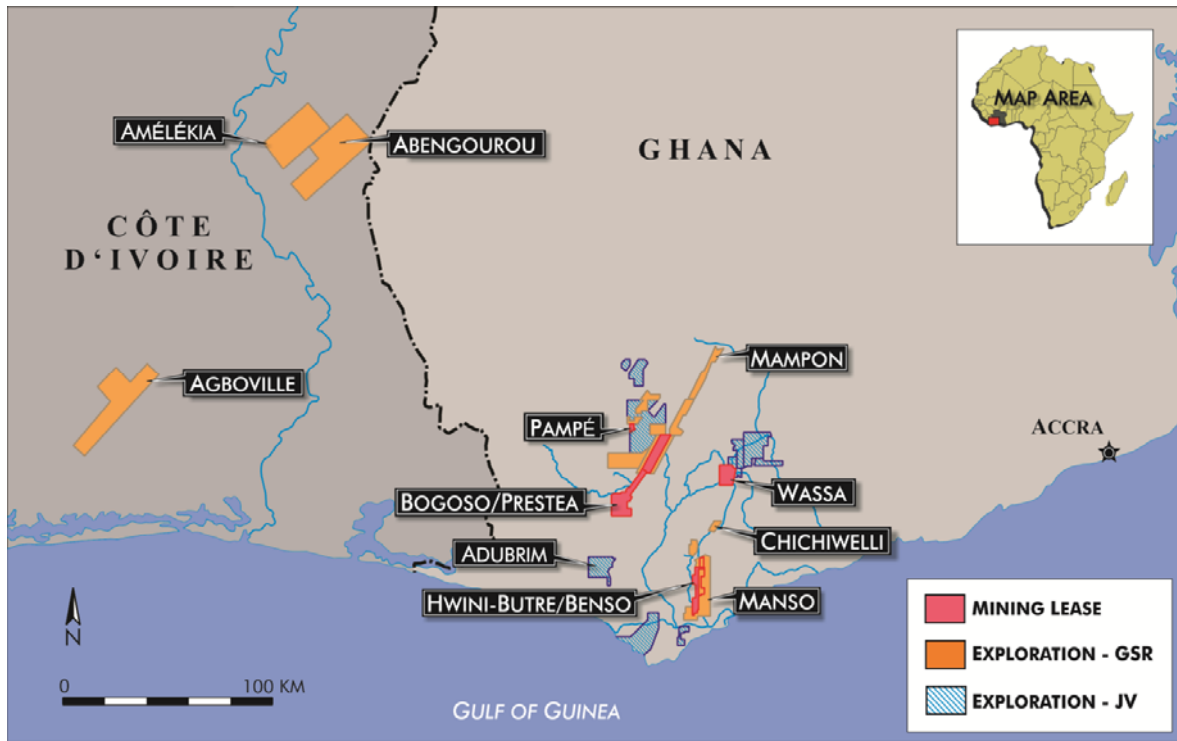


Figure 1 Location of the GSR Operations and some of GSRs West Africa Exploration Properties

The history of production and development for GSR is as follows:

- 1999 - acquired the Bogoso property and began operating its mines and CIL processing facility
- 2001 - acquired the Prestea property located adjacent to the Bogoso property and mined surface deposits at Prestea from late 2001 to late 2006
- 2002 - acquired Wassa, and constructed the Wassa plant, which began commercial operation in April 2005
- 2007 - completed construction and development of the Bogoso sulfide plant
- 2005 - acquired the Benso and Hwini-Butre properties; the Benso mine began sending ore to the Wassa plant in 2008; the Hwini-Butre mine began sending ore to the Wassa plant for processing in 2009.

GSRs overall objective is to continue the growth of our mining business both through internal growth and external acquisitions.

2 Environmental Bonding in Ghana

The environmental legislation within Ghana requires mining companies to develop provisional rehabilitation and closure plans that include the costs associated with the closures. In 2005, pursuant to a reclamation bonding agreement between the Ghana Environmental Protection Agency (EPA) and GSWL, we bonded \$3.0 million to cover future reclamation obligations at Wassa. Pursuant to a further bonding agreement between the EPA and GSBPL, we bonded \$9.5 million in early 2006 to cover our future obligations at Bogoso/Prestea. In 2008 the GSBPL letter of credit was increased by \$0.5 million to cover the Pampe mining areas.

Each of the bonding agreements provides a series of stages for the reduction of the bond. These are based on achieving certain levels of reclamation (*e.g.* landform, vegetation establishment) and are reviewed by the EPA before the bond is released. The completion criteria are based on the end land use. As such, agreement with the stakeholders is required before a final land use can be developed. This has changed over the past several years. Originally, the EPA required that land in the west of Ghana be returned to tropical forest. However, intervention by communities and mining companies has resulted in a model where stakeholders develop a land use plan that is then sent to the EPA for review and approval.

2.1 Land Use Planning and GSR

When GSR took over the Bogoso and Wassa operations, rehabilitation work was underway and had already been completed in certain areas. This was based on the old model where the EPA defined the final land use plan which, for Bogoso/Prestea and Wassa, was defined as successional series with a view to establishing a tropical forest. Therefore, the initial work focussed on developing biomass within the ecosystems through the extensive use of fast-growing legume trees such as *Acacia mangium*. These trees grow rapidly and, due to their nitrogen fixing capabilities enhance soil characteristics and nutrient levels. Large amounts of biomass and leaf litter are rapidly incorporated into the developing ecosystem making it an ideal species for enhancing the nutrient poor soils of tropical West Africa.

To further the development of the tropical forest, following the initial establishment of the legumes, the forested areas are thinned and native species are planted under the shade of the legumes. The soil conditions and shade provide good growing conditions for the native hardwoods, so allowing a developing forest to mature with minimal management beyond 5 years. As much of the rehabilitation work carried out is concurrent with operation, the option to manage the developing forests in the longer term is available.

The evolution of the rehabilitation planning around GSRs operations is primarily driven by stakeholder community needs. GSRs operations are close to smaller centres and a number of villages and hamlets. As such, developing our operations takes place in areas that were previously affected by shifting slash and burn agriculture. Our initial land use for mining, therefore, removed some of the agricultural land from production. GSR offsets this loss with a local hiring policy and local purchases that inject much needed cash into the local economy, so stimulating the economy. However, there is still a need for agricultural production from the existing land base.

As the local population increases and the burgeoning younger population comes of age, there is increasing pressure on the existing agricultural base. Therefore, GSR encountered several instances where mature *A. mangium* trees were either cut down to allow farm development or burned. Both of these techniques are used frequently by local farmers to prepare land for agricultural production.

In meetings with the local community leaders, it became evident that the community needs and the work that GSR was carrying out in concurrent rehabilitation were incompatible. Therefore, GSR developed a model for integrating community needs into rehabilitation and closure.

3 Corporate Social Responsibility and GSR

GSRs corporate social responsibility (CSR) programs are well developed and address the dual needs of stakeholder communities for improved services and economic development. We offer opportunities for community infrastructure development via our Golden Star Development Foundation that is funded through a contribution of \$1 per ounce produced plus 0.1% of pre-tax profit. The GS Development Foundation uses community committees to select projects from within the communities. Our approach to CSR has changed to reflect the reality of community needs.

Initially, we approached local opinion leaders with a proposed project and the community accepted the project. Through our community meetings, we determined that the projects were not necessarily the community development initiatives that the community most needed. Therefore, we initiated a program to train local community committees to identify projects from within the community and present them to the GS Development Foundation for funding. All projects are reviewed by a broad community committee before being submitted for funding. We also require partnerships with institutions that will continue to look after the project once it is completed (e.g. Ghana Education Service must accept, staff and fund any schools). This

provides sustainability for the infrastructure that we develop.



Photo 1 GS Development Foundation Project: Bondaye Health Post

A further evolution of our CSR development initiative was to move to a turnkey hand over. Initially, our commitments from sponsoring agencies included the installation of equipment (e.g. desks in schools) for which they receive government funding. This was aimed at allowing more projects and sharing the costs. However, immediately after the hand-over to the agency, we started to receive petitions for furniture and buildings were not commissioned as the

equipment was missing. Therefore, any GS Development Foundation approved project must have a sponsoring agency and must be complete.

As a further initiative, we established the Golden Star Oil Palm Plantations Limited (GSOPP), which is also a benefit sharing initiative with support established at \$1/oz produced. This was in response to the need for local economic development and followed a series of alternative livelihood projects that met with limited success. We evaluated the economic development options and were able to identify gaps in agricultural productivity that were due to a lack of local management and skills. The initial proposal for the GSOPP was presented to stakeholders and the Traditional Authorities agreed to contribute land for the oil palm plantation development.

The project was started with a 267 ha plantation at Bogoso and now has been expanded to 890 ha in total (including an outgrower section of 100 ha). The main problem with such initiatives in Ghana is that they are started by an entity and then the local people are left to manage the project themselves; this frequently results in a good initiative failing and the people reverting to subsistence agriculture.

For the GSOPP, the plantation is run along the lines of a commercial plantation with direct input from the Plantation. Support is provided for the development of the plantation through to maturity of the plants so that they are producing fruits to generate an income for the small holder farmers. During this time, labour and inputs are provided by GSOPP; the small holder farmers also receive training in plantation management, plant husbandry and business. For each plantation, a small holder farmers association is formed that provides support for the farmers and interacts with GSOPP management. The total support for GSOPP now exceeds \$2.8M.



Photo 2 Bogoso Oil Palm Plantation



Photo 3 Transporting the fresh fruit bunches to the road for collection

4 GSR and Concurrent Rehabilitation

As part of the ongoing environmental management at the various operational sites, GSR operations carry out concurrent rehabilitation of areas of the mine that are no longer required for operations. This was initially completed with a view to establishing a tropical forest on the site. Therefore, the approach to the rehabilitation of sites was generally as follows:

- Evaluation of the site conditions (*e.g.* determination of potentially acid generating rock, contamination, slope)
- Develop a closure plan in line with the GSR Corporate Standard for Rehabilitation and Closure
- Complete contouring and capping
- Planting and maintenance
- End land use planting following the initial ecosystem development

A typical rehabilitation sequence for a potentially acid generating dump is shown in the following photographs. The waste is capped with 2 m of compacted oxide and the planted to a mix of legumes and grasses to prevent erosion and provide stability to the waste dump cap.



Photo 4 Capping for ARD prevention at Subriso East Waste Dump



Photo 5 Initial plant at Subriso East Waste Dump

As indicated above, the end land use plan for many of the areas was for tropical forest development. However, pressure on the land base in the area resulted in some of the rehabilitated areas being burned by farmers so that the land can be used for farming. This is the normal approach by subsistence farmers who



Photo 6 Burning of mine land by stakeholders for farm development

fallow land for extended periods and then burn the land to clear the vegetation for planting. Rehabilitated mined land is seen to be ideal for this approach as the management of the sites is to increase soil nutrient content and organic matter.

Meetings with local stakeholders indicated that the rehabilitated land when released to the Traditional Authorities would be incorporated into the agricultural base. Additionally, forest patches are not as effective as continuous forest and the plants and animals are subject to intense hunting and gathering pressure from the local communities. This reduces the value of the secondary forest, which, if not protected, would just be cut down and burned.

5 Rehabilitation for CSR

As a result of the local stakeholder need for additional land, we revised our rehabilitation plans in consultation with the EPA. Therefore, we started some field trials to guide the rehabilitation work with a view to integrating the rehabilitated land into the economic base for the stakeholder communities. Field trials were completed for vegetables, oil palm *Jatropha* (fruits are for bio fuel). The results showed that food and cash crops could be produced on the waste dumps. Testing of the produce indicated that the food was of acceptable quality for consumption. Work on the rehabilitation of tailings storage facilities indicated that oil palm could be successfully grown on the tailings. These areas, once rehabilitated to oil palm, will be incorporated in to the GSOPP plantation base, so further providing a secure future for some GSR stakeholders.



Photo 7 *Jatropha* planted on a waste dump at the Wassa Mine



Photo 8 Maize planted at a Wassa Waste Dump



Photo 9 Lettuce at a Wassa waste dump



Photo 10 Direct planting of oil palm in a closed out tailings storage facility

The trials indicated that the rehabilitated sites could be incorporated into the local agricultural land base; the maize produced was donated to a local school as part of the Ghana School Feeding Program. Therefore, the rehabilitation planning process was adapted to incorporate a wider stakeholder consultation in that community stakeholder consultation was added and the suggestions incorporated into the rehabilitation and closure plan before it was forwarded to the EPA for final approval. Community consultation for rehabilitation and closure is key to the success of plans where operations are close, or easily accessible, to stakeholder communities.

Experience with rehabilitation of sites shows that there is scepticism amongst stakeholder communities but open houses held to educate community stakeholders on the work proved to be successful. This allowed the stakeholders to follow progress made with the rehabilitation work and to be able to understand that the land affected by mining could be returned to a productive use. The following sections provide the details for two examples of CSR integration into rehabilitation planning and implementation.

5.1 Wassa Mine Borrow Pits

To develop the Hwini Butre and Benso mines for the Wassa operation, and access road was required. The access road was partially new road and partially an upgrade to an existing rural road. However, the



Photo 11 GSWL rehabilitated borrow pit showing plantain

construction required borrow pits along the access road alignment. These borrow pits required rehabilitation and the Wassa Mine took the opportunity to carry out rehabilitation of the borrow pits in conjunction with the local stakeholder farmers. Each borrow pit was assigned to a farmer and the inputs were provided for the rehabilitation. The aim of the project was to increase the cash crops that the farmers could produce and the farmers could then use to the improved / new

access road to transport their produce to market.

Each of the borrow pits along the road alignment was rehabilitated with plantain as the key cash crops. This provides each of the farmers with a continuous cash crop. Topsoil was spread on majority of the borrow pits from which gravels were won to build the road and planted with both indigenous and leguminous tree species as well as foodstuffs and cash crops. GSWL supplied the farm inputs and planting materials as well monthly allowance between GH¢50 to GH¢150 (US\$35 to US\$100) depending on the size of the farm. During 2010, it was estimated that an additional US\$6,000 was generated by the 50 farmers. This needs to be placed into context where the minimum wage is about US\$4/day.

5.2 Bogoso Mine Plant North Pit

The Plant North Pit was mined adjacent to the town of Prestea. Prestea was developed as a result of the underground mines in the area that have been operating throughout the past 120 years. The environmental approval for the development of the project required that the pit be backfilled and then rehabilitated. Due to



Photo 12 Backfilling the GSBPL Plant North Pit

the location immediately adjacent to the town, a community forum was held and input for the rehabilitation and closure of the area was incorporated into the plan that was submitted to the EPA for approval. The Plant North Pit consisted of various pieces of infrastructure and the main operational areas of the open pit and waste dumps. As part of the operation, the open pit was sequenced and some of the northern end of the pit backfilled before the completion of operations. Work to complete the backfilling is ongoing using contract civil companies.

Stakeholder engagement for the closure of the Plant North Pit included individuals, government agencies, and community groups. A series of consultation meetings were held on the specific issues of post-mining land use with the Prestea local authorities, special interest groups and individuals within the community. These stakeholders were also engaged in deciding decommissioning options that will assist the long term economic and social sustainability of communities associated with the mine. Letters and communication were received from stakeholders to define the end land use plan. The final land use plan for the various components is as follows:

- Plant North Pit – backfilled and to be used for agro-forestry, re-establishment of the original drainage patterns
- East Dump - seamless interface between the site of the waste stockpile and the re-profiled pit and will be agro-forestry
- Temporary stockpile area – agriculture
- Maintenance workshop – maintained as part of ongoing GSBPL operations
- Old Post Office and Labour Office - handed over to the Prestea Urban Council (PUC) for use by Agricultural Extension Officers and as a Community Library / NGO Centre, respectively
- Old Police Station – community and the PUC will determine the use
- Access road – integrated into the Prestea road system
- Railway Valley Spring - rehabilitated

6 Conclusions

GSR has developed options for corporate social responsibility at its operations in Ghana. By working with a flexible model, GSR has been able to react to its improved understanding of community needs and respond to the long-term needs of stakeholder communities for economic development both during operations and at closure.

Community consultation for closure is a key driver to understanding the future community needs. By incorporating economic development options into closure planning, GSR is able to improve local agricultural production and hence incomes. The longer term options for the closure of tailing disposal facilities to oil palm plantations that will then be incorporated into GSOPP further offers enhancements to local agricultural production.

As GSRs CSR programs continue to develop, changes are anticipated as we continue to address changing stakeholder community needs.