8.0 CLOSURE AND DECOMMISSIONING

Closure and decommissioning of the Project would be accomplished in accordance with Ghana's *Mining and Environmental Guidelines* (1994) and the Company's Policy and Standards (see **Annex A-3**). Several aspects of site decommissioning and reclamation planning have already been incorporated into the initial design of the Project. Reclamation activities would be designed to achieve, at a minimum, post-mining land use consistent with a level of productivity and biodiversity present at pre-mining levels. Post-mining land use would be determined in consultation with the EPA, other Ghanaian governmental institutions and stakeholders and local communities and is likely to include areas for agriculture, livestock grazing and wildlife habitat.

A detailed Closure and Decommissioning Plan is required to be submitted to the EPA within two years of mine closure. The Closure and Decommissioning Plan would describe reclamation objectives and specific reclamation/closure activities for the open pits, Waste Rock Disposal Facility, Tailings Storage Facility, Water Storage Facility, mill and process plant, Sediment Control Structures, storm water management structures and ancillary facilities. Final grading and contouring schemes would also be described for the Project area.

The Closure and Decommissioning Plan would be developed for anticipated operational conditions of facilities, tailings characteristics, site climatic conditions and available construction materials and would be consistent with the following guidelines and regulations:

- Guidelines addressed in the Government of Ghana Environmental Protection Agency Act 490,
- Newmont environmental guidelines for reclamation of tailings and other mining facilities,
- Standard practices of the International Finance Corporation and
- Environmental Health and Safety Guidelines for Precious Metal Mining.

The Closure and Decommissioning Plan would also include descriptions of practices to be implemented for post-operational water management and for ensuring long-term stability of reclaimed areas.

The Company's broad reclamation objective for the Proposed Mining Area is to ensure that the site is left in a condition that is safe and stable, long-term environmental impacts are minimised and any future liability to the community and future land use restrictions are minimised.

Specific Reclamation Objectives to be included in the Closure and Decommissioning Plan include:

- Legal Compliance - Meet all statutory requirements.
- Landform Stability - Ensure that land is left in a stable condition that minimises long-term environmental impacts and does not compromise proposed post mining land uses.
- Eco-system Re-establishment - Reclaiming as much of the affected area as possible to a condition where its pre-mining usage can resume and ensuring the eco-system function is representative of this land-use. The primary pre-mining uses include cropland, livestock grazing and small residential development.
- Water Quality- Ensure that the quality of water that discharges from the reclaimed mine area meets standards for the immediate downstream use.
- Public Safety - Ensure that reclaimed land is physically safe for people to access and does not pose a human health risk.
- Infrastructure – Decontaminate, decommission, salvage or demolish all structures on the site according to the terms of the mining agreement. These include facilities, ancillary equipment and buildings.
- Biodiversity – Ensure that the biodiversity of the Proposed Mining Area is maintained at pre-disturbance levels or improves.

The Company has prepared a Provisional Land Rehabilitation Plan (**Annex G**) that addresses land stabilization and erosion control during the first 18-month period of construction. The Company proposes to optimize this provisional plan to address the land stabilization and erosion control issues associated with the broader Project and submit a comprehensive Land Rehabilitation Plan to the EPA 18 months after issuance of the Environmental Permit for the Project. The timing of delivery of this document will coincide with submittal of the Environmental Management Plan for the Project. Various stakeholders, including the EPA and local residents, will be consulted in developing the Land Rehabilitation Plan.

Notwithstanding the outcome of processes to arrive at a more detailed and sustainable Closure and Decommissioning Plan and Land Rehabilitation Plan, this section of the EIS provides a framework for the closure and decommissioning approach for the Project.

8.1 GENERAL APPROACH

Short-term reclamation goals would be to stabilize disturbed areas and protect disturbed and adjacent undisturbed areas from unnecessary or undue degradation by erosion or sediment transport and deposition. Long-term reclamation goals would be to ensure public safety, stabilise the site and establish a productive vegetative community consistent with specific and targeted post-mine land uses and in line with the EPA reclamation success

criteria. The Company's priority is to decommission and reclaim the Proposed Mining Area in a manner that is protective of human health and the environment, to the maximum extent practicable. General reclamation activities would include the following:

- Contour the surface of the Tailings Storage Facility,
- Place a portion of the waste rock in the open pit,
- Contour the surface of the Waste Rock Disposal Facility,
- Regrade roads,
- Complete grading to ensure adequate drainage control,
- Remove and regrade stockpile areas,
- Replace salvaged topsoil,
- Seed disturbed areas and
- Monitor reclamation success.

Reclamation activities would be progressively completed during the operational phase of the Project as specific areas or facilities would no longer be needed to support operation, and the activities would continue for approximately two years after mining ceases.

Upon completion of reclamation and decommissioning activities, the site would be subject to post-closure monitoring (see **Section 6.4,** *Post Closure Monitoring*). Post-closure monitoring would continue after the reclamation phase of the Project until such time as all closure objectives and success criteria defined in the final approved closure plan have been met.

8.2 RECLAMATION ACTIVITIES

Several reclamation actions would take place prior to, during and following mine development activities within the Proposed Mining Area. These actions are described below.

8.2.1 TOPSOIL SALVAGE

As the mine, haul and access roads, stockpiles, Waste Rock Disposal and Tailings Storage Facilities are being constructed; the Company would recover available topsoil from these sites for future use in reclaiming disturbed areas. Topsoil profiles vary considerably across the Proposed Mining Area. Recovery depths would be determined through an analysis of soil data collected during baseline studies of the Study Area as verified by on-the-ground reclamation specialists during salvage operations. The overall intent is to obtain only the growth medium (topsoil and subsoil) necessary to achieve the objectives of the Closure and Decommissioning Plan. Topsoil would be salvaged and transported to stockpiles using scrapers, wheel and track dozers, haul trucks and loaders. Subsoil materials, where suitable for use as growth media in reclamation, would be salvaged and stockpiled separately from topsoil.

8.2.2 GRADING DISTURBED AREAS

Prior to replacing topsoil or suitable growth media, facility sites and other disturbed areas would be graded to attain a stable configuration (slope of 3.0H:1.0V), establish effective drainage, minimise erosion and protect surface water resources. To the extent practicable, grading would blend topography of disturbed areas with the surrounding natural terrain. Angular features, including tops and edges of the Waste Rock Disposal Facility, would be rounded.

8.2.3 REVEGETATION

Prior to initiating the proposed reclamation vegetation plan, the Company would evaluate topsoil replacement depths for various exposures to arrive at a design that accounts for soil replacement depths that may vary according to location and soil type. The variety of replacement depths would provide different vegetation mosaics on reclaimed areas. The regraded surface would be ripped where necessary prior to placement of topsoil. Ripping would reduce compaction, maximise infiltration, provide a uniform seed bed and establish a bond between subsoil and topsoil. The Company's revegetation programme goals would be to stabilize reclaimed areas, ensure public safety and establish a productive vegetative cover based on applicable land use plans and designated post-mining land uses.

8.3 CLOSURE AND DECOMMISSIONING OF MINE COMPONENTS

Using methods described above, decommissioning and reclamation of the major components associated with the Project would occur as described below. Variations to these general descriptions, up to including salvaging much of the infrastructure associated with these facilities, would occur in the event the outcome of the process that engages stakeholders in developing a sustainable land rehabilitation plan for the Project indicates otherwise. The Closure and Decommissioning Plan envisioned represents a more traditional approach to site closure.

8.3.1 OPEN PIT

The open pit would cause a change in land form in the Proposed Mining Area which would be considerably different from current topography. As indicated previously, the Company would concurrently place waste rock in the smaller eastern lobe of the open pit and complete reclamation during mine operation, resulting in development of approximately 19 hectares of arable land. At full build-out, the larger western open pit would cover an area of approximately 120 hectares with a maximum depth of approximately 480 metres. The Company would place waste rock in approximately one half of the larger western open pit (as measured along its long axis) using waste rock obtained from the Waste Rock Disposal Facility which would bring the total open pit area filled with waste rock (including eastern and western open pits) to 70 hectares, leaving 69 hectares as open pit. Approximately 47 hectares of the remaining open pit would be located within the southern boundary of the Ajenjua Bepo Forest Reserve.

Following mining, the current closure and decommissioning plan is to place waste rock in approximately one half of the larger western open pit (assuming full build-out) using waste rock obtained from the Waste Rock Disposal Facility. Waste rock placement in a portion of the open western pit would occur once the Company can demonstrate to the EPA that human health and safety and environmental conditions would not be compromised through completion of such an action. In the event placement of waste rock in the western portion of the open pit is determined by EPA and area residents to be unacceptable, the Company could modify this portion of the closure and decommissioning plan to provide for an acceptable closure alternative for the open pit and waste rock disposal facility. Details of the approach for conducting waste rock placement would be presented in the final closure and decommissioning plan for the Project.

The surface of the waste rock placed in the open pit would be stabilized and sloped to promote positive drainage, covered with a growth medium and revegetated in accordance with the Closure and Decommissioning Plan. The western slope of the reclaimed area trending into the open pit would be stabilized but would remain relatively steep (approximately 37 degrees). Access to the western rim of the reclaimed area would be limited to ensure public safety is maintained until the pit lake forms.

The remaining 69 hectare open pit (at full build-out) would gradually fill with water as the groundwater system in the area recovers following cessation of dewatering activities. It is expected to take approximately 200 years for water in the open pit to achieve equilibrium after dewatering activities are terminated (Golder 2006). As indicated in **Section 3.0** *(Existing Environment*), geochemical testing conducted to date indicates waste rock and residual rock in the open pit walls would not be acid-producing. Ongoing geochemical kinetic testing and modelling are being completed to confirm results of the initial geochemical modelling relative to expected water quality in the pit lake.

The Company has conducted consultations with the Water Resources Commission and the Fisheries Department to solicit input on possible post-mine uses of the pit lake.

In making the decision to place waste rock back into the larger western open pit, the Company considered several factors, including:

- Safety – The Company desires to ensure the safety of people in the vicinity of the mine pit in a post-mining environment. Given the proximity of the open pit to communities located east of the open pit, it was decided that it would be prudent to create a wider buffer between these locales and the open pit.

- Arable Land – The Company desires to design a closure and decommissioning plan that would maximize the arable land available post-closure. The proposed action would create approximately 70 hectares of arable land (including the areas within the eastern and western pits) to partially offset land taken out of production through open pit development.

- Visual – A waste rock disposal facility constructed to the height proposed for this Project would represent a substantial change in the viewshed for residents in the communities of New Abirem and Afosu and in hamlets in the area. The Company is cognizant of this fact and believes that lowering the height of the proposed Waste Rock Disposal Facility should be considered to curb this viewshed effect.

Potential issues related to public safety at the open pit following active mining include individuals falling from heights due to presence of steep pit slopes and existence of a 69 hectare pit that would be filling with water to a substantial depth (up to 480 metres). To mitigate concern for public safety associated with the hazards that may be present due to the open pit, the Company would implement the following activities:

- Incorporating EPA reclamation criteria relating to the safety of the uppermost top benches of the open pit in the saprolite zone.

- Conducting Public Education Programmes – Prior to mine closure, a campaign would be conducted to make the public in the surrounding communities aware of the open pit closure and inform them of the potential dangers which could be present.

- Installing Barricades – A combination of earthen berms, fencing and signage would be installed in those portions of the pit perimeter where total exclusion of public access is determined to be warranted.

- Controlling Malaria Vectors – The pit lake that develops after mine dewatering ceases could become a potential source for breeding of mosquitoes and water-borne parasites. The Company would stock the pit lake with fish that will feed on mosquito larvae as a means to control them.

- Monitoring – During the post-closure phase of the Project, geotechnical monitoring of the pit walls would be conducted monthly to verify pit wall stability. During this time, patrols would be conducted to discourage entry into areas which have been determined unsuitable for safe entrance. In addition, the geochemical model developed for the open pit would be updated as new hydrologic and rock chemistry data area collected from the Proposed Mining Area. Output from the refined model would be reported to the EPA periodically.

Water filling into the mine pit would take approximately 200 years to ultimately achieve equilibrium with the local groundwater systems (Golder 2006). The Company intends to work with interested stakeholders in devising feasible options for using the pit lake through all stages of development.

8.3.2 WASTE ROCK DISPOSAL FACILITY

Following placement of waste rock in the open pit as described above, the remaining waste rock in the Waste Rock Disposal Facility would be graded and recontoured to provide a minimum 3.0H:1.0V reclaimed slope. The final configuration of the waste rock disposal facility would be approximately 1,800 metres from east to west and approximately 2,000 metres from north to south at full build-out. The facility would be approximately 86 metres

tall with a total footprint of approximately 246 hectares. Grading would minimise potential for slope failures or rill erosion, facilitate reclamation activities (seeding, mulching), and provide a surface that would enhance water retention and support vegetation. The top of the Waste Rock Disposal Facility and remaining safety benches would be graded to promote runoff of water (free draining), prevent ponding or impounding of water and limit erosion.

Waste rock would be graded and ripped to relieve compaction from mining equipment. Upon completion of grading, the Company would redistribute topsoil or other suitable growth media over the waste rock. The area would then be seeded according to the Closure and Decommissioning Plan.

8.3.3 ORE STOCKPILE

Generally, ore stockpiles would be removed by the end of mine life and stockpile areas reclaimed by grading and revegetating to blend with surrounding topography. Ore stockpiles that are not treated during the life of the project would be reclaimed using methods as described for the Waste Rock Disposal Facility.

8.3.4 PLANT SITE

The mill and process plant would be decommissioned prior to demolition or salvage of any structures. Portable equipment of value including vehicles, furniture and computers would be removed for subsequent reuse or salvage. Decommissioning the crushing and screening plant would be initiated once the last ore has been processed. The CIL plant would be decommissioned once all economic recoverable gold solution has been processed. Immovable assets that have been properly decommissioned, such as office and plant buildings, would be transferred to the agreed end user as described in the terms of the mining lease. Contaminated soil from oil spills and lubricants would also be removed and placed in an approved disposal facility. Stripped areas in the vicinity of the mill and process plant would be scarified, covered with topsoil, graded to match contours of surrounding topography and revegetated.

8.3.5 TAILINGS STORAGE FACILITY

Reclamation of the Tailings Storage Facility would commence upon termination of tailings deposition. After removal of the pond (through evaporation or direct discharge, depending on the quality and timing of the action) in the low area adjacent to the final spillway, the tailings surface would be allowed to dry to the point where cover placement is possible without excessive deformation of the tailings surface. Drying is expected to take approximately 12 months in the decant/final spillway area followed by installation of a cap during the dry season. The Tailings Storage Facility under-drain system is expected to continue to operate for a number of years after completion of capping and revegetation as excess pore water continues to drain from the tailings.

Tailings would be drained via the under-drain system (see **Annex B-4**). The under-drain system installed throughout the tailings basin serves to reduce the phreatic surface within the tailings. Drains would report to a collection sump, which would be dewatered by pumping from an access riser pipe. Water treatment may be required during the

dewatering process to ensure that water from the facility can be discharged in accordance with applicable standards. Water quality monitoring of the seepage and treated effluent would be conducted during the closure period until such time as seepage meets discharge criteria or until seepage ceases.

The primary focus of reclamation would be revegetation, erosion control and stormwater management. At the end of mining, the height difference from the north embankment tailings level to the south embankment tailings level would be approximately 18 metres. The final profile of the tailings surface would slope from the north, east and west embankments toward the final spillway located in the southeast corner of the south embankment. The low point on the tailings surface would be adjacent to the spillway so that reshaping of the tailings surface would be minimized. The capping material type and configuration would be determined during detailed design of the closure plan for the facility.

8.3.6 WATER STORAGE FACILITY

The Water Storage Facility would either remain as the responsibility of operations and maintenance, given to an appropriate institution or breached and reclaimed, depending on the approved Closure and Decommissioning Plan. Maintaining the facility may be useful for the local community as a source of water for a variety of applications. Ongoing maintenance of the dam and outlets would be required as well as the source water system that would maintain a desired pool elevation.

In the event that the approved Closure and Decommissioning plan requires removal of this facility, an engineered dewatering process would be developed to either direct the water into the downstream drainage (depending on water quality) or into the open pit. The dam creating the reservoir would be removed with material to be used for reclamation cover material (if suitable) or hauled to the waste rock disposal facility prior to reclaiming those sites. The impoundment area would be allowed to dry and the resultant land surface would be scarified, shaped to blend in with surrounding topography, covered with suitable growth media and revegetated.

8.3.7 SEDIMENT CONTROL STRUCTURES

Upon completion of closure and reclamation activities, accumulated sediment would be removed from areas upstream of the sediment control dams. Where possible, sediment and topsoil collected from the base of the sediment control structures would be redistributed in areas requiring additional reclamation growth media. The sediment control structures would then be breached to restore free flowing conditions and the area reshaped to blend with the surrounding topography.

8.3.8 ROADS

Roads associated with the Project would be reclaimed concurrently with cessation of operations in each individual area. Roads remaining at the end of mining operations would be reclaimed when no longer needed for reclamation and/or monitoring access. Reclamation of haul roads would be by grading to provide proper drainage, replacement of topsoil and revegetation. Reclaimed roads would be graded, to the extent practical, to re-

establish the original topography and drainage of the site in order to minimise erosion. Haul roads associated with the waste rock disposal facility would be reclaimed concurrently with closure of the disposal site.

Exploration roads, drill pads, sumps and trenches would be reclaimed in conjunction with ongoing operations. Exploration roads are constructed by stripping topsoil and using the topsoil as a safety berm at the edge of the exploration road. Topsoil in the berm would be redistributed back onto the graded surface during reclamation.

8.3.9 ANCILLARY FACILITIES

At the end of the Project mine life, the explosives magazine would be removed in consultation with the Minerals Commission (Inspectorate Division) and fuel tanks and other mine support structures with significant salvage value would be dismantled for salvage or used for other operations in the area. Unused explosives would be returned to the vendor or used at other mine sites. Some Project facilities, such as the accommodation and administration structures, may be turned over to an agreed upon end user or may be dismantled at the government's discretion.

8.4 CONCURRENT RECLAMATION

Concurrent reclamation is a requirement of the Company's Environmental Performance Standards (see **Annex A-3**). Concurrent reclamation is recognized as an effective method to minimise erosion and limit sediment transport. The Company has been conducting concurrent reclamation at the Proposed Mining Area addressing disturbances resulting from exploration activities. Disturbances include exploration roads, drill pads, trenches, sumps and other land disturbances. During mining operations, the Company would re-vegetate any area that can be safely reclaimed as soon as feasible. Such areas would include lay down yards required for storing materials during the construction phase, access roads no longer needed after construction and waste rock disposal area as soon as the face reaches its final configuration.

In addition, the Company proposes to concurrently place waste rock in the smaller eastern lobe of the open pit during the latter stages of mining in the larger western lobe. The final surface of the eastern open pit would be shaped to promote surface drainage, covered with a growth medium and revegetated to achieve post-mine land use goals.

8.5 MONITORING

Procedures for short- and long-term monitoring of the Proposed Mining Area after closure would be established as a continuation of the operational monitoring programme to ensure that mining activities do not affect surrounding areas. The items scheduled to be monitored should not be considered as an all-inclusive monitoring list, and would be updated as mining and reclamation activities progress. Periodic environmental reporting would be undertaken as required by the appropriate statutory authorities.

Short-term monitoring would consist of monthly monitoring of groundwater, fugitive dust, revegetation progress, surface water run off quantity and quality, open pit condition, pit lake water quality and Waste Rock Disposal Facility and Tailings Storage Facility effluent quantity and quality. Monitoring would be performed routinely for the life of the Project. Monitoring groundwater, surface water and pit lake water would consist of sampling for a selected list of parameters agreed with EPA. Air monitoring stations would be installed and sampled for fugitive dust. Revegetation would be inspected for erosion, biodiversity and growth.

Long-term monitoring would be conducted on a quarterly basis and would consist of a combination of observations, well measurements and sampling for water and air quality. Groundwater and surface water sampling and site observations would be conducted in accordance with a schedule agreed upon in discussions with the appropriate agencies.

8.6 RECLAMATION AND CLOSURE COSTS

Two facets of site closure and decommissioning are applicable to estimating Project closure costs that can be used as a basis for calculating reclamation bonding requirements and capital reserves. These include costs associated with the generalized closure and decommissioning plan, as described above as well as costs associated with placement of waste rock in the western open pit.

8.6.1 OVERALL PROJECT RECLAMATION

Reclamation costs associated with the work described above were estimated using unit rates and costs prepared by the Company based upon experience with similar projects in Ghana. These costs would be updated and refined for inclusion in the Closure and Decommissioning Plan in accordance with Ghanaian regulations.

The Company would accrue adequate funds to complete final closure and reclamation of the Project. Approximately $10 million (US) has been budgeted for concurrent reclamation activities during the operations phase of the Project (excluding placement of waste rock in the eastern open pit). Estimated closure and reclamation costs, including concurrent reclamation are summarized in **Table 8-1** and are estimated to be $44,106,030 (US). These costs are based upon current (2008) United States dollars and have not been adjusted for inflation.

8.6.2 OPEN PIT WASTE ROCK PLACEMENT

As described in **Section 8.3.1,** above, the Company is proposing to transport waste rock from the Waste Rock Disposal Facility and partially fill the eastern portion of the western open pit. At full build-out, the western pit and remaining Waste Rock Disposal Facility would appear as illustrated in **Figure 8-1**. To reserve capital to support the cost to accomplish this aspect of site reclamation, the Company proposes the following:

TABLE 8-1
Closure and Reclamation Cost Estimate
Akyem Gold Mining Project

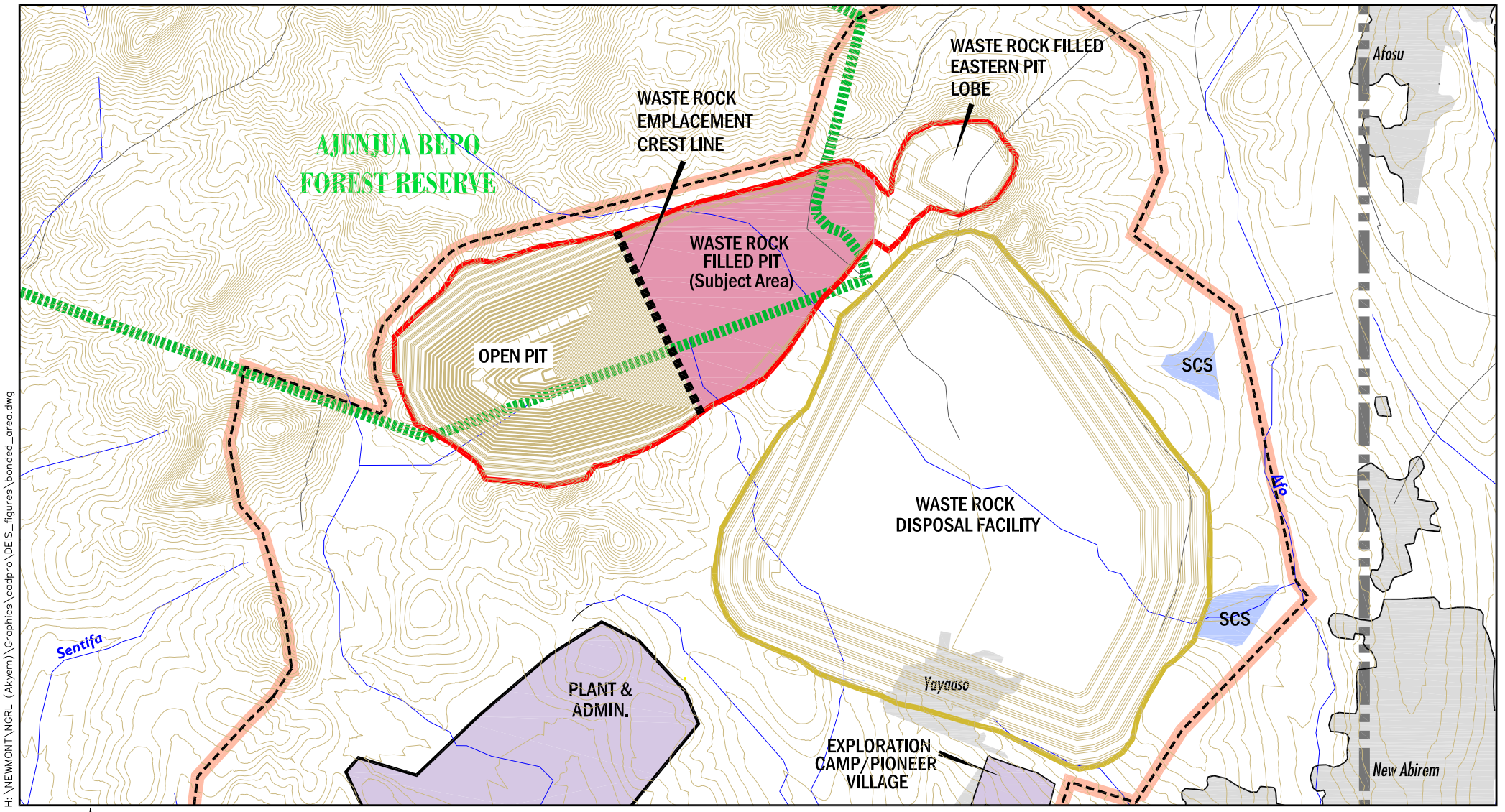
Project Facility	Operation	Land Area (ha)	Average Cost (per ha)	Total
DIRECT COSTS				
Open Pit	Groundwater filling of open pit; construct spillway and decant system; grade and place topsoil on selected areas; establish erosion control vegetation; establish initial soil stabilizing and nitrogen fixing vegetation; establish final land use vegetation on selected areas.	139	$54,800	**$7,617,200**
Total Waste Rock Disposal Facility	Reshaping/topsoil placement of selected areas[(1)], establish erosion control vegetation – slopes, tops, and benches, establish initial soil stabilization and nitrogen fixing vegetation, establish final land use vegetation	260 (assume 50% slope & 50% flat)	$16,200	**$4,212,000**
ROM Zone	Reshaping, topsoil and growth media placement, establish erosion control vegetation, establish initial soil stabilizing and nitrogen fixing vegetation, establish final land use vegetation	5	$19,000	**$95,000**
Plant Site (Treatment plant; Mine Services; Explosives Magazine)	Demolition and removal of treatment plant, structures, concrete footings; backfill foundation areas; removal of affected soil; re-spreading of topsoil/overburden; establish erosion control vegetation (flat surface); establish initial soil stabilizing and nitrogen fixing vegetation; establish final land use vegetation.	85	$92,700	**$7,879,500**
Haul & Access Roads	Rip and grade, place topsoil in selected areas, establish erosion control vegetation, establish initial soil stabilizing and nitrogen fixing vegetation, establish final land use vegetation.	21	$23,500	**$493,500**
Sediment Control Structures (36 ha) and Process Water Ponds	Remove sediment – place on reclaimed areas ; remove and dispose of liner; rip and grade compacted surfaces; replace growth media on selected areas; establish erosion control vegetation; establish initial soil stabilizing vegetation and nitrogen fixing vegetation; establish final land use vegetation.	36	$41,400	**$1,490,400**

TABLE 8-1 (continued)
Closure and Reclamation Cost Estimate
Akyem Gold Mining Project

Project Facility	Operation	Land Area (ha)	Average Cost (per ha)	Total
DIRECT COSTS				
Tailings Storage Facility Area	Reclaim oxide waste from dump, truck, and place & spread topsoil; final grading for water management; water treatment as necessary; establish erosion control vegetation; establish initial soil stabilizing and nitrogen fixing vegetation; establish final land use vegetation.	419	$34,300	**$14,371,700**
Accommodation Sites		8	Revert to Government	0
Water Storage Facility		56	Revert to Government	0
	Sub-total Total Closure and Reclamation (1-7)			**$36,159,300**
INDIRECT COSTS				
Mobilization and Demobilization		%	5	$1,808,000
Consulting services		Lump Sum	$600,000	$600,000
Management		%	10	$3,615,930
Repairs and Maintenance		%	0.5	$180,800
Monitoring		Lump sum	$1,742,000	$1,742,000
	Sub-total Total Indirect costs			**$7,946,730**
			Total	**$44,106,030**

Notes: (1) Cost for contouring and reshaping the Waste Rock Disposal Facility with slopes battered at 20 degrees followed by re-spreading of topsoil/overburden is not included as a direct reclamation cost. The reason for not applying this cost to the reclamation costs is that Company will include contouring, reshaping and re-spreading as an operational cost as they are constructed and not at the end of the mine life. Cost of re-spreading as a reclamation cost would be US$ 2,600,000. Cost reflects higher costs for reclaiming slopes verses flat ground.

ha = hectares



Bonded Area; Waste Rock Placement in Western Open Pit
Akyem Gold Mining Project
Eastern Region, Ghana
FIGURE 8-1

- The Company would move waste rock from the Waste Rock Disposal Facility and place the material in a geotechnically stable manner into the western open pit.

- The Company has established an estimated "crest-line" with northwest coordinates of easting 271598.4784(Longitude 1° 1' 28.56" W) and Northing 187102.7619 (Latitude 6° 21' 33.07" N) and Southeast coordinates of Easting 271909.1835 (Longitude 1° 1' 18.45" W) and Northing 186434.895 (Latitude 6° 21' 11.32" N) that represents the western limit of waste rock placement to be achieved during closure of the Project as constructed at full build-out (**Figure 8-1**). This waste rock placement limit will apply to open pit configurations that differ from the full build-out scenario and result in a similar post-closure open pit strike length.

- Annually, the Company would calculate the amount of waste rock (volume expressed in tonnes) removed from the area of the western open pit extending from the crest-line to the eastern edge of the open pit that exists at the time of the annual review (extent illustrated on **Figure 8-1**).

- An open pit reclamation reserve fund would be established for ensuring adequate funds are available to cover the costs to place a volume of waste rock into the open pit equivalent to that removed from the subject area, as described above.

- The cash account for the open pit reclamation reserve fund will begin to accumulate when production initiates. However, an initial deposit, as determined by negotiation between the Company and EPA, would be made into the account following construction activities and prior to the start of operations.

- The open pit reclamation reserve fund would be comprised of an amount of capital, recalculated annually, that represents the total amount of waste rock mined from the subject area times the agreed upon unit rate cost (actual cost per tonne) to transport and emplace the waste rock into the open pit.

- **Table 8-2** summarizes the estimated annual waste rock generation from the "subject area" and related incremental attributed costs beginning from Project Year 3 when mining begins to remove waste rock from the "subject area."

- The unit rate cost of US$ 1.11 per tonne was used to calculate the cost for waste placement and is based on the following current factors.

Base Cost (load/haul/dump)	US$ 1.03 /tonne
Dump Elevation Increment	0.003 % of base cost/tonne
Indirect Costs (engineering/geology/management)	0.0686 % of base cost/tonne

- The current estimate of the amount of waste rock to be emplaced into the open pit at full build-out is 130,615,000 metric tones. Based on this full build-out over 15 years, the estimated spending requirements for which the reserve fund is intended to cover would be equal to US$ 144,982,650 on the basis of a unit rate cost of US$ 1.11 at current costs.

- The open pit reclamation reserve fund would not be accessed by EPA or the Company to fund waste rock transport and emplacement into the open pit until mining activities cease in the Proposed Mining Area.

Table 8-2
Open Pit Waste Rock Placement Cost Basis

Production Year	Waste Rock Removed from Subject Area (expressed in tonnes x 1000) (1)	Open Pit Reclamation Reserve Fund Basis (US$ x 1000)
1	(2)	(2)
2	(2)	(2)
3	(2)	(2)
4	4,538	$5,028
5	2,835	$3,141
6	1,775	$1,967
7	15,854	$17,565
8	17,681	$19,590
9	17,071	$18,914
10	15,381	$17,041
11	13,865	$15,362
12	15,246	$16,892
13	14,004	$15,516
14	9,357	$10,367
15	3,008	$3,333

(1): Assumes a swell factor of approximately 30% following blasting and removal from the pit and placement in the waste rock disposal facility.

(2): Mining during production Years 1-3 will occur from areas above grade and will not result in a depression which requires waste placement in the 'subject area." Therefore, there are no associated costs during these years.