

# EXECUTIVE SUMMARY

Newmont Golden Ridge Limited (the “Company”), a subsidiary of Newmont Mining Corporation, is proposing to mine gold reserves at the Akyem Gold Mining Project (the “Project”) site in the Birim North District of the Eastern Region of Ghana, West Africa (**Figure I-1**). The Project is located approximately 3 kilometres west of the district capital New Abirem, 133 kilometres west of Koforidua the regional capital, and 180 kilometres northwest of Accra. The proposed development lies within an area belonging to the Akyem Kotoku Paramountcy. This Environmental Impact Statement (EIS) describes the proposed Project, existing environmental conditions, potential impacts, mitigation measures, monitoring programmes, environmental management plans and closure and decommissioning approaches.

## PROJECT DESCRIPTION

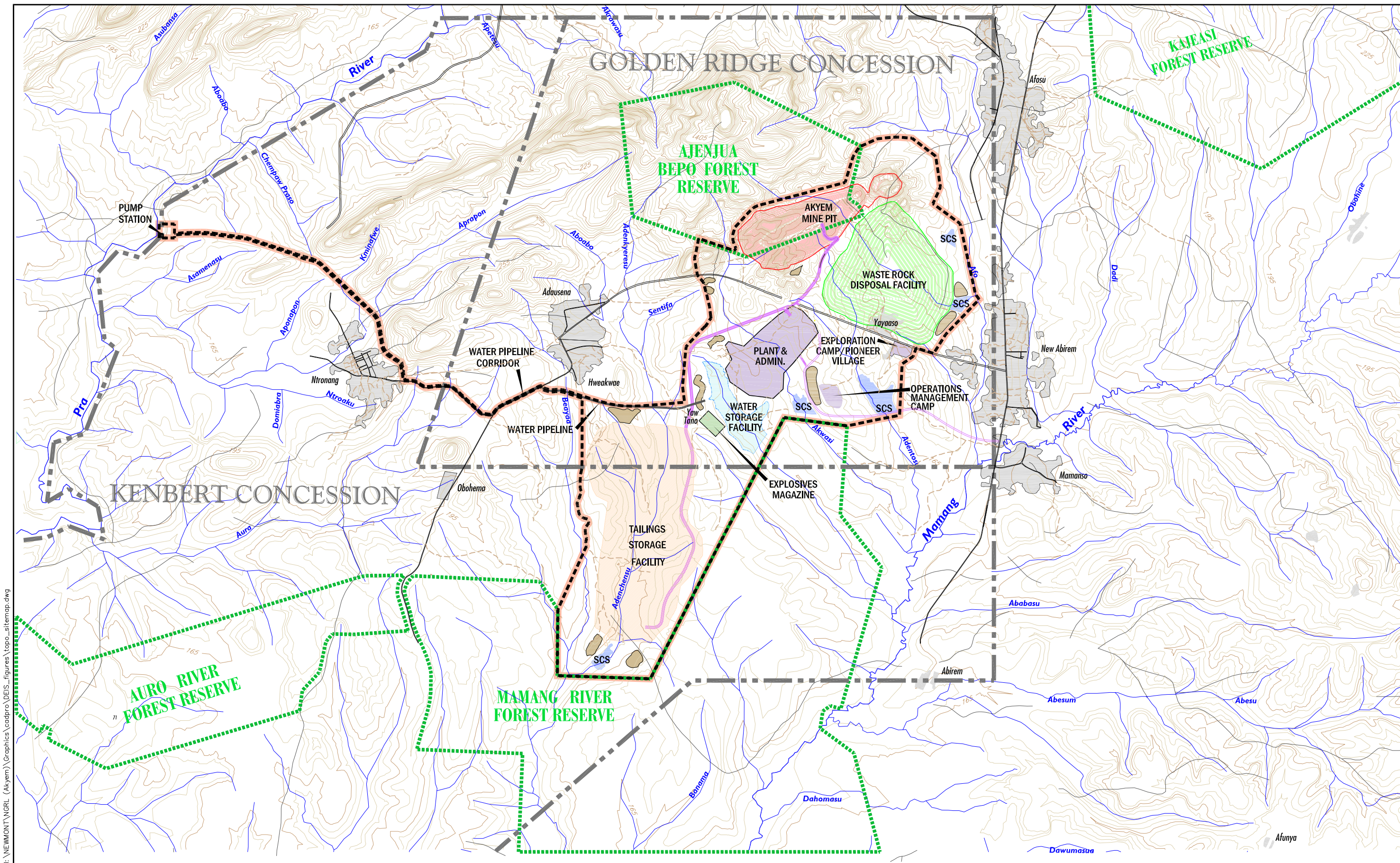
Development of the Project would involve excavation of an open pit mine and construction of waste rock disposal facilities, a Tailings Storage Facility, ore processing plant, Water Storage Facility and water transmission pipeline, sediment control structures and diversion channels, haul and access roads and support facilities (**Figure ES-1**). As proposed, a portion of the waste rock in the disposal facilities would be placed into the open pits during the closure and decommissioning phase of the project.

Approximately 1,903 hectares are included in the Proposed Mining Area which encompasses areas required for mine development and buffer zones; additional acreage would be required to accommodate resettlement villages. Of this amount, approximately 1,428 hectares would actually be disturbed during the Project; concurrent reclamation would be accomplished when possible to reduce physical impacts on the landscape. Approximately 74 hectares of the surface disturbance associated with the Project would occur in the Ajenjua Bepo Forest Reserve.

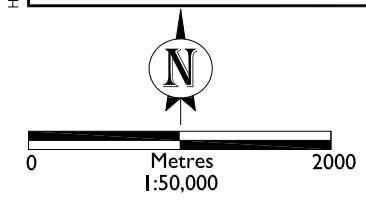
The Project would involve relocation and resettlement of one settlement (Yayaaso), multiple hamlets including Nyamebekyere, Kerenkeren, Kwasi Kporfor, Badu, Kofi Aklo, Ayesu Zigah, Yaw Tano, and Metemano and a number of farmsteads individual residences. In total, 2,734 farms within the Proposed Mining Area would be directly impacted through loss of farmland and require compensation and livelihood replacement. Households located within the Proposed Mining Area total 242 and would also require resettlement.

Based on current reserve estimates, the Company proposes to process approximately 8.8 million tonnes of ore annually (on average) to ultimately extract 7.7 million ounces of gold over a projected 15-year life-of-mine. The proposed Project would involve mining a total of 116 million metric tonnes of ore and 396 million metric tonnes of waste rock.

The ore and waste rock would be drilled and blasted in benches developed sequentially to facilitate loading and hauling from the mine pit. Blasted ore and waste rock would be loaded into off-road, end-dump haul trucks using shovels, backhoes and front-end loaders. Ore would be processed on-site with the gold extracted and waste material (tailings) contained in an engineered facility.



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- |                         |                                |
|-------------------------|--------------------------------|
| Proposed Pipeline       | Stream/Drainage                |
| Concession Boundary     | Existing Access Road           |
| Proposed Mining Area    | Proposed Road                  |
| Forest Reserve Boundary | Water Storage Facility         |
| Village                 | SCS Sediment Control Structure |
| Stockpile               | Waste Rock Disposal Facilities |

Primary Project Features Map  
Akyem Gold Mining Project  
Eastern Region, Ghana  
FIGURE ES-1

The process used to extract the gold would include primary and secondary crushers, a semi-autogenous grinding (SAG) mill, hydrocyclones (to size the materials), a ball mill, leach-feed thickening tanks, a Carbon-in-Leach (CIL) circuit (to dissolve the gold), cyanide recovery circuit, carbon recovery systems and a stripping/refining facility (to produce the gold product). The recovered gold would be stored in a room that is protected by various surveillance and security systems prior to shipment of the gold off-site. Extracted ore would be processed using a counter-current decantation process, the same as that currently being used at the Company's Ahafo Mine in the Brong Ahafo Region. This system uses rinse water in multi-stage thickeners to reduce the cyanide concentrations in the tailings. Using this process, nearly all the cyanide in the system is recovered and recycled in the plant. The remaining residual cyanide would be present in the process tailings at concentrations below standards established by the International Cyanide Management Institute, an independent organisation that oversees responsible use of cyanide by users world-wide. The Company was one of the first signatories to the Institute and its code of conduct.

The Tailings Storage Facility would be constructed initially as a cross-valley storage facility. As the tailings impoundment increases in size over time, additional embankments would be constructed to contain tailings on all four sides of the impoundment. Tailings would be delivered to the storage facility via an aboveground pipe placed in a high-density polyethylene- (HDPE-) lined trench. A pipe containing decant return solution from the supernatant pond would parallel the tailings pipeline in the same lined trench. A HDPE-lined event pond would be constructed to accommodate tailings and/or decant return solution in the event of a pipeline rupture. The Tailings Storage Facility would be developed to be state-of-the-practice, using rotational, subareal tailings deposition and would be designed, constructed and operated in accordance with the Company's Standards for Tailings Management and relevant Ghanaian rules and guidelines.

Electrical power during the construction phase would be provided from an existing Electricity Company of Ghana 34.5 kV overhead line system connecting Nkawkaw and Kwae. A section of this line is adjacent to the road between New Abirem and Adausena, which crosses the Proposed Mining Area. The main power supply for the processing plant during operations would be provided by a dedicated 161 kV line from the Volta River Authority Nkawkaw substation located approximately 50 kilometres northeast of the plant site. A 161/11 kV substation would be constructed at the mine site and power distributed over 11 kV lines from the substation. The 11 kV rated power distribution system would be used to reticulate power to the various plant area substations and large motor drives, and the services from two centrally located separate high voltage switchboards, which would be interconnected at completion of the construction phase. Emergency power would be provided by two 1000 kVA diesel generators for the plant site and one 800 kVA generator for the Operations Management Camp.

Construction of the Project would require up to 30 months to complete with employment during construction peaking at approximately 3,300 workers. The short-term employment mix of construction contract workers at any one time could include up to 1,155 skilled, semi-skilled and unskilled workers from within the affected communities. Company policy dictates that unskilled labour would be recruited from within the area of mine development and construction contractors would be required to source unskilled labour locally. Once mining operations commence, employment associated with the Project would total

approximately 3,200 permanent Ghanaian workers and approximately 100 expatriates, with 25 to 30 percent of the workforce coming from the local communities. Contractors would augment this workforce to provide laboratory, vehicle and equipment maintenance, catering and transport services.

At the conclusion of mining, the open pit (comprised of the east and west pits) would be approximately 900 metres wide, 2,560 metres long and 480 metres deep with a footprint area of approximately 139 hectares. The Company proposes to place waste rock into the smaller eastern lobe of the open pit concurrent with the latter stages of active mining and reclaim approximately 19 hectares of land in this portion of the open pit. This would reduce the overall pit length to 1,920 metres.

Placement of waste in a portion of the western and larger open pit has been identified as a key closure and decommissioning objective by the Company based on the following criteria and considerations: (1) proximity of local population to the open pit area to ensure overall safety, (2) importance of agriculturally productive land in proximity to local populations and (3) minimisation of the visual impacts to residents of communities located east of the mine pit. Placement of waste rock in the open pit would be completed only if the action would result in a stable land configuration that minimises long-term environmental impacts, does not compromise proposed post mine land uses, the quality of water in the reclaimed mine area meets standards for beneficial use and that reclaimed land is physically safe for people to access and does not pose a human health risk. Such decisions would be made in consultation with the EPA.

Assuming environmental conditions and safety issues are not compromised, approximately 130 million metric tonnes of waste rock would be transported following mining from the Waste Rock Disposal Facility and placed into a portion of the larger western open pit in accordance with the Closure and Decommissioning Plan, resulting in reclamation of an additional 51 hectares of land. Total open pit area being reclaimed would be 70 hectares (19 hectares for the east open pit and 51 hectares for a portion of the west open pit). The resultant open pit would be an oval-shaped feature approximately 960 metres along its axis, covering an area of approximately 69 hectares. Other features associated with the Project would be abandoned and reclaimed in accordance with a Closure and Decommissioning Plan, to be prepared by the Company within 2 years of cessation of mining and approved by EPA. The primary feature that would remain following reclamation activities would be a open pit lake, covering approximately 69 hectares. The Company believes that the water source in the pit could be developed into an asset if creative thought is applied to how such a source of water can be used in a post-mine environment. Discussions have been initiated with relevant institutional stakeholders to identify viable options for productively using this water source.

## **ALTERNATIVES EVALUATED**

Alternatives discussed in this EIS were evaluated based on potential impacts or issues associated with the proposed Project. Reasonable alternatives are intended to mitigate, minimise or eliminate potential adverse environmental impacts associated with the Project. Alternatives not selected were eliminated because they are either technically or economically infeasible or provided no environmental or social advantage over the proposed

Project or other alternatives. The No Action Alternative is also reviewed in this document; impacts of this alternative are presented to describe the potential consequences if the Project were not authorized.

Alternatives evaluated include:

- No Action Alternative,
- Alternative Tailings Storage Facility locations,
- Alternative Water Storage Facility locations,
- Alternative Waste Rock Disposal Facility layouts and
- Alternative Operations Management Camp locations.

The outcome of the alternatives evaluation resulted in selection of preferred locations for the Tailings Storage Facility, Waste Rock Disposal Facility and Operations Management Camp that minimised the overall footprints of the features and resulted in the least impact to residents and the environment.

## **EXISTING ENVIRONMENT**

The Study Area for the Project is characterized by steep hills and patches of secondary forest interspersed with agricultural land and inhabited by people living in small communities, within hamlets or in individual residences. Most individuals in the area are involved in agricultural activities to sustain their livelihoods. Small seasonal streams drain the area, ultimately issuing to the Pra and Mamang rivers. Elevations in the Proposed Mining Area range from approximately 150 metres to nearly 300 metres above mean sea level. The Ajenjua Bepo Forest Reserve and Mamang River Forest Reserve bound the area to the north and south, respectively. Brief descriptions of the various aspects of the biological, physical and human environments within the Proposed Mining Area and the broader Study Area follow.

## **BIOLOGICAL ENVIRONMENT**

### **Flora and Fauna**

Investigations of the flora and fauna indicate the Proposed Mining Area outside of the Forest Reserves is primarily a complex of agricultural lands from which the forest has been removed. The 569-hectare Ajenjua Bepo Forest Reserve has been extensively logged, converted to cropland and planted with non-native timber species (e.g., *Cedrela odorata*). The structure and composition of plant communities and wildlife habitats within and outside of the Ajenjua Bepo Forest Reserve have been extensively fragmented and altered by human activities and, consequently, have little resemblance to natural forests once typical of the region. Several villages are near the boundary and inhabitants access and use the Forest Reserve for bushmeat, farming and gathering of forest products.

Like flora, the fauna of the Proposed Mining Area has been extensively affected by alteration and fragmentation of habitat resulting from fire, logging, invasive plant species, human settlement and agricultural activities. The structure and composition of habitats outside of

the Ajenjua Bepo Forest Reserve primarily support wildlife species adapted to high levels of human activity (“habitat generalists”). Bush meat hunting has also reduced numbers and geographic distribution of many of the larger mammalian species and birds, especially those associated with forest communities.

Within the Study Area, the Mamang River Forest Reserve and portions of the Ajenjua Bepo Forest Reserve outside the Proposed Mining Area exhibit the greatest biodiversity. The 74 hectare portion of the Ajenjua Bepo Forest Reserve that would be impacted by open pit development, as well as other portions of the Proposed Mining Area outside the Forest Reserves, exhibit relatively lower biodiversity values because of the presence of a matrix of farm and fallow land, low forest condition class, smaller forest patch size and poor connectivity to other forest communities. Several investigators have classified the condition of the forests in the portion of the Ajenjua Bepo Forest Reserve within the Proposed Mining Area as well as the balance of the Proposed Mining Area as “degraded.” No “Critically Endangered” or “Endangered” plants were identified in the Study Area. Seven tree species that occur in the Study Area are ranked as “Vulnerable” although these species are common and widespread throughout Ghana. No “Critically Endangered” animals were detected in the Study Area but several species that are present have been ranked as being of conservation concern, most of which were located in the Mamang River Forest Reserve.

## **Wetlands**

Studies conducted in the Study Area found wetlands associated with the Pra and Mamang rivers, seasonal drainages and springs. These wetlands provide benefits to wildlife as a source of drinking water and breeding habitat. Human use of wetlands in the Study Area includes water for drinking and crop irrigation. Many wetlands that are inundated during the wet season are used as farm land during the dry season. The proposed Project would affect less than one hectare of wetlands.

## **Fisheries**

Streams and rivers in the Study Area (primarily the Pra and Mamang rivers) support an abundant and diverse fish fauna that have adapted to the conditions and seasonal variation of rivers and streams that are typical for this area. The highest diversity of fish species and largest catches occurred in the middle reaches of both rivers. During the dry season, smaller catches and lower diversity were measured at survey stations located in tributaries to these rivers, which is indicative of the movement of fish from these areas and into the main stem reaches during the low flow period. Fish appear to move from the Pra River and Mamang River into the tributary channels during the wet season for spawning, rearing and refuge during high flow in the main river channels.

A number of whole fish were analyzed for metals in fish tissue. Findings of these analyses indicated mercury concentrations in 11 of the 12 samples analyzed exceeded a subsistence fish tissue consumption standard of 0.049 milligrams per kilogram. The precise source of the mercury measured in fish samples is unknown. Detectable concentrations of mercury were measured in several surface water and stream sediment samples collected in the area;

the highest concentrations occur in samples obtained from tributary channels to the Pra and Mamang rivers. Surface soil and groundwater samples collected in the vicinity of these primary water courses did not exhibit mercury concentrations of significance.

### **Macroinvertebrates**

Studies of macroinvertebrates indicate the Pra and Mamang drainages lack many of the species that are indicators of clean water. Those species identified are primarily indicators of enriched water or water impacted by microbiological organisms, which was evident in the Study Area. Benthic invertebrates in the Study Area consist mainly of nymphs and larvae of midges and other insects, round worms (nematodes) and snails.

## **PHYSICAL ENVIRONMENT**

### **Climate and Air Quality**

The Study Area is located within the wet semi-equatorial climatic zone of Ghana which is characterized by an annual double maxima rainfall pattern; wet seasons usually occur from March to July and September to mid-November. The climate type is determined by movement of the Inter-Tropical Convergence Zone, which oscillates annually about the equator attracting air masses from the north and south. Southern air masses, emanating from the anticyclone of St. Helena in the South Atlantic, bring relatively cool, moist weather. Northern air masses, locally called "Harmattan," come from the sub-tropical Azores anticyclone and its extension over the Sahara desert. These air masses bring hot, dry weather from December through February.

Mean monthly temperatures in the Study Area are relatively consistent, varying from about 25 to 27°C; the lowest recorded temperature during the period of record (1970 to 2004) was 19.4°C and the maximum recorded temperature was 35.4°C.

Several environmental factors can influence air quality in the Study Area including mining, logging and agricultural practices. Air quality impacts of these activities are generally localised and do not contribute substantially to regional degradation of air quality. Motor vehicles are the primary source of gaseous pollutants in the Study Area, but the generally low numbers of vehicles would indicate these are also a minor source of gaseous pollutants. During certain times of the year, crop field burning is a source of gaseous pollutants, although these activities typically occur for a short period of time.

Particulate pollutants are generally caused mainly by large dust sources in the Sahara Desert, particularly from December to February, when the "Harmattan" wind brings dust from the north. In addition to these natural sources of dust, vehicular traffic on unpaved roads also contributes particulate loading to the atmosphere.

### **Geology and Mineral Resources**

The Study Area is located at the northern end and along the southeast margin of the Ashanti Belt which has historically produced approximately 40 million ounces of gold and

may have resources of a similar magnitude. The Akyem deposit is developed in Birimian Age rocks on the southern limb of a major regional fold structure and is associated with a shear zone. Approximately 7.7 million ounces of gold have been identified as being economic to recover from the Akyem deposit.

Results of geochemical tests conducted on rock core samples obtained from the proposed open pit area indicate the rock to be mined has an overall net neutralizing potential and that sufficient neutralization capacity exists in the rock to prevent acid generation in the Waste Rock Facility, Tailings Storage Facility and open pit area (pit lake). Geochemical testing indicates the potential for certain trace metals to be released at low concentrations from various rock types in a post-mining environment through leachate moving through the Waste Rock Disposal Facility or through pit walls as the pit lake develops. Further geochemical tests are being conducted by the Company to provide additional data to confirm these predictions and determine the influence of iron complexation, a phenomenon that would reduce the low levels of metals even further to below drinking water standards.

### **Surface Water Resources**

The Study Area is located in the Pra River basin which flows south to the Gulf of Guinea in the Atlantic Ocean. The Pra River is the second largest river in Ghana with a total drainage area of 23,170 square kilometres. All of the proposed mine facilities (with the exception of the Pra River pumping station and a portion of the water pipeline) would be located in the Mamang River drainage which joins the Pra River near the community of Kotokuom.

Streams and rivers in the Study Area generally flow during the rainy season (May to November), with reduced or no flow occurring during the dry season (December to April). Lower reaches of the Pra River generally flow year-round (perennial) whereas the upper Pra River, all of the Mamang River and tributary streams flow seasonally during rainy periods. During dry periods, portions of channels that become dry often contain shallow pools of water.

Mean annual discharge for the Pra River at the downstream end of the Study Area is 12 to 16 cubic metres per second, with mean daily flows ranging from approximately 2 cubic metres per second during the dry season to approximately 80 cubic metres per second during the wet season. Mean annual discharge calculated for the Mamang River at its mouth is approximately 2.9 cubic metres per second. Peak flow measured in the Mamang River was 68 cubic metres per second.

Water quality results show that streams and rivers in the Study Area generally have moderate conductivity, near neutral pH (some samples are slightly acidic), low dissolved oxygen, warm temperatures and moderate turbidity. The presence of clay and silt in surface water is common throughout much of the Study Area. This phenomenon, as well as human activities, can cause relatively high sediment levels in surface water.

Inorganic parameters and nutrient concentrations (e.g., nitrate, nitrite and phosphate) are generally low; however, there are instances where nitrate and nitrite concentrations have exceeded drinking water standards (10 milligrams per litre and 1 milligram per litre,



respectively). Free cyanide was detected at concentrations exceeding standards at two stations in 2001, but not in subsequent samples. Microbiological analysis of surface water samples collected near villages shows elevated levels of faecal coliform bacteria.

Metals in most surface water samples collected in the Study Area are either present at low concentrations or are below laboratory detection limits. Some samples from various locations exhibited elevated total metal concentrations (i.e., above drinking water standards), including aluminium, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium and zinc. These metals were likely associated with colloidal sediment in the surface water (i.e., clay). Some samples contained elevated dissolved metals, including aluminium, arsenic, iron and manganese.

Because of the seasonal nature of stream flow in the Study Area, surface water use is limited. During the wet season, surface water in Study Area streams and rivers is used for drinking, bathing, recreation, irrigation of crops and aquatic life support. During the dry season, fetch points are dug by hand in the channels in remote areas to obtain drinking water and for other uses when there is no flow in the streams.

To the southwest of the Study Area downstream of the Pra River and Mamang River confluence, water is pumped daily from the Pra River and distributed by piping to four settlements (Brenase, Ofoase Kuma, Ofoase Pinyin and Ofoase Zongo) that are located more than 18 kilometres from the Proposed Mining Area. The pumping station and treatment plant are operated by the Ghana Water Company. The Pra River is also a direct source of domestic water for various villages and hamlets located along its channel.

### **Groundwater Resources**

Three general bedrock units are considered potential aquifers (from top to bottom) in the Study Area: saprolite, saprock and bedrock. Overall groundwater recharge rate is estimated at about 70 to 140 millimetres per year, which is 5 to 10 percent of total annual precipitation (1,370 millimetres). Groundwater discharge in the area occurs to wetland areas, springs and some streams and rivers.

The saprolite unit acts as a reservoir of unconfined groundwater that contributes water to underlying saprock and bedrock. Saprock is 1 to 10 metres thick and represents a transition between the upper weathered saprolite and deeper fresh, unoxidized bedrock. The saprock zone typically is the first water-bearing unit that yields enough water to wells for domestic or other pumping needs. Depth to groundwater in saprolite and saprock ranges from about 2 metres below ground surface in some low-lying areas to 50 metres or more in upland areas. Saturated thicknesses of these units range from about 1 to 20 metres.

Monitoring wells sampled in the Study Area exhibit variable electrical conductivity and acidic to neutral pH. Suspended solids and turbidity were relatively high in some samples. Most metal concentrations were generally below or near laboratory detection limits. Several metals were present at concentrations exceeding drinking water standards, including aluminium, antimony, arsenic, cadmium, chromium, iron, lead, manganese, nickel and selenium. Elevated concentrations of total metals typically are associated with suspended

solids in the water samples. Metals in filtered samples from monitoring wells that also exceeded standards include arsenic, iron and manganese. Total and faecal coliform bacteria were detected in one monitoring well.

Boreholes or wells are the main source of water for residents in the Study Area. A total of 36 village wells and one distribution pipe were identified. Many people obtain drinking water from boreholes fitted with hand-pumps. A majority of households draw their water from unprotected sources, exposing residents to water-borne infections and other health hazards. Vendor trucks also supply potable water to some areas.

For village well samples collected in 2007, five of 24 hand-dug well samples contained nitrate above the drinking water standard; however, no drilled well samples exceeded the standard. Field pH ranged from slightly acidic (around 5.0) to neutral, and conductance ranged from low to moderate. Total coliform bacteria were detected in 21 of 24 hand-dug well samples, as well as 15 of 52 drilled well samples. Faecal coliform bacteria were detected in 10 of the 24 hand-dug well samples, as well as 2 of the 52 drilled well samples.

Some unfiltered samples from village wells exhibited metal concentrations that exceeded drinking water standards, including aluminium, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium and zinc. The presence of clay and silt in many village wells indicates that these wells may not be completely developed or properly screened and turbidity may be at least partially responsible for some elevated metals concentrations in unfiltered samples. Filtered samples from a few village wells contained elevated metals concentrations, including aluminium, arsenic, cadmium, iron, manganese and nickel.

## **Soil Resources**

Soil in the Proposed Mining Area has developed to a mature stage with morphological characteristics typical of tropical conditions. Parent material and topographic position are the dominant factors influencing soil variability in the Proposed Mining Area. The resultant characteristics affect use of the soil for agriculture purposes.

Natural processes and intensive agricultural practices employed throughout much of the surveyed area have resulted in soil erosion and low soil nutrient content. In tropical soil types such as those surveyed, nutrient cycling occurs rapidly. Where vegetation is cleared or fallow is burned, nutrients released into the soil solution are not consumed as effectively and are easily leached from the soil. High rainfall, intense weathering of soil and agricultural practices have resulted in soil that is acidic and low in plant nutrients. Natural processes and clearing for agriculture have resulted in eroded areas, especially on middle to upper slopes and summits.

Potential erosion of soil in the Proposed Mining Area from wind is minimal due to the high clay content and low wind speeds. However, erosion from water can affect the ability of the landscape to sustain agricultural production and watershed function. As a result of farming and other intensive land uses, soil in the Proposed Mining Area has experienced erosion, especially on upper slopes and the steep slopes in the Ajenjua Bepo Forest Reserve.

Soil erosion occurs on exposed surfaces and increases with rainfall intensity. Soil types that exhibit low infiltration rates, low plant cover or are located on steep slopes are especially vulnerable to water erosion.

Six of the soil series identified in the Proposed Mining Area were determined to be “moderately suitable” for rain-fed agricultural use, four were determined to be “marginally suitable” and one was identified as “permanently not-suitable.” The suitability of soil for use in reclamation is ultimately dependent upon the objectives and methods of reclamation, which will be identified in the Closure and Decommissioning Plan to be developed for the Project.

## **HUMAN ENVIRONMENT**

### **Noise**

The Study Area has few existing industrial noise sources. A primary roadway extends north-to-south from Afosu to Mamanso (and beyond) along the eastern boundary of the Study Area with a second extending east-to-west from New Abirem to Ntronang (and beyond). Relatively light traffic is present on these roadways. Other potential sources for background noise in the Study Area occur within communities as well as with those produced by natural sources of sound including birds, crickets, frogs, roosters, goats and, to a lesser degree, wind. The highest noise levels measured in the Study Area during the daytime (0600 to 1000 hours) were often higher than the 55-decibel residential daytime guideline set by the EPA. Similarly, the highest night time noise level frequently exceeded the 48-decibel night time guideline.

### **Visual Resources**

Topography in the Study Area consists of valleys bound by rolling hills. Elevations range from 100 metres above mean sea level in the valleys to 300 metres above mean sea level along the ridgelines. The highest elevation in the Study Area is 480 metres in the Ajenjua Bepo Forest Reserve. The hills and valleys in the Study Area are covered in dense vegetation exhibiting varying shades of green. Undulating horizontal lines visible through the atmospheric haze represent the hills relative to depth of field. Texture, pattern and colour are heavily influenced by the dominance of vegetation. Breaks in the natural homogenous visual pattern include palm plantations and citrus tree groves. Villages offer a contrast to this view by being devoid of nearly all vegetation and exposing reddish yellow soil. Those viewing the area are primarily local residents; tourism and recreation are not prominent activities in the Study Area. The primary view points of the Proposed Mining Area are from the communities of New Abirem and Afosu.

### **Access and Transportation**

The Study Area is accessed by turning off the main Accra-Kumasi highway at Nkawkaw and travelling south via Inter-regional Road 3 for approximately 40 kilometres to New Abirem. New Abirem is linked to other towns in the Study Area by a network of un-tarred feeder roads.

Roads in the Study Area vary from satisfactory to poor. New Abirem and Afosu are situated along the main road from Nkawkaw. The road is tarred and in good condition, although there are signs of wear and tear and potholes starting to appear. The main road from New Abirem through the Study Area to Ntronang is also tarred and in good condition. Roads within all communities are not tarred, in poor condition and are susceptible to erosion from rain making them impassable in an ordinary car.

Walking is the major form of transport for people seeking goods and supplies. There is no public transport system but an extensive private system of buses and taxis provides mobility. Transportation is one of the key hurdles expressed by focus groups and some survey respondents to economic growth in the area.

## **Heritage and Archaeological Resources**

A total of 46 heritages sites were identified in the Study Area of which 18 were determined to be “Community Sacred Sites” sites which serve the community and are overseen by the stool chief, linguist and / or elders. Twelve sites were identified as “Individual Sacred Sites” sites which were located in an individual’s home or land and overseen by that individual. Six sites were identified as Royal Cemeteries and 10 were Public Cemeteries. Of the heritage sites identified, 15 were determined to be within the Proposed Mining Area where planned development of the open pit, Waste Rock Disposal Facility and other proposed mine features may impact some or all of the sites.

Findings from a Level 1 archaeological survey indicate 9 sites are present in the Proposed Mining Area which were determined to be of archaeological significance. Of these, 5 sites were attributed by the archaeological team as being abandoned settlements, 2 were of religious or sacred significance and 2 were of prehistoric significance. Of the sites identified in the Proposed Mining Area, 6 sites were determined to be within or reasonably close to areas of proposed disturbance where planned development of pits and waste rock disposal facilities could impact the sites.

## **Community Health**

Principal findings of a health survey conducted by International SOS in the Study Area in 2006 include the following:

- Malaria is the most predominant disease in the Study Area.
- The prevalence of HIV/AIDS for the Eastern Region (4.2 percent) is the highest in the country.
- Other disease conditions include diarrhea, skin, eye, ear and throat infections. Malaria is a water-related insect vector disease, diarrhea is primarily water-borne (faecal-oral) and many skin diseases are water-associated. The incidence of upper respiratory tract infections is associated with living conditions resulting from the inhalation of smoke from wood stoves in the humid environment.

- Access to health care for most residents in the Study Area is difficult with the primary health care centre located in New Abirem. Complicated inpatient treatment is available at Holy Cross Family Hospital in Nkawkaw or Saint Dominic's Hospital at Akwatia.
- No qualified doctor is available in the Study Area.
- Malnutrition is present in the Study Area and the percentage of children that are underweight (17.3 percent) or wasted (8 percent) correlate with country statistics.
- Fifty-eight percent of the children in the Study Area participated in growth monitoring and 42 percent participated in immunization, as reported by both International SOS and OICI.
- Illness is common among residents of the Study Area. More than 40 percent of survey respondents reported sickness or injury within their homesteads during the 4-week period preceding the survey.

### **Socioeconomic Resources**

There are 242 households (1,331 persons) living within the Proposed Mining Area which equates to an average household size of 5.5 persons. Primary land use in the Proposed Mining Area is agriculture. As of December 2007, the Company had identified 2,734 farms within the Proposed Mining Area. An additional 1,443 households have farms within the Proposed Mining Area but do not reside within the Proposed Mining Area. Between residents and non-residents, the Proposed Mining Area supports 1,685 households (approximately 9,268 persons) on an average farm size of 0.9 hectares. The primary settlement in the Proposed Mining Area is Yayaaso, which is regarded as a settler community because the inhabitants are predominantly non-Akyem. The estimated population of Yayaaso in 2006 was 700 persons.

The people of Yayaaso are mainly farmers engaged in the cultivation of cocoa, oil palm, citrus, maize, cassava, plantain and cocoyam. Production of cocoa ranges between ½ bag and 30 bags from farms between 0.2 to 6 hectares in size. Food crop farms range in size from between 0.2 to 1.2 hectares; the two most important food crops are cassava and plantain. The settlement has four masons, two carpenters, two mechanics, two electricians, four seamstresses and two tailors. There are four stores, seven drinking spots, and two hair salons in Yayaaso. There is no chemical store, entertainment, community centre or palace. Of greatest economic value in the community is the presence of two oil palm processing facilities and three corn mills. The settlement has a primary school and two churches - Pentecost and Mosama, both charismatic Christian religions.

The conditions in the hamlets and farmsteads within the Proposed Mining Area are very similar to those in the larger Study Area. The buildings are structurally poor and are generally of wattle and daub construction with rammed earth floors and thatched or bamboo roofing. There are a few buildings with corrugated metal sheets. There are no public facilities or services in these hamlets, and economic activity is limited to agricultural

pursuits. Most of the residents of these hamlets raise cash crops of cocoa, oil palm and citrus. In addition to these cash crops, the residents grow a variety of food crops including cassava, pineapple, cocoyam, plantain, maize, ginger and a variety of vegetables.

Livelihood activities overlap within the Study Area and are used with one another to increase family strengths and survival mechanisms. Many inhabitants work on farms, in addition to their work at trading, self-employment or salaried jobs. The primary livelihood categories are:

- Agriculture and natural resource use,
- Small-scale trading and self employment,
- Salaried work (teachers, medical practitioners, civil servants, mine employees) and
- Other strategies to secure livelihoods and obtain care (remittances, rent, pensions, marriage and cohabitation).

Agriculture is the predominant activity in the local economy. A community biodiversity use assessment of the Study Area by Conservation International indicated that there is a high degree of bio-cultural relationship between the local community and its natural environment, particularly related to farming practices and collection of wood and non-wood forest produce. Farming is commonly done on a small-scale, designed to meet local food needs rather than for commercial purposes. Some farmers engage in charcoal burning, gari and oil palm processing and distillation of local gin as additional self-support or income-generating activities. Other agricultural-related activities conducted in the Study Area include livestock production and harvesting of medicinal plants. The estimated income of households surveyed in the Study Area ranges from 37.26 GH¢ annually to 4,057.74 GH¢.

## **PRIMARY ISSUES AND IMPACTS**

The primary issues associated with the proposed Project were identified through three principal means: (1) the public consultation process which provided interested and affected parties opportunities to identify issues and concerns and receive Project-related information; (2) consultations with a variety of government institutions; and (3) analyses completed by technical specialists. The outcome of the public consultation process was preparation of a Scoping Report and Terms of Reference. The Terms of Reference, along with the outcomes of consultations held with government officials resulted in identification of the following primary issues associated with the proposed Project:

### **Biological Environment**

- Loss of ecological habitat (including some in the Ajenjua Bepo Forest Reserve) and increased pressure on remaining fauna,
- Protection of endangered species,
- Loss of integrity of Ajenjua Bepo Forest Reserve,
- Formation of a pit lake,
- Impacts to forest habitat and
- Plans for timber removal and replacement.

## Physical Environment

- Deterioration of air quality from increased dust levels,
- Contamination of surface and/or groundwater resources,
- Formation of a pit lake,
- Soil erosion and
- Impacts to water quality and quantity.

## Human Environment

- Loss of farm holdings,
- Loss of agricultural land and lifestyles,
- Compensation process and procedures,
- Resettlement of Yayaaso, multiple hamlets and farmsteads,
- Increased noise levels,
- Dust and noise pollution from blasting and transport activities,
- Increased vibrations from blasting that could damage structures,
- Disruption of socio-economic conditions,
- Respect for Traditional Authorities and traditional ways of life,
- Clear and transparent communication,
- Positive/beneficial socio-economic impacts such as increased employment, tax and improved infrastructure,
- Success of reclamation with a view to future generations,
- Impacts of the open pit on area residents,
- Long-term public safety implications and
- Safety of individuals on road rerouted around waste rock disposal facilities.

Guided by these identified issues and impacts, technical specialists conducted an evaluation using scientific data collected at the Study Area and reported in the scientific literature to assess and quantify (if possible) the direct, indirect and cumulative impacts associated with the Project. These assessments provided the basis from which measures to mitigate the impacts were identified.

## MITIGATION MEASURES

In response to issues and potential impacts identified above, the Company designed a variety of mitigation measures to:

- Minimise impacts by limiting the degree or magnitude of the action and its resulting effects,
- Rectify the impact by repairing, rehabilitating or restoring the affected environment,
- Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action and
- Compensate for the impact by replacing or providing substitute resources or environments.

The Company's general philosophy with regard to mitigation of impacts it causes to the biological, physical and human environments is grounded in its commitment to conduct this Project in a manner that is transparent and in accordance with Ghanaian rules and regulations and is compliant with the Company's internal standards and policies. The Company abides by stringent internal policies that affect the Company's behaviour with respect to its environmental, social and health and safety responsibilities at the various locations the Company operates around the world. The Company has established management, audit and reporting procedures to ensure the manner in which individual projects are developed, operated and decommissioned is in compliance with various internal policies.

Numerous mitigation programmes and monitoring systems are in-place at the Company's Ahafo Mine that have proven the Company's willingness to honour its commitments to individuals, communities and to the environment. Examples of the mitigation programmes and monitoring that are ongoing at Ahafo Mine include:

- Monitoring of air resources, climate, surface water, groundwater, aquatic resources and revegetation success,
- Concurrent reclamation of disturbed surface areas that are no longer needed for ongoing operations,
- Construction and maintenance of sediment control structures to control sedimentation,
- Installation of plastic-lined ditches that host reagent pipelines to provide secondary containment in the event a leak occurs,
- Operation of a nursery at which various floral species are evaluated and propagated for use in ongoing reclamation of disturbed areas,
- Periodic external assessments of the Land Acquisition and Compensation Programme, Resettlement Action Plan, Livelihood Enhancement and Community Empowerment Programme and Vulnerables Programme and
- Regular independent assessment of Management System standards and procedures with reports issued outlining areas for improvement.

The Company intends to exercise the same level of care and attention to detail with respect to mitigating its impacts at Akyem and implement improvements in areas where practicable.

**Tables ES-1, ES-2 and ES-3** summarise the mitigations identified for the issues and impacts listed above for the biological, physical and human environments, respectively. Through this evaluation process, the Company identified issues and potential impacts beyond those listed above for which other mitigations were developed.



<b>Table ES-I Summary of Proposed Mitigations Biological Environment Akyem Gold Mining Project</b>	
<b>General Issue or Impact Identified by Public Stakeholder, Government Stakeholder or Company</b>	<b>Proposed Mitigation(s)</b>
Loss of ecological habitat (including portion of Ajenjua Bepo Forest Reserve) and increased pressure on remaining fauna	<ul style="list-style-type: none"> <li>• Implement reforestation programme developed in concert with agencies</li> <li>• Company using Akyem Gold Mining Project as pilot project in evaluating biodiversity offsets in conjunction with non-governmental organisations.</li> <li>• Implement a closure and decommissioning plan that would include provisions for re-establishing habitat throughout disturbed areas.</li> <li>• Implement community education programmes to develop alternative means to secure bushmeat, forums for reducing pressure on fauna and establishing farms to raise bushmeat and snails.</li> <li>• Administrative controls including policies that prohibit employees and contractors from engaging in hunting activities on all mine properties have been implemented.</li> </ul>
Loss of integrity of Ajenjua Bepo Forest Reserve	<ul style="list-style-type: none"> <li>• Implement reforestation programme developed in concert with agencies</li> <li>• Company using Akyem Gold Mining Project as pilot project in evaluating biodiversity offsets in conjunction with non-governmental organisations.</li> <li>• Implement a closure and decommissioning plan that would include provisions for re-establishing habitat throughout disturbed areas.</li> </ul>
Impacts to forest habitat	<ul style="list-style-type: none"> <li>• Implement reforestation programme developed in concert with agencies</li> <li>• Company using Akyem Gold Mining Project as pilot project in evaluating biodiversity offsets in conjunction with non-governmental organisations.</li> <li>• Implement a closure and decommissioning plan that would include provisions for re-establishing habitat throughout disturbed areas.</li> </ul>
Protection of endangered species	<ul style="list-style-type: none"> <li>• Company to develop and implement a Critical Species Management Plan including avoidance of nesting and brood-rearing periods for raptors and other species of high conservation priority, implement an endemic plant species propagation programme and sponsor educational opportunities for individuals to reduce stress on flora and fauna.</li> </ul>

<b>TABLE ES-2 Summary of Proposed Mitigations Physical Environment Akyem Gold Mining Project</b>	
<b>General Issue or Impact Identified by Public, Stakeholder, Government Stakeholder or Company</b>	<b>Proposed Mitigations</b>
Deterioration of air quality from increased dust levels and emissions	<ul style="list-style-type: none"> <li>• Control fugitive dust using water and/or chemical binders (e.g., magnesium or calcium chloride) on roads and control speed of vehicles</li> <li>• Revegetate areas as soon as possible to bind soil.</li> <li>• Control emissions from mining equipment through proper maintenance of exhaust systems and installation of scrubber equipment.</li> <li>• Conduct air quality monitoring routinely to measure particulate and emissions concentrations.</li> </ul>
Contamination of surface and/or groundwater resources  Impacts to water quantity	<ul style="list-style-type: none"> <li>• Control run-on and run-off water to avoid contamination with mine areas through use of Best Management Practices (BMPs) (e.g., ditch systems designed to divert water around disturbance areas; ditch systems designed to collect and manage water that contacts disturbance areas).</li> <li>• Maintain capacity of sediment control structures through routine maintenance (remove sediment trapped in structure as needed).</li> <li>• Implement plan to control the transport, storage, use and disposal of chemicals and reagents.</li> <li>• Implement spill containment and corrective action plan.</li> <li>• Implement programme to restore water supplies (e.g., installation of new wells; establishment of new or maintenance of existing fetch points) that could be lost as a consequence of mine development.</li> <li>• Implement water treatment programmes where necessary.</li> <li>• Implement engineered design for mine facilities to control and manage trace metals associated with waste rock and tailings (e.g., construct facilities with low permeability base; install seepage collection ditch and pond systems; install liner systems for collection of process solutions).</li> <li>• Implement site-wide groundwater and surface water monitoring programme with periodic reports to EPA.</li> </ul>
Soil erosion and sedimentation	<ul style="list-style-type: none"> <li>• Implement BMPs to arrest soil movement from disturbance areas (e.g., silt fences, revegetation, rip rap placement, sediment control structures, run-off control ditches).</li> <li>• Maintain sediment control structures to ensure capacity – return sediment to growth medium stockpiles.</li> <li>• Conduct concurrent and final reclamation including establishment of vegetation to bind soil.</li> </ul>

<b>TABLE ES-3 Summary of Proposed Mitigations Human Environment Akyem Gold Mining Project</b>	
<b>General Issue or Impact Identified by Public, Stakeholder, Government Stakeholder or Company</b>	<b>Proposed Mitigations</b>
<p>Loss of farm holdings</p> <p>Loss of agricultural land and lifestyles</p>	<ul style="list-style-type: none"> <li>• Implement compensation programme for crops, outbuildings and livestock..</li> <li>• Develop and implement various programmes including:               <ul style="list-style-type: none"> <li>○ Alternative Land Access.</li> <li>○ Managed/Controlled Farm Lands.</li> <li>○ Livelihood Replacement Programme.</li> <li>○ Vulnerables Programme.</li> </ul> </li> </ul>
<p>Resettlement of Yayaaso, multiple hamlets and farmsteads</p>	<ul style="list-style-type: none"> <li>• Implement resettlement/relocation programme.</li> <li>• Compensate for loss of residential and non-residential structures and commercial business.</li> <li>• Develop and implement various programmes including:               <ul style="list-style-type: none"> <li>○ Alternative Land Access.</li> <li>○ Managed/Controlled Farm Lands.</li> <li>○ Livelihood Replacement Programme.</li> <li>○ Vulnerables Programme.</li> </ul> </li> <li>• Implementation of education and training programmes for money management, micro-enterprise development.</li> </ul>
<p>Compensation process and procedures</p>	<ul style="list-style-type: none"> <li>• Implement open and transparent interactions.</li> <li>• Establish Resettlement Negotiation Committee.</li> </ul>
<p>Increased vibrations from blasting that could damage structures</p> <p>Increased noise levels</p>	<ul style="list-style-type: none"> <li>• Implement noise reduction and blast management measures to reduce effects including maintaining buffer zone.</li> <li>• Implement structure and foundation assessment programme.</li> <li>• Communicate blasting schedule.</li> <li>• Implement controlled blasting technology.</li> <li>• Implement monitoring programme to ensure compliance.</li> </ul>

<b>TABLE ES-3 (continued)</b> <b>Summary of Proposed Mitigations</b> <b>Human Environment</b> <b>Akyem Gold Mining Project</b>	
<b>General Issue or Impact Identified by Public, Stakeholder, Government Stakeholder or Company</b>	<b>Proposed Mitigations</b>
Disruption of socio-economic conditions Influx of outsiders Changes to the social fabric of local communities	<ul style="list-style-type: none"> <li>• Implement hiring policy emphasizing local labour pool.</li> <li>• Develop local training initiatives.</li> <li>• Conduct open and transparent interactions.</li> </ul>
Respect for Traditional Authorities and traditional ways of life	<ul style="list-style-type: none"> <li>• Conduct open and transparent interactions.</li> <li>• Conduct periodic information meetings.</li> </ul>
Clear and transparent communication	<ul style="list-style-type: none"> <li>• Conduct open and transparent interactions.</li> </ul>
Positive socio-economic impacts such as increased employment, tax, and improved infrastructure	<ul style="list-style-type: none"> <li>• Implement hiring policy emphasizing local labour pool.</li> <li>• Collaborate with local and district governments on infrastructure improvements.</li> <li>• Pay taxes and royalties to provide revenue to the District.</li> </ul>
Special employment schemes for youth and women	<ul style="list-style-type: none"> <li>• Implement hiring policy emphasizing local labour pool.</li> <li>• Support business opportunities for women and youth.</li> <li>• Implement contractor hiring and procurement policies.</li> </ul>
Success of reclamation with a view to future generations Long-term public safety implications	<ul style="list-style-type: none"> <li>• Implement sustainable development programme.</li> <li>• Collaborate with stakeholders to establish suitable post-mining land uses and use of infrastructure.</li> </ul>

## MONITORING PROGRAMMES

Several environmental and social monitoring programmes would be continued or initiated as Project operations commence to ensure mitigation measures, presented above, are effective. These programmes would be implemented in accordance with various plans that would receive reviews and approvals from the appropriate Ghanaian government institutions. A summary of the monitoring programmes and the period of monitoring are presented in **Table ES-4**.



## PROVISIONAL ENVIRONMENTAL MANAGEMENT PLAN

The Company developed a Provisional Environmental Management Plan that establishes the framework addressing company activities associated with site clearance, construction, operation and closure of the Project. The Provisional Environmental Management Plan includes a social management plan which addresses social issues that could arise during development of the project. After 18 months following permit issuance, in accordance with the Environmental Assessment Regulations (L.I. 1652), the Company would issue an Environmental Management Plan that updates and revises this plan to address anticipated activities conducted during the subsequent 3 years of operation. Ghanaian regulations require the Plan to be updated every 3 years during the life of the operation.

This Provisional Environmental Management Plan identifies feasible and cost-effective management programmes and actions to reduce potentially adverse impacts to acceptable levels. The monitoring aspect of the plan would be consistent with the environmental and social monitoring plan described above to provide a means to determine the effectiveness of mitigations implemented. This Provisional Environmental Management Plan also provides for timely and effective implementation of mitigations by specifying institutional responsibilities, an implementation schedule and commitment of financial resources to support the plan. Finally, the plan is an integral component of the Project's overall planning, design, budget and implementation. As an adaptive management strategy, the plan provides for modifications over time if monitoring data indicate changes would be appropriate.

The Provisional Environmental Management Plan is comprised of a series of plans and programmes that would be prepared and implemented to ensure that potential adverse impacts to the environment and Project-affected people would be reduced to an acceptable level. These plans and programmes include:

- Site clearance management plan,
- Sediment and water management plan.
- Waste management plan (hazardous and solid waste),
- Fuels and hazardous materials management plan,
- Spill prevention, control and response plan,
- Emergency response and contingency plan,
- Social impact mitigation programmes, to include:
  - Compensation and resettlement,
  - Livelihood replacement,
  - Transitional vulnerability,
  - Influx management and
  - Community health and safety.

- Social investment programmes, to include:
  - Building community resilience and sustainability,
  - Creating opportunities for employment and training,
  - Creating opportunities for local economic and business development and
  - Creating partnerships for sustainable community development.
- Ongoing public consultation and disclosure and
- Occupational health and safety management (including work environment monitoring).

## PROVISIONAL LAND REHABILITATION PLAN

The Company has prepared a Provisional Land Rehabilitation Plan that addresses land stabilization and erosion control during the first 18-months of the construction period. The Company proposes to optimise this provisional plan to coincide with submittal of the Environmental Management Plan following issuance of an Environmental Permit for the Project by engaging various stakeholders in a defined process. The process would be developed in consultation with the EPA and other relevant institutions as well as community stakeholders.

The Company would take specific actions to minimise impacts during the initial 18 months of the construction period. **Table ES-5** summarizes these actions and mitigation strategies. The Company would coordinate environmental and social monitoring programmes, described above, to provide a means to measure success of these efforts.

## CLOSURE AND DECOMMISSIONING

Closure and decommissioning of the Project would be accomplished in accordance with Ghana's *Mining and Environmental Guidelines* and the Company's internal Policy and Standards. 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 government institutions and stakeholders and local communities and is likely to include areas for agriculture, livestock grazing and wildlife habitat management.

A Closure and Decommissioning Plan would be prepared for the Project that describes reclamation objectives and specific reclamation/closure activities for 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 would also be described for the mining area. This Plan would be compiled within 2 years of cessation of mining in accordance with Ghanaian regulations.

The Company's broad reclamation objectives for the Project are to ensure that the site is left in a condition that is safe, stable and minimises long term environmental impact, is left without any future liability to the community and future land use restrictions are minimised.

**TABLE ES-5**  
**Summary of Probable Development Activities, Impacts**  
**and Proposed Generalized Mitigations**  
**Akyem Gold Mining Project**

<b>Activity</b>	<b>Possible Environmental or Social Impact</b>	<b>Proposed Generalized Mitigation</b>
Construct Sediment Control Structures	Increased erosion, sedimentation, airborne dust.	Smooth and contour dams, outlet structures, surface impacts. Scarify soil. Cover with topsoil. Revegetate and maintain vegetation. Apply water with tanker truck as necessary to control dust until vegetation is established.
Clear and Grub Vegetation	Increased dust due to uprooting of trees and other vegetation; possible increase in erosion and sedimentation rates.	Where necessary, apply water to source areas of dust using water supplied by tanker truck. Sediment control structures installed prior to undertaking this task to retain any increased sediment resulting from surface disturbance.
Install Surface Water Diversion Channels	Increased erosion and sedimentation due to presence of disturbed surface areas; possible source for airborne dust.	Scarify, apply soil and revegetate barren areas following construction. Use interim BMPs to control erosion and sedimentation until vegetation is established.
Salvage and Stockpile Topsoil	Increased dust, erosion from stockpiles. Sedimentation could increase in receiving drainages.	Incorporate processed biomass from grubbing operation to further increase organic content in soil stockpiles and cover revegetated with fast-growing plants to stabilize stockpile until needed. Use BMPs to control short-term sedimentation and erosion impacts. Apply water, as needed, to control dust until vegetative cover is established.
Construct Access Roads	Increased erosion and sedimentation due to surface disturbance of cut and fill areas; possible slight increase in runoff due to removal of vegetative cover.	Scarify, apply soil and revegetate cut and fill areas that are barren following construction. Use interim BMPs to control erosion and sedimentation until vegetation is established. Apply water as interim measure, as necessary, to control fugitive dust.
Construct Accommodations	Source of dust from areas cleared for housing construction; possible increased erosion of bare areas.	Scarify and place topsoil over bare areas and revegetate or apply gravel cap. Control dust by applying water until vegetation is established or gravel cap is installed.
Construct Area to House Processing Plant	Possible source of dust due to clearing activities; increased erosion and sedimentation potential due to lack of vegetative cover.	Scarify and place topsoil over bare areas and revegetated. Use BMPs to control erosion and sedimentation until vegetative cover is established. Control off-site sedimentation impacts using sediment control structures. Control fugitive dust by applying water until vegetation is established or install a gravel cap.
Compensate and Resettle Project-Affected People	Variety of social impacts associated with compensation; relocation and resettlement of persons living in Proposed Mining Area.	Implement Resettlement Action Plan, Vulnerable Management Programme and Sustainable Livelihoods Programme.
Manage Population Influx	Variety of social impacts associated with influx of opportunity seekers from outside the local area.	Implement Influx Management Plan.

Specific reclamation objectives for the Closure and Decommissioning Plan include the following:

- 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 - Reclaim as much of the affected area as possible to a condition where pre-mining land use can resume and ensure the eco-system function is representative of this land use. The primary pre-mining land uses include cropland, livestock grazing and small residential development.
- Water Quality- Ensure that the quality of water that discharges from the reclaimed Proposed Mining 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 site maintains or improves biodiversity of the Proposed Mining Area.

As indicated above, a detailed Closure and Decommissioning Plan is required to be delivered to EPA within 2 years of mine closure. The Company is proposing to initiate reclamation planning for the Project soon after receipt of the Environmental Permit to take advantage of opportunities outlined below:

- Opportunities currently exist through the various groups already formed in the Study Area to engage a variety of stakeholders in the reclamation design process. Outcomes from this planning process could be used, in turn, to refine the design of certain mine and processing components that may not be available once construction begins.
- Agreements may be reached regarding acceptable design, closure and post-mine land use criteria by consulting a variety of institutional and community stakeholders in the closure and decommissioning planning process. Such agreements, likewise, could influence mine and processing facility design and operational procedures.
- Strategies would be developed to address decommissioning with respect to determining how infrastructure would be removed or maintained and applied to other uses. These strategies would be considered in evaluating various sustainability options for the Proposed Mining Area that propose using existing infrastructure for other non-mining applications. The useful life of the infrastructure, retrofitting costs, maintenance requirements, costs and liabilities to the various parties involved in the Project could be determined. Activities that could “jump start” other business lines during the mine life could be identified that may result in materials and supplies that could be used in the reclamation and closure phases of the Project or at other mines in Ghana.

- If post-mine land uses were agreed upon, programmes could be planned and designed to conduct research and perform pilot studies on various reclamation methods that would reinforce the overall plan. Likewise, appropriate monitoring and evaluation programmes could be developed to ensure reclamation methods are successful, as intended.
- Opportunities would be created for incorporating objectives of existing and planned social investment plans and sustainable livelihood programmes into the Closure and Decommissioning Plan prepared for the Project such that social programmes remain consistent, sustainable and targeted at the end result of providing alternative means of livelihood to Project employees.

## CONSULTATIONS

Consultations regarding various aspects of the Project have been conducted since 2003 through: (1) contact with various government ministries, departments and agencies; (2) ongoing efforts by the Company to engage with, listen and educate Project-affected people in the Study Area; and (3) the formal EIA Scoping Process (including Public Hearings).

### Government Institutions

Since 2003, Company representatives have held workshops and briefings on the Project for the following entities:

- National ministries, departments and agencies
  - Environmental Protection Agency
  - Ministry of Lands, Forestry and Mines
  - Lands Commission
  - Forestry Commission
  - Land Valuation Board
  - Ministry of Local Government, Rural Development and Environment
  - Ministry of Education / Ghana Education Service
- Regional and local officials and agencies
  - Birim North District Assembly

In 2007, the Company expanded its engagement with local government functionaries to build an understanding of where the Company and local Government could work together to influence the socio-economic advancement of the Study Area. In this effort, the Company periodically briefed the District Chief Executive, District Coordinating Director and members of the District Assembly. These briefings were aimed at improving the understanding of both parties of the impacts and opportunities that the Project could deliver and the benefits that could come from collaborating as partners on development initiatives that will benefit the District. The Company is collaborating with the District Planning Coordinating Unit and has started the process of aligning Company initiatives with those of the District and through OICI, in collaborating with the government's Rural Enterprise Programme which began operation in the District during the year.

A monthly schedule of engagement with the Regional Minister and the Regional Coordinating Council was also initiated with the intention of keeping this group updated regularly on programmes and activities of the Project and providing a forum for the Regional Minister and the Regional Coordinating Council to share their thoughts on the Project. The Member of Parliament for the area was also briefed regularly on project activities.

The Company has met with several government agencies and commissions to brief them on the status of the Project and solicit their concerns, and discussed the issues, which were raised by EPA in the previous EIS and discuss with them their recommendations regarding the development of the Project. These groups include:

- Forest Services Division
- Wildlife Division
- Water Resources Commission
- Ghana National Commission on Culture
- Hydrological Services Department
- Irrigation Development Authority
- Ghana Highways Authority
- Traditional Authorities / District Assemblies
- Ghana Meteorological Agency
- Ghana Health Service
- Ghana Museum and Monument Board
- Fisheries Department

### **Project-affected People**

The Company has also undertaken a comprehensive suite of consultation, disclosure activities and stakeholder engagement exercises since acquiring the mining concessions at Akyem. Project stakeholders (individuals, groups, and organisations with an interest in the Project) have been actively engaged in the consultation process since 2003. These consultative efforts have included:

- Advisory committees, including:
  - Crop rate review committee.
  - Community consultative committee.
- Workshops and briefings
- Community-based consultative programmes, including:
  - Mine site visits.
  - Community information centres.
  - Schools engagement programme.
- Media
  - Community newsletter.
  - Regional media relations.
- Local consultations, including:
  - Consultations with traditional authorities.
  - Consultations with youth organisations.
  - Consultations with farmers and landlords.
  - Consultations with religious leaders.

- Consultations with other focus groups.
- Community durbars.
- Capacity building.

### **EIA Scoping Process**

On November 2, 2004, approximately 200 local residents attended a scoping meeting hosted by the EPA to obtain formal public comment on the Project. The outcome of this consultative effort was a Scoping Report, including Terms of Reference. EPA held a second public meeting on June 28, 2005 in Yayaaso to summarize the design of the Project and disclose results of the second Draft EIS. The Company Senior Community Liaison Officer presented results of the Draft EIS in Twi to enhance public understanding. Approximately 200 local residents attended this second meeting and the traditional authorities of each settlement in the Study Area were asked to address the findings of the Draft EIS. A Final EIS was sent to EPA in May 2006, followed by withdrawal of this document by the Company in order to re-evaluate several aspects of the Project.

The Company reinitiated the permitting process in January 2008 through preparation of another Draft EIS which evaluates three waste rock disposal options, addresses comments offered by EPA on prior versions of the document, includes updated social information and data and presents additional environmental data collected in the Study Area since the last EIS submittal in May 2006. EPA organized a Peer Review and Liaison Group to review the April 2008 Draft EIS, and held a Public Hearing in the community of Yayaaso on July 4, 2008 to solicit the views, comments and concerns from adjoining communities and the general public.

During all of the public meetings, representatives of each settlement were encouraged to state any concerns about the Project before the EPA considered issuing an environmental permit. The outcome of these meetings was an accounting for issues and potential impacts associated with the Project.

## **CONCLUSION**

In consideration of the foregoing and the information, analyses and data presented herein and in the Draft EIS, the Company requests the EPA deem this Final EIS acceptable as one component of the EIA process ultimately leading to issuance of an Environmental Permit for the Project.