

## 5.0 MITIGATION MEASURES

In response to issues and potential impacts identified in **Section 4.0** (*Assessment of Impacts*), the Company has designed and would implement a variety of mitigation measures to reduce, minimise or eliminate adverse effects that could result from the Project. These mitigation measures include those that would be implemented during construction, operation and closure/decommissioning of the Project. Measures that would be implemented during construction and operation of the Project are described in **Section 2.0** (*Project Description*). Mitigation measures that would be implemented during closure and decommissioning of the Project are described in **Section 8.0**, *Closure and Decommissioning*.

Mitigation measures described in this section are cross-referenced to the specific section of the EIS where the Company has committed to implementation of the measure. In general, mitigation measures are designed to:

- Minimise impacts by limiting the degree or magnitude of the action and its resulting effects,
- Rectify the impact by repairing or rehabilitating 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.

Monitoring measures described in **Section 6.0** (*Monitoring*) would be used to ensure that actions taken comply with the terms, conditions and mitigation measures identified in the environmental permit.

This section of the EIS describes the overall philosophy of the Company with respect to its obligations to minimize and mitigate impacts it may cause (directly or indirectly) on the people in the Study Area and the environment. In addition, specific mitigations are identified and described to address the various impacts and potential issues identified in **Section 4.0** (*Assessment of Impacts*).

The mitigation actions presented represent the Company's obligations to the Government of Ghana and its people to be a good steward of the environment and a good neighbour in the communities in which the Company operates. Methods of measuring the degree of success that the Company achieves in meeting these responsibilities are described in subsequent sections of this EIS.

## 5.1 NEWMONT ENVIRONMENTAL POLICY

Newmont's Environmental Mission Statement (Newmont 1991) states in part that Newmont and its affiliates intend to set standards of excellence with regard to environmental matters. The following policies provide definition to the Environmental Mission Statement that reflects challenges faced by Newmont as a global business in the 21<sup>st</sup> century:

- Newmont will, at all times, operate its facilities in compliance with applicable laws and regulations.
- Newmont will adopt and adhere to standards that are protective of both human health and the environment at facilities it builds and operates.
- Each Newmont operation will develop during the design phase and implement during operations and closure, a closure and reclamation plan that provides for long-term environmental stability and suitable post-mining beneficial land uses.

In addition, Newmont will:

- Commit necessary human and financial resources to support activities necessary to achieve compliance with the environmental mission statement and policies.
- Motivate and reinforce behaviour in its employees (including contractors) that support the environmental mission statement and policies, including compensation linked to annual environmental performance targets.
- Operate and maintain pollution control equipment and facilities to minimize upsets or malfunctions and demonstrate a record of continuous improvement in this regard.
- Establish an audit program to systematically evaluate compliance of operating facilities with applicable federal, state, and local rules and regulations, as well as corporate policy, which includes a corrective action process to address deficiencies that arise.
- Hold employees accountable for ensuring equipment, facilities, and resources are managed to comply with this policy and minimize environmental risk.

Some of the mitigation programmes that would be implemented at the proposed Project include:

- 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 (RAP), Livelihood Enhancement and Community Empowerment Programme and Vulnerables Program.
- Regular independent assessment of Management System standards and procedures with reports issued outlining areas for improvement.

## 5.2 MITIGATION MEASURES

Various mitigation measures would be implemented in a manner that ensures the Company's actions are consistent with the spirit of its mitigation policies (stated above), addresses specific concerns of particular individuals or groups (to the extent possible) and achieves compliance with Ghanaian laws. Descriptions of the mitigations the Company would institute to address issues and impacts associated with the biological, physical and human environments as presented in **Section 4.0** (*Assessment of Impacts*) are presented below.

### 5.2.1 BIOLOGICAL ENVIRONMENT

**Table 5-1** summarizes mitigations the Company would complete to address issues and potential impacts relative to the biological environment. More specific discussions of these mitigation actions are presented below.

#### FLORA

Several actions would be taken to mitigate identified impacts to the site flora during the initial, construction and operational phases of Project development. These are discussed below.

Site clearing would occur prior to actual construction of the major facilities associated with the Project. Mitigations to be employed during this pre-construction phase include:

- A Preliminary Site Clearance Plan (see **Annex B-1**) has been developed consistent with requirements of EPA and the Forest Services Division to guide application of Best Management Practices to reducing the impact on flora, fauna and waterways.
- Land clearance and deforestation in advance of soil salvage and mining operations would be limited to the extent practicable and conducted on an as-needed basis.

- Concurrent reclamation would be performed during site pre-construction activities, as areas disturbed through development are no longer required to support site functions. This would include reclamation of exposed road cuts and fills and access roads and temporary storage areas.
- Only authorized vegetation clearing would occur to maximise retention of secondary forest outside the mine facilities. The Forest Services Division would be consulted regarding this effort prior to site clearing activities occurring.

<b>Table 5-1 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>

### Species of Concern

To mitigate potential loss of floral Species of Concern identified in **Section 3.0** (*Existing Environment*), the Company would conduct the following actions:

- Prior to commencing site clearing activities, the Company would develop and implement a Critical Species Management Plan (CSMP) to ensure sustainable management of endemic flora and key fauna species within the Proposed Mining Area. The CSMP will address flora and fauna species identified by the Ghana

Department of Wildlife and International Union of Conservation and Nature (IUCN) classifications, those species identified as “vulnerable,” and community use of certain species (including those that have medicinal and cultural values). The CSMP will identify types and locations of key habitat components that require protection and management to maintain conditions that support critical species. Locations of these species will be mapped for use in monitoring (see **Section 6.0, Monitoring Programmes**).

The CSMP will address the need to incorporate critical floral species into the onsite Project nursery programme to propagate species to meet the following needs:

- Species that would meet site reclamation requirements for the Proposed Mining Area,
  - Species that would meet community needs for medicinal and cultural uses and
  - Species that could be used to establish capacity in resettlement communities where access to species is lost (development of community gardens or common areas).
- The Company would implement an endemic plant species propagation programme at the Project nursery to ensure that a stock of endemic flora species that meet the needs identified above is available for transplanting into forest habitats within the Proposed Mining Area.
- The Company would develop and manage a noxious weed management programme to reduce and/or eradicate invasive species.

## **Biodiversity**

In response to the loss of biodiversity associated with excavation of the open pit within and outside the Ajenjua Bepo Forest Reserve, the Company would complete studies and mitigatory actions discussed below.

The Company would enhance the biodiversity of a target area to offset that withdrawn from the Ajenjua Bepo Forest Reserve resulting from Project development. The enhancement project(s) would address loss of timber resources, plants for medicinal and cultural uses and biodiversity and the approach used to define candidate sites and types of offset would be consistent with the outcome of the Business and Biodiversity Offset Programme process discussed below. The Company would work with relevant agencies to identify and develop a reforestation programme and location to replant trees and plants as one component of the offset program. Appropriate consultations would be made with the Forestry Services Commission in making these determinations.

Several mitigations would be implemented by the Company to ensure revegetation and reclamation actions completed during initial construction, operational and post-mining phases of the Project are successful. These are discussed below.

- A comprehensive Closure and Decommissioning Plan would be developed in concert with a group of interested stakeholders and delivered to the EPA within 2 years of cessation of mining. This plan would present an agreed upon plan for post-mine land use including descriptions of how and where particular reclamation activities would take place. As part of this plan, a path forward would be developed to create sustainable solutions to aspects of the post-mine environment involving both the environment and social issues. The plan would provide for an analysis of retaining infrastructure associated with the Project for specific post-mine uses as well as requisite operations and maintenance needs. Methods to salvage and replace topsoil and recontour surface features to accommodate the post-mine land use would be specified in the closure and decommissioning plan.
- Stockpiled topsoil and other mine substrates would likely have reduced microbial presence and nutrient cycling activity during storage and therefore be less productive than undisturbed soil. Supplying mulch, supplemental plant nutrients and microbial inoculations to areas to be reclaimed may be necessary to initiate recovery of a diverse and self-sustaining cover of vegetation. Testing for macro and micronutrients would be conducted prior to seeding and planting to determine if supplemental nutrients would be required to re-establish post-mining vegetation.
- To restore nutrient cycling system which would facilitate crop and timber production potential on reclaimed land, locally adapted, native, nitrogen-fixing legumes would be a major component of the initial revegetation mix of species.
- A noxious weed monitoring and control plan would be developed and implemented to ensure that reclaimed areas are protected from noxious weed invasion.
- Concurrent reclamation and revegetation of areas disturbed by Project development would be conducted as these areas are progressively no longer needed to support the operation. Monitoring of revegetation success would be conducted and modifications to the reclamation approach at these locations would be made, as necessary, to ensure reclamation objectives are achieved.
- Reclamation activities within the Ajenjua Bepo Forest Reserve would include use of approved timber species with a focus on native species indigenous to Ghana. The Company would seek direction and approval from the Forest Services Division of the Forestry Commission regarding appropriate plant species.
- In accordance with the 'Guidelines for Mining in Production Forest Reserves', only the open pit would be located within the boundary of the Ajenjua Bepo Forest Reserve. All other roads and facilities would be located outside the Forest Reserve to eliminate these potential sources of erosion and sedimentation.

As identified above, the Company intends to enhance the biodiversity of a target area to offset that withdrawn from the Ajenjua Bepo Forest Reserve resulting from Project development in accordance with procedures described in the Business and Biodiversity Offset Programme (BBOP; 2008a, 2008b). The Company is a partner in this programme

which explores the concept of establishing biodiversity offsets to compensate for significant residual biodiversity impacts that can occur with development projects. Recognizing that the proposed Project would affect biological resources and socioeconomic conditions in and around the Project area, the Company volunteered the proposed Project as a pilot BBOP project.

The Company, in cooperation with Conservation International – Ghana, evaluated the proposed Project relative to the biodiversity offset design processes developed using the BBOP tools and methodologies. A case study report is being prepared by the Company that documents methods used to apply the draft BBOP tools and methodologies, in particular the January 2008 versions of the Draft Biodiversity Offset Design Handbook (BBOP 2008a) and the Draft Community Biodiversity Offset Cost Benefit Handbook (BBOP 2008b), to the proposed Project. Baseline biological and social data reported in this EIS were used to support this analysis.

## FAUNA

Mitigation measures to reduce impacts of construction and operational activities on wildlife would include the following:

### Fauna Habitat

Habitat lost through land clearing and construction phase activities would be mitigated through implementation of the following actions.

- A comprehensive closure and decommissioning plan would be developed and implemented; the framework of this plan is described in **Section 8.0** (*Closure and Decommissioning Plan*). This plan would take into account the desire of the Company to re-establish habitat conducive for various types of fauna.
- An analysis of offset of loss in biodiversity would be completed in conjunction with the BBOP process, as described under “*Flora*” above.

### Bushmeat Habitat

- Training would be offered to teach residents alternatives to bushmeat hunting, such as establishing farms to raise favoured bushmeat species (e.g., grass cutters and snails). Training would focus on fallow cycle plant communities which that may support growth of bushmeat species without exerting additional demands on areas producing food and cash crops. In addition, training would be oriented toward commercial production of the giant African snail, a delicacy and a good source of protein. Snails are traditionally gathered from the wild, but stocks are increasingly threatened by loss of habitat due to the expansion of farming, use of pesticides on farms, small-scale mining activities and over-harvesting. Climatic conditions and abundant sources of food in the Project Area are optimum for raising snails.

- Educational opportunities would be provided on other alternatives to bushmeat hunting, including increasing poultry production and developing fish farming. Potential for members of the communities to produce poultry successfully is high especially if the supply of chicks, feed and veterinary products are available and affordable, and the supply of these is accompanied by training in feed production, health, housing requirements and production techniques. Basic requirements for establishing fish farms include a dependable supply of water, equipment to construct fish ponds or dugouts that can hold water perennially, supply of healthy fingerlings, feed, and the technology for combining these efforts to successfully produce fish in captivity. All these requirements can be met in the Study Area. Preferred types of fish (tilapia and mud fish) also lend themselves to aquaculture development.
- The Company would sponsor and support the conservation awareness programme (CREMA) offered by a non-governmental organisation and supported by the Forest Services Division. Similar programmes have had localized positive impacts on reducing overexploitation of fauna to support the bushmeat trade.
- Administrative controls including security inspections and patrols, and employee and contractor training have been implemented that prohibit employees and contractors from engaging in hunting activities on all mine properties.

## WETLANDS AND AQUATIC RESOURCES

Mitigations to offset impacts to wetlands and aquatic resources that could result from development of the Project would include:

- Stakeholders involved in developing the closure and decommissioning plan (see **Section 8.0, (Closure and Decommissioning)**), would be encouraged to consider devising a means to operating and maintaining the Water Storage Facility and open pit lake in a post-mine environment to provide habitat to potentially offset impacts to wetlands and aquatic resources from mine development. Should the decision be made not to retain the Water Storage Facility, the dam structure would be removed and the Company would reclaim the area to include an ephemeral drainage that would be designed to reintroduce a habitat conducive to reestablishment of macroinvertebrates.
- The Company would cooperate with appropriate government institutions in offering training on operations and maintenance of the water storage dam (if retained) and open pit lake to promote aquatic habitat health. Training would be based on successful programmes offered elsewhere in Ghana.
- The Company would comply with Ghana Water Resources Commission stipulations placed in the abstraction permits required to divert water from the Pra River into the pipeline that would be routed to the Water Storage Facility. It is expected the conditions presented in the abstraction permit would consider potential downstream effects on aquatic resources.

## 5.2.2 PHYSICAL ENVIRONMENT

**Table 5-2** summarizes mitigation measures the Company would complete to address issues and potential impacts relative to the physical environment expressed by stakeholders. More specific discussions of these and other mitigatory actions are presented below.

<b>Table 5-2 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 Mitigation(s)</b>
Deterioration of air quality from increased dust levels and emissions.	<ul style="list-style-type: none"> <li>• Controlling 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>• Air quality monitoring would be conducted 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 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>• Implementation of 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>• Maintenance of sediment control structures to ensure capacity – return sediment to growth medium stockpiles.</li> <li>• Concurrent and final reclamation including establishment of vegetation to bind soil.</li> </ul>

### AIR QUALITY

Two primary components of impacts to air quality that may develop through development of the Project are fugitive dust from surface disturbance and emissions from the processing plant. Mitigations to control these source areas are discussed below.

## **Fugitive Dust**

- Dust suppression sprays and dry dust collection systems would be installed on all ore crushing circuits and all ore transfer points in the processing plant.
- Water, chemical binders (e.g., magnesium or calcium chloride) or wetting agents would be applied to all disturbed surfaces to control dust emissions.
- Revegetation of disturbed areas would be conducted concurrent with operations, as possible.
- Speed limits for Project vehicles would be lowered through populated areas to minimize fugitive dust generation. The company currently has a 20 kilometre per hour (kph) speed restriction for all vehicles travelling within local community roads for safety reasons.

## **Gaseous Emissions**

- Emissions testing would be conducted as prescribed in the Environmental Monitoring Plan, to be approved by EPA.
- A scrubber unit has been included in the design of the process facility to control emissions from the gold room and onsite laboratory.
- Gaseous emissions would be minimized through proper operation, routine checks of performance and maintenance of equipment.

## **GEOLOGY AND MINERALS**

Geochemical testing (static tests) conducted by the Company indicates that waste rock and pit wall rock would be net neutralizing; acidic conditions are not expected to result from excavation and processing of the rock materials associated with the Project. Kinetic tests would be conducted on core samples from representative rock zones in the open pit area during development to provide data that can be used to confirm findings to date through predictive geochemical modelling. If geochemical conditions indicate the potential exists for a certain rock zone to result in leachate which could impact groundwater or surface water resources, further specialized tests (e.g., humidity cell tests, column leach tests) would be conducted to confirm model predictions. If confirmation is obtained from these tests, special waste rock handling procedures would be incorporated into the design for the Project to isolate such rock from the environment or treat the effluent. Waste rock management could include encapsulation of potentially acid-generating rock, blending of neutralizing waste rock with acid-generating rock and/or installation of capping systems to reduce rainfall infiltration into the waste rock disposal facility.

## **SURFACE WATER AND GROUNDWATER RESOURCES**

Several potential sources of contamination to surface water and groundwater and impacts to water availability may occur through development of the Project. Mitigation measures for these potential sources of impact to water quality and quantity are described below.

## **Solid, Liquid and Hazardous Waste**

The Company will follow a Waste Management Plan to ensure all solid, liquid and hazardous wastes transported into or generated at the Project site are handled and disposed of properly and in accordance with applicable Ghanaian laws. A Preliminary Waste Management Plan is included in **Annex B-6**. A brief discussion on the general approach that will be taken to mitigate potential impacts associated with the primary solid, liquid and hazardous waste streams associated with the Project follows.

### **Used Oil and Lubricants**

Principal generators of used oil and lubricants (i.e. motor oil, gear oil, hydraulic fluid and brake fluid) would be vehicle and earth moving equipment. Temporary storage of used oil and lubricants would be accomplished using an above ground steel tank(s) with secondary containment. Except during transportation, oil drums would be located within areas with secondary containment.

Most, if not all, of the used oil and lubricants will be taken off-site to a licensed waste disposal or recycling facility approved by the Company. This may occur as part of an agreement with the oil supplier or may be managed independently by the Company.

Absorbent materials and spill response equipment would be located at the primary storage areas and on trucks used for transporting oil and lubricants. These materials would be used in the event of spills or leaks. Oily clean-up materials will be treated at the volatilization pad and disposed of within the designated "inert" waste disposal area of the Waste Rock Disposal Facility. Untreated clean-up materials will not be deposited directly within the Waste Rock Disposal Facility.

The volatilization pad facility will consist of a concrete slab, surrounded by concrete berms (for containment) and covered with a roof to prevent runoff, runoff and ponding of surface water. Contaminated materials will be mixed using lightweight mechanized equipment on a periodic basis to facilitate volatilization of petroleum hydrocarbon compounds. After testing for residual hydrocarbons the material will be disposed of by burial within the designated area of the Waste Rock Disposal Facility.

A temporary hazardous waste storage facility will be constructed to cater for the Project's needs during the early stages of construction. This facility will have a concrete floor, block walls and a roof. Storage will be controlled and logged. Disposal will be via approved local oil re-processing companies.

### **Diesel Fuel**

Diesel will be the primary fuel supply used for the Project during construction and operation. Minor amounts of gasoline will be supplied for light vehicles and power tools.

In the early stages of construction, limited quantities of fuel may be transported to the site in approved metal containers (e.g., 200 litre drums or jerry cans). Materials or soil contaminated during refueling operations will be treated at the volatilization pad prior to disposal.

Transport of bulk diesel to site will be accomplished using trucks contracted by the fuel supplier and distribution of diesel will occur at suitably constructed refueling stations and from mobile tanker trucks during construction.

Fuel storage will be contained in a bund with 110 percent capacity of the largest storage tank plus a 10-year 24-hour rain event. Secondary containment for fuel tanks, including the walls and floor, will be designed to be impervious to fuel for 72 hours. A roof would be constructed over the secondary containment to eliminate runoff, runoff and ponding of rainwater.

Small fuel spills may occur during fuel transfer into and out of tanks, or during vehicle and earthmoving equipment refueling operations. Measures for spill containment and absorbent materials for spill cleanup will be provided at each pumping station and storage tank location to address potential spills.

### **Oily Water**

Oily water is generated as a result of rainfall in fuel storage tank secondary containment areas, and as a result of cleaning operations at maintenance shops and vehicle washing facilities. Oil-water separators will be provided at the main fuel storage facility.

Oily water generated at washing bays and mine maintenance shop areas will be piped via gravity flow (if possible) to oily water retention basins. After sedimentation of solids in these basins, oil and floating debris will be skimmed using vacuum methods before discharge of the water. Recovered oil will be placed in the tanks used for storing used oil and transported offsite to an approved disposal or recycling facility.

Oily water retention basins will be sized to accommodate a 10-year 24-hour precipitation event for 24 hours (basin spillways will accommodate a 25-year 24-hour event) and will have controlled discharge via manual valves to an American Petroleum Institute- (API-) type oil-water separator to discharge through a storm water drainage pond to surface drainage. Effluents will have no visible oil sheen, and contain a residual oil concentration not exceeding 10 milligrams per litre.

Vehicle washing facilities located at the maintenance area may utilise a concrete sedimentation basin (or equivalent) coupled with an API oil-water separator and vehicle wash recycle system, as far as practicable, for water conservation during dry seasons. Otherwise, effluent will be directed to the oily water separation system.

Oil removed from the oil-water separators via vacuum trucks will be placed in the tanks for storing used oil, or in drums within a bermed area, prior to being transported off-site for authorized disposal or recycling.

## **Containers / Drums**

Most materials will be transported using standard shipping containers, which will be trucked to the appropriate areas for emptying and distribution, cleaned if necessary, and returned empty to the vendors for reuse.

Empty packaging and drums will be stored in bermed areas and will be cleaned and/or drained prior to recycling or disposal. A decision to recycle any drum or packaging materials will be made in consideration of the nature and potential hazards posed by the residual quantities of the original contents.

Packaging and drums not deemed suitable for recycling will be crushed for disposal (as inert waste) within the designated area of the Waste Rock Disposal Facility or used to store wastes (e.g., used oil) prior to removal for offsite disposal. Drums used to store hazardous and non-hazardous wastes will be labeled appropriately and stored in designated areas for the type of materials contained.

## **Sewage**

Sewage waste streams originate as effluent from bathroom facilities, laundry facilities and kitchen operations. Kitchen grease will be removed by grease traps prior to discharge of the water into the sanitary waste water system. Grease will be mixed with absorbent material and managed as a solid waste.

Sewage generated within the Proposed Mining Area (plant, mine administration, exploration and construction camps, Pioneer Village, Operations Management Camp) will be drained /pumped to package sewage treatment plants for treatment. Effluent from the treatment plant(s) will not be discharged into watercourses. Effluent will be tested to demonstrate the treatment systems are functioning as designed and meet applicable discharge requirements. Treated effluent will be discharged to the Tailings Storage Facility.

If during construction the need for remote facilities arises, these situations will be addressed by either local properly designed and installed septic tanks or mobile units. Effluent from mobile units will be discharged into the package sewage treatment plants.

## **Solid Waste**

Solid waste will consist of bulk non-hazardous and hazardous waste. Most construction waste will be generated during the initial phase of the Project, although minor volumes of waste from construction activities will continue to be produced throughout the life of the Project.

Non-hazardous waste will be disposed of on-site while hazardous waste will be transported off-site to a facility approved by the Company for the recycling or final disposal of hazardous substances. Non-hazardous waste includes putrescible waste and rubbish such as domestic waste as well as inert industrial waste generated during construction and maintenance activities. Putrescible waste (i.e., food scraps) and rubbish will be generated in the offices,

kitchen, camp and eating areas. Inert industrial waste will be generated throughout the mine and will consist of such materials as piping off-cuts, drained containers (i.e., with no residual liquids), scrap metal, paper, wood, concrete and textiles.

Domestic waste and inert industrial waste will be separated at source and disposed of via different methods. Inert industrial and domestic waste will be buried in designated areas within the Waste Rock Disposal Facility. Putrescible domestic waste will be incinerated within an on-site facility, which will have the approval of the appropriate Ghanaian agencies.

A temporary hazardous waste storage facility will be constructed on site consisting of a covered (roofed) concrete pad with walled perimeter. Hazardous wastes will be placed in drums and labeled for off-site disposal or recycled at an approved facility. Waste oil and lubricants will be stored in accordance with procedures described above.

Used tyres will be used as berms along the haul roads and any excess tyres that require disposal may be deposited with the inert solid waste within the Waste Rock Disposal Facility.

Soil contaminated with petroleum products (diesel, gasoline), oils and lubricants and absorbents will be treated using a volatilization (bio-remediation) pad using procedures described above. Once treated these materials will be disposed of in the Waste Rock Disposal Facility.

A salvage yard will be developed for the reception and sorting of recyclable/reusable materials. This yard will be secured with a fence and contain designated areas for sorting and storage of different types of materials (e.g., metal, wood, plastics). Secondary containment will be provided in areas where rainwater seepage may become contaminated.

## **Explosives**

Several explosive products and diesel fuel will be stored in the designated Explosives Magazine in the Proposed Mining Area. Ammonium nitrate and emulsion are the only two products that pose a risk of spillage. Dry ammonium nitrate will be stored in woven bags within shipping containers. Spills of ammonium nitrate that may occur as bags are removed from the shipping containers will be recovered and used in the blasting operation. Soil contaminated with ammonium nitrate will be managed as solid waste using procedures described above. Spills at the ammonium nitrate fuel oil (ANFO) plant silos will be handled in an identical manner.

The emulsion plant will mix water and an emulsifier to form a desensitized explosive emulsion for blasting operations. Due to the propriety nature of the emulsion composition, the emulsion plant will be operated by a contracted explosive supply company. The operator will be responsible for ensuring all waste is handled in an approved and acceptable manner.

The diesel tank at the Explosives Magazine will comply with the secondary containment criteria as specified for fuel storage tanks (see above). A valved discharge pipe will prevent storm water being released until visual inspection confirms that there is no oil sheen. Spills

will be vacuumed out of the containment area. Leaks or spills at the Magazine's diesel-powered fire water pump will be contained within a berm. Oily liquids will be recovered using procedures described above. Absorbent materials will be used in the event of minor oil spills and allowance will be made for these materials in spill equipment inventory at the site. Absorbent materials and any contaminated soils will be treated at the volatilization pad prior to disposal within the designated area of the Waste Rock Disposal Facility.

### **General Chemicals**

The plant will use a wide range of chemicals, both in bulk and also in smaller quantities in the laboratory. As all bulk chemicals are consumable items, waste will only occur in the event of an accidental spill.

Where contaminated material can not be safely reintroduced into an appropriate process stream, all chemicals and contaminated materials will be collected and put into suitable sealable containers or drums. These drums or containers will be temporarily stored in the hazardous materials store until they can be either returned to the supplier or removed from site by an approved disposal contractor (see *Solid Waste* section above).

The laboratory would perform routine quantitative analyses for metallurgical and environmental monitoring purposes. Waste streams will consist of organic and non-organic material.

Inorganic laboratory wastes will be disposed of in the Tailings Storage Facility. Metallurgical and nonhazardous waste streams generated from analytical testing will be disposed into a separate chemical waste sewer discharging to a neutralization tank. Waste water will be neutralized (pH of 6.5 to 8.5) and discharged to the Tailings Storage Facility.

Organic laboratory wastes will be stored in 200 litre drums and be disposed of by the supplier or an approved contractor in accordance with procedures described above.

### **Medical Waste**

Both non-hazardous (inert) and hazardous waste will be generated at the clinic. Non-hazardous waste will be sent to the designated areas within the Waste Rock Disposal Facility.

The management and disposal of the hazardous (including biologically hazardous) waste will be the responsibility of the Company-contracted medical services provider. Hazardous waste will be stored in containers for off-site disposal at authorized facilities. Sharps and syringes will be stored in containers specifically designated for this purpose to prevent accidents during storage and transport. All containers will be labeled. The provider will be required to keep a detailed log of all hazardous waste storage and movements, which will be regularly inspected. The disposal process will also be subject to regular audits.

## Spills and Accidents

Mitigations to accidental releases of deleterious substances due to various spills and accidents include the following:

- The Company would develop and implement a Spill Prevention, Control and Response (SPCR) Plan that would include procedures and protocols to be followed in the event of a spill or accident involving any fuel or solvents used in conjunction with the Project. Contingencies would be included in the plan for responding to spills in critical areas of the Proposed Mining Area, such as near water courses, wetlands or reservoirs. Operations personnel would receive training in spill response, containment, and clean up procedures. Earth moving equipment would be available from the mining operation for constructing emergency dikes. The general framework for a SPCR Plan is as follows:
  - A prediction of the direction, rate of flow, and total quantity of oil or solvent that could be discharged where experience indicates a potential for equipment failure.
  - A description of containment and/or diversionary structures or equipment to prevent discharged oil from reaching surface water. (One of the following would be used as a minimum: dikes, berms, or retaining walls (bunds); curbing; culverting, gutters, or other drainage systems; weirs, booms, or other barriers; spill diversion ponds; retention ponds; sorbent materials.)
  - Where appropriate, a demonstration that containment and/or diversionary structures or equipment are not practical and a strong spill contingency plan and a written commitment of manpower, equipment, and materials to quickly control and remove spilled liquids.
  - A complete discussion of the spill prevention and control measures applicable to the facility and/or its operations.
- Emergency backup and treatment systems have been designed and procedures developed and implemented to control potential spillage of process effluent and other chemicals used on-site.
- The Processing Plant and fuelling vehicles would be equipped with spill response materials.
- Aboveground tanks and associated piping would be inspected for leaks on a daily basis. Bulk storage tanks would be constructed with secondary containment to accommodate 110 percent of the volume of the largest tank.

## Contact of Water with Exposed Rock, Waste Rock and Tailings

The company would implement a variety of actions to mitigate potential impacts to water quality resulting in water coming into contact with waste rock, sediment and tailings. These include:

- The foundation of the Tailings Storage Facility would be constructed of compacted earth with finger drain systems or leachate collection drains to capture and convey leachate to seepage collection ponds. Solutions would be returned to the mill circuit, used as dust control if quality is acceptable for that use or discharged after proper treatment and approval of EPA.
- Should trace metals be detected in leachate samples obtained from the toe of the Waste Rock Disposal Facility, the Company would evaluate the flow path for leachate sources and review management procedures for waste rock disposal. Mitigation measures could include encapsulation of potentially acid-generating rock, blending of acid-generating rock with neutralizing rock and /or implementation of surface capping design that would reduce rainfall infiltration into the facility.
- To meet discharge standards for suspended solids, sediment-laden water would be held in the sediment control structures for sufficient time to allow sediment to settle from the water. The timeframe for achieving this goal is dependent on the volume of water and the amount and type of sediment in the water.
- Responses to the discovery of contaminated water would include identification of sources and pathways of contaminant movement; evaluation and determination of methods to arrest source and intercept contaminants; determination of methods to treat source receiving water to remove contaminants; implementation of selected methods to remedy conditions such that no further contamination occurs. Mitigation could include modification of waste rock placement and handling methods; installation of pumpback wells to return water to the process plant; modification to tailings placement to seal portions of the impoundment; and / or installation and operation of a water treatment plant.
- An earthen berm and appropriate clean water diversion system would be installed around the perimeter of the open pit to prevent surface water run-on from entering the pit from upslope areas. The run-on diversion system would consist of a ditch designed to pass the 24-hour, 25-year flood event sized according to the drainage area where the specific ditch will be installed. The ditch will convey run-on water to an undisturbed natural channel to avoid contact with the disturbance area.
- A system of wells would be installed downgradient of tailings storage, waste rock disposal and process plant facilities to capture and pump back any groundwater contaminated from operations.

### **Water Supply Quantity and Quality**

Methods to be used to mitigate potential impacts to community water supplies (water bores) that may occur due to dewatering activities will include either deepening existing wells to provide additional specific capacity or installation of new wells to access appropriate aquifers capable of providing a sufficient quantity of replacement water. Replacement wells will be constructed to provide for sanitary seals about the well annuluses and will be secured to inhibit unauthorized access. The wells will be disinfected and

equipped with appropriately sized hand pumps to provide ready access to clean water for affected residents. The quality of the water will be determined prior to providing access to the well by residents to ensure its potability.

Selected existing community wells will be included in the routine groundwater monitoring program to ensure the quality of the wells is not compromised by development of the Project. Should aberrations in the data occur as compared to background water quality conditions, efforts will be made to verify such changes and appropriate actions (including well repair, disinfection, and well replacement) will be taken to remedy the situation.

## SOIL RESOURCES

Several actions would be implemented to mitigate erosion and sedimentation impacts to soils within the Proposed Mining Area. These include:

- All activities resulting in disturbance to ground surface would be conducted in accordance with the Construction Environmental Management Programme and commensurate with activities proposed in the Site Clearance Plan (see **Annex B-1**). No intrusive activity would be conducted without prior approval of a site- or project-specific Construction Environmental Management Plan, which defines specific environmental impacts associated with the activity and specific Best Management Practices, environmental, and engineering control measures that would be used to minimize the impact. Performance would be audited on a regular basis to ensure that controls are effective.
- Stormwater would be routed around easily erodible materials in exposed areas through diversion ditches. Stormwater run-on would be controlled by installing interceptor ditches above surface facilities to reduce water that may come in contact with areas of surface disturbance.
- All surface disturbances would be reclaimed and revegetated as soon as practicable, concurrent with Project operations to minimize erosion and sedimentation (see discussion under *Water Resources*, above).
- Sediment control structures would be installed in all primary drainages below impacted areas to capture any sediment produced by Project-related disturbance. Sediment collected behind these dams would be periodically removed and stored for use in future reclamation activities.
- Soil stockpiles would be seeded with a cover crop to bind soil and arrest wind and water erosion and to maintain biological activity in the soil material.
- During reclamation of the Project site, replacement of soil on regraded areas and seeding and planting of vegetation would re-establish biological activity in the soil, nutrient cycling, organic matter and soil structure.

- Concurrent reclamation would be conducted during the operational phase of the Project, to the extent practicable, to control sediment and erosion and return the land to a beneficial use as soon as possible (see discussion under *Water Resources*, above). Roads and areas no longer needed for access within the Proposed Mining Area or to support Project operations would be graded to blend with the surrounding terrain ripped, scarified to reduce soil compaction and covered with salvaged soil. The surface would be left in a roughened condition and seeded during the first appropriate season to promote vegetation success.

### 5.2.3 HUMAN ENVIRONMENT

**Table 5-3** summarizes mitigations the Company would complete to address issues and potential impacts relative to the human environment and social and economic resources expressed by stakeholders. Specific discussions of these mitigatory actions and others are presented in this section.

#### LAND, COMPENSATION & RESETTLEMENT

##### Loss of Forest Reserve Land

Mitigation measures identified for the loss of 74 hectares within the Ajenjua Bepo Forest Reserve are discussed under *Flora*, above. Loss of land associated with open pit development and subsequent reclaimed portion of the open pit in the forest reserve and adjacent areas would total approximately 69 hectares (47 hectares inside the Forest Reserve and 22 hectares of land outside of the Forest Reserve). This loss of land is considered irreversible; however, establishment of a pit lake in a portion of the open pit would create habitat and potential uses not presently available in the Ajenjua Bepo Forest Reserve.

##### Loss of Land

The loss of land required for mine development is a concern within the communities in and around the Proposed Mining Area. Loss of land can be categorized as follows:

- Temporal – land that is temporarily modified from its current uses to a condition that supports the development of the Project. The land is restored to one or more land uses that existed prior to mine development once mining has ceased and reclamation is implemented.
- Permanent – land is modified for use in the mine development but would not be returned to a condition that supports pre-mining land uses.

As described in **Section 2.0** (*Project Description*), the closure and decommissioning plan would result in reclamation of pre-mining land uses on all land except the portion of the open pit that would be reclaimed as a pit lake (approximately 69 hectares).

<b>Table 5-3 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 Mitigation(s)</b>
<p>Loss of farm holdings.</p> <p>Loss of agricultural land and lifestyles.</p> <p>Increased vibrations from blasting that could impact structures.</p> <p>Increased noise levels.</p>	<ul style="list-style-type: none"> <li>• Implement compensation programme for crops, outbuildings and livestock.</li> <li>• Development and implementation of various programmes including: <ul style="list-style-type: none"> <li>○ Alternative Land Access,</li> <li>○ Managed/Controlled Farm Lands,</li> <li>○ Livelihood Replacement Programme and</li> <li>○ Vulnerables Programme.</li> </ul> </li> <li>• Implement noise reduction and blast management measures to reduce effects including blast schedule, technology, maintain buffer zone.</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>• Development and implementation of various programmes including: <ul style="list-style-type: none"> <li>○ Alternative Land Access,</li> <li>○ Managed/Controlled Farm Lands,</li> <li>○ Livelihood Replacement Programme and</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 structure and foundation assessment programme.</li> <li>• Communicate blasting schedule.</li> <li>• Implement controlled blasting technology.</li> </ul>
<p>Disruption of socio-economic conditions.</p> <p>Influx of outsiders.</p> <p>Changes to the social fabric of local communities.</p>	<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>
<p>Respect for Traditional Authorities and traditional ways of life.</p>	<ul style="list-style-type: none"> <li>• Conduct open and transparent interactions.</li> <li>• Conduct periodic information meetings.</li> </ul>
<p>Clear and transparent communication.</p>	<ul style="list-style-type: none"> <li>• Conduct open and transparent interactions.</li> </ul>

<b>Table 5-3 (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 Mitigation(s)</b>
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>• Collaboration with local and district governments on infrastructure improvements.</li> <li>• Payment of 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>

The Company has devised its own internal standards and principles that guide its responsibilities toward mitigation for loss of land (see **Annex A-3**). Proposed mitigations to address this issue include:

- The Company is working with local stakeholders, chiefs and elders through the Alternative Land Access Programme to identify land that would be available and suitable to meet the agricultural needs of Project-affected people who desire to continue engaging in agricultural activities.
- If suitable land cannot be located or if individuals prefer to pursue alternative livelihoods, the Company would ensure that adequately funded and resourced training opportunities and business inputs are available to those individuals through programmes designed and executed by experienced Non-governmental Organisations supporting the Company's Environment and Social Responsibility Department.

- A Livelihood Replacement Programme would be implemented to assist farmers displaced by the project to return to the land and use improved methods in all aspects of agricultural activities when establishing new farms. In preparation for this, approximately 280 persons were trained in activities such as vegetable production, grasscutter rearing, snail farming, small ruminant production, fish farming and horticultural nursery during 2007. Other farmers have benefited from receiving training in optimizing agricultural production using technological improvements. Examples include education regarding maize and plantain intercrop techniques, results from plantain split corm multiplication nursery, split corm sucker establishment and row planting techniques for tomato, okro, and paring of plantain.
- Project-affected persons/households/communities are considered eligible for resettlement assistance if they have immovable assets in the Proposed Mining Area that are in place, either planted or constructed, as of the entitlement cut-off date. The Company would propose a broad range of appropriate and fair compensation and assistance for eligible recipients. The compensation terms and conditions (entitlement) would be negotiated with and agreed to by the Compensation Negotiation Committee (CNC). The CNC would be comprised of Company, Government and elected / selected Community representatives and would be modelled on the structure and processes used in the most recent crop rate review negotiations. The Company, in consultation with stakeholders, has developed a proposed structure for this entitlement.
- The Company would also implement a Vulnerables Prevention and Management Programme to identify, assess, support, remediate and follow-up contact with Project-affected households experiencing transitional hardship due to Project development. This programme is discussed further in the *Vulnerable Population* section of *Social and Economic Resources* of this section.
- Upon completion of mining and reclamation, the affected land reverts to the Ghanaian government as required by law. The Company is proposing to initiate post-mine land use and reclamation planning within 18 months of permit issue. In this manner, post-mining use of affected land would be decided early in the mine life through consultation among stakeholders, both public and institutional.
- A plan to mitigate potential impacts to women due to loss of agricultural land, measures to ensure that potential benefits of mining are available to women in a manner they can access would be implemented. This would be achieved through direct involvement of women in the development of appropriate resettlement and compensation plans, establishment of employment policies that ensure women's access to appropriate types and numbers of job opportunities and implementation of alternative livelihood development programmes tailored to support women-owned businesses.

## Losses in Land Productivity and Capacity

Losses in productive capacity of the land affected by mining would be mitigated or compensated by improving sustainable food and cash crop production among local farmers through activities such as:

- Training in sustainable food and cash crop production,
- Training in sustainable livestock and aquaculture systems,
- Facilitation of access to agricultural inputs (e.g., fertilizer and seed), equipment and tools,
- Training in participatory farm management and agri-business development and marketing,
- Training in bio-intensive gardening,
- Training in crop diversification and cash crop production and
- Training in improved marketing of agricultural products.

The open pit portion of the Proposed Mining Area (approximately 69 hectares) would be permanently removed from crop production. The balance of areas impacted within the Proposed Mining Area would be potentially available to return to some level of crop production in the post-mining environment, depending on the desires of the stakeholder group who would develop the Closure and Decommissioning Plan.

## Resettlement and Compensation

Yayaaso, and multiple hamlets including Nyamebekyere, Kerenkeren, Kwasi Kporfor, Badu, Kofi Aklo, Ayesu Zigah, Yaw Tano, and Metemano and 2,734 farmsteads are located within the Proposed Mining Area. An estimated 242 households and 25 businesses within the Proposed Mining Area would be physically displaced by the Project.

Project development would create long-term impacts that would occur during the land acquisition process prior to Project development including:

- Loss of crops, including cash and subsistence crops,
- Loss of buildings, including residential and non-residential structures and
- Loss of income, including income from commercial enterprises and livestock.

All Project-affected people/households dealing with long-term impacts would be eligible for compensation for the loss of crops, buildings and income, depending on actual losses incurred. Entitlement benefits offered by the Company would include, but are not limited to:

- Compensation for loss of crops, buildings and income,
- Participation in money management and micro-enterprise development training courses designed to help Project-affected people and/or households use compensation money appropriately to sustain or replace livelihood enhancement,
- Resettlement or relocation assistance, if applicable and
- Transport of people and goods, the right to salvage materials from the previously occupied buildings, temporary housing allowances and other short term provisions required to move from one site to another, if applicable.

In addition, the Company proposes several other mitigation measures, listed below.

- The Company has developed a Guide to Land Acquisition and Compensation (GLAC) for its project development activities in the Proposed Mining Area to ensure that activities related to resettlement and compensation are executed in accordance with the Minerals and Mining Law, the Newmont Land Access and Acquisition Standard and the IFC Performance Standards. A draft copy of the GLAC is provided as an example in **Annex F**. The GLAC would be updated to reflect commitments presented in this Final EIS prior to implementation of the resettlement process.
- The Company would also develop and post a Resettlement Action Plan (RAP) as part of its public consultation and disclosure process. The RAP would contain the specific commitments, procedures, and actions which would be taken to resettle and compensate people, households and communities impacted by the Project in compliance with Ghanaian law and guided by the International Finance Corporation Performance Standard 5: Land Acquisition and Involuntary Resettlement. This process would be finalized in consultation with local stakeholders and would be designed to assure Project-affected people that they would be paid an appropriate amount, cash or in-kind, for permanent loss of crops, structures, and income.

Resettlement would be developed as a process that seeks to maximise choices available to those potentially affected. Resettlement would be a negotiated compromise acceptable to critical stakeholders including: the directly affected community of Yayaaso and multiple hamlets; adjacent communities; the district administration; interested government agencies; the Company; and the external international community.

## **NOISE AND VIBRATION**

Impacts associated with the Project noise may stem from open pit development, waste rock disposal and processing plant operations. Mitigations to these potential issues are addressed below:

- A safe blasting perimeter of 500 metres would be implemented to mitigate potential hazards associated with flyrock around all blasting sites.

- Blasting demonstrations would be organised for public witnessing.
- Blasting times would be made known to the public to avoid surprise effects. Sign boards would be located in New Abirem, Afosu, Adausena and Hweakwae. Blasting would be performed only during daylight hours.
- Controlled blasting technology would be used to minimize the noise and vibration associated with blasting events. This includes initiation of the blast holes through bottom primers and use of non-electric delay detonators connected with shock tubes on the surface (blasting relays) and establishment of a maximum instantaneous charge.
- A blast vibration monitoring plan would be developed and implemented prior to mining. The plan would be developed in consultation with EPA and would address “lessons learned” at the Company’s Ahafo Project. A part of the monitoring plan would include a baseline assessment of the structural condition of buildings within a prescribed perimeter around the mine pit as well as a “control area” well away from the mine pit. This control area would include, at a minimum, certain structures in the communities of Afusu and Adausena. The monitoring would produce data which could be compared to baseline conditions. Structural damage attributable to blasting or vibration caused by the proposed Project would be repaired at the Company’s expense.

## **ACCESS AND TRANSPORTATION**

Measures proposed to mitigate potential impacts to access for residents in the Proposed Mining Area include:

- The Company has collaborated with the Ghana Highways Authority to develop an appropriate management plan to address the expected change in movement of people and attendant traffic along access routes to the Project area. These include measures to minimize conflicts between pedestrians and mine traffic.
- Community access patterns would be reviewed as part of the resettlement process to avoid isolating hamlets and farmsteads and/or creating barriers inhibiting access to land and resources not necessarily affected by Project development. Appropriate measures would be included in the mine design to allow for foot and vehicular traffic to accommodate the access needs of the local residents, to the extent possible.
- The Company, in conjunction with Ghana Highways Authority, would develop a traffic management plan to ensure safety of individuals on roads. Traffic management would focus on reducing conflicts between mine traffic and residential traffic and could include scheduling mine traffic to avoid peak residential traffic; modifying the design of the rerouted road segment at intersections to separate traffic flow; and implementing speed control measures.

As part of its efforts to address potential traffic issues, the Company intends to perform the following mitigations.

- The Company, in cooperation with the Ghana Highways Authority, would develop convoy structures and devise routes to protect transport vehicles, local residents and other road users from potential accidents as a result of Project development.
- An emergency response plan would be developed and implemented to address any spills or accidents that may occur in conjunction with transport of materials, supplies, fuel and solvents to the Proposed Mining Area (see *Water Resources*, above). The emergency response plan identifies the shipping routes for materials, the surface water features along the route, methods and procedures to be used to secure a spill site, cleanup methods and techniques, disposal or recycling of spilled material, type and location of response equipment and personnel training requirements. The plan also specifies the monitoring needed to ensure cleanup is successful.
- Isotainers for transporting cyanide to the site would be used to decrease the chance of an accidental release to the environment.

## **VISUAL RESOURCES**

The viewshed of the Proposed Mining Area would be altered through development of the Project. In response, the Company proposes the following mitigations.

- As part of the development of the closure and decommissioning plan, input would be provided to ensure the resultant reshaping of land forms and colours and textures in the post-mine environment blend with undisturbed land. Mitigation includes regrading slopes and tops of the waste rock disposal facility to eliminate sharp edges and terraced benches to the extent practicable.
- Where possible, resettlement buildings and structures installed as part of the Project would be constructed in a manner consistent with local construction practices.

## **HERITAGE AND ARCHAEOLOGICAL RESOURCES**

Mitigations to be implemented by the Company relative to heritage and archaeological resources identified in the Proposed Mining Area are discussed below.

### *Sacred Site and Cemeteries*

- The Company would ensure that relocation of community and individual sacred sites occurs with culturally appropriate respect and consideration in order to preserve their cultural significance and importance.

- Relocation of graves at the two cemeteries would occur in a culturally appropriate manner with full participation of affected elders, community members and families. These may include an offer of financial compensation and completion of appropriate rituals. Elder men and women would be included explicitly in the process such that their knowledge of the traditional ways would be incorporated into planning and implementing the relocation of graves.
- Company employees would be sensitized to local cultural practices, which would be given appropriate respect.

#### *Archaeological Sites*

- Archaeological sites identified in the Proposed Mining Area would be further characterized through a Level II survey before the land is disturbed to ensure that artefacts have been catalogued appropriately prior to removal.
- The process of excavation of the artefacts as part of the Level II survey would be approved, in advance, by the National Museums and Monument Board and would be completed in such a manner to satisfy requirements of the Government of Ghana and the International Finance Committee (IFC). All archaeological artefacts would be managed in accordance with the procedures of the National Museums and Monuments Board.

#### *Management of Heritage and Archaeological Resources Chance Finds*

- The Company would develop and implement procedures on managing chance finds during construction of the Project. Examples of chance finds may include an archaeological site, which has remained unnoticed or documented in the past or a site of cultural / heritage significance which had not been identified previously. Procedures for managing chance finds would be in line with procedures of the National Museum Decree 1969 (NLCD 387).

## **COMMUNITY HEALTH AND SAFETY**

Community health and safety has been identified as a social impact and would be managed by the Company. The Company conducted a Health Impact Assessment (HIA) to record baseline conditions associated with individual health, health trends and tendencies, and infrastructure and health care capacity in the area. In addition, the HIA identified those activities associated with the operation which may affect community health and safety and require specific management intervention by the Company.

The Company would develop a community health and safety mitigation plan to control potential adverse effects from the operation. Additionally, the Company would collaborate with Ghana Health Service representatives to determine which interventions may have broader community health benefits which may be of interest to the local communities and develop a prioritized plan to guide community health interventions in the area.

Long-term safety impacts associated with the presence of an open pit and pit lake would be mitigated by installation of a barrier fence around the facility, preventing unauthorized access to the opening and posting of placards warning residents of the danger of the steep slopes and the pit lake. The Company would also sponsor training sessions with the local communities to educate residents about the safety aspects of the relict open pit to ensure a sound understanding of the hazards are understood.

## **Malaria**

The Company is committed to reducing and controlling mosquito presence in and around living, dining, recreational facilities, and work stations to reduce exposure of individuals to malaria. The following mitigations would be employed:

- The Company has developed a Malaria Procedure for Ghana which provides information about malaria, prevention techniques, descriptions of malaria prophylaxis and treatment. These procedures would be reviewed and provided to all workers associated with the Project. Some components of these mitigation measures include:
  - Drainage control and prevention of stagnant water areas in and around Company facilities.
  - Active spraying of stagnant water, residential buildings and industrial buildings.
  - Provision of impregnated bed-nets to all workers and families in conjunction with an awareness campaign.
  - Provision of malaria treatment for workers.
  - Partnering with District, Regional, and National Health officials to develop wide-spread vector control and awareness campaigns within local communities to reduce overall incidence in the Study Area.

## **HIV/AIDS**

Mitigation for the potential spread of HIV/AIDS is of concern to the existing community and to the Company. The Company would commit to the following mitigations:

- In conjunction with the Ghana Health Service and community leadership, the Company would develop and implement an HIV/AIDS awareness program.
- The Company would provide educational materials, posters and workshops on HIV/AIDS facts and prevention to all its workers and contractors.

## **SOCIOECONOMIC RESOURCES**

### **Socio-Economic Benefits**

Socio-economic benefits associated with the proposed Akyem Gold Mining Project would include the following:

- Building community resilience and sustainability through collaboration with the District Administration, District Assembly, Unit Committees, ministries, NGOs, donors, contractors and stakeholders in the communities,
- Creating opportunities for employment and training through development of a skill register and employment pool. Operational skill training would be implemented through local and regional government training centres,
- Creating opportunities for local economic and business development through implementation of a programme to encourage small and micro-enterprise business development and
- Creating partnerships for sustainable community development through collaboration between three key stakeholders - Birim North District Assembly, Project affected communities, and the Company.

### **Taxes and Royalties**

Through taxes and royalties, the District Administration, Forest Services Division and Traditional Authorities would have access to greater financial resources – some of which would need to be spent towards addressing these increased service delivery pressures. Other funds may be used in broader development planning initiated by the District Administration and/or from within the Development Forum which would benefit the broader communities. Mitigation measures to be implemented to address this issue include Company support to the District Administration by providing expertise and resources to plan appropriate development projects for those people who would not benefit directly from the Project and whose lives may be more inconvenienced than improved if no mitigation is implemented.

### **Employment Opportunities**

Several issues associated with employment opportunities would occur as a result of implementation of the Project that would require some level of mitigation. These are described below.

- Unskilled labourers would not need to be able to read and write. The Company would institute basic tests to ensure that all employees have the necessary understanding of signs and symbols that they can work in a safe and responsible manner.
- The Company would develop a semi-skilled training programme to enable some workers to expand their level of expertise and improve their opportunity to secure work outside of Newmont once the construction phase of the project is completed.
- The Company would develop a skilled trade apprenticeship programme during the construction phase of the Project that would enable some to participate in long term employment through operations.

## Indirect Employment

Although the Company is not responsible for generating wider economic opportunities, the Company would act as a catalyst for the economic development for the Study Area. These actions are described below:

- The Company would promote supply chain linkages enhancing opportunities for sustainable economic activity beyond the life of the mine.
- The Company would outsource catering, laundry and waste collection services.
- The Company would offer support in identifying business opportunities through mine-related projects that offer employment opportunities for youth and women.
- The Company's policy is to procure goods and services locally, when quality and economic competitiveness can be established.

## Sustainable Development

Sustaining development of community livelihoods during and after cessation of mining activities is a potential issue. Mitigations proposed include the following.

- The Company is collaborating with local stakeholders to develop a sustainable development programme for the Study Area that would address the short-, medium- and the long-term development needs in the area. The programme would likely focus on critical human capital needs such as education, health, sanitation and water, agriculture, training and housing as well as environmental issues. The collaborative process with the Birim North District Assembly and other relevant community and government stakeholders is critical in order to achieve long-term sustainability.
- Through established mechanisms – Community Consultative Committee, Company representation on the district strategic planning committee, regular engagement with district and regional government agencies; a focus on sustainable livelihoods five capitals in planning and consultations, with interventions and programs linked to key project development milestones – approval, construction, operations and closure, a platform is in place to move this planning and implementation forward
- The Company would develop a Closure and Decommissioning Plan in conjunction with stakeholders to rehabilitate the Proposed Mining Area to meet community needs. The framework for this plan is included in **Section 8.0** (*Closure and Decommissioning*).

## Potential for Inflation

The issue of price inflation has been identified as a possible impact of the Project. There is anecdotal evidence that a “two tier” pricing structure is being implemented in the local communities, where Company employees pay higher prices for food stuffs and accommodation than locals. It is expected that this would continue into the future.

Mitigations the Company proposes to address this issue include:

- The Company would continue to educate local entrepreneurs on the benefits of constructing housing suitable for its non-local Ghanaian staff and would continue to provide rental assistance to its employees, the combination of which is expected to reduce the pressure on rental costs for community members.
- The Company would construct accommodation for its expatriate and Ghanaian management staff. This would reduce the demand on housing in the communities that could lead to increased rental costs.
- The Company would target hiring 100 percent of its unskilled labour from Project-affected communities in part to reduce the demand for new housing.

## **POPULATION INFLUX AND SOCIAL AMENITIES**

The Study Area currently is an agriculturally-based rural society. Social systems and structures have evolved in the Study Area over generations and have responded dynamically to the changing social environment. An influx of construction and operations workers is anticipated to compete with local residents for employment. Local residents may find themselves dealing with social problems such as prostitution, teen pregnancy, drugs, drunkenness and increased crime. Prostitution is recognized as an unavoidable consequence of a large influx of wealth, which, aside from the health implications discussed below, tends to create conflict between spouses, sometimes with breakdowns in marriage and disruption of families and children. In an effort to mitigate impacts to the social system, the Company would take the multi-focused approach described below.

### **Consultation**

The Company would ensure access to information and active participation in decision-making through open and transparent interactions between the Company and affected individuals and settlements to reduce feelings of loss of well-being. The Company would provide people with accurate information regarding the Project from an early stage, including information about resettlement; the extent of land loss; who would be affected; and the process through which the issue would be addressed. Communication would also include providing information about the type of mining operation to be implemented, and how many local job opportunities would be created which must also be accessible to local communities. This information would assist people to plan for their future, thereby reducing the anxiety of the unknown. Furthermore, it would help to keep local expectations in proportion and thus limit future disappointment when unrealistic expectations are not met.

### **Management of Population Influx and Pressure on Social Amenities**

To mitigate potential impacts due to population growth, the Company would:

- Offer a daily bussing service for workers, modelled on the successful programme used at Ahafo.

- Implement a construction employment programme (see opportunities for employment and training) aimed at maximising opportunities for local people.
- Collaborate with the Birim North District Assembly (BNDA), District Planning Officers, District Environmental Health Coordinator and Community Water and Sanitation Agency (CWSA) to develop community participative programmes to construct individual household latrines at households of homeowners who plan to rent to Company workers or job seekers.
- Provide support for latrine demonstration projects to be placed in Project-affected communities and assist in the dissemination of health information regarding disease control measures offered by safe human waste disposal.
- Provide food sanitation awareness materials to local District Environmental Health Officers for educational sessions with food handlers and slaughter houses; particularly local vendors who sell food to Project workers.
- Collaborate with the BNDA to develop gender violence prevention educational materials and conduct violence prevention education programs.
- Develop programmes in conjunction with the OICI LEEP programme to address social change for individuals within settlements by partnering with the Ghana Department of Social Welfare, including home visits.
- Collaborate with CWSA and community WATSAN to improve the effectiveness and utilization of existing facilities.
- Target hiring 100 percent of unskilled labour from the Project-affected communities to minimise the number of people coming to the area to find work.
- Work in partnership with government and community leadership to lessen social disruption by developing local training initiatives that enable local residents to acquire the required job skills to compete for semi-skilled and skilled jobs.

### **Ethnic Diversity**

To address the impact of ethnic diversity with an infusion of contract workers, the Company would complete mitigations, as follows.

- The Company would adhere to its stated employment policies and limit employment of expatriate workers and non-local Ghanaians. One hundred (100) or less expatriate workers would be employed and between 25 and 35 percent of all Newmont and contractor employment would be reserved for residents of local communities.
- The Company would clearly communicate with local residents the Company's use of expatriate contractors and contract tenders. The Company would require that contractors follow its local employment policies.

- Where expatriates and non-local Ghanaians are employed, the Company would provide cross-cultural sensitivity training during their first visit to the Proposed Mining Area to increase awareness to local social and cultural practices and what is regarded as acceptable within those local codes and generally to recognizing their position as visitors to the local communities.

### **Respect for Traditional Authorities and Traditional Ways of Life**

To address the issue of challenges to traditional authority, the Company would complete several mitigation actions, described below:

- The Company would continue the practice of holding periodic informational meetings with Traditional Authorities prior to and during Project construction and operations. The main objective of the meetings would be to discuss the social impacts experienced and determine how the Company can help overcome identified impacts.
- The Company would continue open and transparent dialogue with all levels of the community.
- The Company would continue its support and participation in cultural events, cross cultural training for non-local workers, and training to respect various taboos.
- The company would continue to use traditional dispute resolution processes in areas of Company and community conflict, to the extent possible.

### **Vulnerable Populations**

To address the issue of vulnerable persons in the Proposed Mining Area, the following mitigations would be conducted:

- The Company would implement a Vulnerables Prevention and Management Programme to identify, assess, support, remediate and follow-up contact with Project-affected households experiencing severe transitional hardship due to Project development. As part of this programme, the Company would manage and be directly responsible for people and households experiencing transitional hardship where the Project is responsible for that hardship. Assistance would be provided in a socially acceptable manner to maintain the social balance so as not to interfere with the traditional community support.

### **OCCUPATIONAL HEALTH AND SAFETY PROGRAM**

The Occupational Health and Safety Program will be established based on a Newmont policy. This policy provides the framework for the development of Health, Safety and Loss Prevention (HSLP) standards, procedures and guidance. It also addresses risk assessment, information distribution and communication, control activities and monitoring. This policy requires that all Newmont managed facilities and employees:

- Identify health and safety exposures and hazards with the potential for loss and community health impacts,
- Adhere to Newmont Safety Principles, which includes health and safety leadership in all its people,
- Implement and maintain a health and safety management system that identifies, assesses and controls health and safety risks,
- Identify measurable objectives and targets that will drive the continuous improvement necessary to pursue an injury-free workplace and community health opportunities,
- Comply with relevant and applicable statutory and other requirements,
- Demonstrate positive behaviour in pursuit of superior HSLP performance,
- Be reviewed by internal and external resources to ensure that the HSLP organizational goals and objectives are being achieved and
- Publicly report its HSLP performance.

Other typical programmes could include:

- Implementation of Road and Water Safety community awareness programmes,
- Support for improvements to local health care institutional capacity and facilities such as the District CHP program,
- Support for establishing a medical education scholarship programme provisional upon working in a Project-affected community for a period of time after completion and
- Providing opportunity for rotation of health care personnel through the Project clinic for skill enhancement.
- Implement long-term public safety awareness programme related to the Project area components including pit lake, water storage facility, reclaimed tailings storage facility and reclaimed waste rock disposal facilities.

## **WASTE MANAGEMENT**

**Annex B-6** discloses how wastes (solid, liquid and hazardous) would be managed during construction, operation and closure of the proposed Project. The waste management plan includes provisions for spill prevention and cleanup (see Spill Prevention, Control and Response Plan under *Spills and Accidents*, above).

Mitigation measures described in these plans include employee training, personal protective equipment, spill cleanup equipment and methods, spill response protocols and spill containment systems. Plans also provide for disposal of waste materials, waste minimisation measures and recycling procedures to be implemented to reduce waste disposal.