

# A Mining Information Toolkit for Guyana

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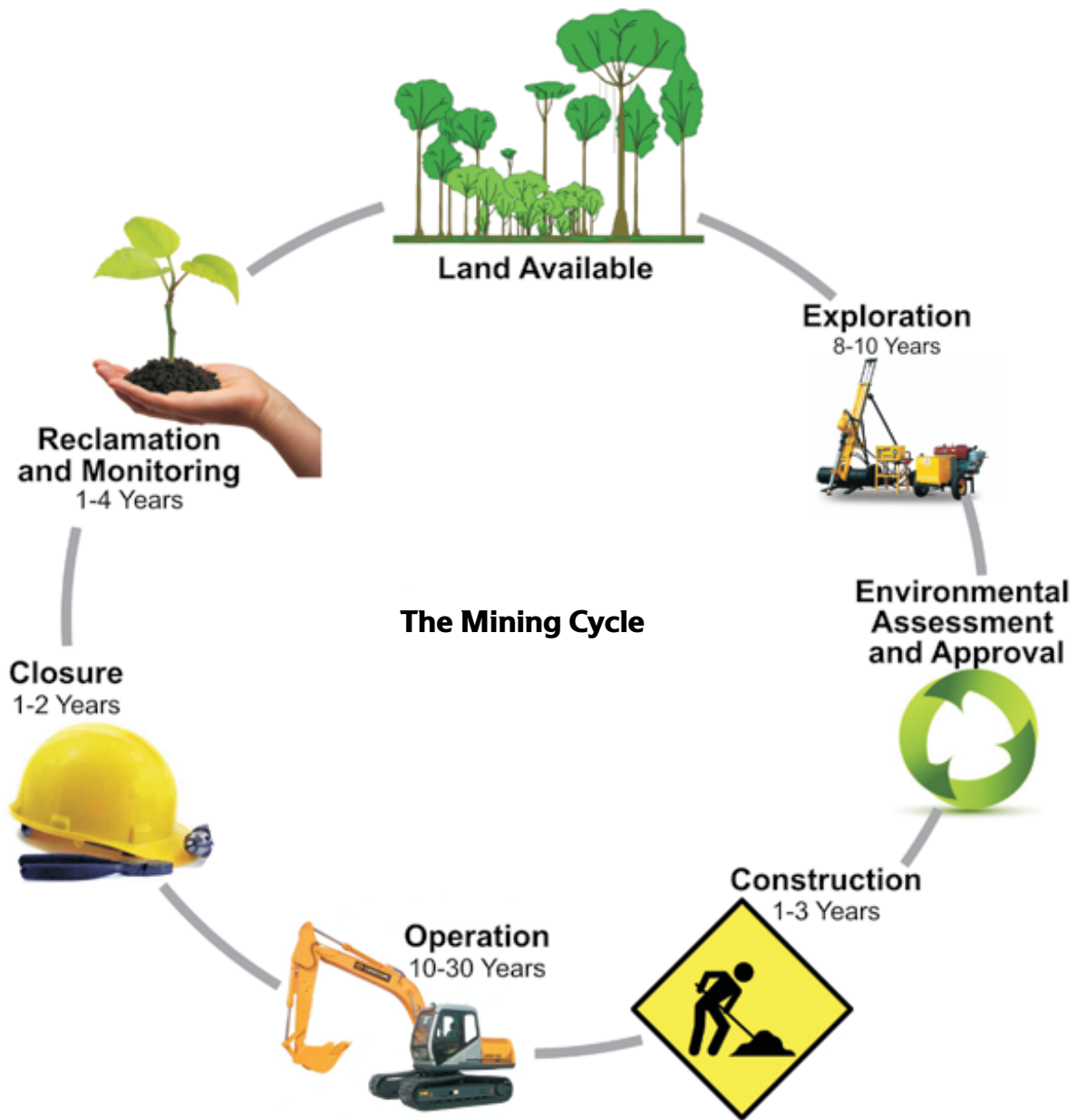
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# Introduction

## General conditions in relation to mining in Guyana.

Welcome to the Mining Information Toolkit for Guyana. Guyana has a long history and tradition of mining. The Amerindian peoples who first inhabited the Guianas were mainly hunter/gatherers and not engaged in mining as an economic activity, but they were aware of the minerals well before formal mining began in the 1870's. Over the last 100 years, gold, diamond and bauxite mining has placed Guyana as a favourable location for mining. Guyana (then British Guiana) attained international recognition as a world class mineral producer of bauxite, gold and diamonds while manganese was also mined from 1960 to 1969 and alumina was produced from 1961 to 1982. Kaolin, rutile, columbite-tantalite and amethyst were also mined. Today sand, stone and loam are also produced but mainly for local consumption.

Mining in Guyana is managed by the Geology and Mines Commission (GGMC) under the mining act of 1989. Under the act the State is the owner of all subsurface mineral rights in Guyana and authorises the GGMC to manage these resources. The GGMC is a semi-autonomous state agency which reports to a board of directors and a Minister of Mines (Minister of Natural Resources and the Environment).

Mining in Guyana is administered via the six established mining districts.

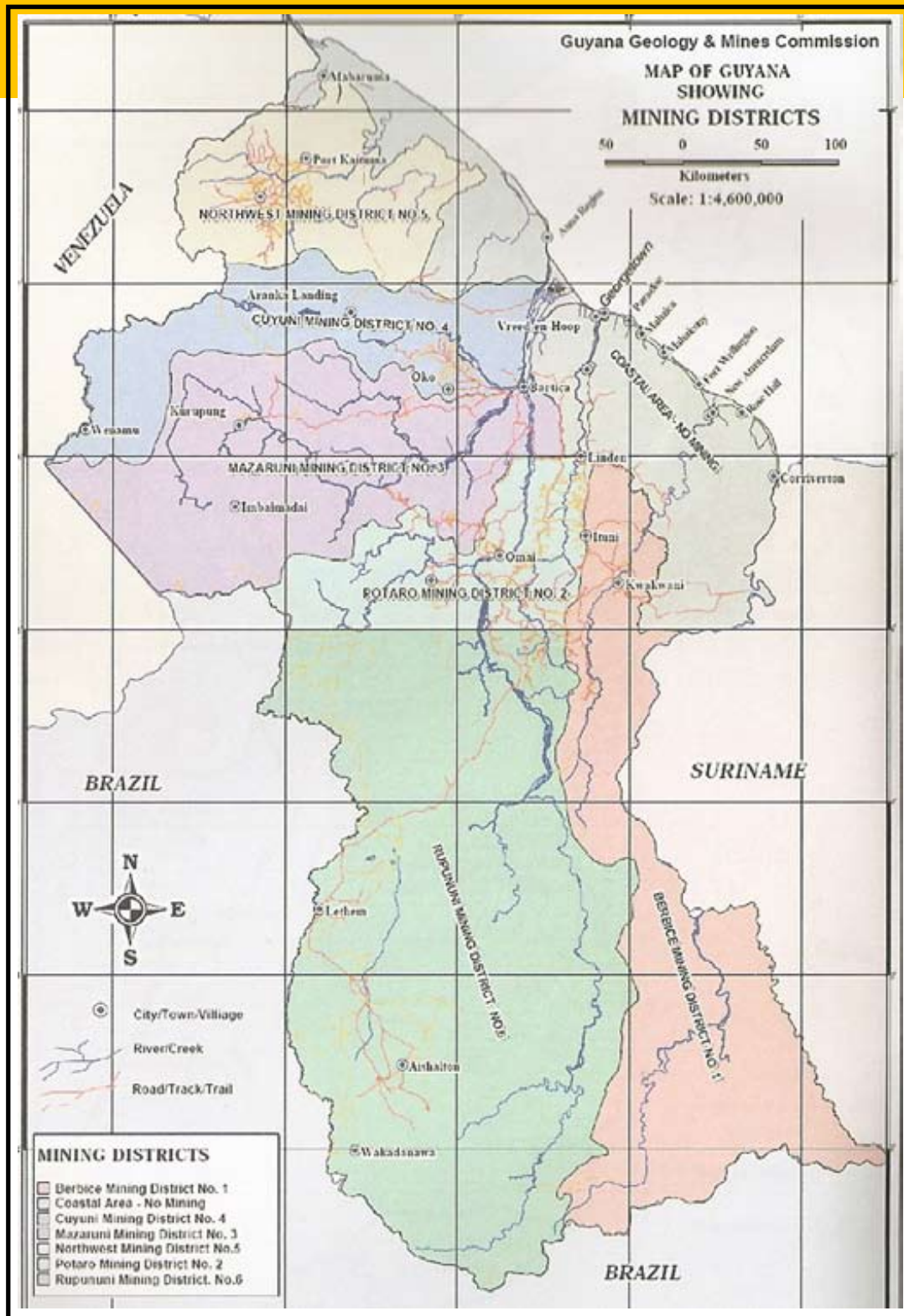
1. Berbice Mining District
2. Potaro Mining District
3. Mazaruni Mining District
4. Cuyuni Mining District
5. North West Mining District
6. Rupununi Mining District

In Guyana mineral properties are managed and assessed by the scale of the operations; they fall into one of three distinct categories.

The Mining Act of 1989 allows for three scales of operation:

- Small Scale: A land claim which covers an area of 1500 feet by 800 feet or a river claim which covers one mile of a navigable river.
- Medium Scale: Prospecting and mining permits. These cover an area between 150 and 1200 acres each.
- Large Scale: Prospecting licences cover an area between 500 and 12,800 acres.
- Permission for reconnaissance surveys, geological and geophysical, over large acreages with the intent of applying for a prospecting licence based on the results of the survey.

# A Mining Information Toolkit for Guyana



In addition the scale of the operation is also defined by the output of materials, including overburden in a 24 hour period. According to the 2005 Mining Regulations a small scale mine excavates or processes 20-200m<sup>3</sup> of material, a medium scale mine 200-1,000 m<sup>3</sup> of materials and a large scale mine more than 1,000m<sup>3</sup> of material per 24 hour day.

Permission for geological, geophysical and other surveys is granted by the Minister of Mines as he deems relevant for prospecting and mining. The terms and conditions may include the fees, duration of the survey, the requirement for the results of the survey to be shared with the Minister and the restriction of the dissemination of the information.

Mining is playing an increasingly important role in the development of the Guyanese economy. Today more and more Amerindians are involved in mining, directly and indirectly. The passing of the Amerindian Act of 2006 also gives communities new authority over their traditional lands, many of which are located in the mining districts of Guyana. The opportunities for Amerindian involvement are now greater. This information kit was developed to help communities better understand the mining cycle and to identify the opportunities that mining can bring to communities. It also looks at the involvement of Amerindian communities and mining companies for relationship building, partnership, capacity building and potential economic and business development.

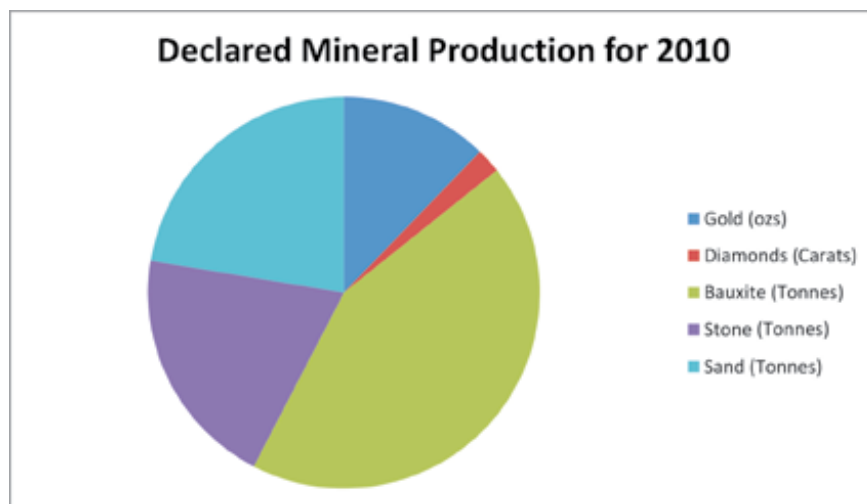
The goal of the information kit is to increase the ability of Amerindian communities to understand and participate in mine related activities, monitoring and negotiations. The information kit is designed to explain the mining cycle, from exploration to closure. It contains four sections; Mineral exploration, Mine development, Mine operation and Mine closure. The sections work together but can also be used separately. Although there is some duplication from section to section this is done to allow the sections to be understood independently. Within each of the sections there are five common topic areas:

- Overview: this explains the purpose, main activities and key participants during each phase of the mining cycle.

- **Acts and Regulations:** this identifies the general regulatory requirements, laws and licences and permits that apply during each phase of the mining cycle.
- **Environmental and Social Impacts:** this identifies the most likely impacts on people and the environment that a community may experience during each phase of the mining cycle. Ideas for monitoring, lessening impacts (mitigation) and community input are included.
- **Community Employment and Other Economic Opportunities:** this identifies the various business and economic opportunities that may become available to communities. This section also looks at ideas on how communities can build capacity.
- **Community experiences:** this provides examples of strategies and success stories of Amerindian communities dealing with the challenges of mining.

The Mining Information Toolkit for Guyana is an adaptation of the Canadian developed “Mining Information Kit for Aboriginal Communities” which was developed with similar objectives in mind. The Canadian kit has since been adapted in Peru and Mexico. The Guyana experience is unique in that many of the Amerindian communities are quite aware of small and medium scale mining but have little knowledge about large scale mining. This kit is designed with this in mind and focuses mainly on interactions with large scale mining operations.

This kit is designed to be received and used as a complementary tool to existing instruments and as a living document. Discussion and feedback are welcome and will help expand future editions.



Source: Guyana Geology and Mines Commission



# 1. Mineral Exploration:



## 1.1 Overview

### What is mineral exploration?

Mineral exploration is the search for mineral deposits and the first step in the mining process. This is the start of any mine and the main aim is to determine if there are mineral deposits worth mining. Every mine starts at this stage and many also end at this stage, not all explorations prove positive and lucrative enough to warrant further investment.

The main purpose of exploration is to find new sources of minerals and to determine exactly what is in the ground. Exploration can be done for both minerals, such as copper, gold, silver, manganese, bauxite, platinum and uranium or for gemstones such as diamonds, emeralds etc. In Guyana, exploration starts with identification of an area of interest, this done via a mineral map provided by the Guyana Geology and Miners Commission (GGMC). This allows the potential miner to identify the area of interest and apply for a claim/prospecting permit (small scale), prospecting permit (medium scale) or prospecting license /reconnaissance permission (large scale). The mining maps can be obtained from the GGMC and are used to help inform potential miners about areas that have mineral deposits and are open for mining.

The review of maps, previous geological surveys, mining reports and other information is the first step in the exploration process and is normally done with support from the GGMC. In the case of large scale mining, some of the larger companies also utilise satellite data to help determine areas of interest and to verify the terrain.

### **Starting up**

The first step in establishing a mine in Guyana begins at the Guyana Geology and Mines Commission (GGMC). Individuals or companies interested in mining must first obtain permission from the GGMC in the particular category they wish to mine. The application process to be undertaken is determined by the scale of mining to be undertaken. The mining act of 1989 identifies large scale prospecting licences, large scale reconnaissance (Geological, Geophysical and other surveys) permission, Medium scale prospecting licences, Quarry licence, small scale prospecting claim and river location licences.

Small and medium scale licences can only be issued to Guyanese (citizens, partnerships/associations, companies or cooperatives). Large scale licences, Quarry licences and reconnaissance permission can be issued to Guyanese citizens and Guyanese and foreign companies. All of the permits, except the small scale prospecting permit, is tied to and can only be used over a specified area/property.

#### **Tribute**

According to the Amerindian Act communities must receive a minimum of 7% tribute for usage of their land.

### Application steps for a prospecting licence

- Fill out the prescribed form 5D
- Pay application fee (\$100 US)
- Submit a work program and budget for the first year
- Submit a map on Terra Survey 1:50,000 sheet
- Submit cartographic description of the area
- Submit proof of financial and technical capability
- Submit a schedule of activities

All exploration activity in Guyana is monitored by the Guyana Geology and Mines Commission; in 2009 the GGMC reported that there were 121 large scale reconnaissance and prospecting properties and 6,287 medium scale prospecting properties.

### Types of Mineral Exploration

In Guyana, the approach used for mineral exploration is determined by the scale of mining being undertaken. The Guyana Geology and Mines Commission requires that all mining activity be preceded by an exploration period, even if it is small scale.



There are primarily three types of mineral exploration; Brownfield, Greenfield and onsite mineral exploration. In the small scale, the time between the exploration and mining is very short as many miners prospect and mine at the same time using the “brownfield” method. This method is where miners look for additional deposits near a known mine or in an area that has traditionally produced good mineral yields. The brownfield method is also used by the medium scale and large scale mining companies.

Another method of exploration is known as the preliminary or Greenfield method this, as the name suggests, is the opposite of “brownfield” it is the search for minerals in areas that have not previously been proven to have ore deposits. This method relies heavily on geological models and knowledge of ore formation.

The third method used is onsite exploration which is primarily done to find additional resources in an already developed mine. This is normally done in an effort to expand existing mining operations and mine life.

### **Success rate**

The success rate is usually higher using the brownfield method since there is a better understanding about the geology of the area. This is because more information is available from previous explorations. Preliminary/Greenfield explorations are normally more costly and take a longer time to find proven results as a result many companies view this type of exploration as a higher risk. The rate of return on a finding is still however quite low. Success rate using mine expansion is normally higher but only feasible if the right conditions are met. The mine expansion is used only when the existing resources of an established mine are about to run out and the market conditions make previously ignored areas profitable. Most explorations that come up with an initial finding do not develop into a mine, estimates show that fewer than 1 in 10,000 initial mineral finding can be developed into a mine.

### **Time frames**

Exploration is a slow process and can take years to discover, document and quantify the deposits that make it viable for a mine to be established. In many cases it takes as many as 7 to 10 years to develop from a promising mineral finding into an operational mine, in some cases even longer. During this time an area may be explored several times and the ownership of the company may also change. The amount of financing available and the current world price and demand for the mineral are also factors that

affect how quickly investors advance monies to complete exploration and move to mine development.

With the high demand for new deposits of gold, silver and other minerals there has been an increase in exploration activities and this is being lead by junior mining companies. These companies seek out new deposits and then partner with or sell to larger (senior) mining companies once a significant find has been proven.

### What are the activities of mineral exploration?

#### How to locate a claim?

Any Guyanese can locate a claim once they are over 18 years old and of “sound mind.”

A claim is approximately 800 feet by 1500 feet for land claims and one mile of river in the case of river claims. Before locating a claim you must purchase a prospecting permit (small scale) which has is valid for one year. The prospecting permit cost \$500 Guyana dollars (as of 2011) and can be purchased from the GGMC or any of its mines offices or officers.

Once you have located a claim you must mark all four corners with claim boards which state:

- The name of the claim holder
- The date of location
- The prospecting permit number
- The name of the creek, flat or hill where the claim is located.

Once this is done the GGMC must be informed within 60 days and a notice of location must be filled up and signed.

#### Prospecting.

Prospecting is the search for mineral deposits on land or in water. It is the first step in a mining operation after getting permission from the Guyana Geology and Mines Commission. Prospecting is considered as a low-intensity activity and varies from

walking the claim on foot with a battel (gold pan), pickaxe and shovel to the use of more specialised tools such as the Global Positioning System, metal detectors and chemical analysers. The basic activity (whether large or small scale) however, remains the same, prospectors walk the claim and collect samples, test different areas and examine the terrain. The samples of rock and soil are collected and sent for mineral and chemical analysis. In the small scale gold mining operation miners may dig small areas and pan for minerals. In the case of locating a river claim the prospectors will take samples from the river for analysis.

Once there are initial signs that indicate the presence of minerals, the intensity of the prospecting activity may increase. Many companies continue exploration using portable drilling, more sampling and a more detailed work programme. The larger companies will take larger and deeper rock and soil samples to be analysed. These companies may also use geosciences surveys and satellite mapping to help guide their prospecting activities and rely on geological maps provided by the GGMC. These maps help prospectors identify the rock types in the various areas and give a better understanding about the geology of the area in which they are prospecting.

During the prospecting phase of the mining operation a small camp may be established, if there are no nearby villages, to support the exploration activities. Some of these camps are normally in place for several years and serve as the main support site for ongoing and increased exploration activities. Depending of the size of the operation the camps may establish supply roads and trails and use support services from close by villages and townships.

### **Exploration:**

Once the initial prospecting has indicated the area has significant mineral deposits, the companies normally move into a more detailed phase of exploring the property to identify the specifics of the deposit. At this stage the exploration is trying to determine the size, quantity and quality of the mineral deposit. This allows the company to determine if the area is worth any additional investment and if a mine can be established.

Most of the mining in Guyana is done in placer mines (open pit) but many larger scale operations, especially in gold, do not depend only on this type of mining. The deposits for the larger scale of operations are not normally easily found on the surface.



This means that drilling must be done and underground samples must be extracted to make an accurate decision on the value of the deposits. In addition geophysical and geological surveys are also done. To facilitate this the company will cut lines in the forest and establish a survey grid. During this time the exploration operation and the number of people working in the area may increase with larger samples being extracted. The aim is to estimate the size and shape of the deposits. This phase may take several years and cost a significant amount of money, but no large scale company will invest in the next phase of mining without comprehensive knowledge about the status of the deposits in their property.

### **Claiming / Mining:**

If the area shows promise for minerals the licence holder will apply for a claim (in the small scale) or for a mining permit (medium scale) or mining licence ( large scale).



### **Small Scale:**

Once a prospecting permit holder has located a claim or river location they have sixty days to apply for a claim or river location licence to mine. Mining can only be done once notice of the location of the claim and an application for a claim licence have been filed. However the claim will not be considered to be valid until there has been an on the ground verification by the GGMC. It is imperative that small scale operators get their claims verified.

### **Medium Scale:**

Medium scale operations can apply for a mining permit or a special mining permit once they have successfully concluded prospecting. To get a mining permit an Environmental Management Agreement must be submitted along with an approved mercury retort. Medium scale operators who want to mine using the prospecting permit must submit a closure plan, a contingency and emergency plan and lodge an environmental bond in addition to the other requirements. The use of the prospecting permit to mine is being phased out.

### **Large Scale:**

If the explorations have shown a positive result for mineral deposits, large scale operators can apply for a mining licence. To apply for a mining licence they will have to submit a technical and economic feasibility study, a mine plan and an environmental plan. If the exploration has indicated that the area is not profitable and the licence holder wants to withdraw from the licence they are required to submit a final evaluation report of the exploration results and findings.



### Environmental Impact Assessment

An Environmental Impact Assessment is an assessment of the possible positive or negative impact that a proposed project may have on the environment, together with the natural, social and economic aspects. The purpose of the assessment is to ensure that consideration is given to environmental and social impacts when deciding whether to proceed with a project.

#### **Small Scale:**

Small scale operators are not required to prepare any environmental impact assessment studies during the prospecting stage. There are several regulatory requirements that have to be met before being granted a claim or river location.

#### **Medium Scale:**

In the medium scale an Environmental Impact Assessment is not required; however medium scale operators need to provide GGMC with an Environmental Management Agreement which covers 14 areas. In addition to this the medium scale operator/prospecting permit holder also has to have a closure plan, and a contingency and emergency response plan. These requirements become necessary when applying to for a mining permit and preliminary work on this requirement is also done during the exploration phase.

#### **Large Scale:**

An Environmental Impact Assessment (EIA) is required for most the large scale mining operations which must be approved by the Environmental Protection Agency of Guyana. Only after the EPA has issued an Environmental Permit can a mining licence be issued for a large scale operation. Initial work on the EIA will begin during the exploration stage also. The collection of baseline environmental data is also done at this stage and includes the collecting of water, plant and soil samples which will be used as a reference for impact assessments.

### **Who are the main participants in the mineral exploration stage?**

#### **The Government**

Any individual or company that wishes to explore for minerals in Guyana must apply, prior to the start of any operation, to the Guyana Geology and Mines Commission (GGMC). The GGMC administers the Mining Act of 1989. This act authorises the agency to administer mining in Guyana. The GGMC is a semi-autonomous state agency which reports to a board of directors and the Minister of Mines. The GGMC is the first place any potential exploration operation must begin. The agency provides a series of maps and is the main repository for all geological and geophysical data for the mining industry. The agency administers the mining laws to see an orderly progression from exploration to mining, however it makes provisions to allow for the direct application of a mining licence once adequate, geological, prospecting and exploration information and data are available.

#### **Prospectors**

A prospector is the person employed to look for minerals in a new area. This is normally the first person to begin the exploration process on the ground. Prospectors work in a small group or as a lone individual in the case of the small scale miner. The larger exploration operations will have more than one prospector employed and working on their property, usually with more sophisticated equipment than the small scale prospector.

#### **Junior Exploration Companies**

A junior exploration company is a smaller company that has a few employees most of whom are professional geologists. The junior companies are now considered critical to the discovery of new mining deposits globally. These companies are often not large enough to operate a large scale mine and often sell their interest in a proven area to a more senior mining company, or will partner with a larger investor or company.

#### **Senior Mining Companies**

These are very well established and have a lot of money to invest into new ventures. Junior companies often partner with senior companies to ensure adequate financial backing to develop a project. Senior mining companies have vast experience in mine development and other related activities. These companies tend to be well financed and can conduct more intense mining exploration programmes.

### **Contractors / Service Providers**

Many contractors are needed during mineral exploration, especially in the large scale operations, for specialised expertise or services, some of them are:

- Line cutters who help cut trails and lines in the vegetation to help the prospector or surveyor's move easily in the jungle. A single line cutter may work with larger prospecting teams while more than one line cutter will be employed by the larger survey teams to help establish grid lines for geophysical and geological surveys.
- Drilling Companies provide specialised drilling services for exploration operations that require large scale sampling, especially in rock. Many smaller and medium scale operations do not use drilling companies.
- Expeditors are very important to exploration companies. They are responsible for the provision and sourcing of supplies and services. In some cases the expeditor is also required to employ staff, set up camps, arrange transportation (aircraft, boat or road transport).
- Charter Aircraft Service is needed to access many of the interior regions of Guyana, where there are no roads. The aircraft services are important for getting the early prospecting operations to the remote locations, and this is often done via the large number of airstrips and access by local villages.
- Boat Services are also needed to get exploration operations, supplies and people to the remote interior locations. In many areas there are no roads and the river and creeks are the best, and often only, method of transportation in some areas. Some Amerindian communities provide boat services along with boat operators/guides that take prospectors to their specified sites. Some of the boat operators also work with a bowman who also doubles as a porter.
- Road Transportation Companies with special off-road and heavy duty trucks are used to move people and supplies to the remote locations. Many of the mining areas are accessible only by 4x4 vehicles. Transportation companies who specialise in interior travel will be contracted to assist the exploration team.

- Geophysical and Geological Survey Companies are contracted to search for deposits. They do this with the use of specialised equipment and knowledge about the rock formations, behaviour of ore deposits and through the use of soil and rock sampling techniques.
- Camp cooks/Bahirs are employed to provide meals for the exploration operations; these are normally full time employees with the exploration team and can be hired from a nearby community. The cooks maintain the camp, cook and order food supplies for the teams. In some cases where the exploration operations do not have a camp and work out of a nearby village a caterer will replace the position of a full time cook.
- Local businesses provide companies with the goods and services they need to support the exploration activities.

### **How can Amerindian communities get involved in mineral exploration?**

Amerindian communities are more likely to be involved with mineral exploration operations than with functioning mines since the chances of an exploration turning into a large scale mine are not very high. At this stage there are not a lot of opportunities for communities to participate in the exploration process as is the case with other stages of the mining cycle. However there are still some opportunities and communities can learn about the impact and benefits of mining.

If the exploration is taking place on Amerindian titled lands the company is bound by law to seek an agreement with the community before it starts the process. In most cases, however, the exploration is not on community lands and the company can choose to interact with the community for support and local knowledge.

“Traditional mining” by Amerindians on their titles lands is permitted, however persons need to get the permission of the village council and the GGMC needs to be informed. Additionally persons must adhere to the scale of operation that is considered as traditional and must sell all mineral in accordance with the law.

Early engagement with the mining company allows the community to negotiate for opportunities that may be available to them. Some companies may hire community members to provide services and guidance and jobs.

## 1.2 ACTS and regulations

This section identifies the general legal and regulatory requirements, jurisdictions and licences and permits that apply during mineral exploration.

Mining in Guyana is governed by the Mining Act of 1989 but is also affected by the Amerindian Act of 2006 and the Environmental Protection Act of 1996. These three acts are the main legal documents which regulate the industry. All mining in Guyana is managed by the Guyana Geology and Mines Commission (GGMC). During the exploration stage several aspects of these three acts determine where and how exploration can proceed.

### What are the jurisdictions?

Mining in Guyana is administered via the six established mining districts.

1. Berbice Mining District
2. Potaro Mining District
3. Mazaruni Mining District
4. Cuyuni Mining District
5. North West Mining District
6. Rupununi Mining District

### The Mining Act

Under the mining act the GGMC is the guardian all minerals in Guyana. Permission must be received, from the GGMC, before any exploration activity can begin. In addition the applicant for a prospecting licence must demonstrate that they have the adequate financial resources, technical competence and experience, and must also submit an adequate programme of operations. A performance bond is required for the large scale prospecting licence.



### **Restricted Areas**

Large scale prospecting is restricted in certain areas:

- Within 200 metres from village or from public works, except with the written consent of the Minister.
- 50 metres from any land prepared for growing agricultural crops, except with the written consent of the lawful occupier.
- A prospecting licence holder may not interfere with lawful fishing or navigation without giving written notice to the GGMC.

In the small and medium scale mining/prospecting is prohibited in buffer areas such as:

- 20 metres along the banks of rivers and creeks.
- Along public roads and 30 metres from public roads.
- 100 metres from approved residences, commercial or industrial development.
- 1 km from an approved nature park or reserve.
- In specified nature reserves and parks where resource extraction is prohibited (i.e. Protected Areas).

### **Additional regulations:**

Large scale prospecting licence holders are required to submit annual work plans and budgets for explorations for approval by the GGMC and are required to submit quarterly and annual progress reports as well as audited financial statements. They are also required to lodge a performance bond of 20% of the annual budget and the GGMC monitors the work through site visits and the submitted reports.

If during the exploration stage an irregular mineral deposit is discovered the prospecting licence holder is required to promptly inform the GGMC and to undertake a detailed programme of evaluation. They are then required to submit a full report on the findings and to ascertain the quantity of the minerals.

However not all explorations result in a lucrative find and the prospecting licence holder may decide to withdraw from the licence. If they choose to do this they must submit a final evaluation report on the results and findings to the GGMC.

### **The Amerindian Act**

Under the Amerindian Act of 2006 a miner who wishes to carry out mining on Amerindian lands must obtain permission from the council of that particular village. During the initial stages and prior to exploration, negotiations between the Village Council and the miner have to be concluded.

Under the Amerindian Act all mining done on Amerindian titled lands, in any river or creek or waterway that passes through titled land must:

- Obtain any necessary permissions and comply with the requirements of the applicable written laws.
- Make available to the village any information which the Village Council or village reasonably requests.
- Give the Village Council a written summary of the proposed mining activities including:
  - Information on the identity of each person who is involved.
  - A non technical summary of the mining activities.
  - The site where the mining activities will be carried out.
  - The length of time the mining activities are expected to take.
  - The likely impact of the activities on the village and village lands.
  - Any other reasonable and relevant matter which the Village Council may request.
- Attend any consultations which the Village Council or village requests
- Agree with the Village Council on the amount of tribute to be paid

Negotiations with Amerindian communities can only be facilitated by the GGMC, but the agency cannot be involved in the actual negotiations. In the case of small and medium scale mining an agreement has to be reached between the village council and the mining interest before any mining or exploration can proceed. In the case of the large scale operations the GGMC may again only facilitate a meeting between the mining interest and the village but may not participate. The mining interest is obligated under the law to negotiate in good faith with the village for an agreement. If one cannot be successful reached, the Minister responsible for mining in consultation with the Minister of Amerindian Affairs may declare that the mining activities are in the public interest and overrule the Village Council.

## 1.3 Environmental and social impacts

This section identifies the possible environmental and social impacts that exploration activities may have on a community. Ideas for monitoring and reducing impacts (mitigation) and community participation are included.

### **What are the potential environmental impacts?**

The environmental impact during the exploration stage is relatively low. The main activities that impact this phase are the clearing of vegetation to facilitate transect lines and the drilling of exploration holes. Both these activities are low impact and





are easily managed. The GGMC however requires that consideration be given to the environmental requirement for the operation and development of the mine. Once the exploration is successful, consideration has to be given to establishing baseline data for the environmental impact of the project. In the small and medium scale the GGMC insists on exploration before mining since it allows for the better placement of tailings/settling ponds and reduces the area of vegetation that will need to be cleared for mining. Environmental impacts in exploration, like other aspects of mining, are governed by the Mining (Amendment) Regulations 2005 for environmental management.

The small and medium scale operators are also required to have a closure plan and a contingency and emergency plan. Prospecting permit holders who wish to mine on their property are required to sign an Environmental Management Agreement (issued by the GGMC) and lodge an Environmental bond. However the practice of allowing mining with a prospecting permit is being phased out.

Some of the surveys for the Environmental Impact Assessment are normally done in the initial stages and helps establish the baseline for the operations. During this time researchers categorise the species of plants and animals that are found in the area of influence and quantify their numbers. Water and soil sampling is also done during this initial phase. An EIA covers the following areas:

- Public consultations and scoping meetings.
- Data collection.
- Characterization of the baseline conditions.
- Identification and characterization of potential impacts.
- Identification of impact mitigation measures and enhancement of benefits.
- Preparation of an Environmental Management Plan.
- Preparation of Emergency Response.
- Preparation of a closure plan.

## ENVIRONMENTAL IMPACTS

	Condition	Mitigation
Land use	Line cutting	Lines are kept within specification and not extended beyond the area necessary for surveys.
	Road/trail construction	Adhere to regulations in relation to dust, water and noise pollution. Roads must be built in keeping with the requirements of the GGMC and EPA.
	River landing construction	Adhere to the GGMC and EPA regulations for water pollutions and river constructions.
	Drilling programs	Refill bore holes after use, drill only necessary holes and collect and properly dispose of waste materials from drilling.
	Camp construction	Keep construction to the minimum area necessary, adhere to the regulations set by the GGMC and EPA.
	Fuel/lubricant storage	Adhere to the regulations set by the Guyana Energy Agency (GEA), EPA and GGMC.
Water quality	Tailings from drilling/ excavation operations	Tailings disposal according to regulations set out by the EPA in relation to turbidity levels of creeks and rivers.
	Manage tailings from test washing	Manage tailings disposal according to regulations set out by the EPA in relation to turbidity levels for creeks and rivers.
Biodiversity	Animals attracted to waste and garbage	Properly dispose of garbage and waste.
	Nesting areas for birds/ animals disturbed	Work with biodiversity experts to identify and avoid critical nesting areas.
	Animals affected by noise from drills and other activity	Follow the EPA guidelines for noise pollution.
	Animals hunted to supply exploration camp with meat	Maintain good supply chain to reduce exploration camp dependence on wild game.

### **What environmental monitoring is required?**

There is little environmental monitoring required during the exploration stage as the impact is minimal. The main impact on the environment at this stage is largely from the cutting of transect lines, the drilling of exploration holes, emission from machinery and the impact of people in the area. The small impact is largely due to the level of activity that takes place during this phase and to the small number of people who conduct the exploration. The GGMC however requires that companies have a waste disposal plan and adhere to the regulations 127 to 137 in relation to the use of poisonous substances.

### **What are the potential social impacts?**

Social impacts at the exploration stage are often minimal and consist primarily of additional employment for a few residents, additional services, materials and goods sourced from the nearby towns and villages and additional spending in the areas around the exploration. One of the main concerns at this stage is that of unrealistic expectations. Many communities have to recognise that most large scale exploration activities do not advance to the mining stage. Many of the small and medium scale operations do not significantly increase employment once they begin mining. Here are some of the possible social impacts that communities can experience at the exploration stage:

#### **Types of gold deposits:**

There are two main types of gold deposits, Placer and Lode deposits. Placer deposits are deposits that have moved from its original location over time while Lode deposits are the original deposits that can be found in the rocks. Many explorers, especially for large companies, try to trace the place deposits back to the lode sources.

## A Mining Information Toolkit for Guyana

Type	Positive or negative impact	Community response
Shift and migratory work	<p>Workers spend long periods away from their family.</p> <p>Members abandon the community for the gold mining areas.</p> <p>Marital stress/more single parents.</p> <p>Less time to spend on traditional activities/community work.</p> <p>Members abandon traditional activities, drinks and foods.</p> <p>Absence of traditional role models to pass on skills and language.</p> <p>Greater opportunity for members to learn new skills not available to them in the community.</p> <p>Members develop negative habits such as drug and alcohol use while away from the village.</p>	<p>Work with family and community groups to help and support families that are affected by the absence of members due to migratory work.</p> <p>Plan community work for when members are available.</p> <p>Work with members to help them understand and appreciate cultural traditions.</p> <p>Establish family support groups and partnerships with family members who can help teach younger community members in the traditions of the village.</p> <p>Use new skills to help develop the community.</p> <p>Work with returning members to address the new habits and reinforce positive traditions.</p>
More employment	<p>More money available for spending in the village on worker's return.</p> <p>Increase skills and training for workers.</p> <p>More money to send children to school.</p>	<p>Work with members to understand how to responsibly manage the increased income; this will help to ensure that the monies are not squandered.</p>
More money/ local purchases	<p>More drop outs from school at an earlier age to seek employment in the mines.</p> <p>More demand for modern conveniences.</p> <p>Better built/more modern homes.</p>	<p>Reinforce the importance of education in employment.</p> <p>Cater for the increased demands</p>

	<p>Creation of additional jobs for community members.</p> <p>Improved development in communities.</p> <p>Members stop hunting and fishing for food supply instead seek canned options such as “sardines” etc.</p> <p>A greater demand for readymade meals and restaurant services.</p> <p>More demand for and money to spend on drugs and alcohol.</p>	<p>Help community members understand how to manage their increased income responsibly.</p> <p>Work with members of the community to help them understand the value of traditional knowledge and values.</p> <p>Stricter enforcement of the village rules in relation to the regulation and abuse of alcohol and the prohibition of illegal drugs.</p>
Strangers in the community	<p>Increased population.</p> <p>Increased demand for local services and supplies.</p> <p>Introduction of new (often negative) habits .</p> <p>Dilution of traditions, loss of language, music, dances and traditional practices.</p> <p>Increase in diseases such as Malaria and STDs.</p> <p>Increase in marriages to members outside of the community and a greater number of mixed marriages.</p> <p>Increase in crime and violence.</p>	<p>Ensure that the members of the community are aware of the increase in people and their purpose in the community.</p> <p>Cater, by planning ahead, for the increased number of people and increase the supplies and services that can be sold.</p> <p>Teach and introduce the strangers to the traditions of the community. Promote the traditions with more involvement by the members of the communities.</p> <p>Increased health checks for strangers entering communities. Increase awareness about health risks and diseases.</p> <p>Ensure that strangers know the village rules on entering the community. The police and village authority to play a greater role in enforcement.</p>

### What are the opportunities for community participation?

Under the Laws of Guyana, communities have to be consulted prior to the start of any exploration on their land. In the case of the small and medium scale mining the community has the absolute power of refusal on whether or not mining can be done on their lands. This means that community involvement is an unconditional step in the exploration process.

Community consultation is normally done through direct communication with the community and the mining company and members and the Village Council are given the opportunity to understand what is being proposed, what tribute is being offered, to raise questions, concerns and learn about the process. This early consultation also allows the village to identify the opportunities/issues that may arise and to plan for them. Among the questions that the village will have to address are:

- Do we want to get involved in mining/ mine related business?
- Who are the owners/partners/ companies we will be dealing with?
- What will our community get in return for the permission to mine on our lands?
- What are the potential employment/ business opportunities?
- What are the potential social, economic and environmental impacts and how will we be able to address them?



For exploration in non-Amerindian land the mining company chooses whether or not to meet with nearby Amerindian communities to get support for the project and to seek assistance with the exploration.

## 1.4 Community employment and other economic opportunities.

This section identifies the employment and other economic opportunities available to Amerindian communities during exploration. It also examines how Amerindian communities can increase their readiness to participate in mining exploration activities.

### **What are the employment opportunities?**

The job opportunities during the exploration phase are often short term and limited. Many exploration companies will employ a small number of persons from nearby communities to assist in the exploration work for a few weeks or months. Most of the exploration work takes place near Amerindian communities and residents are often afforded the opportunity to gain employment, experience and skills. Line cutters, boat operators, guides, saw operators, guards, cooks, drivers, expeditors and labourers are the most common positions sourced to help with the initial exploration exercise.

The length of the employment with the companies depends on whether or not the exploration projects are a success. Many companies will hire specialists such as geologists, geophysicists, drill operators and surveyors and a few local residents where applicable.

Since the completion of an Environmental Impact Assessment is also a requirement under the laws of Guyana, exploration companies at this stage will also seek to gather basic information for the Environment Impact Assessment. Employment may also be created here for members of the community to work with the team to assist in the collection of plant, water and wildlife samples.

Through early consultation with the company the community will be able to evaluate what skills exist in their community and seek to get qualified residents employed with the project. The communities will, at the time of the consultation, have an idea of the skills and education levels of members of its community.

### **What are the other economic opportunities?**

There are not many economic opportunities available to the local communities in the early stages of the exploration process. The level of economic involvement at the community level depends largely on the scale of the operation, its remoteness or proximity from a village and the capacity of the community to satisfy the needs of the exploration team. There are several types of business opportunities that maybe available for local communities, these are:

- Line cutting and clearing
- Construction of campsite
- Collection of baseline environmental data
- Provision of food/material supplies
- Boat rental
- Local guides
- Drillers
- Drivers
- Chainsaw operators
- Guards
- Cooks/Bahirs
- Expeditors

Most of the exploration done at the large scale consists of small teams which normally prefer to outsource the jobs that can be done by local communities or contractors. Many of the companies that conduct the exploration are junior exploration companies which have few full time employees, most of who are normally specialists such as geologists.

Exploration projects normally have tight schedules and defined budgets, during the consultations the exploration company will tell the communities of its plans and the time that has been allocated for its completion. Since this is usually a very short timeline many local communities will not have enough time to develop a new business to support the explorations and can often only benefit from the already established services which they can provide.



### **Training opportunities:**

Some exploration companies may employ members of the community and at the same time train them to assist in more technical skills such as GPS usage and mapping. This means that members of the community, beyond the benefit of employment, will also be able to acquire a new skill. One of the main areas, during this phase that provides training, is during the collection of environmental baseline data. Community members are trained to collect environmental data and are more easily hired in the same field when and if the mine develops. In terms of small and medium scale operations there are often no opportunities for training since the teams are very small and in most cases persons employed only get training on the job or are employed based on their working experience.



## Community experience

### **Romanex and Aishalton - The Marudi Mountain Project**

Guyanese communities have not had a lot of experience with large scale exploration projects. The Marudi Mountain Mining Project was to be one of the first to be conducted under the new Environmental Protection Agency requirements. Additionally the project would be one of the first of this scale in Region 9, an area that is traditionally associated with subsistence indigenous activities.

The Marudi Mountain Mining Concession is located in the South Rupununi in administrative region 9 and is located less than 28km from the village of Aishalton. The main access to the mine is through the village via a 45 km roadway, the road runs directly through the village. This has resulted in the community being able to serve as the primary hub for access to the exploration site. The community has the closest airstrip to the site and it is also the administrative hub for the communities of the South Rupununi.

The Marudi mining project initially started with suspicion surrounding its operations. The community of Aishalton, which was the closest community in the area of influence, knew little about the project since the company, which initially established the project, did not seek to consult with the members in the nearby areas. In 1999 when Romanex (Vanessa Ventures) took over the project the community was rife with distrust about the project. Several NGOs had been campaigning for an end to the project and had convinced community members that the project would rob Amerindian Communities of their land.

The new company, Vanessa Ventures, faced an uphill battle in convincing, an already bunkered population, that the project was more than they had been misled to believe. The company entered a phase of full disclosure with all the communities in the area of influence and especially with the community of Aishalton, the one closest to the exploration site. It engaged the Touthao council of the Deep South and communities through them. The company then fielded questions about its proposed operation and began to build a community partnership.

The community and the company soon came to an understanding about the operation in the area and a new partnership developed. The company ensured that there was a full disclosure about its activities and embarked on developing a code of conduct for its employees in keeping with the discussion with the village and model for supporting community development projects. The company agreed with the community that

they would source the majority of the labour needed from the village and that the necessary and prior requests will be made for the use of passage through the village. Additionally the company actively reduced the interaction and time spent by its outside workers within the village and thereby reduced the impact the “strangers” had on community life.



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### **Connectivity for the Deep South.**

The company since its initial work in the area was beset by requests from various members of the community and from members of the nearby communities. The company took a structured approach to its community support and decided that all community support and assistance will be made to projects that are sustainable and provides a long term benefit.

The communities of the Deep South Rupununi main access to the rest of the world was via high frequency radio sets and the odd newspaper that made its way into the village days later. This created a serious gap in the communication access for the community and the nearby villages. Vanessa mining was approached by the Deep South Toshao council to assist them in establishing a better communication link.

As a result the mining company decided with the community that the establishment of a computer centre with internet access will be the best way to connect the village, and others nearby communities, to the rest of the world. The company worked along with the South Rupununi Toshao’s council and built and established a computer learning centre in Aishalton. The centre is managed by the Toshao’s Council and the company provides training for the identified representatives in computer skills. These skills were then passed on to other members of the community. Additionally the company still facilitates the training of community members in computer skills.

The centre since its establishment has provided training to several community members and now allows for one of the country’s most southern villages to be able to stay connected via email and internet access.

# 2 Mine Development



## 2.1 Overview

This section explains the purpose of mine development, identifies the main activities and players, and outlines opportunities for Amerindian communities to get involved during the mine development phase of the mining cycle.

### **What is mine development?**

Mine development is the second phase of the mining cycle. The purpose of this phase is to learn about the potential value of a mineral deposit, determine if it can be mined profitably and if it can, construct a mine. In order to build a mine, the ore deposit must be large and valuable enough to pay for the cost of construction (capital

costs) and the costs to operate the mine (operating costs). Factors that determine if a resource is economical to mine include:

- Location of the resource.
- Type of mineral and access to and existing infrastructure (roads, airstrips, wharves etc.). This means that it may be possible to mine in a much more difficult to access area for gold or diamonds but not for sand since the return from sand is not as profitable as that from gold or diamonds.
- Accessibility of the resource, the more difficult it is to get to, the higher the cost will be to extract it.
- Size of the resource, the larger the deposit the greater the potential for profit.
- Market prices, low market prices may reduce interest in establishing a low yielding mine since it increases the risk for a return on profit.
- Distance from markets and supply points.
- Ability to recover the resource in an environmentally safe manner.
- The regulatory regime in a particular area/country.
- Availability of a qualified work force.

The main activities of mine development include:

- Collection of more technical, environmental and socio-economic data to increase the company's knowledge of the resources.
- Developing the mine plan and infrastructure.
- Consultation between the government, mining companies and, where applicable, Amerindian communities to ensure that the proposed operations are in keeping with existing legal regulations.
- Hosting of public scoping meetings in keeping with the terms of an Environmental Impact Assessment.
- The final evaluation of the project is conducted and a production decision is taken.
- Apply for a mining permit/ mining licence.

It is only after all of these steps have been completed and indicate that the mine will turn a profit that mine construction will begin and preparations are made to start operations.



### **Time frames**

The time it takes to develop a mine is dependent on the size of the mine being developed, the location of the mine and how large a complex is being built. Some mines take as little as 5 years while some can take as much as 16 years. This time includes the time it takes to conduct the EIA, get the approval of the Environmental Protection Agency, the Guyana Geology and Mines Commission and for the actual construction of the physical infrastructure.

### **Costs**

The cost to establish and operation depends on the scale of the operation; small and medium scale operations are significantly less costly than the cost for the establishment of a large scale operation. Large scale operations can cost anywhere between 50 million to 1 billion US dollars to establish.

### **What are the mine development activities?**

If the initial exploration leads to positive results, the project moves from exploration to deposit evaluation and mine planning. During this stage, the mining company will increase its activities and investment to determine if the mineral deposit is worthwhile and if a mine can be developed. It is during this stage that the mining company will prepare the mine design. Once evaluation and planning are completed and a decision has been made to go ahead with mining, construction will start. This will include several activities:

### **More detailed drilling**

The drilling will extract drill cores (cylindrical samples of rock or soil) for analysis. This additional drilling is used to help precisely determine the shape and size of the deposits.

### **Detailed analysis and evaluation**

Samples are analysed to find out the grade and to assess the value of the deposit.

### **Bulk sampling**

Bulk sampling gives large and representative mineralised samples. It is used to determine the metallurgical characteristics of the material. The sample is tested in a testing plant that recovers the minerals. A test mine may be built to identify new technologies needed to recover minerals.

### **Environmental Impact Assessment**

The main work for the EIA takes place during this stage and will include the sampling of the water quality, an analysis of the biodiversity of the mine area, the hosting of public scoping meetings and the determination on the social and environmental impact the mine operation will have. This is a prerequisite for the granting of a mining licence.

### **Preliminary design and engineering (prefeasibility)**

The preliminary design and engineering stage of mine development occurs at the prefeasibility stage. The prefeasibility is an activity used to prove a project's potential before investing money into additional detailed work.



### Feasibility studies

Feasibility studies are a series of planning studies and evaluation reports of the geological, engineering, economic, legal and site data. The purpose of feasibility studies are to determine whether mineral deposits can be mined profitably. Feasibility studies usually include the following:

Geology and resource determination	How large is the deposit or resource? What is the grade of the minerals or metals in the deposit?
Mine planning	What will be mined? How will it be mined (Open pit or underground)? What equipment will be used to mine it?
Process plant test work and plant design	What is the best method to extract the minerals or metals from the host rock? Will there be a smelter?
Infrastructure planning	What roads, airstrips, camps, wharves, and complexes will be needed?
Water and waste management planning	What are the water supply needs? What is the discharge quality (turbidity levels) allowed? How can waste water be safely disposed of?
Mine closure and reclamation plan	How will mine closure be done? What are the requirements for reclamation and closure?
Operating cost estimates	How many workers are required? What types and amount of equipment and supplies that will be required during operations? Will the mine be operational 24hrs a day?
Capital costs	What are the costs to plan, design, permit and construct the facilities?
Financial analysis	What are the costs to borrow money to build and operate the mine? What are the yearly costs and annual earnings? What is the expected profit or loss?





### **Environmental management**

An environmental management plan and a reclamation and closure plan are important steps in mine development that have to be developed and approved, by the EPA and GGMC, before a mining licence can be issued. Small and medium scale operations are required to submit an environmental management agreement issued by the GGMC.

### **Mine closure and reclamation**

This plan will detail how the mine site will be restored and cleaned up at the end of the mining operations. This is an important step in mine development and must include how structures will be removed, how to deal with tailings, the disposal and use of chemicals, mine closure and revegetation of the area.

### **Environmental permits**

During this stage the operations, large scale mines, will have to address the environmental requirements that will allow for the application of a mining licence. These include an Environmental Permit from the EPA, which can only be given after the approval an Environmental and Social Impact Assessment Plan.

### **Agreements**

The types of agreements that can be negotiated between the communities and the mining company at this stage will depend on several factors, including the scale of the operation. If the mining is taking place on Amerindian lands then the small and medium scale operators must have a written agreement with the community. Additionally communities can negotiate with the mining companies for additional agreements such as usage of community skills, where available and practical, the social contribution of the mining operation to the community, and service and sales agreement for community goods.

### **Final/bankable feasibility**

This is where all the previous feasibility studies get reviewed, along with a detailed review and analysis of all the necessary permits and environmental requirements. The main aim here is to determine the final costing for the project and allow the company to decide if it will go ahead with mining.

### **Project financing**

Once the final cost is known, the mining company will seek to secure financing for the operation. The bankable study is used to demonstrate that the project is feasible and thereby encourage investors into funding the mine development and operation. Some companies may need to borrow money from a bank or raise money through the issuing of shares/stocks on the stock market. However some of the larger mining companies are often self financing.

### **Investment decision by the mining company**

The final investment decision on whether or not to build a mine happens only after the final feasibility study is finished, the financing is secured, the necessary studies are completed and the necessary permits are approved. Many times, despite all the monies spent on exploration and feasibility studies, a decision will be taken to abandon the project if the final analysis is not favourable.

### **Construction**

Once the decision has been taken to go ahead with mining and all the necessary permits are approved, the building of the mine starts. The construction phase is the

building/development of the facility. This includes the construction of the actual mine, the processing plant and all other related facilities such as housing, access roads, wharves, airstrips etc. This is the most expensive stage in the mining development and employs the most people. Some of the main activities during this stage include:

- Site preparation
- Clearing and preparing the land for the start of mining
- Construction of accommodation
- Construction of the process and site facilities (mills, offices etc.)
- Building of roads, airstrips, wharves, installation of power plants and distribution lines
- Training programs for personnel

### **Who are the main players in mine development?**

#### **Junior Mining Companies**

Junior exploration companies are not usually involved in mine development. They do not have the resources or money to develop and build a mine. What normally happens is, after the junior company successfully proves the explorations to be viable and find a deposit they will find a senior mining company to invest. In many cases the junior company sells off its interest in the venture or joins the larger company as a partner in the establishment of the mine.

#### **Senior Mining Companies**

These are the main developers of mines. They are typically the manager and operator and are involved in all of the activities from exploration through construction and operation. These companies are normally well funded and have a history of managing and operating a mine.

#### **Consulting Firms**

These firms are sometimes hired by the mining company to help with feasibility studies, mine planning, mine design, construction management, project management and environmental and social impact assessments.

### **Equipment Suppliers**

Equipment suppliers manufacture and sell equipment to the mining company and can also provide maintenance and support services during mine operation.

### **Construction Companies**

These companies are often hired by the mining company to undertake all aspects of construction including the construction of the mine, access roads, airstrip and wharves. Some of these companies provide all the necessary labour and expertise in the development of a mine. These companies will often be the ones who will decide on the local hiring of workers for construction. Some workers are often offered permanent employment with the mine once it starts up.





### **Financial Institutions**

Once the project has reached the mine development stage there is a significant increase in the costs. Many companies will seek to get financing from investors through the issuing of shares, institutional and individual investors and by borrowing from the banks.

### **The Government of Guyana**

The Government of Guyana via the regulatory agency for mining, the GGMC, will issue the mining company with a mining licence and continue to monitor the construction of the mine to ensure that it is in keeping with the mining regulations and the conditions set out in the environmental impact plan and occupational health and safety requirements.

### **Communities**

The mine development phase offers communities the biggest opportunity for employment and involvement. The required environmental and social impact assessment ensures that communities have to be consulted to determine how the project will affect them as it develops into a fully operational mine. It is during the time that communities can identify and negotiate for community opportunities.

### **How can Amerindian Communities get involved in mining?**

Beyond the tribute that has to be paid for the use of Amerindian lands, there are several other opportunities that are available to communities even if the mine operation is not on titled lands. There are several consultations that will take place between the mining company and communities prior to the start of mine construction.

During the development stage the mine company may hold:

- Public scoping meetings and hearings
- Open houses
- Workshops
- Focus groups
- Interviews
- Community meetings / community consultations

Some of these meetings are a requirement and a necessary part of acquiring the necessary approval from the EPA. During this time communities can provide feedback, raise concerns and issues and seek clarification on aspects of the project. Many of the meetings are called public hearings or public scoping because anyone, who might be affected by the project, can attend.

In addition to public meetings the mining company may meet directly with communities that are likely to be most impacted by the project. During these meetings the Village Council can raise additional concerns, further identify the social and environmental impacts of the project and seek clarification about the opportunities that are available for the community. Some communities can negotiate for employment, service provision and the social and community contributions that the mine will offer. The community may enter into written agreements with the mine company on any or all of these issues.

The mining company may offer to take the Village Council to visit the mine site to get a better understand about the proposed operation.

## 2.2 Acts and regulations

This section looks at the regulatory requirements, licences and permits that may be required during mine development. The large scale mining operations, in order to start construction, need to acquire a mining licence. Although the timeline between exploration and mining in the small and medium scale is much shorter than the large scale operations, a mining permit (medium scale) or a claim licence (small scale) is required before the start of mining operations and for the establishment of a mine.



<b>Acts and regulations that govern aspects of mining</b>	
General	<ul style="list-style-type: none"> <li>• The Mining Act 1989</li> <li>• Mining Regulations</li> <li>• Geology and Mines Commission Act 1979</li> </ul>
Health and Safety	<ul style="list-style-type: none"> <li>• Regulations under the Occupational Safety and Health Act 1997</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Environmental Protection Act 1996</li> <li>• Mining Amendment regulations 3005 for Environmental Management                             <ul style="list-style-type: none"> <li>• Part XIV Regulations 127-137: Use of Poisonous Substances</li> <li>• Part XIV, Regulations 216 to 229 requirements for Environmental Management for Large and Medium Scale Mining</li> <li>• Part XXV, Regulations 230 to 239, Requirements for Environmental Management for Small Scale Mining on Claims and River Locations.</li> <li>• Part XXVI, Regulations 240 to 250 General Requirements</li> <li>• Part XXVII, Regulation 251, Protected Areas</li> <li>• Part XXVIII Regulation 252 Pollution Control</li> <li>• Part XXIX, Regulations 253 to 260, Offences and Penalties.</li> </ul> </li> </ul>
Amerindian Rights	<ul style="list-style-type: none"> <li>• Sections 48 to 55 of the Amerindian Act</li> </ul>
Explosives	<ul style="list-style-type: none"> <li>• Explosives Act and Regulations 65:03</li> <li>• Blasting Operations Act and Regulations 65:03</li> </ul>
River Travel/use	<ul style="list-style-type: none"> <li>• River Navigation Act and Regulations</li> </ul>
Taxes	<ul style="list-style-type: none"> <li>• Tax Act 80:01</li> <li>• State Land Act 65:01</li> <li>• Gold Board Act 1981</li> <li>• Income Tax Act 81:02</li> <li>• Corporation Act 81:03</li> <li>• Property Tax Act 82:21</li> <li>• Customs Act 82:01</li> <li>• Industries Aid and Encouragement Act 95:01</li> </ul>



**What licences and permits are required?**

The Mining Act of 1989 governs the establishment of a mine and appoints the GGMC as the state agency with responsibility for mining in Guyana. In addition to the Mining Act; the Amerindian Act, the Environmental Protection Act and the Occupational Health and Safety Act also set out conditions relevant to the development of a mine.

In addition to these requirements the GGMC provides a check list for small scale miners which requires them to show the location of all materials along with a notification and clean-up plan in the event of a spill. The GGMC has published several codes of practices for environmental management in Guyana; these apply primarily to the small and medium scale miners. The codes are:

<b>Code of practice required by law</b>	<b>Draft code of practice</b>
Waste management and disposal systems	Waste management and disposal
Mechanisms for managing sediment losses, effluent and contaminated drainage	Tailings management Mine effluents
Contingency and emergency response plans	Contingency and emergency response plans
Mine reclamation and closure plan	Mine reclamation and closure plan
Environmental effect monitoring programme	Environmental effects monitoring
Sand and loam mining	Sand and loam mining
Quarrying	Quarrying
Control of flows from lower dams less than 6 metres high	Use of small dams for water/tailings management
Mercury use and disposal of effluent	Use of mercury (and disposal of effluent)

### **Mining Licence/Mining Permit / Claims Licence**

#### **Claims Licence (Small Scale)**

For the small scale operation a claim licence is required to start mining. The holder of a small scale prospecting permit, once they have located a claim or river location, has sixty days to apply for a claim or river location licence. This licence allows for the removal of minerals within the boundaries defined in the claim application. The claim and river location licence are valid for one year starting from the 1st of January and expiring on the 31st of December each year. Under the licence the claim holder must pay an annual rental fee for each acre within the claim licence. The rate for a claim licence is set out by the GGMC and updated periodically (see appendix for a table of rentals). The claim or river location licence shall not become effective until all the fees have been paid, the required environmental conditions have been met and a verification of the claim has been carried out by the GGMC.



#### **Mining Permit (Medium Scale)**

For the medium scale operation a mining permit is required to commence mining. The holder of a medium scale prospecting permit, once they have located an area to begin mining, has sixty days to apply for a mining permit. This mining permit allows for the removal of minerals within the boundaries as defined in the application. The mining permit is valid for a period of five years or for the life of the mine, if the mine life is shorter than five years. This permit must be renewed every five years for as long as the mine is operational. Under the licence the permit holder must pay an annual rental fee for each acre within the mining permit. The rate for a mining permit is set out by the



GGMC and updated periodically (see appendix for a table of rentals). The mining permit shall not become effective until all the fees have been paid, the required environmental permits acquired and a verification of the claim has been carried out by the GGMC.

### **Mining Licence (Large Scale)**

In the large scale operation the prospecting licence holder, once they decide to go ahead with the development of a mine, has to apply for a mining licence. The process for the application of a mining licence requires that the applicant submit a technical and economic feasibility study, processing and mine plans and an Environmental Impact Assessment. A mining licence is valid for twenty years or for the life of the mine if it is shorter and can be renewed at the end of the first 20 years if needed. A mining licence is only granted after all the prerequisite conditions have been met. The licence holder must pay an annual rental fee for each acre within the mining permit. The rate for a mining permit is set out by the GGMC and updated periodically (see appendix for a table of rentals). In some cases a performance bond may be required.

## 2.3 Environmental and social impacts

This section identifies the potential environmental impacts a community may experience during mine development. It also explains the environmental requirements necessary for the establishment of a mine, the purpose of an environmental assessment, the types of environmental monitoring and mitigation measures, and the opportunities for the community.

### What are the potential environmental impacts?

The scale of the environmental impact will depend on several factors such as:

- The size of the mine
- The type of mine
- The extraction method
- The chemicals used
- The duration of the operation



To address some of these, all mining operations (large, small and medium) are required to plan for the environmental impact of their operation prior to being issued a mining permit, licence or claim.

In cases where mercury is improperly disposed of it can be easily changed into its highly toxic (poisonous) organic form, methyl mercury, by micro-organisms, in soils and rivers.

### Mercury

Mercury is known to be a serious toxicant (poison) and environmental pollutant as a result the United States has passed a law which will see the banning of all exports of mercury from 2013, the European Union (EU) will ban mercury exports from 2011. As a result gold miners need to develop and adopt other methods and equipment for recovering gold without the use of mercury.

### **Environmental and Health Impacts of Mercury used in Mining**

Small and Medium Scale gold mining in Guyana use mercury to separate and recover fine gold particles from the black sand concentrate.

Mercury vapour is particularly harmful when it is inhaled regularly or when it is inhaled in large doses and mercury poisoning can occur, causing damage to the respiratory and central nervous systems. In addition metallic mercury can irreversibly damage the nervous system, and can cause damage to the kidneys and liver. Miners who heat gold-mercury amalgam without using approved retorts and respirators risk mercury poisoning from inhalation of vapour.

#### **Small Scale:**

Small scale operations are required to comply with the following environmental requirements:

- Possess an approved Mercury Retort where gold is being recovered by mercury.
- A cyanide permit from the GGMC and an environmental permit where gold is being recovered by cyanidation .
- Reclamation fee of \$25,000 Guyana dollars for the claim holder and operator.
- A plan detailing the location of all materials on the mine operation site.
- A notification and cleanup plan for each mine site in the event of a spill.
- Completion of an environmental check list provided by the GGMC.



### **Medium Scale:**

Medium scale operations are required to complete an Environmental Management Agreement (EMA) which is issued by the GGMC. This document sets out the environmental requirements and responsibilities of the medium scale operator in fourteen areas:

- Exploration disturbances
- Mining excavation
- Deforestation (inventory and protection of biodiversity)
- Prohibition of clearing of the banks of river or creek
- Prohibition of mining within 20 metres of a river bank or creek by a river dredge and creation of beaches
- Removal of topsoil
- Use of settling / tailings ponds
- Handling of mercury
- Use of an approved retort when burning amalgam (using mercury)
- Handling and disposal of waste petroleum products and poisonous substances
- Inspection of an environmentally damaged area prior to mining
- Responsibility for the environment
- Environmental bond (\$100,000 Guyana dollars)
- Obligation to provide safe drinking water

Does the GGMC have to issue a shop/business permission if the business/ shop is on Amerindian land or within a CDC?

Shops and businesses must get permission from BOTH the GGMC and the Community in which they will operate.

Additionally the EMA also sets out acceptable standards for sanitary regulations and the use of poisonous substances. The medium scale operator also has to submit an Environmental Management Plan for 3 to 5 years, reclamation and closure plans and contingency and emergency plans. An EIA is required for the medium scale stone and sand mining operation and for gold recovery using cyanide.

### **Large Scale Mining**

Large scale mining operations must complete a detailed Environmental Impact Assessment and get the approval of the Environmental Protection Agency before a mining licence can be granted. Once the EPA has received the EIA it is then sent to



the GGMC for review and comment. Additionally the GGMC also requires that large scale operations provide

- An Environmental Management Plan for 3-5 years.
- A reclamation and closure plan.
- A Contingency and Emergency Response Plan.
- A Cyanide permit from the GGMC if cyanide is being used to recover gold.

### **The reclamation and mine closure plan (medium and large scale):**

Reclamation and closure plans are guided by a code of practice published by the GGMC and includes the following:

- Backfilling of placer mine pits where applicable.
- Sealing or capping of shafts at closed underground mines in accordance with the code of practice or directions of an appropriate authority at the commission.
- Stripping and stockpiling topsoil for use in reclamation.
- Replacement of topsoil and vegetation of disturbed lands.
- Restoration of water course (where appropriate) .

### **Reporting violations:**

When violations of the mining or environmental laws take place, communities can report the breaches to the nearest mining station or mining officer. Alternatively communities can write to the GGMC through the Ministry of Amerindian Affairs.

Potential Environmental Impacts

TYPE	CONDITION	MITIGATION
Land Use	<p>Construction of access roads, power lines and airstrips; habitat disruption and additional/uncontrolled access to mine site.</p> <p>Construction of buildings, workshops, stores, processing plant and permanent camps.</p> <p>Large excavations, bulk sampling and extensive drilling.</p> <p>Fuel and chemical storage.</p> <p>Soil Erosion due to land clearing.</p> <p>Extensive land disturbance from placer mines and hydraulic operations .</p>	<p>Keep road construction to minimum requirements, monitor road use and minimise access by installing security gates.</p> <p>Use local design expertise to advise on construction. Minimize land use.</p> <p>Use planning to minimise land disturbance.</p> <p>Follow the EPA regulations and GGMC guidelines established for fuel and chemical storage.</p> <p>Contingency and emergency response plan.</p> <p>Create water channels to control runoff.</p> <p>Manage the number of dredges allowed to mine in a particular area.</p>
Air Quality	Dust from roads and mining activities.	<p>Water roads to minimise dust emissions.</p> <p>Reduce vehicle speeds on dusty roads.</p>
		Follow approved EIA requirements.



<p>Water Quality</p>	<p>Chemicals in water discharge, tailings discharged in rivers, erosion, rerouting of water courses, and mercury in fish.</p>	<p>Follow limits of turbidity discharge and tailings discharge.</p> <p>Maintain settling and tailings ponds within required specifications.</p> <p>Dispose of effluent in keeping with regulations.</p> <p>Dispose of chemical, petroleum products and poisonous substances in keeping with established code of practice and regulations.</p>
<p>Biodiversity</p>	<p>Animals attracted to garbage, food and waste.</p> <p>Overhunting of animal and overfishing to supply camps.</p> <p>Biodiversity in area affected by increased human activity, increased human / animal conflicts.</p> <p>Valuable / endangered plant/animal species destroyed during mine construction.</p>	<p>Restore water courses in keeping with regulations.</p> <p>Use an approved retort and properly handle mercury.</p> <p>Use effective waste management programs and dispose of garbage properly.</p> <p>Work with local communities to establish limits for supply.</p> <p>Educate employees to understand their environmental responsibility for wildlife.</p> <p>Use EIA to understand biodiversity of the area.</p> <p>Use EIA to understand biodiversity of the area.</p> <p>Work with local conservation organisations to manage impact.</p>

The type and level of the environmental impact and mitigation actions that will be necessary also depends on where the mine site will be located and could also affect, the loss of archaeological and heritage sites and traditional land use. To address this, companies can work with local communities to understand local needs and traditional areas.

### **Environmental Impact Assessment**

An Environmental Impact Assessment is normally required by the EPA and the GGMC for large scale operations and for sand and quarry operations. Environmental management is a critical step that has to be completed prior the granting of a mining licence. This process involves several environmental studies, the gathering of baseline data for these studies begins in the exploration stage. The conditions and requirements of an EIA are set out in the Environmental Protection Act and in specific guidelines published by the Environmental Assessment Board and the EPA. The EIA consists of three main aspects including:

- Environmental Baseline Study - this documents the status of the area before mining starts.
- Environmental Assessment - this looks at the potential impact the project will have and helps to identify alternatives
- The Environmental Impact Statement - this is a summary of the findings in the environmental baseline study and assessment and will also include an Environmental Management Plan.

### **The EIA process**

The Environmental Impact Assessment process starts with the submission of a draft terms of reference to the EPA. The EPA then notifies the public via an advertisement in the newspapers and invites public comment. After a period of 28 days, for collecting written submissions, a public meeting is held and more comments about the project are received. The comments are then forwarded to the EIA team for review and finalisation of the terms of reference. During the impact assessment the EIA team and the mine developers are required to hold consultations with members of the public and interested organisations. The EIA must address several requirements including:

- A description of the project and the technology available.
- A description about the effects of the mine on the environment.

- A description of the mitigation measures.
- A monitoring plan.
- An emergency response or contingency plan.
- A programme for restoration.

This plan is then made available to the public for 60 days for review and comment. A public meeting is often held to receive additional comments before the finalisation of the EIA. The Assessment takes into account the local knowledge and ideas, gives a public voice to the project and ensures that there is early planning for the environmental and social impact of the project.

### **What environmental monitoring is required?**

Environmental monitoring is normally established to serve as an early detection and warning system for the impacts of mining. This allows the operation to take the relevant actions based on the results. The level and scale of the environmental monitoring required is outlined in the environmental management plan and the EIA. Environmental monitoring includes the monitoring of water quality and flow, air quality, fish and wildlife habitat and vegetation changes.

The objective of environmental monitoring is to ensure that all impacts are reduced. The mining company will often perform monitoring exercises in keeping with its management plan. The GGMC's environmental monitoring unit will also take periodic samples from the site and its environs to ensure that the mine is in keeping with the specified regulations, especially water turbidity levels. In addition some communities are also trained to conduct sampling and analysis either for independent monitoring or as part of a support mechanism for the mine site.

### **What are the potential social impacts?**

This phase of the operation will see the greatest arrival of new workers to the site and can bring many more opportunities for employment and business for a community. The increased level of activity and movement of people in or near a community has a significant social impact.

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	Type	Positive and negative impacts	Community response
Social	More employment with the mine/ shift work/ rotational work.	<p>Less time spent on family and traditional activities.</p> <p>Long periods of separation from family and community structure.</p> <p>Increase in the number of single parent households.</p> <p>Loss of culture due to community members being away in the “goldfields” and cannot pass on traditional knowledge.</p> <p>Community members change their “attitude” to village life on their return from mining.</p>	<p>Community needs to look at scheduling activities for when members are available to work.</p> <p>Community and resident family support has to be strengthened.</p> <p>Promote more activities for interaction between younger community members and elders.</p> <p>Host cultural days and other activities to promote traditional ways and methods.</p>
Economic	<p>Community partnerships and alliances developed.</p> <p>Increased employment and greater personal income.</p>	<p>Increased business opportunities, new businesses and services developed.</p> <p>More training opportunities .</p> <p>More money circulating in the community.</p> <p>Community has more money to spend on community development projects.</p> <p>Some businesses promote negative attitudes.</p> <p>Increased training and skill development.</p> <p>Increased indirect employment for non-mining community members.</p>	<p>Manage and monitor the establishment of businesses in or near the community.</p> <p>Promote traditional goods and products more within the community.</p>

		<p>Improvement of houses and infrastructure in the community.</p> <p>Creates positive role models.</p> <p>Greater dependence on manufactured goods and less on traditional goods and methods.</p> <p>Increases the gap between employed and unemployed.</p> <p>Increased cost of living due to an increase in price and demand for goods.</p> <p>Increased school dropouts to seek employment in mining.</p> <p>Increased drug and alcohol use.</p> <p>Increases prostitution.</p> <p>Better education for children.</p> <p>Poor management of money.</p> <p>People become more greedy and selfish.</p>	<p>Work with mining companies and schools to reinforce the benefits of completing school</p> <p>Enforce community rules in relation to alcohol and drug use, work in collaboration with the police to enforce laws.</p> <p>Work with community to development a better understanding about money management and saving.</p> <p>Work with companies to promote savings scheme for employees.</p> <p>Promote more community activities that will reinforce cooperation.</p>
	<p>New roads and improved access to communities.</p>	<p>Reduced transportation costs.</p> <p>Reduced costs of goods.</p> <p>Additional vehicular/boat traffic passing through communities.</p> <p>Increased high speed boats disrupt traditional fishing and threaten small traditional boat traffic.</p> <p>Increased crime.</p>	<p>Manage speed limits by use of toll gates, signs etc. to reduce vehicle accidents.</p> <p>Establish designated boat landings for non-resident boats.</p> <p>Monitor vehicles/boats coming in and out of the community by keeping a record of transit.</p>

			<p>Reduce boat speeds and pay attention to fishing areas.</p> <p>Strengthen community capacity to deal with crime and improve relations with the police.</p>
	Strangers in the community.	<p>Exposure to new cultures and people.</p> <p>Learn new skills.</p> <p>Learn negative habits.</p> <p>Increase in population.</p> <p>Strain on existing services.</p> <p>Increase in diseases.</p> <p>Greater competition for spouses within the community.</p>	<p>Community to enforce and ensure that strangers understand and comply with the rules of the village.</p> <p>Explain cultural skills and traditions to strangers in the community.</p> <p>Work with the school teachers to explain the positive and negatives influences in the community and to promote positive role models.</p> <p>Work with community members to promote positive habits.</p>

**What are the opportunities for community participation?**

The community can make its first contributions about the project during the initial stages of the Environmental Impact Assessment, during consultations with the mining company and at public scoping meetings. This allows the community to have their issues addressed before the construction phase begins and for them to be addressed before the issuing of a mining licence. If the mine is proposed on Amerindian titled land then the community gets an even earlier opportunity during the initial negotiation stages necessary for permission to mine.

During the mine development stage most communities will get to raise their issues and negotiate with the mining company as it plans for the establishment and operation of the mine. A community, with the available skills, can negotiate for the supply of some goods and services, once they have the capacity to deliver, and also raise issues about



training, social impacts and contributions by the mining company. Many communities need to prepare in advance for these consultations and can ensure that they are well equipped by:

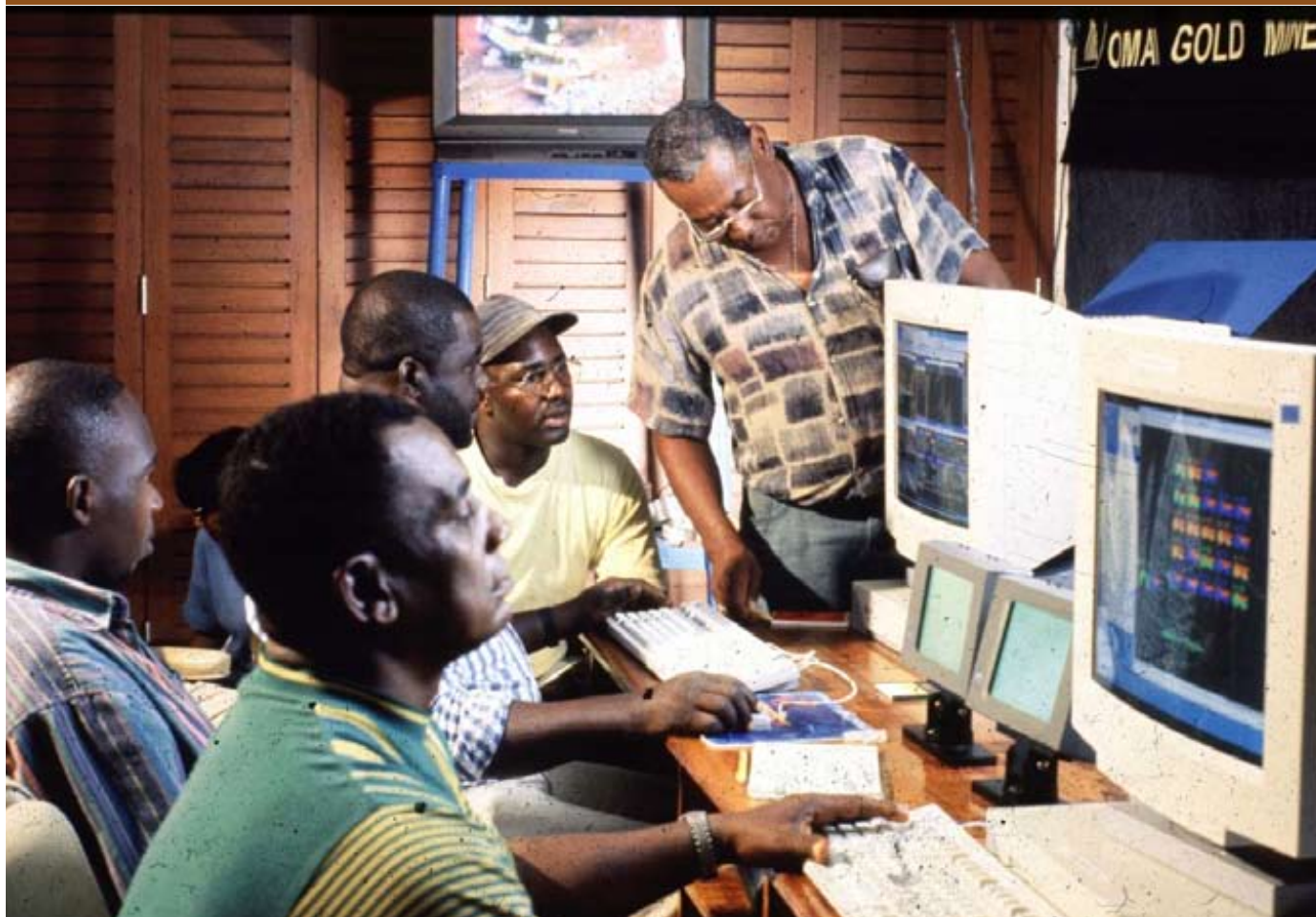
- Identifying potential impacts that may affect their community.
- Conducting a skills and capacity inventory to understand what jobs can be filled and what training will be needed for members to become employed with the mine.
- Identifying the potential business opportunities and partnerships.
- Identifying the main negotiators and contact person from within the community who will meet with and communicate with the mining company.

The consultations held during the development of the Environmental/Social Impact Assessment allows members of the community to:

- Voice concerns about the project.
- Share local knowledge, ideas and information.
- Get information about the proposed activities of the company.
- Identify possible environmental and social impacts from the project.
- Establish agreements for greater local participation in all phases of the project.

Many mining companies welcome the opportunity to have local communities participate and contribute in the mine development phase as it allows the developers to use local knowledge to better manage impacts. Local communities need to develop the skills and capacity to ensure that they can benefit from the opportunities.

## 2.4 Community Employment and other Economic Opportunities



This section identifies the employment and economic opportunities available to communities during the mine development stage.

### **What are the employment opportunities?**

Communities can experience huge increases in employment during the mine development stage. A number of jobs are often available from the entry level to the highly skilled professional. Employment at this stage is typically done by the developer and the contracting firm hired to develop the mine. There are also a number of indirect jobs that also become available through the service providers and suppliers to the mine development operation.



Jobs and Education		
Type of Job	Educational requirements	Examples
Entry level	<p>Primary school education</p> <p>Community members with practical experience/skills</p> <p>Traditional skills</p> <p>The community can negotiate with the company on the skill/ education requirements for most of the entry level jobs.</p>	<p>Line cutter</p> <p>Labourers/porters</p> <p>Guides</p> <p>Fishermen</p> <p>Guards</p> <p>Saw men</p> <p>Masons</p> <p>Carpenters</p>
Semi-Skilled	<p>High/Secondary School education</p> <p>Work Experience</p>	<p>Cooks</p> <p>Warehouse technicians</p> <p>Store keepers</p> <p>Office/administrative staff</p> <p>Trade occupations/ workshop staff etc.</p>
Skilled	Diploma or trade certificate	<p>Trade occupations/ mechanics etc.</p> <p>Safety coordinators</p> <p>Environmental technicians</p> <p>Laboratory technicians</p>
Professional	University degree	<p>Managers</p> <p>Engineers</p> <p>Geologists</p> <p>Scientists</p> <p>Accountants</p>

**What are the other economic opportunities?**

Communities can gain significant benefits during the mine development stage. The main benefits come from increased economic opportunities and increased employment of community members. Communities and mining companies should seek to develop alliances and partnerships in areas of training, employment and business opportunity. A number of economic opportunities for communities exist during mine development including infrastructure development, the provision of utilities and the development of support services for the mine operation. An organised community can benefit by negotiating for and developing some of the following business opportunities:

- Camp catering
- Site services
- Surveying
- Construction services and material supplier
- Airstrip maintenance
- Wharf maintenance
- Environmental monitoring

In order for communities to realise the full potential of the business opportunities that are available to them, they have to develop a plan for the businesses that will become available. They can do so by evaluating their capacity and answering questions like:

- What are the businesses currently available?
- What are the businesses required?
- What are the capabilities of our community?
- Are there companies we can partner with?

While there may be plenty potential opportunities, the mining companies can only work with reliable service providers and guaranteed supplies. This means that a community will have to ensure that they are fully capable of supplying and filling the needs of the service or supply contract before they have secured the job. In many cases a lack of initial capacity may hinder the development of large scale contracts for the communities, however communities can work with other partners to build their community capacity.

Once the mining company and the community have agreed on the economic opportunities that will become available the communities must negotiate and get an agreement in writing before going ahead. Not all the proposed economic opportunities will be available to communities.

## Community experience

### Experience with Guyana GOLDFIELDS

Guyana Goldfields Inc. is a Canadian based mineral exploration company, that has been in Guyana continuously since 1996. It has an interest in the Aurora project which is located in the Cuyuni area. The company, even before being granted a mining licence for its project, started working to assist local communities. There are no communities near to the company's operations and the project is not located on any Amerindian lands. However the company has taken on the role as an active and involved corporate citizen in the communities that they interact with, in particular the community of Itaballi and St. Cuthbert's.

### St. Cuthbert's Village:

The company hired 47 workers from this village with the specific object of providing jobs to the Amerindian population in Guyana. The company explained that there was active consideration to ensure that jobs are provided to the Amerindians, given that this group represents one of the poorest groups in Guyana. This has resulted in a marked improvement in the community of St. Cuthbert's. Apart from the obvious benefits that the increased employment has brought to the village, the medical treatment that employees receive from the company has also ensured that there are healthier persons in the community. In addition several employees have reinvested their wages into commercial equipment purchases such as chainsaws and trucks. Guyana Goldfields also donated \$500,000 to help construct a guesthouse in the village.





### **Itaballi**

Guyana Goldfields has adopted the community of Itaballi in which the company has a logistics/maintenance camp. Initially the company was beset by individual requests but chose to adopt a more structured approach to partnerships. In this regard the company sought to work to improve the school in the community.

The Itaballi Primary School serves approximately 180 children but did not have all the facilities available for the students. The company began its support for the school by developing a playground and providing clean drinking water. This was later developed into a larger plan of support for the school which saw a complete rehabilitation of the

school. This included the rehabilitation of the rainwater collection system used for drinking, provision of solar power for the school, teacher's homes and the community library. In addition the company undertook to establish three additional playfields.

The establishment of a library by Guyana Goldfields was also designed to complement the company's drive to improve literacy in the community; this included the construction, stocking and training of library staff.

The company has committed to continually supporting the community and school in sporting events and literacy improvement.



# 3. Mine Operation



## 3.1 Overview

This section explains the purpose of mine operation, identifies the main activities and players, and outlines opportunities for communities to get involved during operations.

### **What is mine operation?**

Mine operation is the third stage in the mining cycle. It is the process of actually extracting and processing of the deposits for the benefit of society, stakeholders and shareholders. A mine is considered operational when material is removed from the surface/ground and is processed into a saleable product. In the large scale operation there are basically two types of mines; open pit and underground. In the small and

medium scale the mining is generally done via open pit hydraulic mining or by river dredging.

A mine has four main work areas:

- **Excavation areas**
  - This is where earth and rock containing minerals are excavated.
- **Processing plant**
  - This is where the rock or earth is separated from the ore.
- **Waste storage**
  - This is where the earth or rock that has been stripped of ore is stored and may also include runoff (tailings) which are kept in holding ponds.
- **Supporting services**
  - This includes repair shops, stores, labs, living quarters, kitchens and offices etc.

Every mine operation has mining and processing target rates. One key element is to determine rates of mining and processing that will ensure that all costs can be recovered from the sales of the product. These rates are examined during the mine development stage and calculated to ensure that the mine operates at the highest level of efficiency. This means that the mine cannot produce too fast as it will increase the costs and it cannot produce too slowly or it will reduce the efficiency. The mining operation has to try to achieve the correct balance.



### **Time frames:**

The operating life of a mine can be as short as a few years to as long as a few decades. The main aim of the operation is to recover the investment and turn a profit for the developers. How long a mine remains in operation is dependent on several factors:

- Commodity price (demand and world price)
- Production costs and production rates
- Quality (grade) and quantity of ore that is economic to mine in the deposit
- Shape and size of the body of mineral to be mined
- Economic mining rate
- Mining method, equipment and other costs
- Ground conditions, difficulty in reaching the ore and mine safety
- Location

Generally, with a high world price and demand for minerals, mine operators will find it profitable to mine lower grade rock and ore. However with low prices and limited demand the value will be found only in the higher grade ores.

### **Costs**

Mining costs vary depending of the type of mine and its location. The mine will use a significant amount of labour, capital, energy and other inputs which mean that the cost of operation will demand a lot of money. While in many cases labour will be the highest recurring cost, the cost of fuel, spares and other materials used in the mining process are also expensive. The location of a mine also has a major effect on the costs, both from a construction stand point and in terms of transportation, supplies and other operating costs.

### **What are the mine operation activities?**

#### **Hiring**

Once a mine starts operation it requires both permanent employees and contractors. Companies will advertise nationally for the jobs to be filled. In some cases the company may offer jobs to the local communities first, however because of the number of skilled and semi-skilled vacancies the community will be unable to fill all.



### **Training:**

All new employees receive orientation training before starting on the job. This training helps employees to understand the operation and ensure that they are aware of the safety requirements for working in a mine. Other training for new employees includes on-the-job training, trades training, apprenticeships and literacy and life skills training. The training can be delivered via computer, classroom sessions or one on one instruction and mentoring.

Some companies may partner with local communities, government and others to provide community based training. Some companies also partner with local universities and technical institutes to provide technical training.

### **Commissioning**

Commissioning involves testing to see whether a new facility, process or equipment performs as it was designed. All of the processing and mining equipment have to be commissioned before going into production.

### **Production**

During production the waste rock/earth is mined away to recover the ore. It costs money to move both ore and waste so many mines try to mine as much ore as possible and as little waste as they can. When an operation starts up, a lot of waste must be excavated in order to reach the ore. In underground mining this is called pre-production development. In open pit mining this is called pre-stripping. This early stage of mining can last from a few days to as much as a year.

Once the company has removed enough waste and begins to extract ore, it is sent to the production plant for processing, this is the start of the production phase. This is where ore is processed into saleable material.

During production, waste still needs to be removed as the company seeks more ore. In underground mining this period is called development, while in open pit mining it is called stripping. Full production generally means that the average mining and processing rates are meeting or exceeding the target rates set in feasibility studies. Improved market conditions and a higher demand for the product could enable a mine to sell at a higher price than originally predicted; when this is available most

companies tend to increase production to capitalise on the greater prices. Most of these increases are often short term since the only way to increase capacity permanently is to expand the mine.

### **Mine Expansion**

Some mines may have to be expanded to keep up with demand or to maintain profitability, during this mine expansion phase there are several activities:

- Enlarging the existing mine.
- Opening up more mine areas.
- Buying more equipment and hiring more people.
- Expanding the processing plant to process more ore.
- Changing the processing plant to process faster.
- Doing more exploration work to find more ore.

### **Who are the main players in mine operation?**

#### **Junior Mining Companies**

At this stage most of the junior mining companies are not involved. Many companies sell off their interest to the senior mining company which uses its expertise to operate and manage the mine.

#### **Senior Mining Companies**

Senior mining companies have the main role in the mining operation. They arrange the financing, manage, plan, develop and operate the mine. Most senior mining companies have been in the mining business for several decades and have experience operating other mines globally. Mining generates a lot of money, but it also costs a lot of money to start and operate a mine. Senior mining companies are usually the only ones with the capacity to start and operate a large scale mine.

#### **Consulting Firms**

Consulting firms provide special knowledge and capability to mine operations. These companies provide specialists and assist in areas such as safety, engineering, occupational health, communication, environmental science and others.



### **Equipment Suppliers and Manufacturers**

Equipment suppliers have expert knowledge and experience for the machinery they supply. They are usually certified mechanics or electricians or will have engineering degrees and lots of work experience. During operations the equipment supplier will help assemble and commission the equipment. In addition they will provide training, technical support and advise on use, care and maintenance. In some cases, where the equipment and operation is large and complex, some suppliers may be based at the mine site on a full time basis.

### **Construction Companies**

Construction companies build the roads, airstrips, wharves, dams, shops, buildings, offices and other facilities that are necessary for the mine to be operational. Large construction companies are responsible for the construction and commissioning of all the buildings and facilities before handing them over to the mining company. Smaller construction companies work under the direction of large construction companies and may perform smaller jobs under the direction of the mining company.

### **Government**

The Guyana Geology and Mines Commission, the Guyana Gold Board, the Guyana Revenue Authority, the Ministry of Labour and the Environmental Protection Agency are some of the government agencies that the company will interact with, on a regular basis, at this stage.



### **Service Providers**

Not all services can be provided by the mining company, several services are given to outside providers. These can include aircraft service, transportation, site security, catering, environmental specialists and public relations.

### **Financial Institutions**

Institutions such as banks, investment companies, security brokerages and stock exchanges focus on the financial needs of the mining company. A variety of institutions take part in providing loans, managing cash and investment holdings, obtaining investor funding, public listings, buying and selling shares, coordinating mergers and acquisitions and posting bonds for closure liabilities.

### **Industry Associations**

The Guyana Gold and Diamond Miners Association is the industry association that represents the interest of miners in Guyana. Many mining companies are full time members and individual miners are also involved in the association. The GGDMA negotiates on behalf of miners with the government for improved conditions and better policies that will benefit miners. Most of the large mining companies are members of the association.

### **Customers**

The customer is one of the most important players at this stage of the operation. There are both intermediate customers and final customers. Intermediate customers include smelters and refineries, manufacturing plants and selling agencies. Final customers are typically the retail consumers.

The final customers are many and varied depending on the mineral being produced and sold. Base metals such as copper, aluminum and manganese are used in a variety of everyday goods. Precious metals such as gold and silver are used for jewelry and in electronics. Stone, sand and loam are used in the construction industry, while diamonds and other precious stones are used primarily for jewelry.

### **How can Amerindian communities get involved in mine operations?**

Community involvement should continue to happen throughout the mining cycle via employment and monitoring. The level of involvement will depend on how close the community is to the mine site and what agreements were negotiated during the mine development stage.

The mining company may also decide to visit the community and provide them with regular updates on the project or invite the council and other members of the village to visit the site to get a better understanding of what is being done. In addition the communities can be involved based on their partnership with other national agencies such as the GGMC and the EPA which may ask the community to conduct additional monitoring.

## 3.2 Acts and regulations

This section identifies the legal requirements and conditions under which the mine will be operating. Most of the licenses and permits that have to be obtained in the mine development stage will remain in force and applicable during the mine operation stage.

### What are the conditions for mine operation?

Once a mining company has a mining license, permit or claim they are legally allowed to mine the mineral they applied to extract from within the boundaries of their leased area. The miners which operate river dredges are allowed to extract mineral from the one mile area that they are licensed to operate within. Each mine operator is responsible for the mining that takes place on their property and activities, extraction and environmental issues, are monitored by the GGMC.



Acts and regulations that govern mine operation	
General	<ul style="list-style-type: none"> <li>• The Mining Act 1989</li> <li>• Mining Regulations</li> <li>• Geology and Mines Commission Act 1979</li> </ul>
Health and Safety	<ul style="list-style-type: none"> <li>• Regulations under the Occupational Safety and Health Act 1997</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Environmental Protection Act 1996</li> <li>• Mining Amendment regulations 3005 for environmental management                             <ul style="list-style-type: none"> <li>• Part XIV Regulations 127-137: Use of poisonous Substances</li> <li>• Part XIV, Regulations 216 to 229 requirements for Environmental Management for Large and Medium scale mining</li> <li>• Part XXV, Regulations 230 to 239, Requirements for Environmental Management for Small Scale Mining on Claims and River Locations.</li> <li>• Part XXVI, Regulations 240 to 250 General Requirements</li> <li>• Part XXVII, Regulation 251, Protected Areas</li> <li>• Part XXVIII Regulation 252 Pollution Control</li> <li>• Part XXIX, Regulations 253 to 260, Offences and Penalties.</li> </ul> </li> </ul>
Amerindian Rights	<ul style="list-style-type: none"> <li>• Sections 48 to 55 of the Amerindian Act</li> </ul>
Explosives	<ul style="list-style-type: none"> <li>• Explosives Act and Regulations 65:03</li> </ul>
River Travel/use	<ul style="list-style-type: none"> <li>• Blasting operations Act and regulations 65:03</li> <li>• River Navigation Act and Regulations</li> </ul>
Taxes	<ul style="list-style-type: none"> <li>• Tax Act 80:01</li> <li>• State Land Act 65:01</li> <li>• Gold Board Act 1981</li> <li>• Income Tax Act 81:02</li> <li>• Corporation Act 81:03</li> <li>• Property Tax Act 82:21</li> <li>• Customs Act 82:01</li> <li>• Industries Aid and Encouragement Act 95:01</li> </ul>

The Guyana Gold Board Act is an important legal requirement for gold mining at this stage as it governs the sale and movement of gold. Under the act the Guyana Gold Board and Licensed Gold Dealers are the only legal places at which gold can be bought or sold in Guyana. Many small and medium scale miners will decide where to sell their gold based on price and personal preference.

The requirements for the occupational health and safety and the code of practice for safety in mining are also more applicable at this stage of the mining cycle.

## 3.3 Social and environmental impacts



This section identifies the potential social and environmental impacts a community may experience during mine operation. Ideas for monitoring, mitigation and community input are included.

### **What are the potential environmental impacts?**

The location and type of mine will determine the severity and impact the mine will have on the community. The small and medium scale mines are different from the large scale mining by size and the chemicals that they are allowed to use in the mining process. Large scale gold mining companies are not allowed to use mercury in their recovery methods.

There are several impacts which a community may have to deal with and may include:

#### **Potential impacts:**

- Impacts on traditional and non-traditional land use
- Impacts on water flows and quality
- Impact on fish and wildlife
- Impact on air quality

#### **Mitigation:**

- Identification of traditional areas and agreements on reduced impacts
- Water quality monitoring
- Restriction of hunting and fishing zones and wildlife protection
- Dust reduction measures



Potential Environmental Impacts		
TYPE	CONDITION	MITIGATION
Land Use	<p>Land disturbance from mining activities, excavations in the mine and waste rock storage.</p> <p>Tailings waste, tailings dams and mining pits.</p> <p>Soil Erosion due to land clearing and hydraulic mining.</p> <p>Extensive land disturbance from placer mines and hydraulic operations.</p>	<p>Minimise the mining footprint by using good planning and community input.</p> <p>Design and operate within the specifications established by the GGMC.</p> <p>Use planning to minimise land disturbance.</p> <p>Create water channels to control runoff.</p> <p>Manage the number of dredges allowed to mine in a particular area.</p>
Air Quality	<p>Dust from roads and mining activities.</p>	<p>Water roads to minimise dust emissions.</p> <p>Reduce vehicle speeds on dusty roads.</p> <p>Follow approved EIA requirements.</p>
Water Quality	<p>Chemicals in water discharge, tailings discharged in rivers, erosion, rerouting of water courses, and mercury in fish.</p>	<p>Follow limits of turbidity discharge and tailings discharge.</p> <p>Maintain settling and tailings ponds within required specifications.</p> <p>Dispose of effluent in keeping with regulations.</p> <p>Dispose of chemical, petroleum products and poisonous substances in keeping with established code of practice and regulations.</p>

		<p>Restore water courses in keeping with regulations.</p> <p>Use an approved retort and properly handle mercury.</p>
Biodiversity	<p>Animals attracted to garbage, food and waste</p> <p>Overhunting of animals and overfishing to supply camps.</p> <p>Biodiversity in area affected by increased human activity, increased human animal conflicts.</p> <p>Valuable/ endangered plant/animal species destroyed during mine construction.</p>	<p>Use effective waste management programs and dispose of garbage properly.</p> <p>Work with local communities to establish limits for supply.</p> <p>Reduce dependence on local game for food supply.</p> <p>Educate employees to understand their environmental responsibility for wildlife.</p> <p>Use EIA to understand biodiversity of the area.</p> <p>Use EIA to understand biodiversity of the area. Work with local conservation organisations to manage impact.</p>

### What environmental monitoring is required?

The purpose of monitoring is to measure and evaluate the impacts of the operation in comparison to the baseline conditions collected during the exploration stage. The companies and the GGMC will continually monitor the mining operation to ensure that it is in keeping with the regulations and to identify where and when changes are occurring. Once the changes are identified the company, in keeping with its environmental plan, must take the necessary steps to reduce the impact and to prevent any long term damage to the environment. In some cases the GGMC may order the company to stop mining until the problem has been addressed and impact has been corrected. Some changes are noticed easily while others may take a longer time to

show up in the environment. The mining company and the GGMC will, throughout the operation, monitor several aspects including:

- Waste water/effluent discharge
- Wildlife
- Air quality
- Water quality
- Fish and fish habitat

### **What are the potential social impacts?**

Developments such as mining often bring a lot of new influences into a community, this coupled with an increase in employment and money can have a significant social impact on communities. Communities need to understand and identify the risks early in order to reduce the negative impacts and maximize the benefits they can gain.

<b>SOCIAL IMPACTS</b>			
	<b>Type</b>	<b>Positive and negative impacts</b>	<b>Community response</b>
Social	More employment with the mine/ shift work/ rotational work	<p>More regular income generated.</p> <p>Less time spent on family and traditional activities.</p> <p>Long periods of separation from family and community structure.</p> <p>Increase in the number of single parent households.</p> <p>Loss of culture due to community members being away in the “goldfields” and cannot pass on traditional knowledge.</p> <p>Community members change their “attitude” to village life on their return from mining.</p>	<p>Community needs to look at scheduling activities for when members are available to work.</p> <p>Community and resident family support has to be strengthened.</p> <p>Promote more activities for interaction between younger community members and elders.</p> <p>Host cultural days and other activities to promote traditional ways and methods.</p>
Economic	Community partnerships and alliances developed.	<p>Increased business opportunities, New businesses and services developed.</p> <p>More training opportunities.</p> <p>More money circulating in the community.</p> <p>Community has more money to spend on community development projects.</p> <p>Some businesses promote negative attitudes.</p>	<p>Manage and monitor the establishment of businesses in or near the community.</p>

	<p>Increased employment and more personal income.</p>	<p>Increased training and skill development Increased indirect employment for non-mining community members.</p> <p>Improvements of houses and infrastructure in the community.</p> <p>Creates positive role models.</p> <p>Greater dependence on manufactured goods and less on traditional goods and methods.</p> <p>Increases the gap between employed and unemployed.</p> <p>Increased cost of living due to an increase in price and demand for goods.</p> <p>Increased school dropouts to seek employment in mining.</p> <p>Increased drug and alcohol use.</p> <p>Increased prostitution.</p> <p>Better education for children.</p> <p>Poor management of money.</p> <p>People become more greedy and selfish and more money oriented.</p>	<p>Promote traditional goods and products more within the community.</p> <p>Work with mining companies and schools to reinforce the benefits of completing school.</p> <p>Enforce community rules in relation to alcohol and drug use, work in collaboration with the police to enforce laws.</p> <p>Work with community to development a better understanding about money management and saving. Work with companies to promote savings scheme for employees.</p> <p>Promote more community activities that will reinforce cooperation.</p>
	<p>Improved access to communities and more regular</p>	<p>Reduced transportation costs.</p>	<p>Manage speed limits by use of toll gates, signs etc. to reduce vehicle accidents.</p>

	<p>transportation options</p>	<p>Reduced costs of goods.</p> <p>Additional vehicular/boat traffic passing through communities.</p> <p>Increased high speed boats disrupt traditional fishing and threaten small traditional boat traffic.</p> <p>Increased crime.</p>	<p>Establish designated boat landings for non-resident boats.</p> <p>Monitor vehicles/boats coming in and out of the community by keeping a record of transit.</p> <p>Reduce boat speeds and pay attention to fishing areas.</p> <p>Strengthen community capacity to deal with crime and improve relations with the police.</p>
	<p>Strangers in the community</p>	<p>Exposure to new cultures and people.</p> <p>Learn new skills.</p> <p>Learn negative habits.</p> <p>Increase in population.</p> <p>Strain of existing services.</p> <p>Increase in diseases.</p> <p>Greater competition for spouses within the community.</p>	<p>Community to enforce and ensure that strangers understand and comply with the rules of the village.</p> <p>Explain cultural skills and traditions to strangers in the community.</p> <p>Work with the school teachers to explain the positive and negatives influences in the community and to promote positive role models.</p> <p>Work with community members to promote positive habits.</p>

## 3.4 Community employment and other economic opportunities

This section identifies the economic and employment opportunities available to communities during mine operation. It provides information on the types of jobs and training opportunities and looks at community actions for increased economic benefits.

### What are the employment opportunities?

In Guyana many mining companies are utilizing members of Amerindian communities in their mining operations more and more, however many small and medium scale operations have expressed a preference in hiring community members to work in areas far from their homes.

Employment and training opportunities are usually the most significant benefit for a community during mine operation. As the mine goes into operation the mine may employ a few more persons from the community. The jobs in the mining industry cover a wide range and a large mining company can employ hundreds of people at one time. Some of typical jobs in the industry are:



Miners, drillers, blasters, electricians, heavy equipment operators, mechanics, welders, pipe fitters, carpenters, surveyors, environmental scientists, geologists, engineers and technicians, supervisors, safety experts, trainers, accountants, clerks, computer technicians, administrators, managers and executives, security guards, laboratory technicians, assayers, human resource specialists, public relations specialists, marketing personnel, nurses, administrative assistants, drivers, saw men, boat operators, plumbers, cleaners and cooks

### **Recruitment**

Companies will have standards for the recruitment of employees. They will conduct interviews and make sure that potential employees pass pre-employment medical and security checks (police clearance). The company will sometimes work with the community to also help potential employees learn and understand the interview process. In some cases the larger companies may look for employees within the nearby communities first before expanding their search to other areas.

Once employed the community member will earn significantly more money than in many other sectors in Guyana. In some cases employees start out at one level and through training and in-house development are elevated to higher paying positions.

### **On the job training opportunities**

There are many training opportunities for mine employees and contractors during the operation phase. All new employees receive orientation training that usually includes an introduction to the company's vision and mission, safety practices, rules of behavior and information about the site facilities and services.

Some positions will require job specific training. Training on equipment and procedures is provided when the employee starts. This allows for them to work safely and efficiently. This type of training is often administered in one-on-one sessions. Mining companies also engage in cross training, that is where an employee is taught to do more than one job. This ensures that if one person is absent someone else can fill in where it is more critical. In addition apprentice employees in technical fields are often taught advanced technical skills by working with more experienced employees.



### **What are the other economic opportunities?**

Communities can get significant economic opportunities during mine operation. The main benefits come from increased employment, business opportunities and community infrastructure. Opportunities increase for community businesses that already exist and previously provided services during the development and exploration stage. During mine operation there is additionally opportunity to make more money. This is largely due to the fact that the mine tends to be in operation for a longer time than it takes to develop, so many community businesses get longer term contracts.

In order for communities to realise the full potential of the business opportunities that are available to them they have to develop a plan for the businesses, they can do so answering questions like:

- What are the businesses currently available?
- What are the businesses required?
- What are the capabilities of our community?
- Are there companies we can partner with?

The communities can also discuss options with the mining company to ensure that they are considered. While there may be plenty potential opportunities, the mining companies can only work with reliable service providers and guaranteed supplies.

The communities can also seek to get the mining company to break up tenders into smaller parcels in order to ensure that more opportunities are provided for communities. There are several opportunities that will be available to prepared communities, either as joint ventures or as wholly owned businesses. Some of these opportunities include:

- Catering
- Housekeeping
- Environmental monitoring
- Surveying
- Airstrip/road/ wharf maintenance
- Transportation services
- Local material supply
- Vegetable supply

## Community experience

### How can communities maximize economic opportunity?

Communities can increase the amount and type of opportunities available to them by:

- Hiring a professional business manager to maximise their benefits from a project. These skills may be available with the community or they may have to hire someone from outside.
- Developing their own businesses and training capacity.
- Initiating discussions with the mining company at the earliest possible stages.
- Conducting an inventory of community capacity and skills.
- Partnering with other communities and businesses.

### Mine operation experience: Omai and the provision of medical services

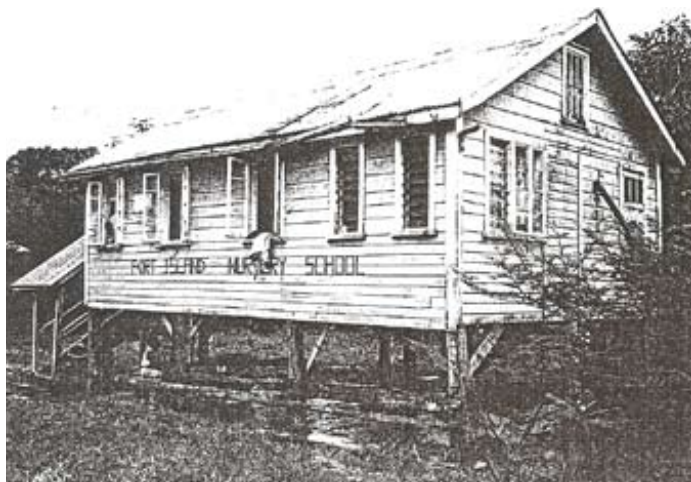
Omai Gold Mines Limited was set up in 1991 and was the first large scale modern gold mine in Guyana. The experiences learnt in dealing with Omai have been applied and implemented in the creation of several pieces of legislation which currently govern the mining industry in Guyana. In particular the 1995 tailings spill was the primary catalyst for the creation of the Environmental Protection Agency and the supporting environmental protection legislation. The mine at the time of its operation was one of the largest open pit mines in the world and was owned by a Canadian company and the Government of Guyana. The company at the time was the largest employer in the gold mining sector and was very influential in the nearby communities on the Essequibo River. The mine site was not located on any Amerindian land and the company

employed persons from across the country.



The company, with more than 300 employees, had implemented a comprehensive medical scheme at the site to cater for any work related accident. There were soon requests from the nearby communities in the Essequibo River and from the communities of Micobie, Rockstone and Mabura areas. The company initially

agreed to assist communities with the request on an as is basis, in addition the company facilitated emergency medivac where there were emergencies. This however led to a realisation of a larger need for medical care in the nearby communities and the company expanded into medical outreaches to the nearby village. As work on the site continued and the relationship with the nearby communities grew stronger Omai undertook the construction of four medical centres.



The health facilities in the nearby communities were in a poor state and lacked the basic facilities and medicines, the company agreed with the community leaders that one of the more long lasting contributions that they could make was the upgrading and construction of the health facilities. The centres were constructed at Rockstone, Alikj, Agatash and Fort Island. Omai Gold Mines Limited continued to support the centres with medical personnel and drugs until the mines closed and the management of the centres were taken over by the Ministry of Health.

In addition to the medical outreach in the communities the company also constructed the Riversview School and supported the Bartica School.



# 4 Mine Closure



## 4.1 Overview

This section defines mine closure and describes the reasons why all mines eventually close. It also explains the necessary role of mine closure and reclamation plans. The primary mine closure activities and players are identified along with opportunities for community development including mine rehabilitation and monitoring.

### **What is mine closure?**

Mine closure is the last phase in the mining cycle. All minerals, regardless of how large a mine or deposit, will eventually run out. Mining is considered a temporary use of land and at the end of the cycle the mine has to be closed.

### **Mines close for different reasons but the two most common are:**

- Running out of ore
- Low commodity or metal prices, which make the mine uneconomic to operate

Closure has to be done according to the acceptable and defined regulations which outline safety and environmental responsibility. After mining, an area has to be restored to a usable state which can see the regeneration of vegetation and become compatible with human activities and a healthy environment.

While closure is the final phase in the mining cycle, planning for the closure of the mine begins at the mine development stage. The GGMC requires mines to present a closure and reclamation plan before the mining license/permit/claim can be issued. Mine closure is usually one of the most regulated aspects of mining. There is a great deal of concern about what will be left behind, the clean-up and restoration and long term effects.

### **Time frames**

The time needed for mine closure depends on several factors including the type of mine, the size of the mine, the extraction method and the severity of the mine's impact on the environment. Most of these issues are detailed in the mine closure and restoration plan, however additional public concerns at the time of closure may warrant additional effort and time to address.

Mine closure normally takes between two to ten years and may take even longer if longer term monitoring or treatment is needed.

### **What is a mine closure and reclamation plan?**

Planning for mine closure can start as early as the exploration stage, with the collection of early baseline data. During the mine development stage a detailed plan is prepared in conjunction with the environmental impact study (large scale mining only) and is made available for public scrutiny. Under the mining regulations medium scale mining operations must lodge an environmental bond and have a reclamation and

closure plan; large scale operations are required to have a closure and reclamation plan; while small scale operations and river claims must lodge an environmental bond and comply with a cleanup plan issued by the GGMC. This bond is kept, and not released, until the company completes the clean up and closure in according to the requirements.

The mine closure and reclamation plans have to be approved prior to the issuing of a mining claim/permit/ license. This has to be completed and approved before any work can start at the mine development stage.

A mine closure and reclamation plan is designed to suit each specific mine and it is highly unlikely to find two that are alike. The plan looks at the operation and the environment and details the steps that will be taken by the company, after mining, to restore the area to as close as possible to its original pre-mining state.





Mine closure and reclamation involves several aspects that have to be considered when developing the mine. Some of these include:

- Roads and airstrips.
- Buildings and other structures.
- Wharves.
- Tailings disposal and disposal facilities.
- Waste rock management and open pits.
- Chemical and petroleum storage.
- Mine and mine site drainage.
- Mine workings.
- Mine shaft, passage ways, pits and openings.
- Site water quality and water discharged from the site.
- Recycling and disposal of materials.
- Backfilling.
- Re-vegetation.

**A mine closure and reclamation plan should also:**

- Indicate how reclamation of the site will occur during the life of the operation.
- Provide cost estimates to close and reclaim the mine.
- Prepare an emergency and contingency plan.
- Develop a plan for post-closure monitoring.
- Ensure that the site is left in a condition that is as close to the original pre-exploration state as possible.



While the GGMC allows mining companies to design their own mine closure and reclamation plan, all are guided by a code of practice which sets out the following requirements:

- Backfilling of placer mine pits where applicable.
- Sealing or capping of shafts at closed underground mines in accordance with the code of practice or directions of an appropriate authority at the commission.
- Stripping and stockpiling topsoil for use in reclamation.
- Replacement of topsoil and vegetation of disturbed lands.
- Restoration of water course where appropriate.

### **What are the mine closure activities?**

#### **Shut down**

When all production has stopped, employees are laid off in a phased way leading up to the shut down. A small labour force is kept on to permanently shut down the equipment. The mine closure plan will indicate what types of skills are needed to shut down and demobilize equipment. The GGMC and other stakeholders are informed ahead of time about the shut down and the mine owner will carry out a final review with the government on the mine closure plan. At this time some changes to the plan may be effected.



### **Decommissioning**

Decommissioning follows mine shut down. Small crews or contracting firm will dismantle processing facilities and equipment. This decommissioning includes:

- Draining and removal of all the fluids and oils from equipment and site.
- Removal, recycling or recovery of saleable equipment and parts.
- Clean up and dismantling of buildings.
- Waste removal and disposal.
- Backfilling and sealing of shafts and pits.

### **Reclamation**

Reclamation is the process of restoring disturbed land to as close as possible to its original condition once mining is completed. The process of reclamation can occur either during the life of the mine (progressive reclamation) or after the mine has closed (reclamation). All mine sites must be reclaimed and restored in accordance with the requirements of the Guyana Geology and Mines Commission and the Environmental Protection Agency. This typically involves a number of activities including replanting of vegetation, backfilling, draining of ponds, reshaping the land and reducing man made slopes. Reclamation is done according to the plan approved prior to the granting of the mining license. In the case of the small scale operation the reclamation and clean up is done in accordance with the checklist provided by the GGMC. These processes are monitored by the environmental division of the GGMC.

### **Post closure**

Environmental activities continue long after a company has finished mining an area. The owner is obligated under the terms of his license to restore the land and monitor the post closure environmental impact for a specific period of time or until the effects of the operations have been addressed successfully. Some mines may require longer periods of monitoring and maintenance after closure. This includes mines where:

- Mine tailings and discharge waters need to be held and treated.
- Tailings ponds need to be monitored and maintained.
- Reclamation and remediation technologies need to be monitored.

### **Who are the main players in mine closure?**

#### **Mining companies**

The mining company is responsible for full and proper environmental closure and reclamation of the mine operation once mining stops. The company has to implement the closure plan, decommission activities and monitor closure activities. Once the reclamation is completed the environmental bond lodged with the GGMC is returned to the company.

#### **Government**

The Guyana Geology and Mines Commission and the Environmental Protection Agency are the two main government entities that are responsible for ensuring that the mining company properly executes the closure and reclamation plan in keeping with the regulations. The GGMC maintains an environmental bond which is not returned to the company unless the mine site has been properly closed and restored.

#### **Communities**

Communities are involved throughout the mining cycle and should be aware and familiar with the mine closure and reclamation plan. The community members affected by mine closure include the employees, their families, suppliers and business owners.

#### **Others**

Consulting firms, service providers and non-governmental organizations may also play a role in mine closure.

### **How can Amerindian communities get involved in mine closure?**

Although the community will know in advance of the mine closure is it still an emotional and difficult time for communities that were affected by the mine. Communities can manage the impact of the mine closure by planning in advance and discussing options with the mining company. There are still some opportunities available for the community including a few jobs, monitoring and maintenance. In addition the community can plan how they can use their acquired skills and diversify the businesses developed.

## 4.2 Acts and regulations



This section identifies the responsibilities and regulatory aspects associated with mine closure.

### **Who governs mine closure?**

#### **Liability**

The license holder is responsible for mine closure and reclamation. The company must conduct closure and restoration according to the agreements signed with the GGMC. For the large companies a detailed mine closure and restoration plan is developed during the Environmental Impact Assessment, while the medium scale companies are bound by the Environmental Management Plans signed with the GGMC. The small scale operation is also responsible for the reclamation and restoration of their area in keeping with the guidelines set out by the GGMC. All scales of operation including river dredges must lodge an environmental bond in addition to these requirements. The GGMC has established an Environmental Division which has the mission to promote the development of the mining industry with integral environmental protection.

### What are the conditions for mine closure?

The mine must decommission its operation in keeping with the submitted mine closure and reclamation plan. This plan governs how the company must leave the site once it has completed the operation and sets out how monitoring and maintenance will be done. The main aim here is to ensure that the site is restored to as close as possible to its original pre-exploration stage and to ensure that the lands do not pose an environmental, health or safety hazard.

<b>Acts and regulations that govern mine closure</b>	
General	<ul style="list-style-type: none"> <li>• The Mining Act 1989</li> <li>• Mining Regulations</li> <li>• Geology and Mines Commission Act 1979</li> </ul>
Health and Safety	<ul style="list-style-type: none"> <li>• Regulations under the Occupational Safety and Health Act 1997</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Environmental Protection Act 1996</li> <li>• Mining Amendment regulations 3005 for environmental management                             <ul style="list-style-type: none"> <li>• Part XIV Regulations 127-137: Use of poisonous Substances</li> <li>• Part XIV, Regulations 216 to 229 requirements for Environmental Management for Large and Medium scale mining</li> <li>• Part XXV, Regulations 230 to 239, Requirements for Environmental Management for Small Scale Mining on Claims and River Locations.</li> <li>• Part XXVI, Regulations 240 to 250 General Requirements</li> <li>• Part XXVII, Regulation 251, Protected Areas</li> <li>• Part XXVIII Regulation 252 Pollution Control</li> <li>• Part XXIX, Regulations 253 to 260, Offences and Penalties.</li> </ul> </li> </ul>
Amerindian Rights	<ul style="list-style-type: none"> <li>• Sections 48 to 55 of the Amerindian Act</li> </ul>
River Travel/use	<ul style="list-style-type: none"> <li>• River Navigation Act and Regulations</li> </ul>
Taxes	<ul style="list-style-type: none"> <li>• Tax Act 80:01</li> <li>• Gold Board Act 1981</li> <li>• Income Tax Act 81:02</li> <li>• Corporation Act 81:03</li> <li>• Property Tax Act 82:21</li> <li>• Customs Act 82:01</li> </ul>

## 4.3 Environmental and social impacts

This section identifies the potential environmental and social impacts a community may experience during mine closure. Ideas for environmental monitoring, mitigation, and community input and response are included.

### What are the potential environmental impacts?

The closure of a mine is the end of the mining cycle and the impact created at this stage is significantly less. Planning for the closure reduces the impact at the end of the operation. The main impacts are:

Environmental Impacts		
Type	Condition	Mitigation
Land use	Long term stability of waste rock piles and mining slopes.	Needs to be monitored until piles are stable.
	Mining pits left open.	Backfill mining pits.
	Tailings containment structures.	Monitor and maintain structures.
Water quality	Tailings discharged into rivers.	Treat tailings to reduce turbidity and chemical toxicity Monitor tailings discharge.

### **What environmental monitoring is required?**

#### **Monitoring plans**

A monitoring program is used to assess the effectiveness of the reclamation and mitigation measures after mine closure. This is usually done by the GGMC and the mining company, to ensure compliance with the closure plan and regulations. At some sites a committee made up of the Government, the mining company and local communities may be established to monitor progress.

### **What are orphaned/ abandoned mines?**

The owner of a mine is responsible for reclamation of a mine site, however if the owner neglects this responsibility the mine is called abandoned or orphaned. The GGMC will in turn forfeit the bond lodged for the area and record the name and particulars of the defaulting company or individual. This in turn will influence the issuing of future permissions for exploration and mining to the defaulter. The GGMC has put in place strong regulations and mechanisms to prevent the orphaning of mine sites, however there are several older mines which were abandoned before the enactment of the new regulations. Ultimately the GGMC is responsible for all abandoned and orphaned mines.

### **What are the potential social impacts?**

The most critical impact that mine closure has on a community is the loss of jobs and the reduction in the amount of money that flows through the community. It also has direct and indirect impacts on local businesses and the supply, demand and sale of goods and services. In many cases mine closure is followed by a migration of businesses from an area and a drastic reduction in business opportunities available for community members.

Communities can prepare for this inevitable stage in the mining cycle. Careful planning and a good understanding of when the mine closure will occur can allow communities to prepare for the impact of closure. Mine closure has the potential to have the longest lasting social impact on a community.

Social Impacts			
	Type	Positive and negative effects	Community response
Social	<p>Decrease in community capacity</p> <p>Newly acquired habits from the mining employment period not in keeping with community value</p> <p>Migration of community workers in search of new opportunities</p>	<p>Loss of social services</p> <p>Community members have a difficult time readjusting to community life</p>	<p>Need to get new sources for resources and capacity</p> <p>Work with community members involved with mining to keep them informed about community life prior to mine closure.</p>
Economic	<p>Loss of employment</p> <p>Reduction in demand for services and businesses</p> <p>Community members better equipped to find new jobs.</p>	<p>Reduction in income</p> <p>Unused skills</p> <p>Excess and unused business and service capacity</p> <p>Less money to support employment lifestyle</p>	<p>Examine and diversify into new economic opportunities.</p>
Cultural	<p>End of employment phase</p>	<p>Return to traditional skills</p>	<p>Teach skills to members with the help of elders</p>

Communities can work with the mining company to reduce the negative impacts of mine closure by:

- Building community capacity to manage opportunities and impacts.
- Providing training and competency development.
- Developing alternative and secondary industries.

This planning process can start during the mine development stage of the mining cycle.

## 4.4 Community and other economic opportunities



This section identifies the employment and economic opportunities during mine closure. It also includes information on re training opportunities.

### **What are the employment opportunities?**

Only a small number of jobs are available at this stage of the mining cycle. The work involved in mine closure provides specialized business and employment opportunities that can often be applied to other mine sites. Some of the main jobs available are:

- Trades personnel - to dismantle equipment.
- Equipment operators and mechanics - to complete the backfilling and other works necessary for reclamation.
- Inspectors/environmental monitors - to inspect sample and audit the closure activities as part of the closure and reclamation plan.
- Security and first aid personnel - these are necessary to secure the area and ensure that the reclamation and closure process is completed safely.



Contractors are the main employers for these activities. In most cases arrangements are made to hire local qualified personnel for decommissioning and reclamation activities. A small number of employees may be kept on to supervise and assist in these activities.

### **What are the other economic opportunities?**

The economic opportunities available at this stage are quite limited in comparison to the mine development and operation stages. The communities by this time may have developed the expertise in providing services or have developed a vibrant supply business which can be marketed to other companies. Communities will need to diversify and use innovation and creativity in order to make use of the limited economic opportunities during this phase.

#### **Business opportunities related to closure activities include:**

- Reclamation of the site
- Replanting of trees and other local vegetation
- Establishing drainage systems
- Water sampling and analysis
- Possible ongoing water treatment
- Dismantling transmission lines
- Site security

The skills required for this work would have been gained during mine development and operation phases. Communities however have to look beyond the closure of the mine for additional economic opportunities and growth. The communities have to plan ahead and be prepared to change or modify the business types or service that they can offer. Many of the skills developed during partnership with the mining company can be used to develop other areas such as tourism, agriculture, manufacturing or other activities. The community skill base will determine how they deal effectively with the mine closure and make the most of the opportunities.

# Community experience

### **Mine closure at Omai.**

Omai Gold Mines Limited was set up in 1991 and was the first large scale modern gold mine in Guyana. The experiences learnt in dealing with Omai have been applied and implemented in the creation of several pieces of legislation which currently govern the mining industry in Guyana. The mine at the time of its operation was one of the largest open pit mines in the world and was owned by a Canadian company and the Government of Guyana. The company at the time was the largest employer in the gold mining sector and was very influential in the nearby communities on the Essequibo River. The mine site was not located on any Amerindian land and the company employed persons from across the country.

The original Omai closure plan had envisioned a “return to nature” situation, however in discussion with the Government of Guyana the company was asked not to dismantle several structures which could possibly be used for other purposes. Specifically the company was asked to keep the river ramps, barge, airstrip, power lines, buildings and telecommunication systems. The company complied and proceeded to dismantle and secure the other parts of the operations.

The closure of the mine had a significant impact nationally and on the nearby communities. The company was one of the largest employers and now most employees were released. The closure plan had however ensured that the workers left with compensation package and skills to find additional employment both within Guyana and beyond.

At the time of its closure Omai had already etched itself into the legacy of the nearby communities through its support for medical treatment and care and school upgrading, however the most significant impact had to be the construction and maintenance of the Linden to Mabura road which has allowed for the expansion and upgrading of the road currently being used to connect Linden to Lethem.

The company in the early part of its operation was the main user of the roadway but by the time the operation was looking to wind down other users made up the majority. The connection it provided to the interior of Guyana was significant; the journey from Lethem to Linden is now far more accessible. The road has now become the primary gateway to the interior and a lifeline for the majority of mining communities.



## Glossary

### **Assay**

A chemical test performed on a sample of ore or mineral to determine its components.

### **Bankable Feasibility**

A comprehensive analysis of a project's economics used by the banking industry for financing purposes.

### **Bond**

A written agreement by which a mining company insures it will pay a certain sum of money if it does not perform certain duties properly, such as reclamation.

### **Bulk Sampling**

Removing mineralized rock in large quantities (frequently involving hundreds of tonnes) in order to do mineral processing tests.

### **Capital Costs**

Capital costs usually involve equipment and physical plant costs, not consumable supplies.

### **Commodity**

Physical substances, such as metals, that can be sold or exchanged in a marketplace.

### **Consultation**

A meeting for deliberation, discussion, or decision.

### **Diversity**

The act of making more varied.

### **Feasibility**

The analysis that determines whether or not a mine would pay for itself and bring economic benefits.

### **Impact and Benefits Agreement (IBA)**

A contractual agreement, usually between an Aboriginal community or entity and a mining company.

**Infrastructure**

The basic facilities, equipment, roads and installations needed for the functioning of a system, like a mine.

**Joint Venture (JV)**

A partnership or conglomerate often formed to share risk or expertise in relation to a particular project.

**Jurisdiction**

The range of authority or control

**Legacy**

Something handed down from an ancestor or a predecessor or from the past.

**Memorandum of Understanding (MOU)**

A way of creating an understanding between a community and a mining or exploration company. The MOU defines principles for working together for mutual benefit.

**Metallurgical**

Related to the process of extracting metals from their ores.

**Mitigation**

The action of lessening in severity or intensity.

**Monitor**

To keep close watch over; supervise.

**Option**

An agreement to purchase a property reached between the property vendor and some other party that wishes to explore the property further.

**Ore**

The naturally occurring material (rock) from which a mineral or minerals can be extracted at a profit.

**Orebody**

A mineralized mass whose characteristics and economic limits have been examined.

**Reclamation**

Restoration of mined land to original shape, use or condition.

**Rehabilitate**

Process used to repair the impacts of mining on the environment.

**Repository**

A place where things may be put for safekeeping.

**Saleable**

Capable of being sold, fit for sale.

**Shareholder**

One who owns shares (certificates representing units of ownership) of stock in a corporation.

**Smelter**

Where ores are processed (using heat) to produce metals.

**Stakeholder**

Any party that has an interest (“stake”) in a project.

**Survey Grid**

A pattern of regularly spaced horizontal and vertical lines forming squares on a map, a chart, an aerial photograph, or an optical device, used as a reference for locating points.

**Sustainability**

Capacity for being continued.

**Tailings**

Material rejected from a mill/ dredge after most of the valuable minerals have been extracted.

**Turbidity**

Having sediment or foreign particles stirred up or suspended; muddy.

**Waste**

Any substance that is useless or worthless.

**Waste Rock**

Barren rock or mineralized material that is too low in grade to be economically processed.

# Appendix 1

**Table of rentals**

Mineral Property / Licence type	\$/ acre /annum
Prospecting Licence	US \$0.50 for 1st year US \$0.60 for 2nd year US \$1.00 for 3rd year US \$1.50 for 4th year US \$2.00 for 5th year US \$3.00 for over 5 years
Mining Licence	US \$5 (foreign ownership) US \$3 (local ownership)
Prospecting Permit (medium scale)	US \$0.25 for 1st year US \$0.35 for 2nd year US \$0.45 for 3rd year Thereafter, an additional US\$0.10 per acre for each successive year
Prospecting Permit (small scale)	G \$500
Mining Permit	US \$1
Claim Licence to mine for gold and precious stones.	G \$1,000
Claim Licence to mine for valuable minerals.	G \$1,000
River Location Licence	G \$2,000
Business Permission	G \$10,000
Residential Permission	G \$1,000
Goldsmith’s Licence	G \$10,000
Trading Licence	G \$15,000



## Resources for reference

### Laws of Guyana

Environmental Protection Act of 1996 - Act No. 11 of 1996

Mining Act of 1989 – Act No. 20 of 1989

Amerindian Act 2006- Act No. 6 Of 2006

### Guyana Geology and Mines Publications

Guyana Geology and Mines Commission. GGMC Mining Supplement January 2010

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Livan, Karen. Regulation of Mining in Guyana. November 2009

[www.ggmc.gov.gy](http://www.ggmc.gov.gy)

### Other resources

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CreateSpace: 2011

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Micobie Village  
Campbelltown Village  
Agatash Village  
Itaballi Village  
Sandhills Village  
Coomacka Village  
Ituni  
Great Falls  
58 Miles Mabura  
Old England  
Mallali  
Linden  
Rockstone  
Butucari  
Butuba  
Maruranau Village  
Shea Village  
Achawib Village  
Aishalton Village  
Awarewaunau  
Kartabo Village  
Batavia  
Mid-Mazaruni Issano  
Kartabo Point  
Waikebi Village  
Santa Rosa  
Kwebanna  
Warapoka  
Karran Village  
Riversview Village  
Karaudarnau Village

### Companies and Individuals

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