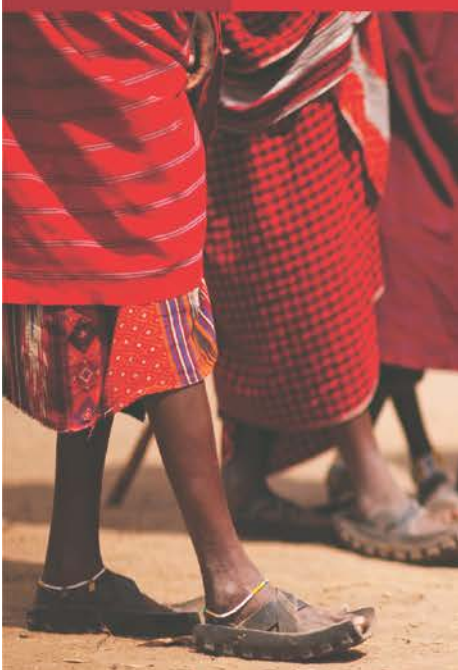


DIGBY WELLS
ENVIRONMENTAL



ESIA Update for the New Liberty Gold Mine in Liberia: ESHS submission and update of specialist reports; March 2014

Environmental and Social Impact Assessment

Project Number:

AUR2025

Prepared for:

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EXECUTIVE SUMMARY

The New Liberty Gold Mine (NLGM) in Liberia is currently under construction. There have been two Environmental and Social Impact Assessments (ESIAs) reports submitted, and approved, for this project. The first by Golder Associates in 2012 and the ESIA update by Digby Wells Environmental in 2013.

The mine and infrastructure plans have been updated and refined and this ESIA update addresses a number of issues for which more detailed planning has been performed and to ensure that the plans presented do correspond to the actual activities which are occurring on site and the management plans proposed. A number of management plans have now been compiled and have been incorporated into an Environmental, Social, Health and Safety (ESHS) System.

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² Bea Mountain mining license area in Liberia. The project will consist of the construction of an open pit, a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads.

Following a review of the ESIA by the IFC, a request was made by them for the compilation of additional management plans to define how the impacts identified in the ESIA would be managed. Digby Wells Environmental have thus compiled the following management plans which form part of the ESHS document:

- A Solid and Liquid Waste Management Plan
- A Hazardous Materials Management Plan
- An Erosion Control and Re-vegetation Management Plan
- A Footprint Management Plan
- A Biodiversity Management Plan
- A Non-compliance / Corrective Action Procedure
- A Pollution Prevention Plan
- A Cyanide and Arsenic Water Management Plan
- An Environmental Compliance Monitoring Plan
- An Emergency Response Management Plan
- A Transportation Management Plan
- A Security Management Plan
- A Labour Management Plan
- A Contractor Management Plan

In addition to these management plans the following reports have been updated:-

- The Resettlement Action Plan
- The Community Development Plan
- The Stakeholder Engagement Plan
- The Integrated Water Management Plan

In addition to the above mentioned plans and reports, Aureus also included a number of their Standard Operating Procedures and guideline documents which apply to the project in the ESHS System.

These documents serve to update and give more clarity to the ESIA submitted in 2013 by Digby Wells Environmental. The 2013 ESIA discusses the mine plans as they currently are presented and approved. It was decided not to amend the ESIA of 2013 as it is an approved document and to do so would trigger another submission and approval process. Rather the ESHS System and management plans compliment that approved ESIA.

Attached to the ESHS System are the current permit conditions from the EPA of Liberia. This deals with the approval of the ESIA of 2013 and details the management and monitoring commitments required from NLGM.

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Appendix A: Environmental and Social Management System

1 Introduction

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area. The project will consist of the construction of an open pit mine, a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads. The current Life of Mine (LoM) is calculated to be 8 years with an ore production and treatment rate of approximately 3,000 tonnes per day. It is possible that the LoM will be extended as further exploration activities take place within the greater license area and the possibility of an underground mine is examined.

The proposed New Liberty Gold Mine (NLGM) will be situated in the Grand Cape Mount County of Liberia, approximately 90 km northwest of the capital, Monrovia. Land access to the area is achieved via 100 kilometres of tarred road and 21 kilometres of laterite road from Monrovia. The Marvov Creek runs through the proposed project area and is part of the Mafa River System. Sinjé is the largest nearby town to the project, which is located approximately 30 km south of the NLGM. Communities that will be directly affected by the project include the communities of Kinjor and Larjor.

2 Environmental and Social Impact Assessment Update

An Environmental Impact Assessment (EIA), in the form of an Environmental Impact Statement (EIS), was undertaken from Q4 2010 to Q2 2012 by Golder Associates (Ghana) Ltd (Golder). As part of the EIA the local environmental and social situation existing prior to the development of the Project was investigated and the likely positive and negative impacts of the Project were determined. The timing, extent, intensity and cumulative effects of these impacts were investigated. The EIS also identified the necessary management measures required to mitigate the identified impacts. These formed the basis of the Environmental Management Plan (EMP).

Subsequent to the compilation of the EIS and EMP, Digby Wells Environmental (Digby Wells) compiled a Resettlement Action Plan (RAP) and accompanying Community Development Plan (CDP) for the Project during 2012/2013.

The EIS compiled by Golder was submitted and approved by the Liberian Environmental Protection Agency in October 2012 and the RAP and CDP were approved in March 2013.

Aureus finalised an optimised Definitive Feasibility Study (DFS) during Q1 2013. The focus of the optimisation work was on the layout of the plant, mine design and the location of site infrastructure, and it also addressed risks from design, operational and environmental perspectives. The work conducted improved the project in terms of mining and plant designs and the layout of the WRD, TSF and plant. The optimisation study determined that the location of the TSF, WRD, mine village and plant would be better suited in new locations all within the area permitted for mining. The outcome of the DFS assessment and the benefits for NLGM include the following:

- New location of the TSF – original location was north of the open pit and now is located south of the pit. As a result, pumping distance has been reduced; there is a reduced risk of TSF failure and the TSF slurry pipeline does not cross the creek diversion, reducing the risk of contamination of the Marvov Creek;
- New 'wrap around' Waste Rock Dump (WRD) design reducing the height of the dumps as well as the distance and time for haulage of waste rock, thus resulting in a cost saving for NLGM and protection of the pit from surface water ingress;
- Reduction in pumping costs from the plant to the TSF as a result of the plant being located adjacent to the TSF; and
- Mine camp located closer to the plant resulting in a reduction in travel time in the event of an emergency (reduction from approximately 5 km to 3 km).

Based on the optimisation work and independent review, Digby Wells was appointed by Aureus to undertake the additional specialist studies and update the ESIA for submission to the Liberian EPA. The 2013 ESIA report presented the detailed specialist studies in the areas of changed infrastructure positions to establish baseline conditions, updated information with respect to the mine plan, integrated impact assessment and EMP for the NLGM. The updated ESIA was submitted to the Liberian EPA, as per the Mining Development Agreement (MDA) between Aureus and the Liberian Government in order for Aureus to continue construction and operation of the NLGM. The report was approved in 2013.

In addition to meet compliance with Liberian Legislation, Aureus, based on the project finance requirements, are required to adhere to the Equator Principles. In line with these principles, observance to the International Finance Corporation (IFC) Performance Standards and the World Bank Group Environmental, Health and Safety (EHS) Guidelines is required and has been integrated into the work undertaken by Digby Wells.

3 Brief Project Description

The proposed NLGM open pit will comprise three adjacent and interconnecting pits. The ore reserve at New Liberty is located within 220 meters of surface and is extractable by open pit mining methods.

A steady state mining rate is planned, after the initial period of waste pre-stripping, with an annualised plant feed rate of 1.1 Mt. The annual waste mining rate is 25.9 Mt for the first 4 years followed by 6.4 Mt for the last 4 years, which results in an average annual waste mining rate of 16.2 Mt over the 8 year mine life. It is planned to pre-strip an estimated 2.5 Mt of waste and 0.3 Mt of ore.

The waste material will be disposed on the WRD which wraps around the pit and also as backfill into the Larjor pit. Mining operations will use a conventional truck and shovel method.

Upon finalisation of the optimised DFS the following changes to the infrastructure layout have occurred, namely:

- Moving of the processing plant to the south;
- WRD to be located around the pit instead of being located to the south of the pit;
- TSF to move to the south of the pit;
- Marvov Creek River Diversion (MCRD) alignment change with a change in the storage dam capacity;
- The re-grading of the Daniels Town Public road (the 21 km gravel section of the road);
- Storage dam located to the north of the pit for water that will be utilised in the process operations;
- New mine camp;
- Waste Landfill area (including the location of the incinerator);
- Alignment of the NLGM access road; and
- Construction of a truck stop and an associated access road as part of the mine infrastructure.

The Project includes the following key activities and components:

- Resettlement of the Kinjor and Larjor communities (as part of the pre-construction phase);
- Open pit gold mine and associated WRD;
- Topsoil stockpiles;
- Gold processing plant, including an associated power plant;
- Water dams associated with the processing plant, mainly used for water storage purposes;
- TSF;
- Support facilities and infrastructure at the mine site, including water, waste infrastructure and storage facilities;
- Diversion Channel (DC) of the Marvov Creek;
- Staff accommodation and associated facilities such as a sewerage treatment plant;
- General waste landfill site, and an associated incinerator; for incineration of hazardous wastes;
- Power and water supply;

- Ancillary facilities and buildings, such as administrative offices, service buildings, laboratory, hydrocarbon storage, explosives storage;
- Non-paved roads and haul roads; existing and new; and
- Pollution control sumps/dams.

4 Current Project Construction

The NLGM is being constructed and a number of the infrastructure items have been installed or are in the process of being constructed. There have been some updates to the plans presented in the approved ESIA and this report seeks to update those plans and to provide more detail on the management of the project impacts.

5 Water Management

5.1 Introduction

The water management report has been updated to discuss flood and drought conditions and the effects these would have on water management at the NLGM.

Also various scenarios for arsenic and cyanide management options were modelled to give input into management plans.

5.2 Water Balance

With management systems as currently planned there will be a positive water balance with discharge being necessary in the wet season (March to November) and none during the dry months (December to February). Currently natural arsenic levels (from site visit and previous monitoring results) in the rivers are already at high levels with concentrations between 0.002 and 0.038 mg/L. The discharge of water along with potentially high arsenic levels expected is one of the project issues requiring management attention.

With an uncertainty of approximately 10%, the following conclusions are reached:

- A total mine make-up water supply demand of 87,675 m³/month should be planned for during the dry months from a water source (excluding water that will be re-used from the return water circuit);
- Dust suppression will be minimal during the wet season, with dry season dust suppression requirement being 500 m³/d or 15,000 m³/month;
- Potable water use for 550 people (this is the maximum number of people during construction phase and included for conservative maximum calculations) on site will be 46 m³/d (1,394 m³/month);
- Water volumes into the TSF from rainfall and runoff during the wet season will be approximately 873,937 m³/month (25,807 m³/d); and

- Discharge from the TSF and the tailings sump circuit is 0 m³/d during the dry months (December to March) and a maximum of 787,282 m³/month (26,243 m³/d) expected to be discharged into the surface water streams downstream of the TSF during the month of August.

The average water balance was replicated using upper and lower 95th and 90th percentile rainfall and evaporation data. The findings of these four separate water balances based on the extreme flood and drought events are shown in the table below:

Table 5-1: Water balances for flood and drought events

Month	Surface runoff and rainfall inflow into TSF from Environment (m ³ /month)				Discharge from the TSF and RWD circuit into the downstream environment (m ³ /month)			
	Upper 95th percentile	Upper 90th percentile	Lower 95th percentile	Lower 90th percentile	Upper 95th percentile	Upper 90th percentile	Lower 95th percentile	Lower 90th percentile
Jan	16 805	15 555	1 266	2 516	0	0	0	0
Feb	35 694	32 814	0	2 759	0	0	0	0
Mar	58 196	54 980	18 173	21 389	0	0	0	0
Apr	123 195	119 709	79 831	83 316	21 389	18 103	0	0
May	570 054	535 832	144 156	178 378	472 515	438 170	45 091	79 435
Jun	1 252 609	1 153 385	17 853	117 078	1 164 319	1 064 232	0	18 929
Jul	1 389 385	1 281 620	48 210	155 987	1 301 895	1 193 355	0	59 627
Aug	896 240	851 085	334 215	379 371	804 680	759 301	239 875	285 254
Sep	942 817	899 157	399 455	443 115	852 299	808 300	304 701	348 701
Oct	696 145	658 158	223 334	261 321	601 882	563 592	125 308	163 597
Nov	168 352	160 689	73 041	80 704	70 660	62 947	0	0
Dec	46 124	42 693	3 431	6 861	0	0	0	0

5.3 Arsenic Balance

All available data and test results on arsenic leachability from the tailings material and the treatment methods thereof up to date has been reviewed. The following arsenic balance scenarios were simulated:

- **Scenario A1** was simulated using all flow volumes and rates as per monitoring data and the water balance with soluble arsenic input concentrations of 1.26 mg/L;
- **Scenario A2** was simulated using all flow volumes and rates as per monitoring data and the water balance with soluble arsenic input concentrations of 0.8 mg/L;
- **Scenario A3** was simulated using all flow volumes and rates as per monitoring data and the water balance with soluble arsenic input concentrations of 0.004 mg/L; and
- **Scenario A4** was simulated to evaluate what the maximum input concentration is needed to allow IFC guidelines to be reached throughout the year.

From the four arsenic balance scenarios summarised the following can be concluded:

- To achieve discharge concentration below the RWD of 0.1 mg/l As a maximum input value of 0.24 mg/L As is allowed onto the TSF; and

- The inclusion of a wetland allows rainfall dilution and evaporation to help the system and allows IFC compliance throughout the year at the wetland outflow at input concentrations below 0.8 mg/L.

If monitoring indicates that the predicted concentrations are not achieved, three management options are recommended:

- Treat the TSF stream from the processing plant to comply with concentrations equal to or lower than 0.8 mg/L As (current indications are that 0.2 mg/L is achievable) to allow discharge from the wetland to comply with IFC guidelines;
- The discharge from the wetland is to be used as the compliance point,; and
- Keep flow rates in the Marvov Creek Diversion channel and the Marvov Creek section downstream from the pit at an average flow rates throughout the year through the use of a siphon.

5.4 Cyanide Balance

In order to achieve the concentration levels as recommended by the IFC Guidelines and by the International Cyanide Code regulations and guidelines:

- The input level of CN from the plant to be placed on the TSF after treatment should be below 50 mg/L WAD CN; and
- The discharge downstream of the wetland, should be below 0.5 mg/L WAD CN.

The INCO detox treatment procedure is planned to be implemented at the NLGM mine.

The natural attenuation of cyanide levels by volatilisation is enhanced under lower pH environments. The natural waters in the NLGM area have a low pH and the arsenic removal process to be used will also lower the pH of the tailings stream during treatment. Four scenarios have been simulated considering the potential lowering of cyanide levels due to natural means. These are:

- Scenario CN1 assuming a 50% cyanide reduction due to natural attenuation;
- Scenario CN2 assuming a 75% cyanide reduction due to natural attenuation; and
- Scenario CN3 assuming a 90% cyanide reduction due to natural attenuation.
- Scenario CN4 assuming a conservative 50% cyanide reduction to allow the sensitivity analysis on the maximum CN input concentration allowed onto the TSF to achieve IFC compliance at the RWD and the Wetland discharge point.

Cyanide levels in the TSF will be at the highest concentration during the dry months. During this time, the water from the seepage collection trenches is recommended to be returned to the plant and not be discharged to the environment.

Literature surveys have shown that if the slurry water is held in the TSF for about 30 days the cyanide concentration is expected to attenuate naturally by about 50%. If it is held for 60

days, it is estimated to reduce to about 80% and if held for 90 days, it is expected to reduce by 90%.

The following is recommended:

- The tailings pH should be treated to allow levels to be achieved between 6 and 9;
- To reach IFC compliance at the wetland discharge point the input CN concentration onto the TSF should be 27 mg/L WAD CN with a natural free cyanide degradation of 90%;
- With the inclusion of a wetland the maximum CN input concentration onto the TSF should be 5.3 mg/L at 50% assumed natural degradation to allow compliance downstream of the wetland; and
- With the inclusion of a wetland the maximum CN input concentration onto the TSF should be 9.5 mg/L at 75% assumed natural degradation to allow compliance at the wetland discharge.

It is seen that the construction of an artificial wetland will greatly increase the natural degradation and treatment of CN to IFC compliance concentrations.

6 Environmental Management System

The updated ESHS System and all the plans that accompany it are given in Appendix A. These plans have been compiled based on a review from the IFC and a request to incorporate a number of management plans into the ESHS System. All of these plans can be considered 'living' documents which are revised and amended as the project develops and monitoring and auditing is undertaken.

Apart from the new management plans that were developed, some of the existing plans have been updated. The following is a summary of the updated plans:

6.1 Updated Management Plans

6.1.1 RAP

The updated RAP makes provision for the temporary resettlement of Kinjor and Larjor in order to accommodate mine pit construction schedules. Kinjor/Larjor will be temporarily resettled to an area directly adjacent to the resettlement village but still within the acquired land deed area. Affected households will be temporarily housed in wattle and daub houses constructed by the affected community until the construction of permanent houses has been completed. Community building teams will receive remuneration while Aureus will provide all materials. Affected households will have ownership of temporary houses as well as their permanent houses. The agreement will in no way alter the commitments and responsibilities of Aureus as stipulated in the RAP.

Following consultations with the affected community with regard to temporary resettlement, the town lay-out of the resettlement village was revised to include a temporary resettlement zone.

6.1.2 CDP

The updated CDP report discusses progress made with the implementation of community development initiatives. Aureus has commenced with a number of projects which already provide direct benefits to the affected communities.

In terms of a 'Community Agreement' a multipurpose Community Cooperative has been established with smaller sub-cooperatives to promote business and agricultural projects. The cooperative is currently involved in brickmaking, as well as masonry and carpentry work for the resettlement village. Three 'Hydraform' brickmaking machines are currently operated by labour from the local community. At the completion of the house construction, Aureus will donate the three machines to the local community. A carpentry centre has been established in the central business area of the resettlement village.

The Cooperative will establish vegetable gardens with the assistance of Aureus to promote food security during and after resettlement. A land area at the resettlement site has been prepared for this purpose. In addition, a clothing manufacturing and sewing sub-cooperative is being established for the Kinjor and Larjor women, who will, amongst others, manufacture protective clothing for mine staff, as well as school uniforms for the local children.

The Cooperative will be expanded in due course to serve as the vehicle for implementing the CDP.

6.1.3 Water Management Update

The updated integrated water management report is presented in Appendix A. This report now contains modelling results and proposals for management levels for cyanide and arsenic and also deals with extreme flood and drought conditions. The changes/updates done on the water management report was mainly on the water balance, cyanide balance and arsenic balance.

The identified impacts remained the same with the updates only occurring due to new information on climate data as well as geochemical assessments. The report also discusses the potential installation of a wetland system below the Tailings Storage Facility (TSF) for the purposes of polishing and treating the water released from the TSF. This wetland has not been designed in any level of detail. If it is to be implemented it will be subject to a detailed engineering and environmental design. Aureus has committed to construct the wetland to assist in treating water for both cyanide and arsenic and to reduce the chemical costs of this treatment.

6.1.4 Stakeholder Engagement Plan Update

Updates were made to the Stakeholder Engagement Plan (SEP) to include additional stakeholder meetings undertaken in August and October 2013 respectively for the purposes of the RAP.

6.1.5 Biodiversity Update

Engagement with the IFC has been undertaken regarding the compilation of a Biodiversity Management Plan for the NLGM and updating the Biodiversity Assessment that was undertaken for the project. With regards to the management plan, a draft plan has been compiled and included in the ESHS. The IFC requested that updates be performed on the Biodiversity Specialist Report. The recommendations on how to manage the identified impacts are contained in the Biodiversity Management Plan. The plan will require that a biodiversity offset project be implemented. The implementation details of this project will be attended to after additional studies and recommendations arising from these studies.

6.1.6 Arsenic Management

6.1.6.1 Objectives

This Arsenic (As) management plan is implemented with the following objectives:

- To recommend As concentrations which should be achieved before the tailings material is discharged onto the TSF;
- Identify compliance concentrations to which discharged effluent and groundwater seepage should adhere to; and
- Identify and recommend compliance points and monitoring programmes.

The compliance points are given on Figure 6-1 below. For surface water compliance there is point TSF CMP2 and for groundwater compliance TSF GMB1/2/3.

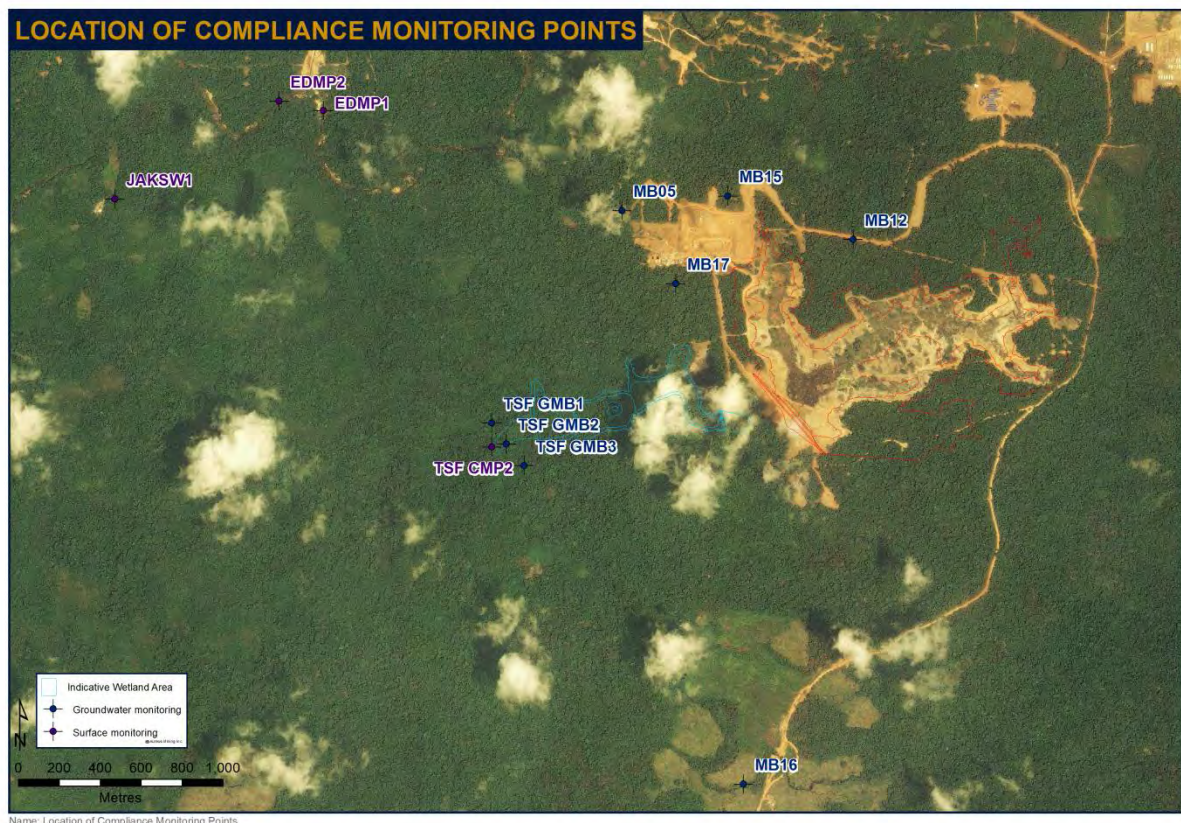


Figure 6-1: Compliance monitoring points below the TSF and Wetland

6.1.6.2 Company Commitments

Aureus has decided to install a wetland system downstream of the TSF to reduce levels of Arsenic and Cyanide in the effluent. The compliance point to meet IFC discharge standards will be at the exit of the wetland (for surface water) and at boreholes immediately down gradient of the wetland (for ground water);

With the installation of the wetland, and based on the Arsenic balance assessment, the Company will commit to a maximum Arsenic discharge into the TSF of 0.8 mg/L, with the capacity, as a contingency, to be able to reduce (treat) levels into the TSF to as low as 0.1 mg/L (IFC discharge limits) if warranted;

The Company will develop a robust surface and ground water monitoring program to assure operational parameters of the TSF are met and concentrations of As and CN are monitored in the TSF and at the various points in the System (TSF, wetland, compliance points, etc).

Aureus/NLGM commit to meeting IFC standards for discharge at the monitoring point below the wetland outflow for surface water and at the groundwater monitoring points to be installed below the final walls of the wetland. The monitoring points are shown on Figure 6-1

as surface water compliance point TSF CMP2 and for groundwater compliance TSF GMB1/2/3.

The following limits apply:

Monitoring Point	As Level	Comment
Discharge into TSF	Between 0.24 and 0.8mg/l As	Start at 0.24mg/l and adjust towards 0.8mg/l once sampling enables levels of As in the discharge to be quantified. The target is to meet the discharge compliance level of 0.1mg/l As into the environment. The company commits to having the ability to reach 0.1 mg/l soluble As in the discharge to the TSF if required.
Discharge to environment	Compliance level = 0.1mg/l As	Compliance point is below the Wetland.

This will be achieved by treating the soluble arsenic levels in the tailings stream entering the TSF to levels which are low enough to achieve the discharge standards of 0.1 mg/l soluble arsenic. This will be achieved using chemical treatment techniques. With the wetland the passive and chemical treatment techniques will be applied in conjunction with one another to achieve the required discharge standards.

The wetland design will take into account the long term fate of any heavy metals which may precipitate and it will be professionally designed and constructed. If any metal rich sludge forms, it will be suitably disposed of onto a specially prepared site which would ensure that it meets sustainability criteria and IFC standards.

With the wetland in place, the company commits to treating the soluble arsenic levels down to 0.24 mg/l in the discharge to the TSF from the plant. The NLGM monitoring programme will then monitor the discharge concentrations at the wetland outflow to determine what the concentrations are at this point. The level of treatment at the plant in the arsenic precipitation circuit will then be adjusted accordingly so that full compliance with the IFC standards at the discharge is achieved with the minimum of active chemical treatment. This process will allow the operations personnel to find out what the natural fate of arsenic is in the system as designed and operated at the NLGM.

Groundwater concentrations of soluble arsenic will be tested to ensure that IFC discharge standards are met at the down gradient monitoring boreholes.

6.1.6.3 Contingency Plans

If the envisaged discharge requirements are not met by the chemical treatment process proposed by NLGM then the following will be instituted as required:

6.1.6.3.1 Reduction of As Levels into the TSF

As a contingency Aureus will have the capacity in the system to treat the tailings going into the TSF to 0.1 mg/L As (IFC discharge limits) if warranted.

6.1.6.3.2 Treatment During Operation

If the proposed water treatment methods do not achieve the required outflow levels of soluble arsenic then alternative water treatment technologies will be investigated and implemented. This could include:

- Separation of the liquid fraction from the solids and treatment on the liquid fraction. The treatment could include electrochemical means, precipitation or membrane processes.

6.1.6.3.3 Collection and Treatment of Seepage After Closure

Ground water flows will be collected from the seepage collection trenches which will be installed below the TSF wall. This is proposed as there is a possible risk that the longer term concentrations will not be met at the compliance points if the scorodite/ferric arsenate which will be precipitated in the arsenic precipitation stage does not keep from going in to solution. With groundwater pH's at between 6 and 7, the ferric arsenate precipitates should naturally remain stable. There is a minimal risk of not meeting surface water concentrations as there will be a covering placed over the tailings dam at closure and there will be no ponding of surface water at closure. The risk is therefore entirely in the groundwater component. This treatment will involve:

- Directing the seepage through a specially constructed wetland and passive treatment system containing iron rich boulders as a substrate. This will ensure additional precipitation of arsenic containing water.
- If there is seepage bypassing the seepage collection system causing contamination then this seepage will be collected and pumped into this treatment system.
- If this system does not produce an acceptable discharge then alternative water treatment technologies will be investigated.

6.1.7 Cyanide Management

6.1.7.1 Objectives

This environmental cyanide (CN) management plan has the following objectives:

- To recommend CN concentrations which treatment methods should achieve before the waste material is discharged onto the TSF;

- Recommend and list possible mitigation methods to lower CN concentration prior to discharge into the environment;
- Identify compliance concentrations to which discharged effluent and groundwater seepage should adhere to; and
- Identify and recommend compliance points.

6.1.7.2 Company Commitments

Aureus has decided to install a wetland system downstream of the TSF to reduce levels of Arsenic and Cyanide in the effluent. The compliance point to meet IFC discharge standards will be at the exit of the wetland (for surface water) and at boreholes immediately down gradient of the wetland (for ground water);

With the installation of the wetland, and based on the Cyanide balance assessment, the Company will commit to a maximum Cyanide discharge into the TSF of 27 mg/L with the capacity of going down to 5 mg/L. The plan is to start up at 5 mg/L and evaluate actual natural degradation rates to determine if discharge levels of CN into the TSF can go up to 27 mg/L. The Company commits, as a contingency, they will have the capacity in the system to treat the tailings going into the TSF to 0.5 mg/L WAD CN (IFC discharge limits) if warranted;

The Company will develop a robust surface and ground water monitoring program to assure operational parameters of the TSF are met and concentrations of As and CN are monitored in the TSF and at the various points in the System (TSF, wetland, compliance points, etc).

Aureus/NLGM commits to meeting IFC standards for discharge at the monitoring point below the wetland outflow for surface water and at the groundwater monitoring points to be installed below the final walls of the wetland. The monitoring points are shown on Figure 6-1 above as TSF CMP2 for the surface water point and TSF GMB1/2/3 for the groundwater points.

This will be achieved by treating the cyanide levels in the tailings stream entering the TSF to levels which are low enough so as to achieve the discharge standards. This will be achieved using chemical treatment techniques. With the wetland the passive and chemical treatment techniques will be applied in conjunction with one another to achieve the required discharge standards.

The following limits apply:

Monitoring Point	CN Level	Comment
Discharge into TSF	Between 5-27mg/l WAD CN Compliance <	Start at 5mg/l and adjust towards 27mg/l once tests enable levels of natural degradation to be quantified. Target is to meet the discharge

	50mg/l WAD CN onto TSF.	compliance level of 0.5mg/l WAD CN into the environment. Have the ability to achieve 0.5 mg/l
Discharge to environment	Compliance level = 0.5mg/l WAD CN, 0.1mg/l free CN, 1mg/l Total CN	Compliance point is below the Wetland for surface and groundwater.

The company commits to having the ability to treat the Free Cyanide levels down to 5 mg/l in the discharge to the TSF from the plant. The NLGM monitoring programme will then monitor the discharge concentrations at the wetland outflow at TSF CMP2 to determine what the concentrations are at this point. The level of treatment at the plant in the cyanide destruction circuit will then be adjusted accordingly so that full compliance with the IFC standards at the discharge is achieved with the minimum of active chemical treatment. This process will allow the operations personnel to find out what the natural decay of cyanide is in the system as designed and operated at the NLGM. It will also allow for the treatment chemicals and process to be optimised. The modelling indicates that compliance would be achieved if levels were increased to approximately 27 mg/l WAD CN.

The company commits to meeting the IFC standards for discharge of 1 mg/l total CN, 0.5 mg/l WAD CN and 0.1 mg/l free CN at monitoring points TSF GMB 1/2/3 and TSF CMP2

Aureus/NLGM commit to engaging with the Liberian EPA to ensure that the mixing zone as required in terms of the ICM Code is agreed to. This will probably mean that the standard of 0.022 mg/l free CN will be met in the Marvov Creek after the river diversion enters into the original water course.

The wetland to be constructed will take into account the long term fate of any metals which may precipitate and it will be professionally designed and constructed.

6.1.7.3 Contingency Measures

If the envisaged discharge standards are not met by the chemical treatment process proposed by NLGM then the following will be evaluated as potential plans to be instituted as required:

6.1.7.3.1 Reduction of WAD CN Levels into the TSF

As a contingency Aureus will have the capacity in the system to treat the tailings going into the TSF to 0.5 mg/L WAD CN (IFC discharge limits) if warranted.

6.1.7.3.2 Treatment During Operation

If the proposed water treatment methods do not achieve the required outflow levels of total WAD and free cyanide, then alternative water treatment technologies will be investigated and implemented. This could include:

- Separation of the liquid fraction from the solids and practising treatment on the liquid fraction. The treatment could include oxidation processes.

6.1.7.3.3 Collection and Treatment of Seepage After Closure

Ground water flows will be collected from the seepage collection trenches which will be installed below the TSF walls. This is proposed as there is a small risk that the longer term concentrations will not be met at the compliance points if the natural degradation does not occur as planned for the ground water component. There is a minimal risk of not meeting surface water concentrations as there will be a covering placed over the tailings dam at closure and there will be no ponding of surface water at closure. The risk is therefore entirely in the groundwater component. This treatment will involve:

- Directing the seepage through a specially constructed wetland and passive treatment system containing iron rich boulders as a substrate and the provision of a growth medium. This will allow for complexes to form between iron with cyanide, as well as biological reduction of the cyanide.
- This seepage water will be kept separate from other surface water flows.
- If there is seepage bypassing the seepage collection system causing contamination then this seepage will be collected and pumped into this treatment system.
- If this system does not produce an acceptable discharge then alternative water treatment technologies will be investigated.

6.2 Summary of New Management Plans

Below is a brief summary of the new management plans that have been developed and compiled:

6.2.1 Environmental Management Plans

6.2.1.1 Solid and Liquid Waste Management Plan

The Solid and Liquid Waste Management Plan addresses the management of domestic and industrial solid and liquid waste derived from all the NLGM activities. It considers the full waste stream from collection through to disposal and presents the approach to waste reduction, recycling, and waste disposal routes.

A separate Hazardous Waste Management Plan has been drawn up to deal and should be referred to when required.

6.2.1.2 Hazardous Materials Management Plan

The Hazardous Materials Management Plan addresses a number of requirements against which Aureus Business Units and managed operations will be audited. The purpose of the plan is to manage hazardous materials, including those brought by contractors, do not adversely impact the environment, cannot be accessed by unauthorised personnel and, based on risk, cannot come into contact with birds or other animals.

6.2.1.3 Erosion Control and Re-vegetation Management Plan

The Erosion Control and Re-vegetation Plan addresses the management of terrain and erosion during exploration, construction, operations and closure. The plan covers all activities that could result in adverse effects on the terrain through all phases of the project.

6.2.1.3.1 SOP Soil and Sediment Monitoring Procedure

This standard provides general principles to be applied in sampling for the physical, chemical, microbiological and radiological analysis of waters, waste waters, including soil, sediment and sludge's for the purposes of process control, quality characterization, identification of the sources of pollution and monitoring of the background levels within NLGM license area.

6.2.1.4 Footprint Management Plan

This Footprint Management Plan will apply to the project from exploration phase, through to closure and decommissioning. It must be applied to all personnel on site whether they are company employees, contractors or sub-contractors. The objective of the plan is to ensure that the proposed mine plan is implemented, to limit areas of disturbance, control of contractors on site, demarcating site boundaries, monitoring, minimising areas to be cleared and rehabilitation activities.

6.2.1.4.1 Permit to Clear

The Permit to Clear procedure details the method that shall be used by any employee or contractor preparing to undertake land clearance works within the mineral license at Aureus premises. This procedure does not document how to go about the actual clearance operations, but rather the approval process for clearing the land.

6.2.1.5 Forest and Wildlife Management Policy

The purpose of the policy is to facilitate the conservation of forest and wildlife resources associated with the New Liberty Gold Mine in order to enable the sustainable development of these resources. Aligning conservation efforts with benefits from a socio-cultural and economic goods and services perspective to ensure that the environment provides the same

benefits for future generations as it does for the present generation in accordance with commitments made under local and international agreements and conventions.”

6.2.1.6 Pollution Prevention Plan

The Pollution Prevention Plan has been developed to help provide a framework for implementing a number of procedures to address pollution of the receiving environment in terms of the air, water and land around the NLGM. The 2013 ESIA identified a number of areas of impact which will require management and mitigation measures. In order to quantify these impacts, a risk assessment will be undertaken, following which, Action Plans will be compiled. The risks and action plans will define inter alia, the key pollution issues that will have to be managed. The Action Plans will define the pollution control management measures required and the monitoring programme to be implemented.

6.2.1.7 Environmental Compliance Monitoring Plan

The Environmental Compliance Monitoring is a valuable source of information for understanding and managing the interactions of industrial processes with the environment and society. Compliance monitoring is therefore a useful investment with wide practical benefits. The objectives of the plan are to supply information on performance for the operation, set target thresholds, information on mine control and efficiencies, understanding of operational impacts, trends in environmental measurements, advanced warning systems and providing information on the impacts of the operations on the surrounding communities.

6.2.1.8 Non Compliance/Corrective Action Procedure

The purpose of this procedure is to define a systematic approach for Aureus personnel to identify, document, evaluate, rectify and close-out non-compliances in the areas of environment, social, health and safety that might occur during all project phases. Aureus should be able to control all Project non-compliant conditions, equipment, processes procedural requirements or incidents by ensuring that all non-compliances are identified and corrected in a formalized and controlled manner. This procedure applies to all company personnel where they observe situations that do not comply with specified requirements. In addition to this plan, several Standard Operating Procedures have been developed, namely dust monitoring, wildlife monitoring and soil sediment monitoring.

6.2.1.9 Closure Management Plan

The NLGM is currently at construction phase, with closure estimated at the earliest 8 years after starting but possibly later on if additional resources are discovered. It is important to develop closure objectives and plans at the initial stages of a mine so that the construction and operational phases are developed to ensure closure is undertaken in an efficient and financially optimal way. The objectives set for closure are to ensure that the post-mining landscape is safe and stable, protection of surrounding water resources, sustainable post

mining land use and development of success criteria with engagement from relevant stakeholders.

6.2.2 Social, Health and Safety Management Plans

6.2.2.1 Emergency Response Plan

The Emergency Response Plan has been developed and is directed at both the construction and operational phases of the project and is applicable to all personnel either directly employed or contracted by Aureus and has been developed for the entire site. The overall Emergency Response Plan provides Aureus with the framework and guidance to respond effectively to emergencies or serious incidents, reducing their impact on the project, its people, property and operations.

6.2.2.2 Incident Management Procedure

This procedure has been developed to ensure the timely and appropriate notification, investigation and reporting of EHS&S incidents, to ensure that all operations are made aware of significant incidents and that key learning's are communicated, assist other business entities review similar potential incidents and implement preventative actions and, to assist with incident communications on site.

6.2.2.3 Transportation Management Plan

The Transportation and Management Plan provides practical guidance for persons conducting a business or undertaking on how to manage the risks associated with transportation within their workplace. It applies to all businesses, departments or undertakings where there is a risk of injury due to the movement of people, vehicles and plant in the workplace, such as warehouses, haul roads, construction sites, exploration areas, access roads and logistics depots, and container or other maintenance or operational yards and or areas.

6.2.2.4 Security Management Plan

The security management plan will apply throughout the life of the operation and should be in place prior to construction when security risks are normally higher. It has been compiled to ensure security measures on site are implemented to reduce risks, maintain the safety and security of the mines assets, personnel and property and be prepared and ready to assist with emergency situations.

6.2.2.5 Labour Management Plan

The Labour Management Plan refers not only to employment for the NLGM, but also to the longer term skills development and career progression of the employees. The following objectives of this plan are to promote employment and advance the social and economic welfare and contribute towards the socio-economic development of the areas in which the

company is operating. Depending on the skills availability, the majority of the workforce is sourced and utilized locally and the existing skills base will be expanded to empower and to serve the community.

6.2.2.6 ESHS Training Plan

The purpose of the Training Plan is to ensure that every employee, subcontractor, visitor, and supplier receives appropriate training for the proper and safe development of their tasks. The plan is applicable to all areas of operation and all phases of the project.

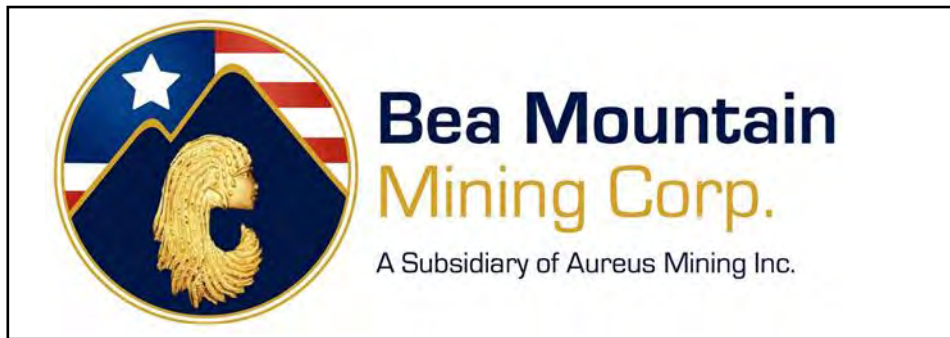
7 Conclusion

In addition to the above mentioned plans, Aureus also included a number of their Standard Operating Procedures and guideline documents which apply to the project. These have also been included in the ESHS System (see Appendix A).

These documents serve to clarify how the impacts identified in the ESIA are going to be managed, update plans where necessary and give more clarity to the ESIA submitted in 2013 by Digby Wells Environmental. The 2013 ESIA discusses the mine plans as they currently are presented. It was decided not to amend the ESIA of 2013 as it is an approved document and to do so would trigger another submission and approval process. Rather the ESHS System and management plans compliment the ESIA and these additional documents will be submitted to the Liberian Government.

Attached to the ESHS System are the current permit conditions from the EPA of Liberia. This deals with the approval of the ESIA of 2013 and details the management and monitoring commitments required from NLGM.

Appendix A: Environmental, Social, Health and Safety Management System



**Environmental, Social, Health and Safety
Management System for the New Liberty Gold Mine,
Liberia**

A/BMMC-ENV-SYS-001

AUREUS MINING INC.

27 March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date

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**Bea Mountain
Mining Corp.**
A Subsidiary of Aureus Mining Inc.

BEA MOUNTAIN MINING CORP.
New Liberty Gold Mine
ESHS SYSTEM

Document No: **A/BMMC-ENV-SYS-001**

Issue Date: 03-25-2014
Page: 2 of 30

REVISION INFORMATION

Rev #	Old Section Ref	New Section Ref	Description of Changes
Draft			Edited from "template"

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1. INTRODUCTION

This Environmental, Social, Health and Safety (ESHS) System is a framework which outlines the system that will apply to the New Liberty Gold Mine. It also incorporates a series of supporting Management Plans. These documents will be activated and periodically updated at appropriate points in the mine life cycle to ensure that the ESHS system remains responsive to changing environmental, human health and safety, and other social management needs, as well as provide a level of detail that is commensurate with available resources and the nature of the activities being conducted. Collectively, the ESHS System and its supporting documents constitute a flexible management approach that can readily accommodate the changing needs of the Project.

1.1 Project Description

Aureus Mining Inc, through its subsidiaries, is engaged in the exploration and development of gold deposits in highly prospective and under-explored areas of Liberia and Cameroon. Aureus Mining's activities are currently being concentrated on the exploration and development of the New Liberty Gold Mine (NLGM) in Liberia.

An Environmental and Social Impact Assessment (ESIA) for the NLGM has been prepared and approved by the Liberian authorities in 2013. For more detail on the proposed project, please refer to this document.

2 SCOPE AND APPLICATION

All Aureus Mining operations, sites, and functional locations must implement, or demonstrate conformance to an integrated management system aligned to the requirements of this System. Statutory and permitting requirements will take precedence over Aureus Mining standards, except in those cases where the Aureus standards are more stringent.

The ESHS System will be periodically reviewed and updated in response to the changes that will occur in various phases of the Project life cycle. It is the primary reference for the overall design and contents of the Management Plans, and is meant to serve as a key communication tool in the presentation of the Management Plans to lenders, regulatory authorities, and other external parties.

2.1 Application

In accordance with the IFC Performance Standard 1 which states:

'An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders. Drawing on the elements of the established business management process of "plan, do, check, and act," the ESMS entails a methodological approach to managing environmental and social risks and impacts in a structured way on an ongoing basis.'

This ESHS applies to:

- exploration and project development;
- conceptual studies (including projects of merit);
- order of magnitude studies;
- prefeasibility studies;

- feasibility studies;
- execution and construction;
- commissioning and ramp up;
- operating;
- care and maintenance;
- closure and rehabilitation;
- post closure;
- all contractor activities undertaken on Aureus Mining sites management.

Aureus Mining expects business partners, such as associate companies or joint ventures where we do not have operating responsibility, as well as principal contractors, suppliers and others with whom it has a substantial involvement, to conform to comparable ESHS standards. Aureus Mining informs them of these standards, its principles and policies and works with them where appropriate to support their adoption of practices consistent with our own.

The objectives of the ESHS System include the following:

1. Aureus will establish, document, implement, maintain and continually review and improve an environmental management system in accordance with the ISO 14001 Standard.
2. Develop a culture where safety, good housekeeping, caring for our environment and community is second nature.
3. Develop an organisational structure for construction phase and later operations identifying roles, responsibilities and key performance objectives which must include safety, health, social and environmental measures.
4. Systematically identify hazards and potential impacts and consequences;
5. Evaluate the risks from the identified hazards against screening criteria, taking into account the likelihood of occurrence and severity of the consequences. Compare these risks against ESHS objectives and targets set for the project;
6. Implement management measures and Management Plans to eliminate the risk or reduce it to acceptable levels. Measures can include reducing the probability of occurrence and/or the consequences of the hazard. Management measures include steps to prevent escalation of the aspect and to reduce the effects;
7. Establish recovery preparedness measures (including emergency procedures) as well as restoration and compensation procedures;
8. Develop a comprehensive training system;
9. Carry out auditing to confirm “that we are doing what we say” and ensure any deficiencies are closed in a timely manner.
10. Aureus will review the Environmental policy and the ESHS regularly and update it as needed.

2.2 Project Life Cycle Planning

Environmental issues are anticipated and managed during all stages of the project life cycle – from exploration through design, construction, operation and closure. The following are to be taken into account when looking at the bigger picture for Aureus NLGM.

- Conduct environmental due diligence evaluations in conformance with relevant standards prior to mergers and acquisitions, including investments in real property, lease holdings and mineral tenures. The scope and depth of due diligence reviews are appropriate to the nature and scale of the transactions;
- Consider potential environmental issues and liabilities and document environmental conditions of properties prior to divestiture;
- Assess potential environmental impacts from planned development projects and major expansions in a manner that, at a minimum, complies with applicable environmental obligations and is consistent with industry best practice, the companies Environmental Policy and the ESHS System. Include identification of communities of interest as part of the assessment and appropriate consultation with those who may be directly affected by the project. Consider issues expressed by communities of interest in designing the project;
- Include measures to achieve and maintain regulatory compliance and manage potential environmental impacts and risks in new development projects and major capital expenditures;
- Incorporate the costs associated with environmental compliance, pollution prevention, and risk management into project financial evaluations; and
- Incorporate planning for mine closure in scoping, prefeasibility and feasibility studies for new projects and major expansions, including estimating costs for closure and post-closure activities. Update closure plans and associated cost estimates annually during the operating phase.

3 POLICY AND LEGISLATION

3.1 Company Policy

As part of Aureus's strategy, to build a large and sustainable gold mining business in the countries we operate, we are committed to recognize international best practice principles of sustainable development and continual improvement. We will never compromise the health and safety of our employees, our host communities or that of any other applicable stakeholders. We are committed to applying world class safety, health, social and environmental management standards and will continually strive towards zero harm.

To achieve this we are committed to:

- Develop, implement and maintain an integrated management system for health, safety and the environment, based on recognized international standards;
- Drive continual improvement through setting objectives and targets based on sound risk assessment methodologies, conduct regular reviews of the system and measure our performance through management self audits;

- Comply with all applicable legislation, regulations, company policies, procedures and customer requirements ;
- Promote awareness of significant health, social, safety and environmental impacts of each person's activities on an ongoing basis;
- Conserve natural resources such as water, energy and land through engaging and encouraging our employees, contractors, communities and stakeholders to minimize consumption of resources and prevent pollution through innovation and use of the best available technology;
- Take due care to prevent process loss, property damage, work related injuries and ensure that activities are safe for employees, contractors, communities and stakeholders who come into contact with our work environment;
- Work closely with our customers, stakeholders and suppliers to establish and comply with the highest health, safety and environment standards;
- Adopt a clear vision of future business decisions, harnessing best available technologies, processes, materials, products and management practices which improve health, safety, and the environmental performance;
- Train employees and contractors on issues of health, safety, social and environmental management to ensure sustainable performance by encouraging overall participation in health, safety, social and environmental activities;
- Communicate our health, safety, social and environmental policy to all employees, contractors and stakeholders and ensure it is available to the public; and
- Regularly review this policy in order to ensure compliance with relevant legislative and best practice requirements.

3.2 Legal Requirements

The development of environmental legislation in Liberia is progressing rapidly and several framework laws are in place. There is a strong focus on the protection of its valuable ecological and cultural heritage and it is expected that the legislative climate will continue to evolve quickly.

An ESIA was compiled in 2013 and approved by the Environmental Protection Agency (EPA). The approval Permits are appended to this document. Within the ESIA the various laws and regulations applicable to the NLGM were well documented. They included:

- Local Liberian laws, regulations and policies;
- Corporate policies;
- IFC/Equator Principle guidelines;
- International best practise standards and guidelines; and
- International obligations and requirements

The laws and regulations documented in the ESIA will be periodically updated to ensure any new or amended components are applied to the project. In addition to the legal requirements in the ESIA, during the implementation of each of the Management Plans, the appropriate applicable legislation will be summarised to ensure the most recent and stringent laws are being applied.

4 IDENTIFICATION OF RISKS AND IMPACTS

4.1 Impact Identification

The environmental and social aspects and impacts for construction, operation, and decommissioning, were identified during the Environmental and Social Impact Assessment (ESIA) process undertaken for Aureus and approved by the Liberian government in 2013.

The ESIA is an extensive and rigorous process to identify the potential environmental and social impacts, assessing their significance and recommend mitigation actions, where applicable. The mitigation actions have been taken a step further into various Management Plans as detailed in Section 5 of this ESHS System.

If the proposed mine plan incurs changes or extends, it will trigger a further ESIA to be completed for any new areas or communities affected. This will in turn result in the Management Plans being updated.

4.2 Risk Analysis

Following from the ESIA, a process of risk analysis will be undertaken which will result in a risk register. The risk register will incorporate risks relating to the environment, community, contractors, health and the company. The findings and conclusions of related plans, studies or assessments that are directly related to the project and its area of influence and the outcome of engagement with Affected Communities will all be incorporated into the risk assessment process.

The following actions are to be undertaken as part of the risk analysis:

- a) Establishing the context, including acceptability criteria for the risk analysis.
- b) Hazards/aspects identification to determine risk scenarios and select a suitable level of risk evaluation.
- c) Recording the risk analysis in the risk register.
- d) Managing risks according to their classification of either Low (Class I) Moderate (Class II), High (Class III) or Critical (Class IV) to achieve levels that are deemed to be As Low As Reasonably Practicable (ALARP).
- e) Utilising the following hierarchy of control;
 - eliminate the risk scenario;
 - substitution;
 - engineering and process controls;
 - administrative controls or management strategies;
 - use of personal protective equipment (PPE).
- f) Developing and agreeing on further actions or monitoring of the risks, taking into account the hierarchy of controls.
- g) Verifying the completion of actions.

- h) Re-evaluating the risk and classification as appropriate.
- i) Reviewing and updating the risk register over time.
- j) Documenting, reporting and communicating the risk information.

Aureus Management Plans and Standard Operating Procedures must be considered as part of the risk identification and evaluation process. These standards establish the minimum level of controls for the treatment of significant risks to the NLGM.

In addition to these Standards, business risks relating to the following themes must also be considered:

- biodiversity;
- closure;
- raw materials (resources);
- energy;
- climate change;
- products;
- communities/social;
- process safety hazards;
- business continuity.

The risk analysis must be facilitated by appropriately trained personnel and include personnel with adequate knowledge and experience for the risk being evaluated. A list of attendees at risk analysis workshops and/or contributors to a risk analysis must be documented.

The Risk register should be initiated prior to construction and reviewed annually, incorporating feedback on identified risks and re-evaluating each risk based on level of management applied.

5 MANAGEMENT PLANS

A Management Plan is a project or site specific plan developed to ensure that appropriate environmental and social management practices are followed during the course of a project. The Management Plans developed for the Aureus NLGM will need to ensure that:

- The plans adhere to the relevant Liberian legislation and any other applicable laws or requirements of the Lenders;
- The controls identified during the ESIA and risk assessment have been incorporated; and
- The Plans are updated and audited regularly to ensure they remain relevant.

5.1 Environmental Management Plans

5.1.1 Solid and Liquid Waste Management Plan

The Solid and Liquid Waste Management Plan addresses the management of domestic and industrial solid and liquid waste derived from all the NLGM activities. It considers the full waste stream from

collection through to disposal and presents the approach to waste reduction, recycling, and waste disposal routes.

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The Permit to Clear procedure details the method that shall be used by any employee or contractor preparing to undertake land clearance works within the mineral license at Aureus premises. This procedure does not document how to go about the actual clearance operations, but rather the approval process for clearing the land.

5.1.5 Biodiversity Management Plan

The Biodiversity Management Plan forms part of a suite of Management Plans for the proposed mine. The aim of the plan is to conserve natural resources through efficient management of impacts on biodiversity.

5.1.5.1 Forest and Wildlife Management Policy

The purpose of the policy is to facilitate the conservation of forest and wildlife resources associated with the New Liberty Gold Mine in order to enable the sustainable development of these resources. Aligning conservation efforts with benefits from a socio-cultural and economic goods and services perspective to ensure that the environment provides the same benefits for future generations as it does for the present generation in accordance with commitments made under local and international agreements and conventions.”

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The Pollution Prevention Plan has been developed to help provide a framework for implementing a number of procedures to address pollution of the receiving environment in terms of the air, water and land around the NLGM. The 2013 ESIA identified a number of areas of impact which will require management and mitigation measures. In order to quantify these impacts, a risk assessment will be undertaken, following which, Action Plans will be compiled. The risks and action plans will define inter alia, the key pollution issues that will have to be managed. The Action Plans will define the pollution control management measures required and the monitoring programme to be implemented.

5.1.7 Water Management Plan

The purpose of the Water Management Plan is to consolidate and compile an integrated management plan for groundwater and surface water quality and quantity based on background information, water balances, salt balances and climatic info discussed in detail in the Integrated Water Management Report, dated 25 March 2014. Separate management plans exist specifically for the management of arsenic and cyanide the two main parameters of concern within the planned mine effluent discharge.

5.1.8 Environmental Compliance Monitoring Plan

The Environmental Compliance Monitoring is a valuable source of information for understanding and managing the interactions of industrial processes with the environment and society. Compliance monitoring is therefore a useful investment with wide practical benefits. The objectives of the plan are to supply information on performance for the operation, set target thresholds, information on mine control and efficiencies, understanding of operational impacts, trends in environmental measurements, advanced warning systems and providing information on the impacts of the operations on the surrounding communities.

5.1.9 Non Compliance/Corrective Action Procedure

The purpose of this procedure is to define a systematic approach for Aureus personnel to identify, document, evaluate, rectify and close-out non-compliances in the areas of environment, social, health and safety that might occur during all project phases. Aureus should be able to control all Project non-compliant conditions, equipment, processes procedural requirements or incidents by ensuring that all non-compliances are identified and corrected in a formalized and controlled manner. This procedure applies to all company personnel where they observe situations that do not comply with specified requirements. In addition to this plan, several Standard Operating Procedures have been developed, namely dust monitoring wildlife monitoring and soil sediment monitoring.

5.1.10 Closure Management Plan

The NLGM is currently at construction phase, with closure estimated at the earliest 8 years but possibly later on if additional resources are discovered. It is important to develop closure objectives and plans at the initial stages of a mine so that the construction and operational phases are developed to ensure closure is undertaken in an efficient and financially optimal way. The objectives set for closure are to ensure that the post-mining landscape is safe and stable, protection of surrounding water resources, sustainable post mining land use and development of success criteria with engagement from relevant stakeholders.

5.2 Social, Health and Safety Management Plans

5.2.1 Emergency Response Plan

The Emergency Response Plan has been developed and is directed at both the construction and operational phases of the project and is applicable to all personnel either directly employed or contracted by Aureus and has been developed for the entire site. The overall Emergency Response Plan provides Aureus with the framework and guidance to respond effectively to emergencies or serious incidents, reducing their impact on the project, its people, property and operations.

5.2.1.1 Incident Management Procedure

This procedure has been developed to ensure the timely and appropriate notification, investigation and reporting of EHS&S incidents, to ensure that all operations are made aware of significant incidents and that key learning's are communicated, assist other business entities review similar potential incidents and implement preventative actions and, to assist with incident communications on site.

5.2.2 Transportation Management Plan

The Transportation and Management Plan provides practical guidance for persons conducting a business or undertaking on how to manage the risks associated with transportation within their workplace. It applies to all businesses, departments or undertakings where there is a risk of injury due to the movement of people, vehicles and plant in the workplace, such as warehouses, haul roads, construction sites, exploration areas, access roads and logistics depots, and container or other maintenance or operational yards and or areas.

5.2.3 Security Management Plan

The security management plan will apply throughout the life of the operation and should be in place prior to construction when security risks are normally higher. It has been compiled to ensure security measures on site are implemented to reduce risks, maintain the safety and security of the mines assets, personnel and property and be prepared and ready to assist with emergency situations.

5.2.4 Labour Management Plan

The Labour Management Plan refers not only to the employment for the NLGM, but also to the longer term skills development and career progression of the employees. The following are objectives of this plan are to promote employment and advanced the social and economic welfare,

contribute towards the socio-economic development of the areas in which the company is operating and employs the majority of the workforce is sourced, utilize and expand the existing skills base for the empowerment and to serve the community.

5.2.5 Resettlement Action Plan

The Resettlement Action Plan addresses the physical and economic resettlement of property owners and assets falling within the NLGM footprint and associated 500 meter blasting zone. The plan defines the policies, procedures, programme and actions through which Aureus will mitigate, compensate and manage the resettlement impacts associated with the development of the NLGM.

5.2.6 Community Development Plan

This Community Development Plan is aimed at continuing the improvement in the livelihoods for communities surrounding NLGM during the mining and post-mining phases. In order to achieve this, the plan needs to be implemented in a manner that restores and preferably improves the livelihoods of resettled and host communities in line with international best practice such as the IFC performance standards.

The plan describes a set of livelihood improvement opportunities that start with food security in the short term and gradually develop to more complicated enterprises which could also bring in revenue from markets outside of the project area in the medium to long term. There is also the opportunity to generate revenue from exports (for example cashew nuts, coconut, banana, abaca, pineapple) that will benefit both the resettled communities and Liberia as a whole in the long term.

5.2.7 Stakeholder Engagement Plan

The Stakeholder Engagement Plan is designed to provide guidance to NLGM in terms of engagement with external and internal stakeholders during all phases of development. The SEP aims to build on an understanding of previous Stakeholder Engagement (SE) activities undertaken in the project area, identify stakeholders, concerns and interests to be engaged with, clarify the strategy for engagement with stakeholders with detailed goals and objectives and provide an Implementation Plan comprising of various components addressing existing and future NLGM requirements.

5.2.8 ESHS Training Plan

The purpose of the Training Plan is to ensure that every employee, subcontractor, visitor, and supplier receives appropriate training for the proper and safe development of their tasks. The plan is applicable to all areas of operation and all phases of the project.

6 ORGANISATIONAL CAPACITY AND COMPETENCY

6.1 Organisational Roles and Responsibilities

The overall accountability for the implementation of this plan lies with the Board of Directors. Various parties will be responsible for certain activities, however Aureus will remain accountable for ensuring the performance of the mitigation measures, monitoring and corrective action contained in the ESHS System are effectively implemented, reported and recorded.

All staff and contractors working on the project must know and understand the boundaries of their jobs so that they can execute their work with minimal interference and supervision. The concepts of responsibility, authority and accountability are central to ensure that this occurs. These are defined:

Responsibility – an individual assuming responsibility undertakes to perform activities according to agreed standards within a set timeframe and with appropriate resources. Responsibilities can be delegated;

Authority – is formally granted and confers upon the person the right or power to take decisions that commit the Company or staff to a particular course of action. This may involve the deployment of resources, the incurring of expenditure, etc. Authority is linked to an organizational or contractual obligation to take particular actions (within prescribed limits); and

Accountability – an individual accepting accountability becomes answerable for the outcomes, which can involve credit or consequences. Elements may be devolved but the overall accountability cannot be delegated.

Each member of Aureus and Project Teams has the responsibility for environmental, health, safety and social protection. It is the responsibility of all managers to ensure that work under their control is carried out in a safe, environmentally sound, and socially responsible manner, and that staff have the necessary training, competency, and tools in order to conduct their work in accordance with environmental, health, safety and social considerations.

A general list of responsibilities, authorities and accountabilities with regard to ESHS System is shown below. This list will be refined following approval for funding and the ramp up to project operations.

Aureus CEO:

The CEO has overall responsibility for establishing, implementing and reviewing an effective ESHS System that demonstrates performance and compliance in order to assure due diligence. It is the CEO's responsibility to satisfy the Aureus Board of Directors that this is the case.

Aureus' General Manager:

The GM is responsible for ensuring that the mine's ESHS System is consistent with corporate systems, and responds to local and project-specific issues. Specific responsibilities include ensuring that:

- incidents, hazards or other ESHS related deficiencies are reported, analyzed and rectified;
- personnel are competent and have the necessary skills to carry out their ESHS functions;
- activities comply with all legislative and company requirements;
- implementation of the project Management Plans through Line Managers;
- reporting ESHS System performance on a regular basis; and
- coordinating the development of ESHS Plans for each project work area.

The Managers and Supervisors are accountable for ensuring that ESHS risks within the scope of his responsibility have been identified, assessed and controlled to 'as low as reasonably practical' (ALARP).

Aureus' Safety Health Environmental Quality Manager:

This position is responsible for providing:

- project assurance that ESHS System legislation, regulations and commitments are being followed;
- ESHS standards and procedures that are consistent with Aureus' corporate standards;
- mechanism for recording and reporting ESHS statistics on documented incidents and other key outcomes;
- an ESHS System management training service;
- a service to analyze technical risks;
- co-ordination of crisis and emergency response plans and practices;
- means to ensure the application of continuous improvement principles to the documentation, tools and other aspects that make up and support the ESHS System;
- assistance to work areas with the implementation of ESHS Management Plans; and an appropriate level of staffing (in the form of either permanent or contracted environmental, safety, health, security officers) to ensure:
 - Compliance with the environmental and safety obligations under the Contract and Scope of Works and under Technical Criteria;
 - Compliance with obligations under the ESIA, ESHS System, and other Safety Management Plans;
 - The environmental safeguards prescribed in government guidelines are implemented and tested before handover of the operating plant.

Project and Contract Design Engineers:

The design engineers are responsible for ensuring that environmental considerations are taken into account in all activities. Engineers will liaise closely with the Contractor Project Managers to ensure that the environmental controls and procedures contained in the Strategic Management Plan are implemented.

Individuals:

Various individuals are responsible for:

- assisting with the developing of the ESHS Management Plans for their particular work area;
- following ESHS assigned tasks according to the ESHS System;
- identification of hazards and risks and the reporting of incidents and 'near misses'; and
- ensuring that their actions are within the ESHS policies.

Individuals have the authority and responsibility to halt any part of an operation if they believe the action presents an unacceptable risk to themselves, to others or to the environment. Any such action must be reported to their direct supervisor as soon as possible.

Individuals are accountable for completing and ESHS tasks that are assigned to them.

Regulatory Authorities:

Agencies such as the Ministry of Lands, Mines and Energy, and EPA have regulatory responsibility to ensure that the construction and operation of the mine is undertaken in accordance with relevant legislation, and with best practice guidelines.

Officers from these agencies can be expected to visit the site periodically to audit the activities for compliance and to provide advice on issues.

Contractors:

Are responsible for ensuring that all persons on the project including subcontractors and their employees, comply with the relevant safety, health, social and environmental requirements. As a minimum, subcontractors and their employees will be required to comply fully with the requirements of the ESHS System and its associated Management Plans as it applies with site safety, health, social and environmental management and control. The responsibilities of subcontractors' personnel are identical to the responsibilities of Contractor's project personnel in all aspects of safety, health and environmental management and control.

Contractor's Environmental Representative (ER):

The ER reports directly to the Project or Construction Manager, and is responsible for ensuring that the Contractor delivers through its various design and construction business units all of the prescribed environmental outcomes. The Contractor's ER will ensure the implementation of the environmental safeguards, and liaise with relevant regulatory authorities.

External Resources:

All levels of management are responsible and accountable for ensuring that appropriate resources are available to enable the ESHS System and Management Plans and accountabilities to be met.

Including:

- allocation to personnel of adequate time to manage ESHS issues;
- appointment of competent and experienced personnel to manage ESHS issues;
- provision of ESHS training; and
- purchase of appropriate equipment.

6.2 Contractor Roles and Responsibilities

Throughout the life cycle of the NLGM, Aureus will designate various contractors through contractual agreements to construct the mine and associated facilities on its behalf. The contracts will contain a contractor's pack and in addition each contractor must comply with all of the specific requirements within the ESIA, ESHS System and Management Plans.

7 EMERGENCY PREPAREDNESS AND RESPONSE

A project of this nature can lead to a number of emergency situations for which an appropriate response is required. As part of the Management Plans, an Emergency Response Plan has been developed which includes more detail on how emergencies will be dealt with. The Emergency Response Plan will apply to all phases of the Project, and is designed to minimize impact and effect of any accidents and emergency situations involving the exploration and construction activities, and the mine's physical structures or operational practices.

The Emergency Response Plan will be developed in conjunction with the other Management Plans developed for specific major construction, operation, decommissioning/ closure, and post-closure phase activities, and will be reviewed and updated, as appropriate, on at least an annual basis. The Emergency Response Plan will identify key emergency-related roles and responsibilities, and will provide direction on required responses to operational or environmental emergencies.

The Plan should be developed in conjunction with the findings of the Risk Assessment to ensure that emergency plans are in place for risks identified. Scenario planning and emergency response planning will need to be undertaken to ensure emergencies situations have been communicated and understood by all personnel.

In addition to the emergency notification requirements addressed in the Plan, the circumstances and response actions associated with any significant spills, releases, accidents, near-misses, or other emergency situations for which Aureus has direct responsibility will be documented and investigated, and appropriate corrective and preventive actions will be taken in conformance with the Non-compliance/ Corrective Action Management Plan. Preventive actions in such cases will require a mandatory review of the adequacy and effectiveness of the Emergency Response Plan and its supporting procedures, and subsequent updates as warranted by the results of the review.

An emergency response plan is in place to cover:

- Accidental spills of hazardous materials;
- A major spill or dam/TSF failure;
- Human conflict or violence;
- Other accidents involving personnel on the work sites; and
- Major failures, such as landslides, disease, mine failures, fires, flooding, structural collapse, etc.

8 STAKEHOLDER ENGAGEMENT

A detailed Stakeholder Engagement Plan (SEP) has been developed and incorporated into the Management Plans. The approach in the compilation of the NLGM SEP comprises *six* main components, namely:

1. *Background*, which provides a brief description of the proposed project and describes the contributors to be considered for successful development and implementation of the SEP;
2. *Strategy*, which describes the SEP vision, goals and objectives;
3. *Regulation and requirements*, which provides an overview of the regulatory drivers;
4. *Consultation history*, which summarises consultation activities undertaken;

5. *Engagement mediums*, which describes proposed mediums to be used during stakeholder engagement activities; and
6. *Implementation plan*, which describes the various Stakeholder Engagement (SE) plans forming part of the SEP.

The Implementation Plan for the SEP constitutes various components (see Figure 8-1) focussing on internal organisational capacity and various implementation plans, each with a different focus. In the SEP the following is documented:

- Corporate Stakeholder Engagement Plan;
- SE Implementation Plan for the Mine Lifecycle;
- SE Implementation Plan for Issues Resolution;
- Grievance Mechanism;
- SE Implementation Plan for the ESIA Update;
- SE Implementation Plan for the Community Development Plan (CDP); and
- SE Implementation Plan for the Resettlement Action Plan (RAP).

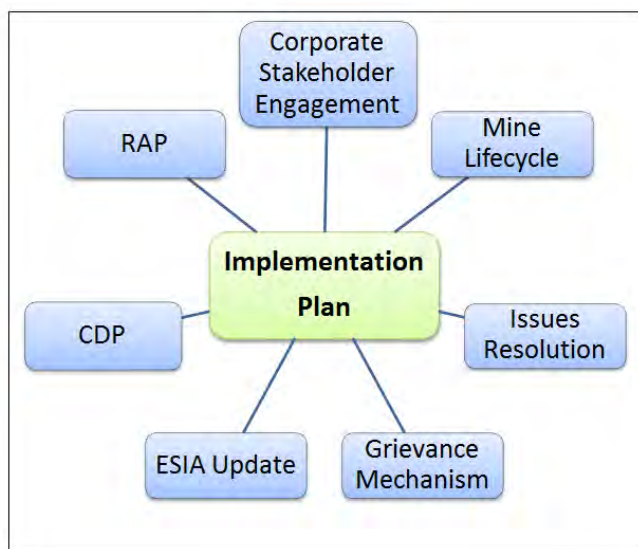


Figure 8-1: Implementation Plan

More detail on the above implementation plan is included in the SEP for the NLGM.

9 MONITORING, REPORTING AND REVIEW

The purpose of monitoring is to follow changes over a period of time and to assess the efficiency of control measures, through a process of repetitive and continued observation, measurement and evaluation of environmental data.

The monitoring process is designed such that the process is applicable at a strategic, programme or project level. Specific indicators need to be monitored regularly to ensure that projects/programmes are socially, environmentally and ecologically sustainable. Further, the monitoring process is applicable to all types of monitoring.

9.1 Environmental and Social Monitoring

Monitoring and reporting provides a direct measure of the project's impacts, the consequences of its operations and the efficiency of the key controls that for part of the ESHS System. By ensuring all controls are monitored, impacts identified and actions taken, the operation can maintain environmental performance. Environmental and Social monitoring includes:

- monitoring of the implementation of ESHS Management Plans;
- regular inspection of facilities, plant and equipment against performance criteria;
- environmental monitoring of ecological impacts over time;
- monitoring of social, cultural and heritage impacts over time;
- reporting and analysis of discharges, emissions and waste disposal; and
- annual reporting of results to Aureus management and to other stakeholders as required.

The focus and extent of the monitoring should be in line with the risk of the pollutant releases as related to the sensitivity of the surrounding areas, taking into account the Affected Community's perception of risks to their health and environment resulting from the project. Appropriate processes should also be in place to ensure the reliability of data, such as calibration of instruments, testing of equipment, and software and hardware sampling. Specific environmental monitoring measures comprise the parameters to be measured, sampling and analytical methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and the definition of thresholds that signal the need for corrective actions. Where external laboratories or other analytical services are required to analyse samples, these should be certified at least under nationally recognized schemes to ensure measurements and data provided are accurate, defensible and reliable.

Specific details of the monitoring plans are included in the various Management Plans. These plans will be expanded and modified regularly as the monitoring reports are compiled and the data interpreted. As the project moves into the operational phase, these monitoring plans may need to be modified or adjusted to ensure issues identified during the project life cycle are incorporated into the monitoring protocol and addressed.

For more detail on each of the monitoring plans proposed, refer to the various environmental and social Management Plans developed, as well as the compliance monitoring plan and non-compliance/corrective action procedure.

9.1.1 Equipment Requirements

In order to implement the monitoring plans, inspection, monitoring, measuring and test equipment must be:

- Calibrated or verified against a traceable standard at specific intervals.
- Controlled / safe guarded from unintentional adjustments.
- Identified and maintained to ensure compliance with specified customer and legislative requirements.
- Stored and protected from damage.
- Recorded or contain identification in order to determine its calibration status.

- Where no calibration standard exists, such as in the case of computer software, the method used for calibration or verification of the software's ability to satisfy the intended application must be confirmed. This verification must be undertaken prior to initial use and reconfirmed as necessary.
- Monitoring results must be collected and analysed using descriptive statistics on a regular basis for:
 - Trends and potential exceedences from legal and other requirements (such as operating criteria or occupational exposure limits).
 - Inconsistent or unusual results.
 - Evaluating the effectiveness of existing controls.
 - Conformance against stated objectives and targets.
 - Continual improvement opportunities.

Exceedences from specified requirements or limits must be recorded, investigated and reported back to the people or area of operation involved. The appropriate actions in response to the exceedence must be recorded, assigned accountability and tracked to completion. Refer to the Non compliance and corrective action procedure in this regard.

An explanation of monitoring results must be reported back to the person(s) concerned, within a reasonable time from when results are available.

9.2 Performance Assessment Monitoring

In addition to the monitoring of environmental and social aspects, the monitoring of the performance and compliance of the ESHS System is required. This is to ensure the operation or site's management system is efficient and effective in managing ESHS performance and meeting Aureus and other legal/lender requirements.

There must be a procedure for completing a review of the management system, at least annually. The review must evaluate any need for change and establish actions to improve the system, its processes and resource needs.

Review Requirements:

The review must be led by senior management and consider:

- a) The suitability of the policy(ies).
- b) The impact of changing legislation.
- c) The management of risk registers.
- d) ESHS System objectives, targets and performance indicators.
- e) Changing expectations and requirements of relevant stakeholders/communities (including complaints).
- f) Changes in the products or activities of the organisation.
- g) Changes to the structure of the organisation.
- h) Communication and feedback (particularly from employees and customers).
- i) The effectiveness of the management of change process.

- j) Workplace, environmental and medical monitoring.
- k) The status of corrective and preventive actions.
- l) Performance statistics, including an annual summary of safety statistics, occupational hygiene, medical and environmental monitoring results.
- m) Findings of completed audits and reviews.
- n) Follow up on actions from previous management reviews.
- o) Recommendations and opportunities for improving the effectiveness of the management system.

The official copy of this document will be made available on the Aureus website and will be submitted to external parties where required.

Records of completed management review(s) must be retained and include:

- a) Decisions and actions relating to possible changes to policy(ies), objectives and targets.
- b) Information relating to revised risks and any proposed treatment and controls.
- c) Improvement suggestions for inclusion into future management plans.
- d) Any other alternation, modification and improvement to the management system that demonstrates a commitment to continual improvement.

Relevant outputs from the management review(s) must be made available for communication and consultation throughout the business or managed site (including the reporting of suggested improvements or case studies on leading practices to Aureus Mining ESHS System).

9.3 Audits and Non Compliance Procedure

Environmental audits help in assuring the accuracy and relevance of environmental monitoring, and the identification of issues via the audit process may also lead to environmental standards that exceed regulatory requirements.

Audits can apply at a project level as well as at a strategic level. Further, audits tend to involve a broader scope of projects, though depending on the nature of the organisation, usually only a sample is taken. Audits are conducted less frequently than monitoring, often annually or biannually. Audits should use a systematic and structured approach to record whether an Aureus is meeting its ESHS Management Plan objectives.

A requirement of an environmental audit is that evidence must be verified by supporting documents, if this is not the case, then the process is a review, survey or assessment, but not an audit. Numerous types of environmental audits can be carried out for various types of projects or sites. The choice of a suitable audit type depends primarily on the purpose of the audit.

9.3.1 Audit Protocol

The auditing protocol can be applied to any level and type of auditing. Thus the protocol can be used at a strategic, project or programme level and it can be used for a compliance audit, environmental management programme audit, ESHS system audit, due diligence environmental audit, etc.

In determining the scope of the audit, one can also decide how much time, money and personnel should be allocated. Appropriate personnel should be appointed. The appointed team members must be suitably qualified to undertake the audit and are able to interpret and analyse the data.

Two types of information is required, the first type is the details of the actual programme or project. The following details may be required:

- the purpose of the project/activity/programme/tool.
- type of project/activity/programme/tool.
- Timeframes of the project/activity/programme/tool.
- activities of the project/activity/programme/tool.

The second type of information that is required is background information on the project/activity/programme/tool. The extent of the information will depend on the objectives of the audit:

- If auditing for legal compliance, knowledge of the legislation which pertains to the project/activity/programme/policy, must be obtained
- If auditing tools, the uses of the tools must be known, the current effectiveness of the tools must be established, as well as the intended outcome of using the tools.
- For compliance audits, a clear understanding of permit/licence/Record of Decisions conditions and the EMP/regulations must be known.
- If auditing targets, the targets and mechanisms to achieve the targets must be known. Targets could be environmental, social or economic and there may be indicators in place for monitoring the achievement of the targets, in which case all previous monitoring and auditing data must be known.

Audit information regarding legal compliance, performance monitoring data and the use of tools is best gathered by conducting interviews with the licence holder, the project manager, the engineer, etc. Information from project reports, trend analysis, evaluations and raw monitoring data may also be used. The people to be interviewed during the audit must be identified and informed of the process.

Some sections of the audit may also be carried out through observations made at the actual project site or other audit areas. Again, the project team should be made aware of what types of auditing will be carried out during the project, and when and where the audit will take place.

A questionnaire or checklist should be compiled based on the audit objectives and scope. Checklists should be carefully prepared for each area to be audited. Suitable data for each indicator should be gathered based on the information obtained during the monitoring protocol of each project.

The results of an audit are obtained by comparing the information gathered during interviews and from reports with the objectives that were originally identified as well as the actual on the ground situation.

The simplest way to evaluate the results is to determine which aspects of the checklist were not evaluated. A trained person must then evaluate the significance of the omission or problem.

Alternatively, the checklists could be divided into sections based on the importance of each aspect. A weighting system could also be applied to the checklists. Various types of statistical analyses may also be applied to evaluate the results, particularly the results obtained from auditing indicators and environmental performance data obtained from the monitoring process.

The findings of the audit should be presented to all members that were present during the audit. Audit results at a strategic business level may be included in other reporting mechanisms such as annual reports.

A requirement of an environmental audit is that evidence must be verified by supporting documents, if this is not the case, then the process is a review, survey or assessment, but not an audit, hence the audit report must be supported by the relevant documents indicating non compliance.

A decision should be made based on the significance of the problem and the resources (financial, human, etc) required to improve the situation.

9.3.2 Reporting and Initialising Corrective Action

Audit results will be documented to indicate the deficiencies found and the corrective actions required. Corrective actions to address non-conformance must be assigned and tracked until completion. Before being closed out, corrective action requests will be followed up to ensure that non-conformance has been corrected.

Identification of the root cause of non compliance will result in actions to eliminate or reduce the risk to the project, or to mitigate consequences.

Corrective and preventative actions will be applied that are:

- ☑Appropriate – relevant to the magnitude of the ESHS risks;
- ☑Actionable – the action is worded in a clear, concise and easily understandable manner;
- ☑Achievable - the person designated can complete the action(s) within the timeframe given; and
- ☑Auditable – completion of the action produces evidence that can be verified at a later date

A framework of how to manage non-compliance is listed below:

- Identify the non-compliance,
- Document the non-compliance,
- Determine the required corrective action,
- Take remedial or corrective action,
- Prevent recurrence of non-compliant issues, and
- Follow up and close out of non-compliant issues.

A non compliance and corrective action procedure has been drawn up for Aureus as part of a suite of management plans that fall within this ESHS System. Please refer to this procedure which will be followed in the event of non compliances being reported.

9.3.3 Variance Request

Where an operation or site recognises it cannot currently conform to an element or clause of the ESHS or the Management Plans, it may submit a variance request.

A variance is an action plan that either puts in place temporary controls to treat the risk resulting from the non-conformance until such time as engineering or procurement issues can be resolved; or it details the process that the business is undertaking to obtain conformance.

The process for submitting non-implementation and variance requests is defined in the work cycle document applying for a non-implementation or variance against Aureus Mining standard. The information will be entered into Aureus Mining's corporate reporting tool – and must be signed off by the implementing operation or site's General Manager and managing director. The Aureus HSE discipline leaders must approve a non-implementation statement and/or variance submitted by the operations managing director before the operation is audited.

9.3.4 Audit Team

Most of the audits outlined above can be conducted by qualified professionals from the Aureus Project who have relevant auditing experience, and knowledge of the audit topic. Independent audits will also be conducted (that is, by people external to the project) to gain an independent assessment. Representatives from external agencies, such as IFC, will also be invited for audits.

Internal audits may be carried out more frequently, depending on the level of risk associated with a particular work area/mine operation and historical performance. External audits are recommended to be undertaken bi-annually, but more regularly if required or requested.

Contractors will be audited to ensure compliance with the projects' ESHS System and Management Plans and relevant standards.

An audit team will, at a minimum, comprise a Lead Auditor, an engineer (or person with appropriate knowledge) familiar with the plant/equipment and/or process, and a person with experience in the relevant field e.g. environmental management.

9.4 Incident Reporting

All employees, contractors and subcontractors shall immediately report any accident/incident or near miss at the NLGM site, work sites, or on NLGM operating areas to their supervisor.

Investigations shall ensure that direct and root causes are identified. Corrective and preventing actions are determined and lessons learned are shared in a timely manner. All corrective actions shall be followed up to closed out and where necessary adjustments to the Management or Monitoring plans carried out.

9.5 Management of Change

Throughout operations, changes to the existing organisation, personnel, property, operations and processes will take place and a system to incorporate these changes is included here.

The Aureus Change Management Procedure:

- Identifies proposed changes that have the potential to impact environmental performance or require modification of existing permits (including changes to Aureus, personnel, property, operations and processes);
- Defines the level of risk assessment appropriate to proposed changes;
- Requires risk assessments of proposed changes, considering potential implications for environmental performance. Ensure competent staffs are involved in the risk assessment of the proposed change;
- Agree on modifications to existing controls or other actions to mitigate environmental risks prior to authorizing the change;
- Obtain all new permits or necessary modifications to existing permits and implement actions to mitigate risks and ensure compliance prior to implementing the change;
- Document the changes made, including maintenance of “as built” drawings and new or modified procedures. Communicate these changes to relevant personnel;
- Ensure the environmental aspects identified during changes are evaluated for significance and the Legal and Other Obligations Register is revised to include all amendments resulting from the change. Notification and training of those with environmental roles and responsibilities must be made and documented; and
- Maintain a register of the significant environmental risks associated with the changes as part of the environmental management system that is considered when setting objectives and targets and when similar changes are evaluated in the future.

10 DOCUMENTATION

Documentation and record keeping is an important part of Aureus’ duty of care, and provides an audit trail for problems and issues to be systemically identified, investigated and remedied. Aureus’ will develop a corporate document control system. The control of documents aims to verify that correct procedures, standards, controls and actions are implemented. Generally, document control ensures that:

- information can be readily associated with the appropriate organization, division, function or activity; documentation can, periodically and as necessary, be reviewed, revised and following approval by authorized personnel, reissued;
- current versions of documents are readily available for use; and
- obsolete versions are promptly removed from all points of issue and use.

There must be a process for the control of documents.

- Provide for the review, revision and version control of documents.
- Require approval of the documents for adequacy prior to issue.
- Uniquely identify documents as appropriate to control their operational use and function.
- Identify external documentation that is relevant and control the distribution of external documents.
- Provide for the effective distribution of documents to, and where necessary, the timely removal of obsolete documents from all points of issue and use.
- Clearly identify changes and record the status of any revisions to documents.

There will be a central document control department to manage documents critical to the project. Procedures and responsibilities will be established to govern the modification of documents, and to ensure their availability to employees, contractors, Government agencies and the public.

11 TRAINING AND AWARENESS

The provision of training to Aureus personnel and contractors will ensure that they have the ability to manage the ESHS aspects of their roles, with the detailed approach to training, awareness and competency being presented through various training mechanisms.

ESHS System training during the project will comprise the following:

- General Induction for new staff and contractors – introduction to the site and assigned tasks in regard to ESHS System;
- Site specific: Tailored to actual site and job description to allow personnel to complete assigned tasks;
- Task Orientated Training: provide ‘on the job’ and focussed on specific ESHS critical activities e.g emergency response, spill prevention
- Company ESHS Training – general ESHS courses offered by Aureus; and
- External Training: particular courses attended that will benefit the employee, Aureus personnel or contractor. Training procedure will take into account the differing levels of rise, responsibility, ability and literacy of personnel.

Training courses will be developed for particular phases of the project (e.g. construction and operation) and locations. They will be based on the results of risk assessment, and cover the key controls needed to manage the key risks that the company faces. A training matrix to specify which personnel must attend what course will help track personnel development and competency. Standards for assessing competency will be included in training courses, contract award, job hires etc.

The project will establish and maintain procedures to ensure that employees and contractors working in ESHS critical roles are aware of the:

- Key ESHS risks associated with their work environment
- importance of compliance with the ESHS policies and the requirements of the ESHS management plans;
- consequences (potential or actual) of their job activities and the benefits of improved personal ESHS performance;
- specific roles and responsibilities of individuals in achieving compliance with the ESHS policies and procedures and ESHS Management Plans; and
- potential consequences of not following specified operating procedures.

Specific information about training relevant to each Management Plan is included in the relevant ESHS management plans and procedures and will be developed in more detail as the Management Plans are updated.

Refresher training will be provided to all staff on at least an annual basis. Additional training in the specific requirements of the management plans and procedures that support the ESHS System will be provided, as appropriate for individual work assignments. Specific training requirements applicable to suppliers or contractors will be defined within the context of their individual contracts or purchase orders. Site visitors will be escorted and required to complete an ESHS briefing on arrival at the NLGM.

All project personnel employed in ESHS System critical roles are expected to attend periodic and minuted communication meetings. These may include, but are not limited to:

Monthly Management ESHS System Meetings

Monthly meetings are a forum to discuss all ESHS System information relating to the project. Attendees will include Senior and Line Management and ESHS Coordinators. Representatives from the New Liberty Gold Mine - NLGM environmental and social Department will also attend. The meetings will analyse incident statistics and reported hazards to identify trends that allow the project to channel resources to the appropriate areas.

Weekly Site ESHS Management Plan Meetings

Weekly meetings are an informal forum to:

- review site hazards and risks;
- review actions of previous minutes;
- present new ESHS Management Plan material; and
- facilitate general points for discussion.

Daily 'Tool Box' Talks

'Tool box' talks are generally conducted prior to the starting of a shift or of any unusual or hazardous task. A briefing includes the proposed operation and any associated hazards or risks. Comments and suggestions are encouraged.

Contractor and Sub-contractor

Contractor, sub-contractors and external resources will need to be trained in all ESHS Systems and Management Plans. This could be done through various methods but will include inductions, regular meetings and through feedback mechanisms.

Contractors and Sub-contractors will be informed regularly of ESHS System performance and will be included in updates during Operational or Technical Committee meetings.



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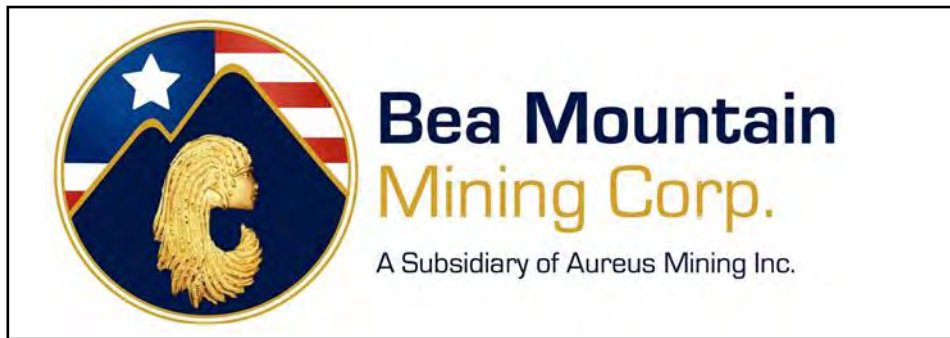
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ESHS SYSTEM

Document No: **A/BMMC-ENV-SYS-001**

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SOLID AND LIQUID (NON HAZARDOUS) WASTE MANAGEMENT PLAN

A/BMMC-ENV-MP-010

AUREUS MINING INC.

March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date

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1. INTRODUCTION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drawn up to integrate the management measures applicable to the project. This Solid and Liquid Waste Management Plan (Waste Management Plan) forms part of the ESHS system and incorporates the mitigation measures that have been identified to manage on-site non hazardous waste.

2. APPLICATION AND SCOPE

The plan addresses the management of domestic and industrial solid and liquid waste derived from all the NLGM activities. It considers the full waste stream from collection through to disposal and presents the approach to waste reduction, recycling, and waste disposal routes.

Note: This plan does not deal with hazardous waste. A separate Hazardous Waste Management Plan has been drawn up to deal and should be referred to when required.

This Management Plan should be read in conjunction with the Aureus Waste Management Guideline which is in draft form but deals with all forms of waste on site.

2.1 Objectives

The objectives of this Management Plan are to:

- Ensure that Aureus complies with regulatory requirements and best practice in the area of non-hazardous waste management within the context and limitations of operating in Liberia;
- Protect the Aureus employees, contractors, local communities and the environment; and
- Maximise the beneficial reuse and recycling of non-hazardous wastes.

3. WASTE IDENTIFICATION AND MANAGEMENT

3.1 Sources of Waste

Throughout the construction and operation of the NLGM in Liberia, a number of waste streams are expected to be generated. The operator has to deal with these wastes in order to be able to operate in a cost effective and compliant manner. The construction phase will be one of the more important phases to implement this plan due to the generation of waste prior to the correct facilities being constructed. The majority of non hazardous waste will be consist of the following wastes:

- Domestic wastes:
 - Organic waste (i.e. any food remains or wastes that have been in direct contact with food such as containers, napkins, wrappers);
 - Tins, cans, bottles;
 - Paper and cardboard;



- Some plastics; and
- General village related and office wastes such as used office supplies, liners.
- Inert bulk waste:
 - Timber;
 - Conveyor belts, tyres;
 - Crusher and chute liners, screen elements;
 - Motors, v-belts;
 - Piping and fittings;
 - Building and bulk debris, cladding, carpeting, drywall, light bulbs (except mercury vapour/low energy bulbs which are hazardous waste), broken glass, and insulation; and
 - Scrap metals.

Waste will need to be managed throughout the different phases of the mining operation.

3.2 Management through all phases of the project

3.2.1 General Waste Management

General waste is a generic term for waste that, because of its composition and characteristics, does not pose a significant threat to public health or the environment if properly managed.

Procedures to be developed for solid and liquid waste will take into account the management of the following waste streams:

- Paper and Cardboard Waste;
- Domestic Waste;
- Plastic And Rubber Waste;
- Scrap Metal Waste;
- Wood Waste;
- Building Rubble Waste;
- Garden Waste; and
- Glass Waste.

While it is permissible for the above waste types to be disposed of at any general landfill site, this is not an ideal situation in waste minimisation terms. Rather, the above waste types to be subjected to the waste minimisation criteria specified in the procedure below.

No solid, semi-solid or liquid material shall be discharged into rivers, streams or other surface water body without prior treatment sufficient to meet the Project governing standards. The use of non-licensed or non-approved landfills for disposal of waste is strictly prohibited and dumping of waste will be monitored to ensure it does not take place.

3.2.2 Liquid Waste/ Sewage Management

Liquid waste refers to on site sewage and waste water directed to the sewage treatment facilities. Staff accommodation and associated facilities will require a sewage treatment plant. The sewage will be disposed of to septic tanks and the resultant overflow from the sewage tanks will be disposed of on to the TSF. As required the septic tanks will be emptied out and the solids placed on specially constructed drying beds. A sewage treatment plant and system will service the accommodation camp and the processing plant areas. Toilet and wash facilities in the resettlement village site will have the waste water directed to numerous septic tank facilities which are situated down gradient of any of the water provision boreholes. The sewage treatment systems will comprise of an underground tank, and an aerobic treatment unit and water effluent disposal to the TSF for the area below the plant and offices.

Aureus must ensure that the correct sewage management technology and plant sizing is in place to cater for the volumes produced.

Water from the urinals, water closets, wash hand basins, showers will be sent to the sewage treatment plant.

3.2.3 Sewage Treatment Capacity

This can also be divided into two phases:

Construction Phase:

- To have capacity for 810 construction people can be broken down as follows:
- 500 will stay in the operational camp and use 35 litres per day on Site– 17500 litres/day
- 300 will stay in local villages (contractor will not provide accommodation – 50% will shower on Site) (will only need water on Site – 80 litres/day) – 24000 litres/day
- Total = 41 500 litres/day

Operational Phase:

- To have capacity for 300 operational people which can be broken down as follows:
- 200 will stay in the operational camp and use 35 litres per day on Site– 7000 litres/day
- 100 will stay in local villages (contractor will not provide accommodation – 100% will shower on Site) (will only need water on Site – 110 litres/day) – 11000 litres/day
- Total = 18000 litres/day
- One sewage treatment plant located at the Project plant with a capacity of 50 000 litres/day will be supplied. This is required for the construction phase of the Project. This value will decrease to about 18000 litres per day during the operational phase.

Duty description

- Plant operation will be for 24 hours per day, 365 days per year and shall operate with an availability of more than 98%. Automatic and unattended operation required;
- The operational design life for the Goods is to be for a minimum of 10 (ten) years;

- The sewage treatment plant must be supplied with a suitable sized buffer tank to allow the plant to cope during peak times.

3.2.4 Waste Minimisation Philosophy

Aureus will apply a waste management philosophy throughout all phases of the project which will comply with the following table:

Most Preferred
Avoid
Reduce
Reuse
Recycle
Recover
Least Preferred
Treat
Dispose

AVOIDANCE

Waste avoidance is the preferred strategy and therefore, ranks first. It is the most cost effective, as no waste means no cost is involved in its management. Waste avoidance is applicable to the point of purchase, for example, the warehouse. In order to implement waste avoidance the following principles apply:

- Bulk buying
- Use of recyclable packaging
- Prevention of spillage
- Correct handling
- Use of electronic media instead of paper.

REDUCTION

After waste avoidance, the next important option is waste reduction. This involves the careful purchasing of bulk buying of materials, thereby cutting out unnecessary packaging, as well as looking into using materials more efficiently, implementing new processes and technology, and replacing disposal products with reusable and durable ones where practical.

The following will be considered rules of thumb for reducing waste through procurement:

- Avoid purchasing disposable items;
- Purchase durable and repairable goods;
- Purchase recycled goods;
- Avoid goods that have been over-packaged;
- Buy in bulk;
- Buy larger sizes and quantities;

- Buy in a concentrated form;
- Use refillable containers; and
- Choose recycled or reusable packaging.

REUSE

Reuse a product more than once for its original purpose avoids the excessive consumption of resources and waste generation, e.g. reuse of plastic containers.

RECYCLING

When reuse can no longer be carried out, the materials will preferably be recycled back into similar products or become secondary raw materials for the production of new products. Producing new products from recycled materials consumes less energy and minimises the impacts on the environment through mining, timber products and petroleum resources for the primary virgin materials.

Wherever possible suppliers of equipment or products will be encouraged to take back the containers they have brought to site with the return trips. This will apply to suppliers of chemical products, lubricant and fuels where there are provided in smaller containers. The suppliers of larger items of once off items will also be encouraged to receive back the packaging in which the products came if they cannot be used on site.

In addition to conserving resources and reducing the environmental impacts, recycling minimises the use of landfill space, is an important universal issue, and for Aureus as landfill sites as well. Aureus do not want to turn productive land unnecessarily into wasteland.

The concept of recycling is based upon the product being reused. Without a demand for recycled products, there will be no need to supply recyclable waste. This concept is referred to as 'closing the loop'. It is important to note that many recycled products are enhanced for better performance and are competitively priced. There are a wide variety of recycled products available, these include:

- Glass/metal/plastic products;
- Paper and paper products;
- Printer cartridges;
- Packaging materials (e.g. shredded paper);
- Re-refined oils;
- Recycled solvents;
- Plastic pallets;
- Lubricants; and
- Re-thread tires.

RECOVERY

Recovery is a viable option after reduction; reuse and recycling have been fully explored and generally is the final step in the exploitation of maximum benefits from waste. It involves the incineration of waste (under strictly controlled conditions and licensing) and the recovery of the

latent heat energy of the materials. The heat energy can then be converted into power to be used commercially or domestically.

TREATMENT AND DISPOSAL

This is the last and the least preferred options in the waste hierarchy. There are always residual materials left over as waste even after undergoing the preferred options in the solid waste management hierarchy. The leftover waste occasionally requires treatment prior to disposal to safe guard against environmental risks, social, health, pest harms and safety issues.

3.2.5 Waste Management during Construction

Prior to a landfill site bring available, the following additional measures for the construction phase should be carried out:

- Waste accumulation and storage areas shall be constructed around the construction site in demarcated areas
- No drums or containers shall be stored directly on the soil if they contain potentially hazardous material
- Collection areas shall be covered to avoid the deterioration of materials
- Vehicle access control shall be maintained
- Areas shall be ventilated
- Dedicated areas for hazardous and non-hazardous wastes shall be provided
- Provide for segregation of recyclable and reusable materials from those items intended for disposal
- Signage and training shall be implemented as described in this plan
- Waste will be accumulated until recycled, reused, returned or disposed of onto an acceptable waste disposal site.

Waste management during construction will be closely controlled through binding agreements with contractors, such as the Contractors Management Plan and the other Plans incorporated into the ESHS System.

3.2.6 General Waste Landfill Site

A general waste landfill is an important part of waste management at the NLGM site. The volume of waste being produced will increase during the life of the mine. Waste management will follow the normal hierarchy of: minimisation, then recycling where possible, then prevention and re-use, before disposal is considered at the NLGM general/domestic waste landfill site.

A general landfill site will be commissioned at the NLGM accommodation camp. The waste will be compacted and backfilled as and when required after all potentially recyclable material has been removed. Burning of waste will be carried out on a scheduled basis. The general waste landfill site will be fenced and properly demarcated with proper signage boards. Waste production shall be minimised and waste re-use encouraged on site.

The facility needs to still be designed using internationally accepted standards for waste disposal for similar facilities. The design will need to take into consideration both operational and closure plans to ensure that it is left in a condition which is sustainable and not a problem for the people who will be using the land after mine closure.

It is recommended that food waste should not be landfilled but composted. The compost can be sold or used in community farming programmes or during rehabilitation, there are also other benefits such as the use of food waste to produce biogas that can be used for cooking or heat generation, thus possibly resulting in reduced consumption of fossil fuels.

3.2.7 Waste Labelling

Waste labelling involves the clear labelling of waste stream disposal / transfer receptacles such as drums / bins and or skips. It helps employees keep wastes separated and reduce the risk of contaminating a product that could be recycled.

There is currently no formal standardisation or regulation standard for colour coding of waste streams. The following standardised colour coding system will be implemented for all significant waste streams to be managed by Aureus operations.

The colour coding system is presented in the table below and may be subject to change.

Waste Stream	Colour Code
Paper and cardboard	Pink
Domestic (general) waste	Blue
Plastic and rubber waste	Orange
Scrap metal waste	Dark Green
Wood waste	Black
Building rubble waste	Grey
Garden refuse	Light green
Glass	Light blue

The colour-coding chart needs to be displayed at the waste generation and transfer areas. These instructions must be adhered to, to prevent contamination of wastes or injury to people.

3.2.8 Waste Signage

The purpose for waste signage or to use the current term "environmental graphics," is to provide waste information that is easily understandable. The type of sign used will depend on the type of information being provided. The five categories of signs are:

- Warning, danger, caution, and emergency;
- Notice and standard operational sign;
- Directional sign;
- Rules and regulations; and
- Sign graphics.

When designing and mounting the signage, the following should be considered:

- Finish and Contrast. Characters and symbols shall contrast with their background --either white characters on a dark background or black characters on a light background.
- Mounting, Location and Height. Where permanent identification is provided the signs be installed on the wall behind the disposal area or on the nearest adjacent wall or in absence fitted on poles or a fence. Mounting height shall be 1525 mm above the finish floor to the

centre line of the sign. Mounting location for such signage shall be so that a person may approach within 76 mm of signage without encountering protruding objects.

- Sign Design Elements The design elements will be consistent throughout the facility placement, size (no smaller than 10cm in height), shape, repetitiveness, colour, and graphics (Aerial Bold).

3.2.9 Managing redundant materials

Aureus operations generate redundant industrial equipment, which is usually termed 'redundant' because it has value through reuse or refurbishment. Typical redundant materials include pumps, valves, motors, chain blocks, pipes, etc. It is important to manage these waste streams for the following reasons:

- Managing redundant equipment reduces the need for disposal to the industrial waste stream and maximises reuse. Furthermore, refurbished equipment costs a fraction of the replacement cost which can result in significant cost savings;
- Redundant materials can contain hazardous substances such as oil, which will cause pollution if allowed to enter the environment and contaminate the soil, surface water and groundwater;
- Poorly managed redundant material storage areas are often perceived by staff as an ideal area for waste disposal.

Any redundant materials or underutilised assets becoming available will report to the Commercial/Logistics department. Regular audits will be conducted at the Material storage areas and stocktake undertaken.

- Formal redundant material's storage area or a 'redundant yard' will be established at selected areas within the site. The following to be considered in the selection of a redundant yard site:
- The selected area will be placed on flat ground and be at a location that is accessible to the relevant mine staff;
- The area will be provided with suitable secure fencing to avoid unwarranted access to prevent theft and illegal dumping;
- The area will be underlain by hard surfacing e.g. concrete slab, which will drain to a single point fitted with an oil separator;
- A covered area will be constructed to protect easily corrodible / perishable materials from the elements;
- Vertical shelves or racks will be constructed to maximise the number of materials that can be warehoused; and
- The yard will be divided into separate areas for the storage of specific materials. All divisions will be clearly signposted.

A system will be implemented by Commercial/Logistic Services for the management of redundant materials and redundant yards. The following to be considered:

- Responsible persons will be assigned for the management of the redundant / scrap yard;
- All redundant items will be allocated numbers and be recorded in a detailed redundant material's inventory;
- Information on warehoused materials will be entered into a central electronic or manual database regularly;
- The database will contain details of redundant materials being warehoused to allow re-use at other departments and
- In order to prevent the accumulation and/or corrosion of warehoused materials, a storage policy will be implemented whereby materials that have been warehoused for established policy set years or more are sold on to the public domain or disposed into the waste stream.

3.2.10 Transport of Waste

General waste, including waste that does not pose a significant threat to community health or the environment is to be transported in such a manner that it does not impact on the surrounding environment. Therefore, the requirements and controls for transportation include the following:

- The areas where waste bins/drums are to be loaded will be designed to allow for a truck to undertake the refuse collection without any unnecessary spillage occurring;
- Ensure that the different waste collection areas are demarcated to prevent miss handling of recyclable waste instead of general waste;
- The waste collector / operator shall note that it is an offence to litter the environment and or discharge polluted water onto community or public places;
- The nature, composition and integrity of transport packaging and containers will be appropriate to the type and class of waste being transported.
- Transport vehicles will cater for the type, class and quantity of waste being transported in terms of its composition, load capacity, covering etc.
- Employees will be trained in the correct procedure to address accidents and emergencies.

3.3 Monitoring and Key Performance Indicators

Waste monitoring will involve the reporting of waste volumes generated and final disposal methods. The Environmental Management Department will maintain an inventory of all wastes arising on site including a description of the waste, its source, classification and volume. Waste volumes and the destinations of the wastes will be reported annually.

Establish a procedure to inspect and monitor waste handling and storage facilities in line with the degree of hazard of the waste. Corrective action must be taken where unacceptable conditions are identified.

Reporting on waste management will include annual reporting on the status of the WMP. This will incorporate notes on significant changes to waste management, future plans, and feedback on

annual review of the WMP for the reporting period. The report will also quantify the waste streams as far as possible.

Rigorous and regular auditing of the implementation of the WMP will enable the generation of recommendations that will monitor adherence to the WMP including the waste hierarchy, and will make recommendations for improved efficiency and reduced environmental/social impacts.

4. REPORTING AND DOCUMENT CONTROL

Site inspections will also be routinely conducted in and around specific waste facilities that are to be established as part of the construction and operational program. As part of the ESHS auditing programme, the waste management subcontractor and their own performance with respect to waste management on site should be included.

5. IMPLEMENTATION

It is much more protective of the environment and cost effective for the business to prevent spills and releases from occurring rather than cleaning them up after they occur. The most effective methods to minimize the number and severity of spills and releases is to ensure:

- proper training of personnel who handle waste;
- effective engineering design of infrastructure used to transport, store and use waste materials and
- full implementation of management systems and operating procedures to reduce inventories, prevent releases and promote rapid response to releases that do occur.

5.1 Responsibilities

Successful implementation of the recommendations in the waste-management guideline requires the appointment of specific waste management representatives at each departmental level within the Aureus Operations, i.e. e.g. exploration, mining, and other services. Appointment of responsible waste representatives will require clear communication of roles, responsibility and accountability for waste management.

Responsibilities are not limited to:

- Familiarisation with this waste-management guideline;
- Review of guidelines regularly;
- Development, implementation, and maintenance of waste management procedures;
- Development and monitoring key performance indicators (KPIs) to measure waste management performance;
- Identification of waste minimisation opportunities through the waste reporting system; and
- Implementation of waste management training programmes.

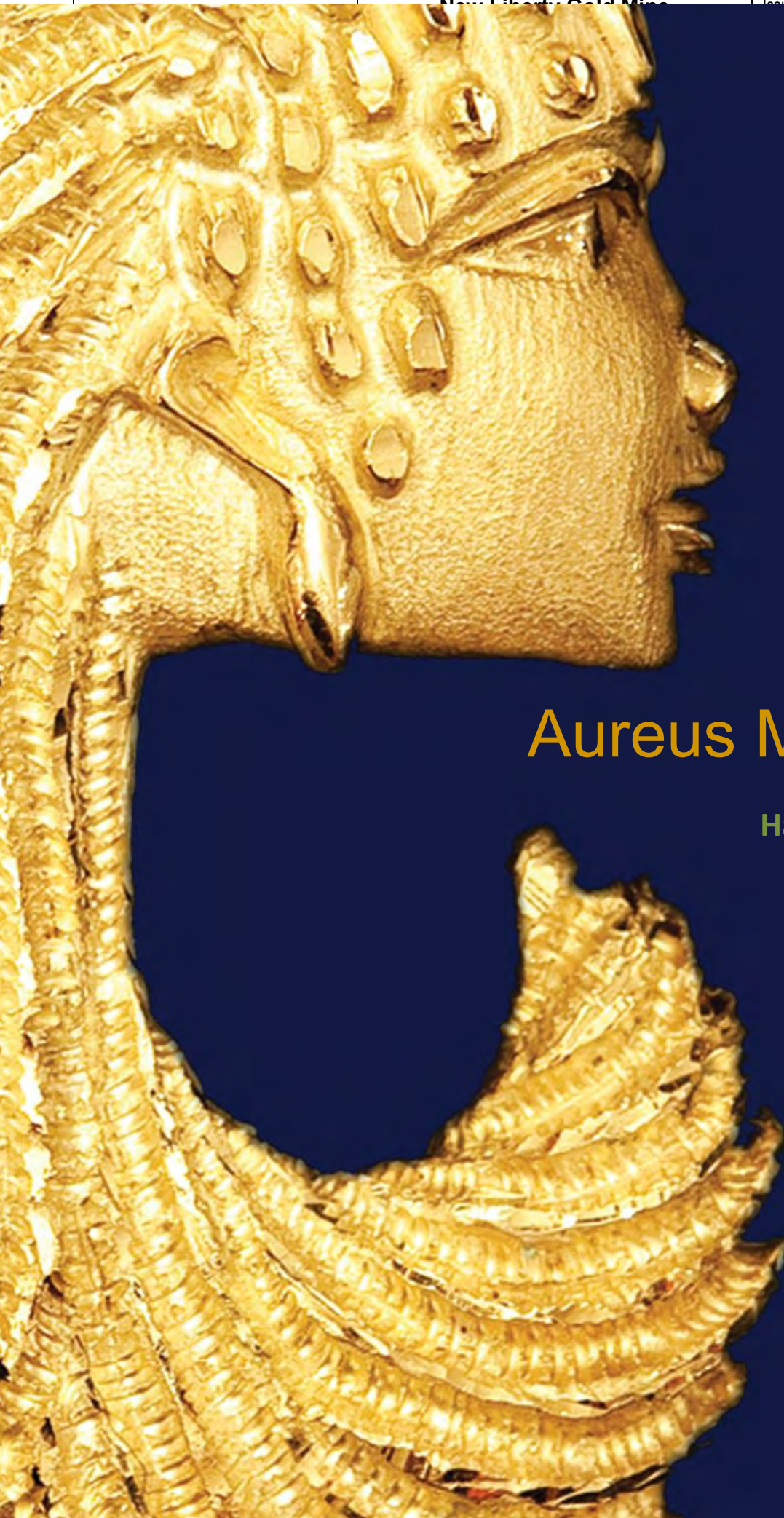
5.2 Training

Ensure that all employees and contractors involved with waste are fully aware of the associated environmental hazards and risks and are appropriately trained in routine activities and the waste minimisation philosophy.

The operation should assign accountabilities for the development and maintenance of induction and environmental education training materials, which include a package on the handling, use, storage, separation, transport and disposal of waste. Competence requirements and training records should be documented and auditable.

The training materials should cover:

- How waste is separated, stored, transported and disposed of at all areas of operation around the site;
- The possible environmental impacts of waste spillages;
- How to access and interpret the Materials Safety Data Sheet (MSDS) system.



Aureus Mining Inc.

Hazardous Materials and Contamination Control **Guideline**



**Bea Mountain
Mining Corp.**
A Subsidiary of Aureus Mining Inc.

**BEA MOUNTAIN MINING CORP.
New Liberty Gold Mine
HAZARDOUS MATERIALS AND
CONTAMINATION CONTROL**

Document No: HAZMAT-CTRL-001

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**Bea Mountain
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A Subsidiary of Aureus Mining Inc.

HAZARDOUS MATERIALS AND CONTAMINATION CONTROL

A/BMMC-SHEQ-HAZMAT-CTRL-001

Guideline

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1.0 Purpose

The Hazardous Substances and Contamination Control Standard specify a number of requirements against which Aureus Business Units and managed operations will be audited. The purpose of this Guidance Note is to assist Aureus Mining Business Units, managed operations and auditors, to interpret and address the requirements of the standard. This note provides explanation or detail on key requirements considered necessary, suggests how the requirements can be achieved, and provides further information on good industry practice.

The Guidance Note is non-mandatory. However, in assessing a Business Unit's compliance with the Standard, reviewers should expect general conformance to this Guidance unless the Business/Operation can demonstrate that it meets the intent of the Standard by an alternative approach.

The environmental management principles outlined in the Standard and discussed in this Guidance Note should be applied to all managed projects and operations from exploration/development through to closure.

1.1 Guidance Revision

The guidance note will be updated periodically, with relevant information being added as it becomes available. All practitioners with an interest or specialist skills in the subject of the guidance note are welcome to comment, make suggestion for improvement or offer best practice examples.

1.2 Requirements of the Standard

Aureus Mining Business Units and managed operations are required to adhere to this standard.

2.0 Planning

2.1 Risk Assessment

Identify and assess the environmental contamination risks and implement spill prevention controls associated with the transport, storage, use, transfer and disposal of hazardous materials, including failures of secondary containment structures.

Develop internal criteria for the assessment of site contamination when government regulations are absent or incomplete. The criteria must be approved by the General Manager (GM) and be in line with internationally accepted regulations, guidelines, definitions and methodologies.

2.1.1 What Are Hazardous Materials?

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Hazardous materials are broadly defined as any substance or article (solid, liquid or gas) that poses a significant threat to human health and/or the environment. Typically hazardous materials are toxic, corrosive, flammable, explosive or radioactive but the level of risk posed by these materials depends on the exposure dosage and frequency, the sensitivity of the exposed receptor and the consequence of the exposure. Included are a wide variety of man-made (i.e. synthetic) and naturally occurring (e.g. metals such as zinc and copper) substances. Many of these materials are a necessary part of our modern life, helping human activities and development, preventing and controlling many diseases and increasing agricultural productivity. However, when misused, they can adversely affect the environment and our health and safety.

Higher risk hazardous materials which are commonly used or managed at Aureus Mining operations include cyanide, acids, caustic soda (sodium hydroxide), lime, chlorine, pesticides, herbicides, explosives, some solvents, gasoline (petrol) and hazardous waste. Other substances can under certain circumstances be considered environmentally hazardous, including paints, diesel fuel, coolants, lubricants, glues, detergents, disinfectants, aerosols and sulphide concentrates. In most circumstances dilute oil/water mixtures (without recoverable floating product) and properly treated sewage (that does not contain any hazardous industrial inputs) would not be considered hazardous. However, raw or inadequately treated sewage may be considered hazardous because of human pathogens and because of its potential impact to aquatic ecosystems due to high biological oxygen demand and eutrophication.

The physical and chemical hazards posed by the materials must be understood before the environmental, health and business risks posed by transport, storage and handling of the materials can be assessed. This information should be readily available from Material Safety Data Sheets (MSDS), on container labels or from other manufacturer and/or supplier information.

2.1.2 Assessing the Risk Posed by Hazardous Materials

The threat posed by a material to the environment depends not only on what the material is, but also the amount that could reasonably be released, the potential migration pathways following release, and the proximity and sensitivity of receiving environments. Each of these components must be considered when assessing the environmental risks posed by the transport, storage, handling, use and disposal of hazardous materials at an operation. The likelihood and consequence of a potential hazardous material release must be considered when assessing the design of storage, transfer, processing and disposal facilities, and when assessing the need for and design of secondary containment systems, leak detection systems and special management requirements.

Innate Material Hazards – Materials which are highly toxic to aquatic life, people or terrestrial biota at low concentration will generally pose the greatest risk of environmental impact. Similarly those materials which are persistent in the environment (not prone to degradation or destruction by chemical or biological processes) and/or which are prone to bioaccumulation are most likely to have long-lasting impacts that will require costly remedial actions to correct.

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Potential Release Volume – Generally the larger the volume of a substance that can be released in a single catastrophic incident or a longer-term undetected continuous release, the greater the potential environmental harm. Materials stored in large bulk storage containers will generally pose a greater environmental risk than the same material present in smaller volume, or the same volume of that material stored in a large number of smaller containers distributed around a facility. Similarly leaks that can be detected rapidly (for example from a pipeline continuously visible to facility employees) will pose a lower risk than leaks which are more difficult to detect (for example from buried tanks or a pipeline in a remote, seldom visited location).

Transport Pathways – The potential migration paths of a hazardous material from its point of initial release to its likely final point of deposition must be considered when assessing the risks posed by a potential release. Solid materials will generally remain at the point of release until transported by the wind, vehicle tracking or by precipitation, erosion and runoff. However, above ground liquid releases are more likely to immediately flow away from the point of release into drainage lines or topographic low points. Liquids may also infiltrate into the ground, contaminating deeper soils, making clean-up more difficult and potentially migrating to groundwater. In general spills or releases onto paved or other impermeable surfaces where runoff is captured will pose a much lower risk than spills which could migrate into natural drainage lines. Similarly a release underlain by a low permeability aquitard poses a much lower risk than a release over an unconfined aquifer located immediately up gradient of drinking water wells or a groundwater dependent ecosystem.

Receiving Environments – The close proximity of sensitive receiving environments or water resources such as streams and rivers, lakes, lands with high biodiversity value, agricultural lands, residential areas or regionally significant groundwater resources will generally increase the potential consequences of a hazardous materials release. Consideration should be given to the length of the possible surface flow paths that would connect the potential release point to the potential receptor. The thickness and permeability of the unsaturated zone separating the ground surface from the underlying water table must be considered when assessing risks to groundwater resources. Any processes which may attenuate dilute or retard the movement of the contaminant should also be considered. The quality of the water resources that could be impacted and the sensitivity of the biota within the potential receiving environment to the particular hazardous material must also be assessed.

2.1.3 Selection of Appropriate Management and/or Clean-up Criteria

Unplanned releases of hazardous materials will typically lead to the contamination of soils, sediment, groundwater and/or surface water. In this guidance note “contamination” is defined as the presence of any potentially harmful substance in an environmental media (most typically soil, sediment, emissions or water) at a concentration above natural background levels which may result in significant harm to human health or the environment. Many jurisdictions have clear guidance on acceptable contaminant levels for these different media. The appropriate local “screening levels” or “investigation levels” should be used when available. These criteria are generally derived from

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simple exposure models with very conservative assumptions to protect human health or biota. Concentrations above these screening levels will generally trigger further remedial, management or administrative actions to control the risks to human health and the environment. The appropriate criteria must be selected based upon the media, the environmental setting and the potential receptors requiring protection. Note when the impacted media might have several beneficial uses the use with the lowest screening concentrations for the given contaminant of concern should generally be selected. Examples include:

Drinking Water Quality Standards – Appropriate for use when surface or ground water resources which might be used as drinking water are contaminated or could be contaminated. Examples include the World Health Organization Drinking Water Guidelines.

Standards for the Protection of Aquatic Life – Appropriate for use when surface water bodies which support aquatic life are contaminated or could be contaminated.

Soils Clean-up Guidelines – Appropriate for use when soils are contaminated or could be contaminated. Soil clean-up standards typically vary according to the environmental setting and the current or proposed final land use. In general soil standards for residential lands are most stringent followed by lands used for agricultural and wildlife habitat. Standards for industrial land use are generally the least stringent.

Sediment Clean-up Guidelines – Appropriate for use when bottom sediments in lakes, rivers or the sea could be impacted by contaminants. Generally these guidelines are designed to be protective of benthic organisms which live in or on the sediment and so will vary according to environmental setting and jurisdiction.

If local regulation or guidance is incomplete, ambiguous or out of date (relative to current science or technological advances) projects and operations should adopt internationally accepted screening and clean-up standards. Because the “screening levels” tend to be conservative, in some cases the cost and time required to derive site-specific criteria through a formal ecological or human health risk assessment process may be justified.

2.2 Contaminated Site Identification and Register

Develop and maintain a contaminated site register, with geographical references, for land currently or previously owned, leased and/or managed (legacy sites). Identify existing contamination and assess its environmental impact. The register must include known contamination for sites previously owned or leased regardless of whether remediation liabilities are retained. Ensure that registers are developed as part of the due diligence process for acquisitions. Key components of the contaminated site register for each site must include:

- a. *Coordinates*
- b. *Description of the wastes and/or potential contaminants of concern and impacted media (soils, sediments, groundwater, surface water)*

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- c. Estimated mass, volume and geometry of contamination (surface area, thickness, buried depth)*
- d. Summary of the site history*
- e. Exposure risks and related land use and access restrictions if any*
- f. Required remedial or administrative actions if any*

All Aureus mining operations should maintain a contaminated sites register which lists all locations with known buried waste, or with known or significant potential for soil, sediment, groundwater and surface water contamination.

2.2.1 Contaminated Site Identification and Assessment

Contaminated sites may be identified by observation, sampling and analysis and/or review of historical records of past practices, facilities or incidents which may have created significant contaminant sources or led to significant releases. Observations may include debris and waste materials exposed at the surface, stained or discoloured soils, bare patches or stressed vegetation, unusual odours, and runoff or groundwater seeps with discoloured water or oil sheen. Sampling may include direct sampling of soils, sediments and surface or groundwater, or more specialized techniques such as soil gas monitoring, vegetation tissue sampling, and geophysical techniques used to identify groundwater contamination and/or buried materials. Some examples of historic contamination sources or events which might be included in the register include landfills, disposal trenches, locations of single large or many recurring small spills, leaking tanks, process water ponds or pipes, soils impacted by past air emissions, unlined stockpiles and intentional releases to groundwater via percolation ponds, drainage fields and injection wells. Historical records that may need to be compiled and assessed include old maps and aerial photographs, historic studies and reports, and interviews with long-term employees.

A broad list of potentially contaminated sites is typically first compiled by a review of current and historical activities that have occurred at the operation, followed by a brief visual inspection of each potentially contaminated site. The potentially contaminated sites may then be prioritized for follow-up investigations based on the uncertainties and potential risks posed to the environment and human health. Individual site contaminant investigations are needed to quantify the risks posed by the contamination and to allow selection of appropriate management strategies to control the potential environmental impacts. For smaller, well defined, low-risk sites, the initial historic records review and visual inspection may be sufficient to make informed management decisions. However, many sites will require follow-up investigations to reduce uncertainties about the nature, extent, migration pathways and exposure risks of the contamination. Follow-up investigations may initially involve low cost sampling of exposed soils, sediments and water. However, in many cases drilling, test pit excavation and/or monitoring bore installation will be required to characterize the nature and extent of contamination in the subsurface. If subsurface migration is a concern, then down gradient zone and aquifer properties may also need to be characterized. Qualified environmental

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professionals with expertise in sampling and characterization, environmental chemistry, hydrogeology, ecological and human risk assessment and/or regulatory requirements will generally need to be involved in the follow-up investigations.

If sample density and distribution is adequate, and no contaminant concentrations exceed the appropriate screening levels identified, then no further work is likely required for the site. If maximum contaminant concentrations exceed the screening levels more detailed risk assessment and/or site characterisation will generally be required. This involves an assessment of each potential migration and exposure pathway which could connect the contaminant source to a potential receptor such as a person, water resource or ecosystem. For example, contaminants in surface soil may pose a direct exposure risk with minimal migration (via skin contact, incidental ingestion or from inhalation of dust and vapours). If complete or potentially complete exposure pathways are identified more detailed and rigorous site-specific ecological and human health risk assessments may be required. All of this information should then be used to develop site-specific remediation and management strategies to reduce the exposure risks to acceptable levels.

2.2.2 Contaminated Site Register

The contaminated site register is intended to list all of the sites areas that have been confirmed to be contaminated by the investigations described above. It should definitely include all sites which are confirmed to have maximum contaminant concentrations in excess of appropriate screening levels. It is also prudent to include:

- sites where contaminated materials were identified and removed by remedial actions;
- historically contaminated sites which have been investigated and found to have maximum contaminant concentrations above background levels but below screening or action levels; and
- suspected contaminated sites which have not yet been investigated or were proven to be uncontaminated (no concentrations in excess of typical background levels). This will help preserve institutional knowledge about these very low-risk sites and ensure that they are not re-identified and un-necessarily re-characterized in the future.

In addition to the items required in the contaminated site register, other information which should be considered for inclusion includes:

- a map showing the location and footprint of each contaminated site at the operation;
- maximum and mean contaminant concentrations identified during each site investigation;
- a general risk ranking for each site at the operation;
- a reference list of pertinent studies and reports completed about each site; and
- the name and contact details of the person or management position responsible for the site.

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The contaminated sites register may be as simple as a map showing each site's location along with an excel spread sheet which includes all of the required information. GIS systems could also provide a good user friendly platform for the register. Associated studies, data and reports for each operation should be maintained on site in a permanent, readily accessible filing system.

3.0 Implementation and Operation

It is much more protective of the environment and cost effective for the business to prevent spills and releases from occurring rather than cleaning them up after they occur. The most effective methods to minimize the number and severity of spills and releases is to ensure

- proper training of personnel who handle hazardous materials,
- effective engineering design of infrastructure used to transport, store and use hazardous materials and
- full implementation of management systems and operating procedures to reduce inventories, prevent releases and promote rapid response to releases that do occur.

3.1 Training

Ensure that all employees and contractors involved with hazardous materials handling or remediation of contamination are fully aware of the associated environmental hazards and risks and are appropriately trained in routine activities and emergency actions.

Whether or not there is a regulatory requirement for training, there needs to be a process to assure the competence of personnel, contractors and consultants engaged in handling hazardous materials or undertaking contaminated site investigations.

The operation should assign accountabilities for the development and maintenance of induction and environmental education training materials, which include a package on the handling, use, transport and disposal of hazardous materials. Competence requirements and training records should be documented and auditable.

The training materials should cover:

- How hazardous material releases to the environment can occur and how they can be minimized;
- The possible environmental impacts of hazardous material releases;
- How to access and interpret the Materials Safety Data Sheet (MSDS) system; and
- How to respond to release of the hazardous materials.

3.2 Hazardous Material Management

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Ensure that hazardous materials, including those brought by contractors, do not adversely impact the environment, cannot be accessed by unauthorised personnel and, based on risk, cannot come into contact with birds or other animals.

Hazardous substances should be admitted to site in a controlled manner and must be handled and stored to reduce exposures to people and animals.

3.3 Infrastructure Design to Ensure Safe Storage

Maintain effective containment barriers for preventing spills of hazardous material from reaching the environment. All tanks (including flow through process tanks) and drum storages containing hazardous material must have properly designed secondary containment.

- a. *Containment drainage valves must remain closed and locked with the exception of rainwater draining events. Appropriate signage must be provided, indicating correct valve position and requirement for locks.*
- b. *Containment systems must be free from product spillage and other materials; rainwater or snow must be removed to ensure adequate capacity is maintained.*
- c. *Measures must be in place to ensure spills from secondary containment and portable containers cannot enter sewers or any body of water or soil.*

Clause 2.5

Storage tanks and pipelines containing or transporting hazardous materials must be above ground. Any exceptions must be justified and authorised by the Managing Director. Any such exception must be based on a risk assessment and provision of additional controls including secondary containment (such as a double-wall design), inventory monitoring and reconciliation, and other leak detection or environmental monitoring systems.

Clause 2.6

Storage tanks, pipelines or other facilities containing, transporting or dispensing hazardous materials must have effective spill prevention and leak / spill detection measures in place. Construction materials must be compatible with the fluid contained in the system.

3.3.1 Secondary Containment Systems

Secondary containment systems need to be built and maintained in compliance with all local and national requirements and permit conditions, or in their absence, internationally recognized standards.

Secondary containment systems may be designed for individual tanks, or for tank farms and drum storage areas. Secondary containment systems should also be constructed for transformers or locations with multiple transformers such as electrical substations. Containment and capture

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systems (such as concrete pads sloped to collection sumps) should also be constructed in areas which are prone to reoccurring spills such as haul truck refuelling areas.

Secondary containment facilities should be sized to hold a volume greater than that of the largest tank in the containment; along with any piping that drains back into the tank or containment, and additional capacity for the design storm event (generally 110% of the largest foreseeable leak into the containment is sufficient). The bunds should also be at a sufficient distance away from a tank so that any leaks cannot occur over the bunded area. Standalone double-walled tanks do provide valid secondary containment if they are designed to contain all leakage from the internal tank. The materials used to construct the secondary containment should be compatible with the hazardous material being stored. The impermeable material used to construct the secondary containment must have a design leakage rate that is consistent with the environmental hazards posed by the material.

In most cases the secondary containment should be constructed with impermeable materials such as concrete or asphalt. However, if risks are relatively low, more permeable materials such as earth berms and compacted fine-grained soils may be acceptable. A documented risk assessment must be used to justify less robust secondary containment systems. Factors that would need to be considered include:

- the chemical hazards posed by the stored material
- the maximum volume that could reasonably be released
- the potential frequency of releases
- the mean and maximum length of time between when a release could occur and when it would be detected and cleaned up
- the potential migration pathways, distances and attenuation mechanisms for material that might leak through the secondary containment
- the presence of other down gradient containment facilities or systems such as extraction wells, cut off walls or dewatered open pits which intersect the water table and
- the proximity of sensitive receiving environments. Quality control and quality assurance procedures should be used in the construction of foundations, tanks, pipelines and containments to ensure that design objectives have been achieved. Records should be retained documenting that these procedures have been followed.

In-ground sumps and pits which are intended to contain non-hazardous waste streams (such as maintenance workshop wastewater sumps and vehicle wash down sediment traps) and which are constructed in situ from formed concrete or other in-place construction methods are not considered underground tanks and are not required to have secondary containment. However, these types of pits and sumps may have potential for leakage over time and should be subjected to periodic visual inspection.

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Single walled pipelines are generally acceptable for above ground pipelines over dry land which are amenable to regular visual inspection provided that:

- the pipeline has been properly designed for the pressures used and material being transported;
- there are adequate pipeline safety measures included in the design such as pressure sensors, alarms and automatic pump shutdown systems if needed; and
- there is an adequate inspection, testing and maintenance program in place.

Secondary containment may be required at vulnerable points along above-ground pipelines such as under pumps, valves, flanges and couplings. Secondary containment is also generally required for pipelines which are over surface water bodies such as those on bridges unless demonstrated by risk assessment that the risks can be mitigated by other engineering solutions or management strategies. If spillages had to occur from these pipelines the probable spillage should be contained within containment areas. These areas should be sized appropriately so that flows from them into the environment is contained and controlled.

Above ground pipelines are preferred for hazardous materials, but in some situations underground pipelines are more practicable or necessary (for example in areas where vandalism or theft may be a concern). GM approval is required by the standard for all buried pipelines transporting hazardous materials. Selection of appropriate controls for buried lines, such as double-wall design (or other secondary containment); inventory monitoring and reconciliation, and/or leak detection or environmental monitoring systems should be based on a risk assessment.

Where pipelines need to run under roads for short distances, placement in culverts is preferred, since this facilitates inspection and leak detection. Such short pipeline segments are exempt from MD approval but are subject to the same requirements as the rest of the above-ground pipeline.

Most sewage transport, storage and treatment facilities are not required to be above ground or have secondary containment and leak detection systems. However, sewage management infrastructure must comply with local regulation, prevent unplanned releases and be protective of human health and the environment.

3.3.2 Leak Detection Systems

Leak detection systems must be commensurate with the risks posed by the stored material. Periodic visual inspections of above ground storage tanks with adequate secondary containment will generally be sufficient. However, engineered leak detection systems are likely to be required for buried tanks and pipelines which transport or hold large volumes of hazardous materials, or large above ground tanks and pipelines located in remote, environmentally sensitive locations which cannot be inspected on a frequent basis.

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3.4 Impoundments and Process Ponds Containing Hazardous Materials

Liner/compaction design for the storage of hazardous materials should always meet or exceed local legal and regulatory requirements. Process water ponds that contain hazardous fluids such as cyanide-bearing solutions or extremely acidic, caustic and/or saline solutions will generally need to be underlain by a composite liner. Tailings impoundments which contain hazardous pore fluids may also need to be underlain by a liner system unless sufficient hydrogeological containment can be demonstrated along with adequate seepage collection and monitoring systems. Liner systems may also sometimes be required for chemically reactive waste rock dumps in wet climates unless sufficient hydrogeological containment can demonstrated along with adequate seepage collection and monitoring systems.

Composite liners are typically constructed with an underlying low permeability compacted clay layer and an overlying synthetic liner. Again the actual design leakage rate of the liner system must be based on a risk assessment that takes into account the hazards posed by the liquid and its potential environmental impacts. If a higher leakage or failure rate is determined to be acceptable then a composite liner may not be needed. Conversely if the hazards posed by the fluid and the environmental setting are high, then a double liner system with intervening leak detection and pressure relief layers (to minimize pressure on the lower liners) is likely to be needed.

Other process circuits which contain large volumes of hazardous fluids should be designed to gravity flow into engineered process ponds and containment structures during power outages and other upset conditions. The capacity of these structures should be large enough to hold the maximum credible volume of the fluid that would be released by drain down before the upset condition could be corrected. In many cases backup emergency power systems for pumps may be required.

3.5 Transport and Emergency Response

Implement selection criteria and control procedures for third party transporters, purchasers and other recipients of hazardous materials and implement follow-up procedures for any hazardous material sent off the premises.

Maintain and test emergency response procedures, associated equipment and personnel for responding to potential hazardous material releases.

All hazardous substances to be transported to or from site should be carried by a licensed hazardous goods carrier and accompanied by the appropriate documentation and approvals, consistent with local regulation. Completed manifests should be retained on site to demonstrate that the hazardous material was safely delivered to its intended destination. Transporters should be periodically assessed to ensure they are appropriately insured and that they have appropriate equipment and

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procedures in place to respond to accidental on and off site releases. Transport routes should also be selected to minimise risks and potential impacts in the event of a spill.

Emergency response procedures for spill containment and clean-up must be developed. Emergency response teams should be established and the appropriate spill response equipment stored on site. Emergency response teams should be regularly trained, and equipment and procedures regularly tested to ensure timely and efficient response to spills.

Appropriate PPE must be used during spill response and must comply with site safety and health standards. Any actual or suspected release of a hazardous substance should be reported and responded to as rapidly as possible. First aid details and emergency response procedures are often detailed on MSDSs and should be followed. Details on emergency procedures should be provided in the site Emergency Procedures Manual and be covered in site-wide training programs.

3.6 Contaminated Site management and Remediation

Develop, document and implement a remediation strategy for those existing contaminated sites where site investigation has shown there to be an unacceptable environmental impact to current land uses, ecological function, surface or groundwater resources, or where off-site impacts are occurring or likely to occur.

If current or potential future exposure risks are determined to be unacceptable, then remediation or management strategies (corrective actions) will need to be developed and implemented. Consideration should be given to stakeholder expectations, legal requirements and to the planned final use of the land when defining remedial objectives. Corrective actions should then be selected to meet the environmental objectives in the most reliable and cost effective manner. Only strategies that will consistently meet or exceed local regulatory or permit requirements should be considered. In some infrequent cases it may not be practicable to reduce residual risks to below typically acceptable levels, in which case risks should be reduced to levels that are “as low as reasonably achievable” (ALARA). Conversely, in some cases more aggressive but more costly remediation strategies may be justified if it will raise the final value of the land or provide significant additional environmental or reputational benefit.

Corrective action selection and refinement should be an iterative process with a range of potentially viable strategies assessed before the optimum strategy or combination of strategies is selected. Figure 1 is a flow chart showing a typical risk-based site assessment and corrective action program for a contaminated site. Common general remediation and management strategies include:

Removal Actions – Contaminated soils and sediments can be removed and transported to a repository or to a treatment facility where the contaminants are neutralized or destroyed. Removal actions typically have a clean-up target where all contaminated soils or sediments over a certain concentration are removed. The clean-up goals are typically based on the final assumed land use such as industrial/commercial uses which typically allow the highest residual concentrations to be

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left in place, and residential land uses which usually require the lowest. Open space, wildlife habitat, grazing and agricultural lands will typically (but not always) have intermediate values. The clean-up values may be derived from pre-existing screening criteria or from a site-specific ecological risk assessment. Sometimes the clean-up goals are based on the leach ability of the contaminants in the soil and are designed to protect surface or groundwater quality.

In Situ Treatment – Some exposed or near-surface contaminated soils may be remediated in place without excavation and transport. Examples of such in situ treatment techniques include:

- lime application to neutralize acidity and limit metals bioavailability and mobility
- application of nutrients or micro-biota and mixing to accelerate the biological degradation of organic contaminants such as hydrocarbons
- application of oxidizing agents to treat cyanide spills and
- bioremediation with plants which extract metals from the soil and which can then be harvested.

Capping in Place – Contaminated soils can be capped with clean fill, soils and impermeable layers (such as compacted soils). Capping can serve several purposes including:

- preserving runoff water quality
- controlling the dispersion of contaminated soils by wind, runoff or tracking
- eliminating direct exposure risks to animals and people from contaminants exposed at the surface
- limiting plant contaminant uptake and subsequent exposure risks posed to browsing and grazing animals, and
- limiting infiltration and subsequent contaminant migration to groundwater. The cap must usually be designed to meet the environmental objectives for the long term because the contamination is left in place.

Groundwater Remediation – Contaminated groundwater may be remediated through a variety of pump and treat systems, by in situ treatment technologies or by other subsurface control systems such as reactive barriers to control contaminant migration. Pump and treatment systems will typically involve either removal of the most contaminated portion of the plume (to remove the contaminant source) or capture of the leading edge of a migrating plume (to control its movement). Pump and treat systems for hydrocarbon contamination is usually focused on the removal of free phase product which is floating on the surface of the water table. Remediation of liquids more dense than water, such as chlorinated solvents, can be much more complicated because they will accumulate as a free phase at the base of the aquifer. Once the easily recoverable free phase liquids have been removed by conventional techniques such as down hole skimmers, intersection trenches or dual phase extraction, the removal of residual contamination can be very costly and is often not justified by the residual risk. Examples of in situ treatment technologies for groundwater include injection of alkalinity to neutralize acidity, and vapour extraction to remove volatile organic compounds, and the addition of oxygen, micro-organisms and/or nutrients to promote biological

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degradation. Groundwater remediation will usually continue until water quality meets applicable criteria for drinking water, aquatic life, irrigation water or stock water. Remediation goals which require water quality criteria to be met throughout the aquifer (including under the original contaminant source) can be very difficult and costly to attain, so remediation goals are often established to be protective of water quality at the closest down gradient receptor such as drinking water wells, seeps or springs.

Groundwater Flow Control – The flux of contaminated groundwater may be reduced so that contaminant loading into and concentrations within down gradient aquifers or surface water bodies remain within acceptable levels. Controls may include:

- impermeable covers which limit infiltration to groundwater through the waste
- impermeable subsurface barriers which divert up gradient flow around the contamination or
- impermeable subsurface barriers which divert down gradient flows away from sensitive receptors.

Land Use Restrictions – Exposure risks to people and animals may be controlled by establishing long-term land use restrictions such as prohibitions against residential development or fencing to keep even incidental visitors out. Areas where contaminated soils are capped in place will typically require restrictions against development or uses which could breach the cap and re-expose the underlying contamination.

Natural Attenuation – Many organic contaminants such as solvents, hydrocarbons and cyanide will degrade with time after they are released to soils, sediment or water due to oxidation and biological activity. Acidic waters may be neutralized through mixing with more alkaline waters or reaction with aquifer materials, and dissolved metals may be removed from solution by sorption and precipitation. Down gradient mixing and dilution will also limit contaminant concentrations below the point of release. If these natural attenuation processes are identified and quantified, it may be possible to justify no further action other than long term monitoring if this is allowed in the local jurisdiction. However, there will generally need to be a rigorous evaluation to demonstrate that impacts to important receiving environments and receptors will remain within acceptable limits throughout the natural attenuation process.

In all cases some form of post remediation sampling or monitoring will be required to ensure the environmental objectives are being met. For removal actions this typically involves short term sampling immediately after the excavation has been completed to confirm residual contaminant concentrations are below the target values. If natural attenuation is selected, then long-term monitoring will generally be required to ensure that contaminant concentrations in the affected media are declining at the rates predicted and that receiving environment criteria are being met.

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4.0 Performance Measurement

4.1 Monitoring Procedures

Implement routine inspections, monitoring procedures for leaks and integrity testing for deterioration of storage tanks and pipelines with a frequency and methodology commensurate with the associated environmental hazards and local legislation.

Maintain spill and leakage detection equipment and emergency response plans that are adequate for the risk posed by the hazardous material to the environment and linked to the appropriate operational control and emergency response unit.

The frequency and design of leak detection and integrity testing procedures should be determined based on the risks posed by a potential release of the hazardous substance. For less hazardous materials in settings where leaks can be easily detected and would have low potential impacts to human health or the environment, periodic visual inspections for leaks and less frequent visual inspections of tank integrity would likely be sufficient. Real time leak detection sensor systems may include pressure gauges, flow meters and conductivity probes connected via telemetry to alarms and control rooms.

Regular reconciliation of tank contents should be carried out to confirm that the amount of material delivered to the tank, less the amount used is equal to the amount actually present in the tank. Measurement techniques must be accurate enough to ensure that the uncertainty in the measurements could not hide the presence of a leak of environmental significance.

Preventative maintenance programs on tanks and pipelines should also be adopted to ensure that the risk of failure is minimised.

Figure 1 – Risk-Based Corrective Action Process Flowchart (modified from ASTM, 2002)

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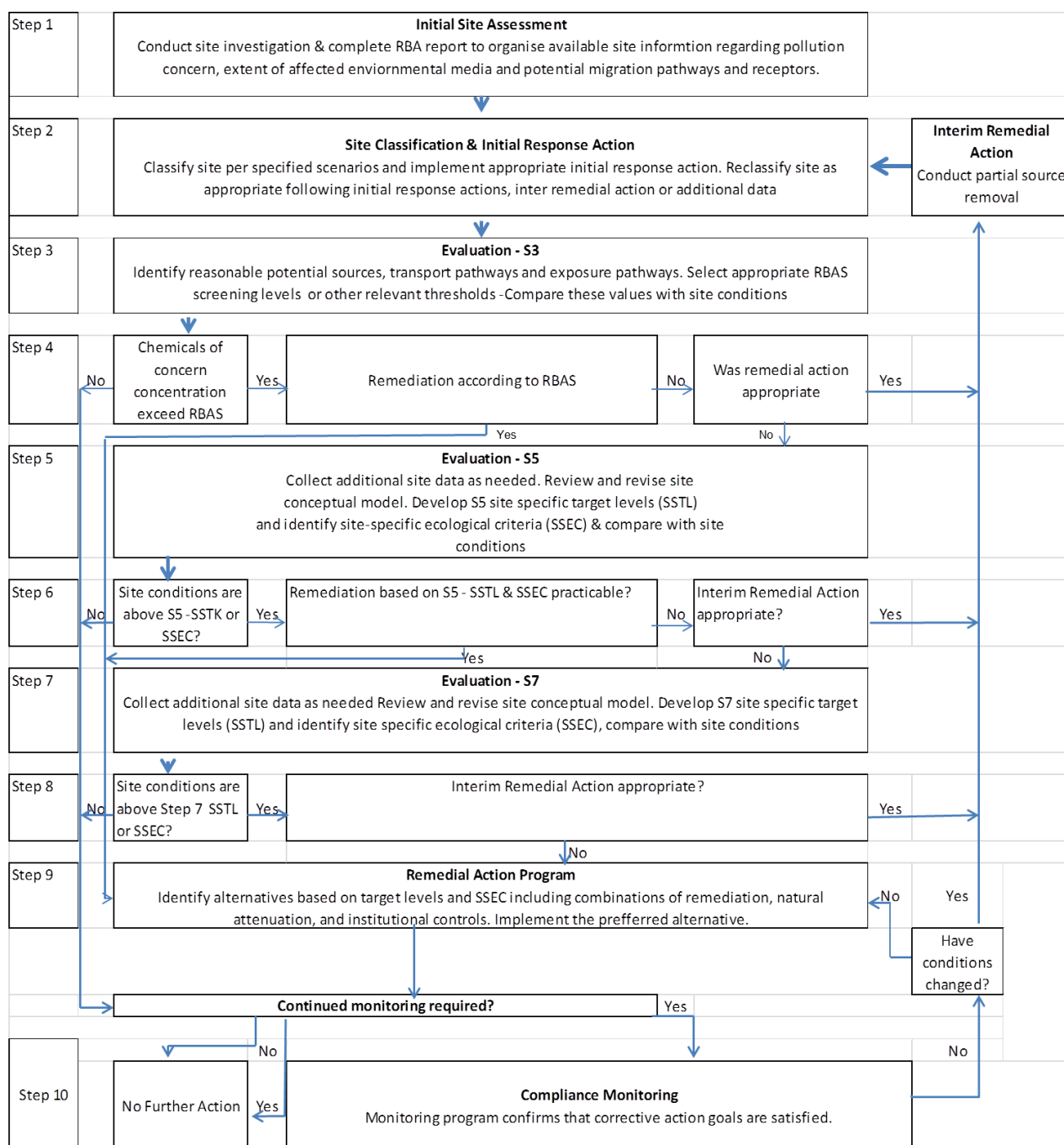
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New Liberty Gold Mine
**HAZARDOUS MATERIALS AND
CONTAMINATION CONTROL**

Document No: HAZMAT-CTRL-001

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5.0 Case Studies and Best Practice

Pertinent guidance, regulations, case studies and best practice examples can be found at various national government agencies and non-governmental organizations which deal with issues related to hazardous materials management, spill response and contaminated sites management and remediation.

ASTM International <http://www.astm.org>

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Australian Government Department of the Environment, Water, Heritage and the Arts
<http://www.environment.gov.au/settlements/>

Environment Canada www.ec.gc.ca

European Union <http://europa.eu/scadplus/leg/en/s15000.htm>

International Cyanide Management Code <http://www.cyanidecode.org>

National Oceanic and Atmospheric Administration Office of Response and Restoration (USA)
<http://response.restoration.noaa.gov>

United States Environmental Protection Agency <http://www.epa.gov>

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**EROSION CONTROL AND RE-VEGETATION MANAGEMENT
PLAN**

A/BMMC-ENV-MP-003

NEW LIBERTY GOLD MINE LIBERIA

AUREUS MINING INC.

March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date
		SHEQ Manager and Technical Manager		

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This document has been prepared by **Digby Wells Environmental**.

Report Title: Erosion Control and Re-Vegetation Management Plan for
the New Liberty Gold Mine, Liberia

Project Number: AUR2025

Name	Responsibility	Date
Liz Hilton Gray	Senior Environmental Consultant	24 March 2014

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EROSION CONTROL AND RE-
VEGETATION MANAGEMENT PLAN**

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EROSION CONTROL AND RE-
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1 INTRODUCTION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of an open pit, a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drawn up to integrate the management measures applicable to the project. This Erosion Control and Re-Vegetation Management Plan forms part of the ESHS system and incorporates the mitigation and monitoring measures that have been identified to minimise the significant residual environmental impacts relating to soil, erosion and re-vegetation.

Erosion is caused by the exposure of soil surfaces to precipitation and wind; such exposure can result from any activity that disturbs the ground surface or covering vegetation. At the NLGM project, such activities could potentially include: road building, dam or containment berm construction, open-pit mining, logging or forest clearance for construction purposes, stockpiling of overburden, soils and waste rock. The mobilisation, transport and discharge of soil particles during precipitation events can adversely impact receiving water quality and aquatic ecology from the turbidity caused by suspended solids and/or from direct deposition and burial of organisms and plant life. Impacts associated with erosion include the loss of top degradation of soil and associated nutrients (e.g., organic matter in the upper soil horizon), resulting in degradation of habitat for both terrestrial and aquatic fauna. If not detected and properly managed, erosion may also contribute to the physical weakening and failure of constructed earthworks.

2 APPLICATION AND SCOPE

This Erosion Control and Re-vegetation Plan is one of a series of Management Plans that will be issued at appropriate phases of the mine life cycle to manage and/or mitigate specific anticipated environmental, health, safety, and social impacts, and will support the final Environmental and Social Impact Assessment (ESIA) prepared for the New Liberty Project in accordance with Liberian and IFC requirements.

This Management Plan is applicable to all operations through all mining phases (exploration, construction, operation, closure), including contractor activities.

The plan addresses the management of terrain and erosion during exploration, construction, operations and closure. The plan covers all activities that could result in adverse effects on the terrain through all phases of the project.

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2.1 Objectives

The overall objective relating to soil erosion and re-vegetation is to manage the control of topsoil and ensure that re-vegetation is successful in that it leaves the mine area in a condition that minimises adverse impacts on the human and natural environment and with a legacy that makes a positive contribution to sustainable development. The following objectives apply to the management of erosion and re-vegetation:

- maintaining and monitoring all rehabilitated areas following re-vegetation;
- preventing soil and surface/groundwater contamination by managing all water on site to acceptable and agreed standards;
- Conserve soil as a resource where practical and possible;
- Prevent/reduce soil erosion;
- Maximize the potential to re-use soils;
- Limit the adverse effects of mining on the post-mining land capability.
- Implement a soil monitoring program to serve as an early warning system of undesirable impacts arising from the construction and operation activities of the proposed project, which may necessitate the modification of the management plan.

3 LEGAL REQUIREMENTS

The full suite of legal requirements applicable to the project is detailed in the ESIA document. Those applicable to the Erosion Control and Re-Vegetation Management Plan are summarised below.

3.1 National Environmental Action Plan

The National Environmental Action Plan, prepared every five years, provides general guidelines for the management and protection of the environment and natural resources of Liberia, well as the strategies for preventing, controlling or mitigating any negative effects. The Plan is linked with County Environment Action Plans and forms the basis of national environmental planning and implementation of development programmes.

3.2 International Conventions

Liberia is a party to a range of international conventions, one of which have relevance to this Management Plan.

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Table 3-1: International Conventions under which Liberia has obligations relevant to the project

Convention	Date of Approval/ Consent	Main obligations	Relevance to Project
African Convention on the Conservation of Nature and Natural Resources (OAU, 1968)	21-Sep-78	Encourage action to conserve use and develop soil, water, flora and fauna sustainably from economic nutritional scientific educational cultural and aesthetic points of view.	Needs action to conserve soil and prevent erosion; control pollution; and conserve flora and fauna.

3.3 Company Commitments

As a local operating company of Aureus, the conduct and operations of the New Liberty Gold Mine in Liberia will be and are dictated by a suite of guidelines, policies and plans which set out the company's commitment to the environment, sustainability and social issues.

These are summarised in the revised environmental policy statement as:

- Implementation of environmental management systems that are compatible with ISO 14001 EMS;
- ISO 14001 certification for all production facilities;
- Compliance with all relevant environmental laws and regulations and other company commitments;
- Continuous and sustainable improvement in environmental performance, taking advantage of systematic monitoring and aiming at pollution prevention;
- Development, improvement and application of low impact, environmental production methods taking benefit of locally available materials;
- Efficient use of natural resources, energy and land;
- Management and reduction where technically and economically feasible of the CO2 footprint of gold production;
- Employment commitment and responsibility in environmental performance;
- Supplier and contractor awareness and respect of Aureus environment policy; and
- Open communication and dialogue with all stakeholders affected by Aureus Mining's operations.

Key elements of these policies are:

- The implementation of environmental management systems including an EMS, compatible with the ISO 14001 system;

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- Compliance with all relevant national environmental and community engagement laws and regulations and other company commitments, keeping the Company's environmental impact to a minimum; and
- Working towards a goal of zero accidents, zero significant environmental incidents and social incidents and health injuries to establish and maintain a safe working environment.

To ensure that these policies and plans are delivered at the local level, Aureus is putting into place a management and monitoring framework which will place the onus on its national and international operating companies to deliver the company commitment.

4 IMPACT IDENTIFICATION AND MANAGEMENT

The mining operations, including the shaping and management of waste rock dump (WRD) and stockpile areas may lead to the formation of erosion gullies on the sides of the dumps. During construction the land clearance and earthworks for the pit, plant, mine infrastructure, TSF, haul roads, dam and river diversion and WRD will disturb the soils. Exposure of the soils in the mine lease area, notably on haul roads, around the mine pit, tailings dam, diversion trench and processing plant will increase soil erosion via storm water runoff. The NLGM project is in an area of high rainfall (3 300 mm/annum) and thus erosion needs to be very carefully controlled.

Heavy rainstorm events will initiate erosion on any slightly elevated bare area. Any fine-graded soils on the site will also be vulnerable to wind erosion (during the short dry season, limited impact) when exposed after the removal of vegetation during site preparation and stockpiling for later use.

The erosion of soil will also impact on water courses and will result in increased suspended sediment loads.

4.1 Management through all Phases of the Project

Management of soil erosion and re-vegetation will be ongoing from project exploration phase through to closure.

4.1.1 Construction and Operational Phase

4.1.1.1 Management of General Site Erosion

Objective: To remove usable soil resources before impacting an area and reuse for rehabilitation and protect soil, stockpiles and rehabilitation areas from erosion.

Measures:

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- Scalping (removal) of the upper 30 cm of soil material prior to site disturbance from the tailings dam, waste rock dump and processing plant areas should be in place. Soil scalping should be from footslopes and lower midslopes in Site A. Soils from areas containing an abundance of coarse fragments should not be collected for rehabilitation. The scalped soil will be stockpiled and demarcated.
- The existing mine pit is already severely disturbed, with overburden and mine spoil haphazardly deposited, occupying the immediate surrounds. Soil structure has been disturbed in these areas, and in most cases, soils have been completely truncated. In mitigation, the mining operation will improve conditions in some parts of the site, due to planned soil scalping, removal and soil storage and later reshaping and topdressing.
- During construction and operation, every effort will be made to stockpile topsoil ahead of development. In the mine pit and peripheral areas, however, only small pockets of topsoil remain intact after previous disturbances by artisanal mining in the open pit area.
- Areas that may be prone to erosion or where signs of erosion are evident will be stabilised. Methods of stabilisation include: brush-cut packing, mulch or chip cover, straw stabilising, sodding, hydro-seeding, the application of soil binders and physical stabilisation methods such as gabions, reno-mattresses, armour flex or retaining walls, where necessary.
- Traffic and movement over stabilised areas will be restricted and controlled, and damage to stabilised areas shall be repaired and maintained to the satisfaction of the Environmental Manager.
- The total footprint area to be disturbed / developed will be kept to a minimum by demarcating the construction areas and restricting construction to these areas only
- Clearing of vegetation should be inspected and verified with co-ordinates to ensure that no more than the minimum area of land that is needed is cleared;
- Prepare soil stockpiles to ensure vegetation establishes itself to avoid erosion losses;
- Ensure stockpiles are placed on a free draining location so as to limit erosion loss;
- Minimise the period of exposure of soil disturbances through a planning schedule;
- Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material. Recommendation is around 3m;
- Ensure erosion measures are put in place at all waste rock dumps and stockpile areas;
- Topsoil stockpiles should be maintained for effective rehabilitation following the closure of the mine;
- Soil erosion is a potential impact for all sloping areas. These sloping areas should be protected by structures such as drains, while the main problem would be the sloped areas of the TSF and WRD. The slopes will require shaping, and contouring as well as vegetation cover to prevent erosion;
- Berms should be placed around stockpiled soil to prevent soil loss due to erosion; and
- Site remediation should be undertaken on a concurrent basis during the operational phase to ensure that vegetation is restored to disturbed areas, which will restore some of the site's flood attenuation capabilities and reduce vulnerability to erosion.
- Wherever stockpiles are expected to stay for a period of time such as longer than a few months, they will be vegetated to prevent erosion and to enhance fertility. The stockpiles should also be demarcated and GPS'd to ensure they are located for later use.

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4.1.1.2 Management of the Soil Erosion and Pollution of the Marvov Creek and Streams Due to Increased Turbidity

Objective: To limit erosion and pollution of the Marvov Creek and adjacent streams due to potential increased turbidity.

Measures:

- Diversion drains around the mine pit, tailings dam and waste rock dump will carry 'clean' storm water around/away from the affected areas and discharge it downstream of the mine, that is, 'clean' and 'dirty' runoff are separated.
- If limited dirty runoff discharges from the mine directly into free-flowing streams, seepage (toe) dams are to be constructed below the tailings wall and other sites where necessary.
- With design of the tailings facility fine tailings should not be discharged into natural watercourses. Tailings will be confined behind the tailings dam wall. Even when large storm flows may cause the wall to be overtopped, any escaped tailings should collect in the seepage/toe dam to settle. Should the toe dam spill, flows will be so high under such conditions that effective dilution of any pollution will occur.
- During construction and operations, the diversion creek will divert clean river flow around the mine pit and other mining structures.
- Sediment-laden water from the construction area is to be put through settling tanks for later release.
- Erosion control measures in the river diversion area will be implemented as per engineering designs.
- The dam walls will be vegetated where they will be above water level and suitable engineering designs will be implemented where there will be a fluctuating water level.

4.1.2 Closure Phase

- At closure, demolition of infrastructure, rehabilitation of roads, tailings dam and waste rock dump will return much of the area to a state ready for rehabilitation and re-vegetation. However, the mine pit will remain a permanent excavation/void. Where feasible, disturbed, exposed areas will be top dressed and re-vegetated on an ongoing basis during construction and operation. At closure, cleared areas will be restored where feasible.
- Keep vehicles on dedicated roads to avoid compaction;
- All foundation trenches need to be filled;
- Access and haul roads will be ripped and re-vegetated;
- Areas where infrastructure was removed need to be vegetated using site specific species;
- Monitor erosion and compaction in areas of rehabilitation;
- Minimise footprint area during decommissioning; and
- Ensure post mining land use suits the land capability.

Refer to the Closure and Rehabilitation Management Plan for further details on re-vegetation following closure.



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4.2 Monitoring and Key Performance Indicators

The objective of monitoring is to minimise areas of erosion and ensure that the agreed rehabilitation process remains on track. There is thus a need to carefully monitor the progress of the physical aspects of rehabilitation (soil stripping, overburden handling and landform development, and soil replacement) during the construction, operational and closure phase, and the progress of re-establishment of the desired final ecosystem.

The following table summarises the monitoring to be undertaken throughout the life of the project, and beyond.

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Table 4-1: Monitoring plan for Erosion Control and Re-vegetation

Source	Monitoring Locations	Parameters	Frequency	Corrective Action	Responsibility
Erosion monitoring	All areas affected by mining activity	Visual signs of erosion at disturbed and rehabilitated areas	Monthly	In event of erosion, remediation work will need to be carried out to improve the vegetation cover or divert water runoff	NLGM Operations Manager, with assistance from the Environmental Manager.
Sedimentation	Culverts are to be inspected during major rainfall events to ensure they are adequately sized.	Culvert sizing	After major rainfall events	If water is overflowing the culvert, the size of the culvert will be re-evaluated and a larger culvert will be placed at the site as soon as possible	NLGM Operations Manager, with assistance from the Contractor
Dams & Berms	The face of the dams and berms should be inspected daily for signs of surface	Signs of erosion, slumps and rills	Daily	If rills or slumping are present, the exposed surface should be covered	NLGM Operations Manager, with assistance from the Contractor

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Source	Monitoring Locations	Parameters	Frequency	Corrective Action	Responsibility
	erosion.			with geotextile fabric or other material that will prevent further erosion.	
Waste Rock Stockpiles	The waste rock and overburden stockpiles should be monitored to verify the integrity of the perimeter containment berm and other erosion control measures.	Signs of erosion and berm maintenance	Weekly	In event of erosion, remediation work will need to be carried out to improve the vegetation cover or divert water runoff	NLGM Operations Manager, with assistance from the Environmental Manager.
Re-vegetated areas	Records should be retained noting plant species, soil type, weather conditions during the period, drainage conditions, and overall success. As part of the reclamation program, a record should also be maintained of all spontaneous and natural	• erosion; • surface water drainage systems and surface water quality; • vegetation basal cover; • vegetation species diversity; • invasive species; • faunal re-colonisation; • crop growth and yield (on sites rehabilitated to	Plant establishment will be monitored monthly for the first year after planting and annually thereafter to determine the success of the plantings.	In the event of re-vegetated areas failing, the cause is to be determined and immediate action taken which may involve re-planting, watering, removal of invasive species or	NLGM Operations Manager, with assistance from the Environmental Manager.

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Source	Monitoring Locations	Parameters	Frequency	Corrective Action	Responsibility
	regrowth after clearing, and the conditions apparently contributing that that regrowth.	agricultural end-uses); and • proportion of mined land that has been fully rehabilitated.		consultation with flora expert	

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Maintenance of rehabilitated sites is often the difference between the ultimate success or failure of rehabilitation. Routine maintenance of structures such as drains, dams, silt traps and fencing will be undertaken during and following rehabilitation works. Maintenance of re-vegetation may also be required, in the form of replanting or reseeding in failed areas, weed control, watering, pest control and installation/repair of tree guards and fencing for protection from grazing.

Monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved. Post closure monitoring will be required to ensure rehabilitation is taking place and there are no residual impacts. This monitoring will take place in conjunction with other post closure monitoring programmes, such as fauna and flora monitoring, groundwater and surface water monitoring and soil monitoring.

5 REPORTING AND DOCUMENT CONTROL

Conformance will be monitored via annual internal audit program in accordance with Element 16 Performance Assessment and auditing. This will be undertaken to assess broad compliance with requirements of HSE management system (including ESIA and management plans).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the OT HSE Management System as described in the Environmental ESMP Framework Document.

9.2 External Auditing

Conformance with this plan will be subject to periodic assessment as part of the Rio Tinto HSE Business Conformance Audit programme and by Project Lenders

5.1 Document Control

Records generated in the routine implementation of the Erosion Control and Re-Vegetation Management Plan will be filed and maintained by administrative staff under the direction of the Environmental Manager.

Regular reporting will be undertaken which will include:

- A summary of activities undertaken during the reporting period;
- Any material deviations or non-compliances to this Management Plan;
- Planned activities during the next reporting period;
- Any other issues of concern.

Further information on environmental monitoring and reporting requirements and procedures is set out in the ESHS Management System.

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Regular internal and external audits will be compiled, a part of which will focus on assessing this Management Plan and determining its effectiveness.

5.2 Change Management

The Erosion Control and Re-vegetation Plan will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing ESHS and social management needs. The overall effectiveness of the Plan will be assessed in the internal audit and management review processes.

6 IMPLEMENTATION

6.1 Responsibilities

The Erosion Control and Re-vegetation Management Plan will be managed by the Safety Health Environmental Quality Manager who will manage the contractors on site to ensure the plans are being implemented.

Aureus' Safety Health Environmental Quality Manager:

This position is responsible for providing:

- project assurance that ESHS System legislation, regulations and commitments are being followed;
- ESHS standards and procedures that are consistent with Aureus' corporate standards;
- mechanism for recording and reporting ESHS statistics on documented incidents and other key outcomes;
- an ESHS System management training service;
- a service to analyze technical risks;
- co-ordination of crisis and emergency response plans and practices;
- means to ensure the application of continuous improvement principles to the documentation, tools and other aspects that make up and support the ESHS System;
- assistance to work areas with the implementation of ESHS Management Plans; and an appropriate level of staffing (in the form of either permanent or contracted environmental, safety, health, security officers) to ensure:
 - Compliance with the environmental and safety obligations under the Contract and Scope of Works and under Technical Criteria;
 - Compliance with obligations under the ESIA, ESHS System, and other Safety Management Plans;
 - The environmental safeguards prescribed in government guidelines are implemented and tested before handover of the operating plant.

Project and Contract Design Engineers:

The design engineers are responsible for ensuring that environmental considerations are taken into account in all activities. Engineers will liaise closely with the Contractor Project

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Managers to ensure that the environmental controls and procedures contained in the Strategic Management Plan are implemented.

6.2 Training

All employees of Aureus and Contractors to Aureus shall be provided with basic training in the reduction of erosion and re-vegetation of disturbed area. Additional, specialist training shall be provided to mine operators, plant operators and key personnel involved in activities which involve activities likely to impact terrain or erosion and to personnel involved in the re-vegetation around site. The general training will form part of the induction programme which every employee and contractor will undertake while the specialist training will involve key personnel and will most likely be in the form of a 2 day workshop.

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FOOTPRINT MANAGEMENT PLAN

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March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date
		SHEQ Manager and Technical Manager		

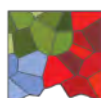
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Report Title: ESIA Update for the New Liberty Gold Mine, Liberia

Project Number: AUR2025

Name	Responsibility	Date
Liz Hilton Gray	Senior Environmental Consultant	23 March 2014

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New Liberty Gold Mine
FOOTPRINT MANAGEMENT PLAN**

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1 INTRODUCTION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drawn up to integrate the management measures applicable to the project. This Footprint Management Plan forms part of the ESHS system and incorporates the mitigation and monitoring measures that have been identified to minimise the spread of impacts from the mining activities.

2 APPLICATION AND SCOPE

This Footprint Management Plan will apply to the project from exploration phase, through to closure and decommissioning. It must be applied to all personnel on site whether they are company employees, contractors or sub-contractors. This Management Plan should be read in conjunction with the suite of other Management Plans incorporated into the ESHS System and ESIA compiled for the New Liberty Gold Mine.

2.1 Objectives

The objectives of the Footprint Management Plan include:

- Ensuring the proposed mine plan is implemented on site as designed;
- Limiting the area of disturbance at site;
- Controlling the various contractors on site;
- Demarcating the site boundaries and communicating this throughout the mining team;
- Monitoring site activities and reporting back on incidents;
- To minimise the need to clear vegetation or disturb areas where it is not necessary;
- Rehabilitate areas as soon as possible.

3 LEGAL REQUIREMENTS

A number of National and International laws and regulations will apply to the management of the site at the New Liberty Gold Mine. The following is a summary of the most applicable laws.

3.1 Liberian Laws

3.1.1 National Environmental Policy (2002)

The Liberian government has a National Environmental Policy that was approved in November 2002. This policy seeks to ensure the improvement of the physical environment, quality of life and co-ordination between economic development, growth and sustainable management of national resources. The following sections are relevant to the SIA:

- **Section 4.8**, which states that the “EIA process must document, evaluate, store, disseminate and utilise local and traditional knowledge and practices with regard to environment and natural resource management”;
- **Section 5.9-4**, which states that “mining activities should take into consideration the socio, cultural and economic impact of the area”; and
- **Section 6**, which states that “stakeholder participation should be encouraged to involve everyone in decision-making, planning and implementation”.

3.1.2 National Forest Policy (2006)

The National Forest Policy was published in 2006. The aim of the forestry policy of Liberia is to conserve and sustainably manage all forest areas, so that they will continue to produce a complete range of goods and services for the benefit of all Liberians and contribute to poverty alleviation in the nation, while maintaining environmental stability and fulfilling Liberia’s commitments under international agreements and conventions.

3.1.3 Environmental Protection Agency Act (2003)

To ensure the effectiveness of the National Environmental Policy, the establishment of a functional, independent and authoritative institutional body for the management of the environment was required. Thus, the EPA of Liberia was established in 2002. The Agency co-ordinates, monitors, supervise and consult with relevant stakeholders on all activities in the protection of the environment and sustainable use of natural resources.

3.1.4 National Environmental Action Plan

The National Environmental Action Plan, prepared every five years, provides general guidelines for the management and protection of the environment and natural resources of Liberia, well as the strategies for preventing, controlling or mitigating any negative effects. The Plan is linked with County Environment Action Plans and forms the basis of national environmental planning and implementation of development programmes.

3.1.5 Biodiversity Legislation and Policy

Liberia ratified the Convention on Biological Diversity (CBD) on 8 November 2000; this acts as the over-arching framework for all Government legislation and policy concerning the conservation and sustainable use of biodiversity and the equitable sharing of its benefits

Liberia is a party to a range of international conventions, one of which have relevance to this Management Plan.

3.2 International Conventions

The following international conventions will apply to the Footprint Management Plan.

Table 3-1: International Conventions under which Liberia has obligations relevant to the project

Convention	Date of Approval/ Consent	Main obligations	Relevance to Project
African Convention on the Conservation of Nature and Natural Resources (OAU, 1968)	21-Sep-78	Encourage action to conserve use and develop soil, water, flora and fauna sustainably from economic nutritional scientific educational cultural and aesthetic points of view.	Needs action to conserve soil and prevent erosion; control pollution; and conserve flora and fauna.
Convention on Biological Diversity (UN, 1992a)	08-Nov-00	1. Three main goals: The conservation of biological diversity; 2. The sustainable use of its components; and The fair and equitable sharing of the benefits from the use of genetic resources.	Construction and operation of the project should lead as far as possible to no net loss of biological resources including genetic diversity.

3.3 Company Commitments

As a local operating company of Aureus, the conduct and operations of the New Liberty Gold Mine in Liberia will be and are dictated by a suite of guidelines, policies and plans which set out the company's commitment to the environment, sustainability and social issues.

These are summarised in the revised environmental policy statement as:

- Implementation of environmental management systems that are compatible with ISO 14001 EMS;
- ISO 14001 certification for all production facilities;

- Compliance with all relevant environmental laws and regulations and other company commitments;
- Continuous and sustainable improvement in environmental performance, taking advantage of systematic monitoring and aiming at pollution prevention;
- Development, improvement and application of low impact, environmental production methods taking benefit of locally available materials;
- Efficient use of natural resources, energy and land;
- Management and reduction where technically and economically feasible of the CO₂ footprint of gold production;
- Employment commitment and responsibility in environmental performance;
- Supplier and contractor awareness and respect of Aureus environment policy; and
- Open communication and dialogue with all stakeholders affected by Aureus Mining's operations.

Key elements of these policies are:

- The implementation of environmental management systems including an EMS, compatible with the ISO 14001 system;
- Compliance with all relevant national environmental and community engagement laws and regulations and other company commitments, keeping the Company's environmental impact to a minimum; and
- Working towards a goal of zero accidents, zero significant environmental incidents and social incidents and health injuries to establish and maintain a safe working environment.

To ensure that these policies and plans are delivered at the local level, Aureus is putting into place a management and monitoring framework which will place the onus on its national and international operating companies to deliver the company commitment.

4 IMPACT IDENTIFICATION AND MANAGEMENT

A number of activities proposed at the NLGM will impact on the site and create a mining footprint. A summary of aspects that generate an impact are described briefly below with more detail in the ESIA report.

Air: Activities causing excessive dust, gas and particulate emissions. Activities causing odours and excessive noise levels.

Biodiversity: Illegal hunting; illegal removal of wood; setting of snares. Disturbance of protected plants and animals. Proliferation of exotic vegetation.



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Hydrocarbons: Spillage of fuel, oil, grease and lubricants. Incorrect storage of fuel, oil, grease and lubricants.

Land: Erosion due to water and process spills, establishment of unauthorised activities, uncontrolled driving off existing tracks and roads. Veld fires. Topsoil handling, stripping and storage. Excessive footprint.

Hazardous substances: Spillage of chemicals and other hazardous substances. Incorrect storage and use. Inadequate training in use and storage of chemicals and other hazardous substances.

Tailings: Spillage/uncontrolled discharge of tailings due to pipe and other failures.

Waste: Illegal dumping of scrap or domestic or industrial waste. Illegal dumping of hazardous waste. Inappropriate handling of waste. Littering.

Water: Leakage or spillage of process water. Illegal/uncontrolled discharge of effluent process or storm water. Excess of water quality standards.

Community: Poor communication, inappropriate liaison, informal trading and in-migration.

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4.1 Management through all phases of the project

Management of the mining footprint applies to a number of on-site activities. The tables below list the mitigation measures and monitoring to be applied throughout each phase of the project to ensure the footprint is minimised and management measures applied. In addition to this Footprint Management Plan, the Management Plans contained in the ESHS System will also apply.

4.1.1 Construction Phase Management Plan

During construction, there will be clearing of earthworks, preparing foundations for infrastructure, construction of dams and berms and mining areas, hence there will be a lot of activity on site which will need careful management to ensure the footprint is contained.

Table 4-1: Construction phase footprint management plan

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
GENERAL SITE					
Uncontrolled mine footprint	- Adhere to the demarcated areas and access roads - Minimise areas of disturbance	- Mine area to be clearly demarcated and communicated to all personnel going on site - Adequate signage to be erected to indicating PPE to be worn and any dangerous areas - Access roads to be clearly marked as such and off site driving to be reported - Speed controls to be put in place on site - Induction training for all personnel going to site	- Daily inspections of site control and PPE adherence - Incidents reported as per the Non compliance Management Plan - Monitoring of all environmental elements as described in each of the ESHS System	- Contractors or personnel who do not comply with site conditions are to be reported and where necessary additional training programmes implemented or fines applied - Where contractors or personnel impact areas not demarcated, re-	NLGM Operations Manager, with assistance from the Environmental Manager. Contractors on site to abide by this Management Plan

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Restricted access to those personnel not expected at site and to local community members - Person requiring new areas to be cleared need to have approval of environmental manager		vegetation to be undertaken as per the Erosion Control and Re-vegetation Management Plan	
SOILS					
Soil erosion & compaction	- Prevent soil loss through erosion - Preserve topsoil for future rehabilitation - Prevent loss of soil structure from compacting of soil	- Clearing of vegetation should be inspected and verified with co-ordinates to ensure that no more than the minimum area of land that is needed is cleared - Prepare soil stockpiles to ensure vegetation establishes itself to avoid erosion losses - Soil stockpile and waste dump slopes should not exceed 18° - Ensure stockpiles are placed on a free draining location so as to limit erosion loss - Minimise the period of exposure of soil disturbances through a planning schedule - Areas that may be prone to erosion or where signs of erosion are evident should be stabilised. Methods of stabilisation include: brush-cut packing, mulch or chip cover, , hydro-seeding, the application of soil binders and physical stabilisation methods such as gabions, reno-mattresses,	- Monitoring to be conducted annually as per the soil monitoring plan Monitoring will include: - Correct placing of topsoil - Soil balance and depth for volumes of soil - Maintenance of all records on site - Erosion assessments carried out twice yearly in the rehabilitated areas to visually check for erosion channels	In event of erosion, remediation work will need to be carried out to improve the vegetation cover or divert water runoff	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		armour flex or retaining walls - Rehabilitated areas or those identified for rehabilitation should be demarcated to ensure traffic and movement over stabilised areas is restricted and controlled, and damage to stabilised areas shall be repaired and maintained to the satisfaction of the Environmental Manager - Install clean and dirty storm water diversion drains around the mine pit, and waste rock dump - this will ensure dirty water goes to pollution control sumps and clean water is diverted to the environment - Progressive rehabilitation to be ongoing during the LOM – recorded and reported			
Hydrocarbon, Waste & Chemical Spillages	- Prevent loss of soil quality through contamination with hydrocarbons - Manage hydrocarbons during construction	- All heavy machinery and trucks should be restricted to designated areas and access roads/tracks - Use of fuels and lubricants should be confined to bunded areas with an impermeable layer to prevent soil contamination with appropriate oil separators for recycling of hydrocarbons - All storage areas (for fuels and lubricants) will be compacted, have impermeable layers and have bunded containers to	- Significant spillages causing contaminated soil will be analysed to check for contamination extent and severity Samples to be analysed for: - pH (water) - Exchangeable cations – Na, K, Ca, Mg CEC (cation exchange	Soil remediation to take place in the event of a spillage. Bio-degradable product to be used for small spillages.	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		prevent soil pollution and appropriate oil separators installed to cover a 1: 50 24 hr rainfall event - Washbays will have a sump and oil separator and used oil will be recycled - Accidental hydrocarbon spillages should be reported and recorded as incidents and cleaned up immediately - Soil hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits - Implement the emergency response plan in event of disaster - Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas	capacity) - Soaps, oils and greases - Where anomalies exist these will be noted and corrective action taken - Monthly inspections around potential areas of contamination		
SURFACE WATER					
Sedimentation of local streams due to increased soil erosion	- Construction activities carried out so as to aid rehabilitation - Prevention of soil erosion on site	- Erosion should be prevented at disturbed areas through water diversion berms and proper stockpiling of soil - Construction of infrastructure located close to local streams should take place in the dry season, when possible - The permit to clear (internal Aureus procedure) to be implemented and signed off by	- Monitor stream channel changes, particularly at points where construction is taking place near rivers - Following heavy rainfall and during the wet season, monitoring of stream channels for	- If sedimentation from construction activities has occurred, soil will be removed using appropriate machinery and placed on a soil stockpile - Topsoil volumes stockpiled to be	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		responsible persons. • Ensure stockpiles are placed on a free draining location so as to limit erosion loss • Develop progressive rehabilitation plan or schedule to address exposure of degraded areas • Construct the diversion channel during the dry season and provide a sediment control plan • Install clean and dirty water separation system around infrastructure and update water balance accordingly • Tailings will be deposited on the TSF. TSF water, during large rain storm events and during the wet season, may cause the TSF to discharge, into the pollution control dam/sump and then to the stream below it. This water will be diluted but needs to be monitored and reported to government and downstream users if not compliant with current water quality and or as per agreed permit requirements. • During construction and operations, the Diversion Channel will divert the river flow away from the mine pit and other mining structures • Physical stabilisation methods	sedimentation	recorded and monitored • Evaluate sedimentation control measures for effectiveness and modify where required.	

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		such as vegetation, gabions, reno-mattresses, armour flex or retaining walls to be installed in the MCDC as per design drawings			
Impact on surface water quality from contamination	- Surface water contamination is kept to a minimum - To protect existing users of surface water from impacts on water quality	- Plan and implement an appropriate water monitoring and management plan - Berms and trenches should be constructed to divert clean water away from the workings to the environment, and dirty water (sediment laden) will report to sediment traps as per the water balance - Hydrocarbon management guideline and procedures to be implemented - Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas - Sewage system will be implemented according to the design drawings. The water from the sewage system is discussed in the water balance and releases to be monitored and recorded - Hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits - Mitigation for construction of the	- Sampling of surface water from the Marvov Creek, both upstream and downstream of the project area - Additional surface water monitoring from all site surface water storage, use and flow points - Monitoring to be on a monthly basis Monitoring to include: - Analysis of physical and biological properties - Compare results with water standards and permits A number of different water quality standards will apply depending on the source and use of the water - All monitoring records kept up to date	- Review of monthly & annual reports will determine trends and quality fluctuations. These will then be investigated for potential problem areas - Hydrocarbon spillages cleared as soon as possible & reported to management - Reports will be made available for review by management - Water quality will be compared to appropriate standards. If exceedences are found, warnings will be issued to the users of water and investigations into possible	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		TSF: - Monitoring boreholes to be placed around the TSF to identify pollution or seepage from the TSF - Treat water and tailings prior to discharge onto the TSF to meet ICMM and Cyanide Code Guidelines and As concentrations such that compliance with IFC Guidelines may be achieved at the discharge point. - Implement quarterly ground and surface water quality monitoring as per the monitoring program - Mitigation for construction of the WRD: - Install clean and dirty water separation system around WRD - Implement ground and surface water monitoring as per the monitoring program - Adhere to the Waste Management Guideline		sources of pollution will take place	
GROUNDWATER					
Deterioration of	• Effective	• Hydrocarbon or chemical spills	• A rigorous monitoring	• Inspections, to	NLGM Operations

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
groundwater quality	management of any accidental spills Adequate monitoring points to allow the monitoring of impacts on water quality through to the operational phase	should be contained and remediated as soon as possible to prevent seeping into groundwater - All storage areas (for fuels and lubricants) will be compacted and have bunded containers to prevent soil pollution and appropriate oil separators installed to cover a 1:50 24 hr rainfall event - Accurate records of oil volumes (purchased, disposed, and recycled oil) need to be kept i.e. Develop an oil balance - The conveyance and storage of hazardous chemicals and effluents must take place in non-permeable proofed infrastructures, including tiles and coatings, concrete channels, trenches, and sumps - The chemicals need to be stored above ground located within a suitable secondary containment (bunded) area which caters for a 24hr storm event (bund) - All holding structures must be inspected annually by a qualified person. Recommendations with respect to repair procedures must be compiled and conducted by a recognised specialist - Implement the groundwater study's mitigation measures	programme of field quality assurance and quality control (QA/QC) to be implemented, including sample labelling, duplicate samples and chain of custody documentation - Monitoring of boreholes as per monitoring program - Water quality standards will, as a minimum, comply with natural quality as per baseline studies - Obtain a water abstraction permit - Capture, report and record water uses	identify potential spills, soil and groundwater impacts - Water quality will be compared to appropriate standards. If exceedences are found, warnings will be issued to the users of water - Implement the incident reporting procedure in cases of non-compliance	Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Regular monitoring of the water table in de-watering and monitoring boreholes - Implement groundwater quality monitoring - Adhere to the Waste Management Guideline			
AIR QUALITY					
Generation of dust and other atmospheric emissions	- Reduce dust emissions from construction activities to acceptable levels - Reduce the nuisance factor of dust to neighbouring communities - Determine the status quo of current ambient air quality in the area - Track progress of air pollution control measures being implemented - Demonstrate compliance	- Clean run-off or recycled water should be used to dampen roads, tracks and/ or stockpiled material especially under windy conditions - Wind speed reduction, wet suppression of permanent roads should be undertaken - Exposed surfaces that are not going to be utilised after construction should be rehabilitated and maintained - Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds - Implement measures aimed at binding the surface material or enhancing moisture retention, such as watering during the dry period. - The removal of the smallest required area of vegetation and	Detailed monitoring plan includes: - Implement the AQ system as per the AQ assessment and management plan - Report and record compliance with adopted ambient air quality guidelines - Demonstrating continuous improvement - Existing on-site meteorological station will continue to be operated and calibrated to ensure good data collection. Meteorological parameters measured at this station include wind speed, wind direction, ambient	- Maintenance of all monitoring and meteorological stations - The regular refinement of the air quality model to incorporate monitored data, thus improving confidence in the model's results - In the event of noncompliance, corrective action to take place which includes: - Source contribution quantification - Review of current control measures for significant	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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	with adopted ambient air quality guidelines	topsoil (i.e. the proposed servitudes and infrastructure footprints) will reduce the spatial scale of the impact Phase clearing as required by the construction programme to avoid exposing areas prior to commencement of the works.	temperature, relative humidity, precipitation, solar radiation, pressure and sigma-theta that provide an indication of the fluctuations in wind direction - Record and report meteorological data on quarterly basis - Air quality monitoring at the mining operations to consist of above ground dust monitoring at tipping points, conveyor areas and other identified areas of potentially high dust levels – implement dust extraction or spray methods to prevent airborne dust - Implement grievance procedure as well as incident procedures in events of non-compliances	sources (implementation of contingency measures where applicable) Reporting of annual monitoring to the relevant authorities	
NOISE					
Increase in noise	Reduce noise levels from the construction	All vehicles and equipment should be monitored and maintained in good working order	The KPI for noise must ensure that baseline levels are	Annual reports to be submitted to government	NLGM Operations Manager, with

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	- activities to avoid annoyance to surrounding community • Ensure compliance with applicable standards	• All sirens should have appropriate directional and volume settings • On site generators should be clad in suitable materials or housed in structures that would reduce their noise impacts • Implement incident procedure and safety and occupational procedures • Reduce noise at source if possible. This includes ensuring silencers on vehicles, using rubber linings, enclosing sources if possible • Where required and feasible, place a screen around the source of the noise • Switch off equipment when not in use • Keep as much vegetation as possible to aid in the noise absorption of the construction activities • Choose low noise plant alternatives • Training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events. • Conduct occupational monitoring system for Employees working in	- not significantly enhanced. • Independent noise monitoring to take place over a period of 2 – 3 days in various locations around the site and general area • Implement an occupational noise monitoring system – report & record • Develop appropriate procedures and implement	• Annual reports to include performances	assistance from the Environmental Manager and NLGM Construction Manager.

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		high noise level areas			
TERRESTRIAL ECOLOGY					
Loss of vegetation communities and biodiversity	- Prevent the loss of important species of vegetation - Limit the destruction of the Primary Forests - Restrict removal and disturbance of vegetation to those areas absolutely essential for the development - Preserve the flora, including areas not directly affected by project activities - Reduce the risk of habitat fragmentation and preserve natural	- Disturbed areas that will not be used (especially the area of drilling paths to the North of the site) should be rehabilitated as soon as possible - Intact areas of primary forest should be set aside as conservation areas, and preferably linked to large tracts of intact forest to the north. This would involve the commissioning of an offset report considering all options (contributions to conservation, setting aside of additional areas for existing conservation areas) The footprint of the mine should be kept as small as possible - Illegal waste dumping should be prohibited - Install/commission a proper waste disposal facility to cater for recycling, re-use, recovery, as well as an area for incinerator. Equip area with hazardous waste storage area under a roof, appropriate oil separator and adequate ventilation – area to be bunded and install clean dirty water separation at waste disposal	- Monitor changes in vegetation communities using LiDAR or other satellite imagery – when available - Monitor roads for logging trucks – continual basis - It is suggested that the monitoring plan as outlined in the Flora and Fauna Assessment be implemented	- In areas where vegetation has been removed or unnecessarily disturbed, re-vegetation will be initiated - Where areas of habitat disturbance are high, there should be an increase in community awareness of the local biodiversity	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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	corridors • Ensure rehabilitation plans are initiated during the operational phase	facility • Domestic waste to be covered to keep animals and scavengers out • Implement the IEMS and waste guideline principles • Community awareness should be implemented as part of the stakeholder engagement procedure to create awareness of biodiversity and preservation of natural habitats • Progressive rehabilitation of disturbed areas should take place as soon as possible • Report any Red data species found and implement permit to clear procedure • Access should be restricted to already impacted areas (drilling roads, test pits and trenches) by rehabilitating these areas as soon as possible by ripping • Areas where large numbers of plant Species of Special Concern occur should be avoided and demarcated • Access should be restricted to already impacted areas by ripping the roads and filling in trenches, and letting these areas naturally revegetate. • Access should be controlled in			

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		areas where the mine has management control to prevent the clearing of vegetation and logging			
Loss of ecosystem function	- Minimise domination of alien species - Prevent the introduction and spread of alien invasive species - Reduce the fragmentation of habitats	- The footprint of the mine should remain as small as possible, with new construction limited as far as possible to existing cleared areas - Alien invasive plants should be monitored and controlled at all times during the construction, operation, decommissioning and closure phase of the mine - A corridor set aside within the mine area would mitigate fragmentation substantially, especially if this could be managed with the community over an extended period of time	- The project area to be monitored visually for alien invasive species - The presence of alien species before the establishment of the infrastructure to be recorded and then monitored in terms of introduction and spread	- If alien invasive species are found, these will be immediately removed in such a way so as to prevent the spread of any seeds that may be present. - Control methods include removing the invasive plant from the ground then monitoring for re-growth.	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.
Loss of biodiversity due to increased site access and influx of people	- Prevention of injury and / or death of individual animals - Preservation of animals' habitats - Prevent direct persecution of wildlife - Prevent	- Workers should be made aware of the importance of maintaining the biodiversity - In order to avoid hunting, domestic animals such as dogs should not have access to the wildlife; - Disturbed areas that will not be used should be rehabilitated as soon as possible - Intact areas of primary forest should be set aside as conservation areas, and	- Implement the monitoring plan prior to construction to check for protected species - Establish bio-monitoring system and program equivalent to SASS 5	Trends and species diversity will be analysed to determine any changes. In the event of decrease in numbers, this will require further investigation to determine the source of the impact and thus possible mitigation	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	unnecessary hindrance to wildlife - Prevent disturbance, death or hindrance to protected species - Prevent logging in the forests where the mine has control	preferably linked to large tracts of intact forest to the north. Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter - Where possible access to forests along haul and access roads should be controlled - An agricultural program should be set up; where local people are taught better farming practices that reduce slash and burn agriculture. Conservation programs involving the local people may also help to reduce logging		measures	
AQUATIC ECOLOGY					
Habitat alteration due the diversion of the Marvov Creek and the construction of a dam, increase sedimentation of the local river systems	Limit the habitat destruction as far as possible during the construction of the diversion channel	- Implement bio-monitoring system and program - seasonal - Artisanal mining activities should not be permitted within the river diversion - Sediment traps should be installed and maintained where appropriate - Riparian vegetation bordering on drainage lines and rivers should be considered environmentally sensitive and impacts on these habitats should be avoided - If erosion has taken place, rehabilitation should commence	Monitoring program such as bio-monitoring system to be implemented - seasonal	Bi-annual aquatic assessments should be conducted to analyse trends in species diversity within the diversion channel and the Marvov Creek. In the event that declines in species are evident then further	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		as soon as possible - All roads need to be maintained and any erosion ditches forming along the road filled - Storm water must be managed so as to reduce the silt loads in the aquatic system - Berms/ earthen walls should be vegetated in order to avoid erosion and sedimentation		investigation will be required to determine the source and the appropriate mitigation measures implemented.	
Decreased water quality from accidental spills	Limit hydrocarbon spillages	- All vehicles and equipment should be regularly maintained to avoid any oil leaks or spills. Furthermore, if any spill or leak does occur ensure that it is properly cleaned up as soon as possible to avoid significant effects - Use drip trays and implement hydrocarbon and waste management guidelines - Spill kits should be available on site and in the case of a spill cleanup operations should commence as soon as possible in order to contain spills and limit the contamination of the receiving environment - Staff members, especially drivers, should be educated as to the importance of avoiding hydrocarbon contamination in the	- An emergency spill response plan should be put in place for the duration of construction phase - A water quality monitoring program should be implemented and maintained throughout the construction phase	As above	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		receiving environment and should not be allowed to wash vehicles in streams and creeks Adhere to the Waste Management Guideline			
SOCIO-ECONOMIC					
Increase in traffic and safety hazards Deal with potential spillage of hazardous material	- Ensure safe access to site - Create safe environment for pedestrians, domestic and wild animals and motorists	- Construction activities such as open trenches dug for culverts will expose road users to health and safety impacts. People could fall or drive into the pits and sustain injuries if the pits are not clearly demarcated. People travelling by foot, motorbike or taxi, which appear to be the main local forms of mobility, will be more vulnerable to possible injury due to increased traffic volumes - Although the road is currently in good condition, increased traffic will result in deterioration if not maintained throughout the life of the mine. This will increase risk of accidents with other road users. - Mining traffic combined with additional heavy traffic caused by commercial vehicles will increase the number of road accidents, if no precautions are taken. - If access is restricted, provide alternative routes. The risk for traffic related incidents increases	The following speed limitations are recommended: 40 km/h in mining areas and on ramps. 50 km/h on the Daniels Town Public Road – reducing speed when in areas that are populated - Work with government in implementing changes to the Daniels town road so that its alignment, width and surface is appropriate for the type of traffic it will deal with. - Ensure speed bumps are installed in areas where traffic speed needs to be controlled. - Ensure that a	Noncompliance to be reported and the necessary repairs, maintenance and replacements to be carried out by the responsible parties	Community Development Manager with assistance from the Environmental Manager.

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		considerably if one considers the narrowness of the road, slippery conditions during the rainy season, and high volumes of traffic. This situation can culminate in severe impacts for road users, pedestrians and densely populated sections adjacent to the road • During the operational phase the transport of products (e.g. fuel and cyanide) could potentially result in the accidental spillage of hazardous materials. Although the companies responsible for the transport of such materials have adequate safety and mitigation strategies in place, the possibility cannot be completely discounted that accidental spillage may occur, causing hazardous materials to seep into the ground and pollute groundwater used for domestic purposes. • Increased noise and dust pollution, due to increased traffic volumes, might impact on the health of the roadside population. Although these impacts have been assessed in the updated EIS, it is important that they also be considered from a social perspective. These impacts will be most significant for those living	hazardous materials management plan is compiled and implemented. • Ensure all suppliers are aware of the hazardous materials plan and safety risks along the road.		

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		or working closest to the road. • Possible selective road realignment can reduce the number of people requiring relocation, and may be considered for sections where villages are concentrated on one side of the road. It is, however, recognised that people are likely to congregate around the new road alignment because of the economic opportunities it offers; if this option is implemented, it would therefore be necessary for government to maintain strict enforcement of the RoW along the re-aligned sections • Establishment of grievance mechanism to facilitate the resolution of affected community concerns and grievances, ensuring on-going interaction with the community and the government in order to build trust and maintain relationships throughout the life of the project • Offer barricaded protection, such as fences, to high risk zones, i.e. areas like Daniels Town, Gbranga, schools and other areas where human activity is close to the road • Continue the existing practice of addressing traffic speed and/or			

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		volume through traffic calming measures such as road humps or speed breakers. However, such calming devices should be provided only in the event of provision of adequate signage • Monitoring the impact of mine vehicles on existing roads or tracks, and ensure that roads are maintained to an acceptable condition • Crossings could be established at areas which are not safe to cross - local residents and regular road users should be consulted with regard to location of crossings • Ensure good visibility on the approach to B 52 village and other areas where human activity is not clearly visible • Consider the provision of parking areas to minimize parked vehicles and other obstructions on the road, these parking areas should preferably be delineated from the road • Ensure roadworthiness of vehicles servicing the Aureus site. • Safe travelling speeds must be determined, especially for areas with high human activity; adequate measures should be implemented to ensure that these restrictions			

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		are enforced. Such measures may include monitoring vehicle speeds, erecting speed limit signs and installing speed bumps, as have already been installed by Aureus - Heavy motor vehicle (HMTV) traffic should be restricted to daylight hours if at all possible. Headlights of HMTV should be on at all times, especially in rainy conditions - Where access has to be temporarily denied for safety and construction reasons, this must be communicated to residents before the event - Implement the recommendations measures contained within the SIA specialist report			
Influx of foreign workforce, job seekers, family, entrepreneurs	- Ensure that recruitment strategies for the mine prioritise the sourcing of local labour, and share in gender equality - Empower the workforce to develop skills that will equip them to obtain	Mine - Clear communication of all available Employment positions to minimise population influx - Implementation of health development plans including upgrading facilities and awareness campaigns surrounding HIV/AIDS - The local community procurement policy and strategy & procedures should be defined - Ad-hoc, informal recruitment at the gate or through other unapproved	- The social plans to involve action plans aimed at providing development opportunities and benefits to the affected local communities. - Specific KPI's which can be used to monitor social development and progress include: - No. of people from	In line with the KPI's, an evaluation of mitigation measures and investigation into targeted actions & improvements will take place	Community Development Manager with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	Employment in other sectors of the economy - Contribute to the sustainable development of a community (not dependent on the mine) surrounding the area of operation - Maximise the number of eligible Employees that pass through the mentorship and coaching programme - Identify businesses that could provide low cost goods and services to the mine and/or help to manage a social/ environmental impact while creating a livelihood for local Employees	channels by setting up recruitment stands in built up areas should be prohibited - Integrated job profiling as a first step in career progression planning should be introduced - Gender-specific recruitment programmes and female targeted bursaries should be initiated - Needs/opportunity assessments in terms of procurement should be commissioned - Stakeholder database should be established to identify partners and develop collaborative networks - Entrepreneurial development initiatives should be undertaken - Investment in training/skills development of younger Employees and local community/gender sensitive groups should be considered - Social development plans should be implemented and should be ready to implement prior to construction Road - In consultation and conjunction with government: - Implementing an influx management framework;	the directly affected project area and nationals employed prior to and after any training received for each phase of the project - No. of employees that were promoted in positions for each phase of the project - No. of people from project area and Liberians that are recruited vs. no. of expatriates - Information relating to the above aspects to be captured and incorporated into a database - Monitoring of KPI's to be done annually		

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	- Provide long term sustainable development benefits to local communities that are in line with the National and District development goals, while adding business value to the company - Explore ways of assisting in building the capacity of local businesses to take up the direct and indirect opportunities provided by the mine	Developing an influx management plan focussed on managing influx throughout the corridor. Implement HIV/AIDS awareness programme/ extend existing programme to include roadside communities.			
CULTURAL HERITAGE					
Potential accidental damage caused by operational activities to a	- Minimise disturbance to culturally sensitive areas - protection of	To prevent vehicle or other accidental damage the cultural site be demarcated by means of earth bunds, fencing and signage	- Monitor grievances from communities - Conduct visual inspections of the site regularly	In the event of complaints from local communities, the grievance procedure will be	Community Development Manager with assistance from the Environmental

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
cultural sites	cultural heritage site		Adherence to site procedures	followed and mitigation applied where possible	Manager.
Indirect impact caused by the Project's construction activities that may inhibit members of the local community being able to access the cultural sites associated with Jawajei.	- Facilitate access to sacred sites - Protection of sites during construction	Identify new sacred site areas in consultation with the community and provide alternative routes to these scared sites in the event that access to these sites is cut off by mining operations. Villages must be notified of these new access routes.	Monitor grievances from communities	In the event of complaints from local communities, the grievance procedure will be followed and mitigation applied where possible	Community Development Manager with assistance from the Environmental Manager.
VISUAL					
Removal of the vegetation and the alteration of the existing topography will result in a change in the existing landscape character and therefore impacting on the visual resource value and becoming a visually intrusive element of the landscape.	Limit the extent of the visual intrusion as far as possible	- Efforts will be Employed to maintain the construction site in a neat and orderly condition during the construction phase - Designated areas for material storage, waste sorting and temporary storage, batching and other potentially intrusive activities will be created and screened off to the extent is feasible - Where feasible, specimen trees must be left in locations adjacent to the mine where they will not be affected by mining activities	Monitor grievances from communities in relation to visual impacts	In the event of complaints from local communities, the grievance procedure will be followed and mitigation applied where possible	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
Site camp and construction plant lights can potentially be highly visible and intrusive	Limit the extent of the visual intrusion as far as possible	- During construction, the Construction Contractors will utilise security lighting that is movement activated rather than permanently switched on, to prevent unnecessary constant illumination - During construction selective lighting for the construction camps and other secured areas will be employed. Up-lighting of structures will be avoided	Monitor grievances from communities in relation to visual impacts	In the event of complaints from local communities, the grievance procedure will be followed and mitigation applied where possible	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

4.1.2 Operational Phase Management Plan

During the operational phase, the mine and infrastructure will be operational, and the site will have restricted access. The mine will need to abide by the suite of management plans as well as this Footprint Management Plan.

Table 4-2: Operational phase Footprint management plan

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
GENERAL SITE					
Uncontrolled mine footprint	- Adhere to the demarcated areas and access roads - Minimise areas of disturbance	- Mine area to be clearly demarcated and communicated to all personnel going on site - Adequate signage to be erected to indicating PPE to be worn and any dangerous areas	- Daily inspections of site control and PPE adherence - Incidents reported as per the Non compliance	Contractors or personnel who do not comply with site conditions are to be reported and where necessary additional training	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Access roads to be clearly marked as such and off site driving to be reported - Speed controls to be put in place on site - Induction training for all personnel going to site - Restricted access to those personnel not expected at site and to local community members	Management Plan Monitoring of all environmental elements as described in each of the ESHS System	programmes implemented or fines applied Where contractors or personnel impact areas not demarcated, re-vegetation to be undertaken as per the Erosion Control and Re-vegetation Management Plan	Contractors on site to abide by this Management Plan
SOILS					
Impact on soil through erosion	- Prevent soil loss through erosion. - Preserve topsoil for future rehabilitation	- All heavy machinery operators and truck drivers should stay in designated areas - Prepare stockpiles appropriately to ensure vegetation establishes itself - Ensure stockpiles are placed on a free draining location so as to limit erosion loss - Ensure erosion measures are put in place at all waste rock dumps and stockpile areas - Topsoil stockpiles should be maintained for effective rehabilitation following the closure of the mine - Soil erosion is a potential impact for all sloping areas. These sloping	Monitoring to be conducted as per the soil monitoring plan	In event of erosion, remediation work will need to be carried out to improve the vegetation cover or divert rain water runoff	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		areas should be protected by concrete structures such as drains, while the main problem would be the sloped areas of the TSF and WRD. The slopes will require shaping, and contouring as well as good grass cover to prevent erosion Progressive rehabilitation to be ongoing during the LOM. This must be recorded and reported.			
Impact on soil through contamination	- Prevent reduction of soil quality - Prevent loss of soil quality through contamination with hydrocarbons - Manage hydrocarbons	- All heavy machinery operators and truck drivers should stay on designated areas and access roads/tracks - Storage and use of fuels and lubricants should be confined to lined and bunded areas and comply with Waste Management Plan. The appropriate oil separators for recycling of hydrocarbons must be installed at these locations - Accidental hydrocarbon spillages should be reported and cleaned up immediately, and the affected soil should be removed, and rehabilitated - All maintenance should be restricted to appropriately designed workshops - Vehicle service areas must be paved or compacted. Water runoff	Soil samples will be taken from the contaminated areas that have been rehabilitated. Samples to be checked for: - pH (water) - Exchangeable cations – Na, K, Ca, Mg CEC (cation exchange capacity) - Texture (particle size distribution) - Phosphorus (Bray No1) - Heavy metals	Soil remediation to take place in the event of a spillage. The affected soil should be removed, and rehabilitated. If this is not possible, affected soil to be dispose of at a waste site designated to accept such waste	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		traps should be constructed at the vehicle service sites to prevent polluted water runoff into streams • Soil hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits • Implement the emergency response plan in event of disaster • Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas • Adhere to the Waste Management Guideline			
SURFACE WATER					
Sedimentation of surface water sources	• To have an insignificant impact on suitability for use downstream • Protect existing users of surface water from impacts to water quality	• Ensure stockpiles are placed on a free draining location so as to limit erosion loss • Water must be encouraged to flow from rehabilitated areas, Erosion of the topsoil must be prevented by using vegetation to control the surface flow velocity in conjunction with berms and drains • Ensure erosion measures are put in place at all waste rock dumps and stockpile areas • Where required, the design of PCDs/ RWDs (or similar facilities suited to the Project) should ensure that the volume of rainwater from a 24 hour storm	• Sampling of surface water from the Marvoo Creek both upstream and downstream of the project area as per the monitoring plan An ongoing storm water management plan is required that can be regularly reviewed with the progression of the mining operation in order to effectively manage the separation of clean	• Review of quarterly & annual reports will determine trends and quality fluctuations. These will then be investigated for the source of the impact	NLGM Operations Manager with assistance from the Environmental Manager.

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		can be contained at maximum operational level Physical stabilisation methods to be installed in the MCDL as per design drawings	and dirty water. Monitoring parameters as per monitoring plan and permit conditions. - Analysis of physical and biological properties - Compare results with water standards and permit conditions. A number of different water quality standards will apply depending on the source and use of the water - All monitoring records kept up to date		
Surface water contamination from spills	- To have an insignificant impact on suitability for use downstream - Prevent the discharge and run off of contaminated water in the short and long term - Protect existing	- Storage of fuel and lubricants must be contained within bunded areas - Access to chemical stores must be monitored - Upslope water should be directed away from cleared areas - The vehicle hard park area should be separated from clean water areas with berms or channels and oil separators. - No discharge of water to be allowed if not meeting the baseline water criteria or the permit	- Sampling of surface water from the Marvoo Creek both upstream and downstream of the project area - Monitor from all site surface water storage, use and flow points - Monitoring will be on a monthly basis - An ongoing storm water management	- Review of quarterly & annual reports will determine trends and quality fluctuations. These will then be investigated for the source of the impact - Hydrocarbon spillages cleared as soon as possible &	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	users of surface water from impacts to water quality	conditions. . - Implementation of stormwater management system/plan - Implement the emergency response plan in event of disaster - Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas - Adhere to the Waste Management Guideline	plan is required that can be regularly reviewed with the progression of the mining operation in order to effectively manage the separation of clean and dirty water. - Monitoring parameters include: - Analysis of physical and biological properties - Compare results with water standards. A number of different water quality standards will apply depending on the source and use of the water - All monitoring records kept up to date	reported to management	
Surface water contamination from runoff from the TSF	- To have an insignificant impact on suitability for use downstream - Prevent the discharge and run off of	Treatment of tailings to get arsenic levels down to acceptable standards (refer to the Cyanide and Arsenic Management Plan) before entering the TSF from the plant, or resort to alternative methods to ensure the effluent discharge complies with recommended guidelines;	- Sampling of surface water from the Marvov Creek both upstream and downstream and the compliant sampling point of the project area. - The water monitoring	Review of quarterly & annual reports will determine trends and quality fluctuations. These will then be investigated for the source of the	NLGM Operations Manager, with assistance from the Environmental Manager

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	contaminated water in the short and long term Protect existing users of surface water from impacts to water quality	- The following management measures are recommended for the TSF and WRD, namely: - Installation of Monitoring boreholes downstream of TSF and WRD; - Seepage monitoring via boreholes downstream of TSF and WRD; - Storm water channels and management around TSF allowing water not to flow into tailings storage area; - Determine whether the TSF should be lined - Monitoring of groundwater and surface water qualities on and around the project area - Five (5) metre deep key below the TSF wall 5 m deep French drain system below the TSF wall to allow the pumping of seepage water back to the TSF pool; - Controlled discharge from the holding dam - Where required, the design of PCDs should ensure that the volume of rainwater from a 24 hour storm can be contained at maximum operational level - All water qualities should be classed against the appropriate	plan to be implemented. - Monitor all site surface water storages, water use and flow points - Monitoring will be on a monthly basis - An on-going storm water management plan is required that can be regularly reviewed with the progression of the mining operation in order to effectively manage the separation of clean and dirty water - Monitoring parameters include analysis of physical and biological properties - Compare results with water standards and or permit requirements. A number of different water quality standards will apply depending on the source and use of the	impact	

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		local background conditions, and agreed standards. Monitoring locations TSFDS1, TSFDS2 and EDMP1 are in place to monitor effluent discharge from the mining activities and should be monitored in a weekly monthly and quarterly basis and evaluated against IFC guidelines. If these guideline parameters are exceeded the recommended discharge control is options listed in section 9 of the Integrated Water Management Report must be implemented to allow higher diluting factors Discharge of water from the holding dam into the Marvov Creek diversion channel should be at a rate close to pre-operational levels with elevated discharge during the dry season. This discharge will take place at D1	water All monitoring records kept up to date		
Surface water contamination due to pit dewatering	- To have an insignificant impact on suitability for use downstream - Prevent the discharge and run off of contaminated water in the	- Seepage capturing boreholes downstream of WRD - Monitoring of groundwater and surface water qualities on and around the project area - Controlled discharge from the holding dam - Where required, the design of PCDs should ensure that the volume of rainwater from a 24 hour storm can be contained at	- Sampling of surface water from the Marvov Creek both upstream and downstream of the project area - Monitor of site surface water storage areas, water uses and flow points - Monitoring will be on a	Review of quarterly & annual reports will determine trends and quality fluctuations. These will then be investigated for the source of the impact	NLGM Environmental Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	short and long term Protect existing users of surface water from impacts to water quality	maximum operational level - Where required, the design of PCDs should ensure that the volume of rainwater from a 24 hour storm can be contained at maximum operational level - Treat the tailings in order to reduce the soluble arsenic content before being deposited on the facility - Monitoring locations TSFDS1, TSFDS2, EDMP1 and EDMP2 are in place to monitor effluent discharge from the mining activities and should be monitored in a weekly monthly and quarterly basis and evaluated against IFC guidelines. If these guideline parameters are exceeded the recommended discharge control is options listed in section 9 of the Integrated Water Management Report must be implemented to allow higher diluting factors - During the dry months there will be no effluent discharge from the TSF circuit if recommended water management measures are adhered to during these periods. Discharge to the TSF occurs at an As concentration of 0.2 mg/l which is diluted to concentrations well below the IFC guideline of 0.1 mg/l	monthly basis An ongoing storm water management plan is required that can be regularly reviewed with the progression of the mining operation in order to effectively manage the separation of clean and dirty water. Monitoring parameters include Analysis of physical and biological properties - Compare results with water standards and or permit requirements. A number of different water quality standards will apply depending on the source and use of the water - All monitoring records kept up to date		

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		by the time it reaches the recommended IFC monitoring point Implement a storm water management plan			
GROUNDWATER					
Deterioration of groundwater quality from the TSF	- Ensure that adequate monitoring points exist to allow the monitoring of impacts on water quality - Prevent indirect impacts on flora, fauna and people due to contamination of groundwater - To minimise arsenic concentrations into the local groundwater	- An integrated groundwater monitoring programme needs to be implemented, which will act as a pre-warning system for management of impacts. Monitoring of mine water is also critical in order to validate the geochemical assessment - Assess the necessity of the proposed lining of TSF - Treat the tailings in order to reduce the soluble arsenic content before being deposited on the facility - Drill seepage interception boreholes down gradient of the TSF site - Continuous sump and pump volume metering and water distribution record keeping - Continued groundwater level monitoring - Evaluate newly-identified impacts - Sump water quality monitoring	- The groundwater monitoring system should be implemented to provide the required water level and water quality data for the hydrogeological modelling and water balance - Monitoring of boreholes as per monitoring program - Water quality standards will as a minimum comply with natural quality as per baseline studies - Obtain a water abstraction permit - Obtain water discharge permit when and if required - Capture report and record water uses	- All monitoring data to be collated into a data base monthly. - The groundwater monitoring system will be used to detect any variance from predicted conditions, for the timeous implementation of corrective action, compensation and enhanced management of contaminant control - Implement the incident reporting procedure in cases of non-compliance	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
Contamination of groundwater through spillages (hydrocarbon, sewage, waste and chemicals)	- Ensure that adequate monitoring points exist to allow the monitoring of impacts on water quality - Prevent indirect impacts on flora, fauna and people due to contamination of groundwater - To minimise contamination of the local groundwater	- An integrated groundwater monitoring programme needs to be implemented, which will act as a pre-warning system for management of impacts - It is essential to contain any run-off and seepage that could potentially impact on the groundwater quality. This must be accomplished by the diversion of clean run-off water away from the site and containment of run-off within the site by various storm water control measures - Vehicles will be maintained regularly and kept in a good working order - Vehicle maintenance will not be carried out in random areas of the site, but in the designated workshops. and - Development and implementation of a hydrocarbon management procedure - Adhere to the Waste Management Guideline	- A groundwater monitoring system should be designed and implemented to provide the required water level and water quality data for the hydrogeological modelling and water balance - Monitoring of boreholes as per monitoring program - Water quality standards will as a minimum comply with natural quality as per baseline studies - Obtain a water abstraction permit - Capture report and record water uses	- All monitoring data to be collated into a data base monthly. - The groundwater monitoring system will be used to detect any variance from predicted conditions, for the timeous implementation of corrective action, compensation and enhanced management of contaminant control - Implement the incident reporting procedure in cases of non-compliance	NLGM Environmental Manager.
AIR QUALITY					
Generation of dust and other atmospheric emissions	Identification of sources of emissions and types of pollutants	- All access and haul roads should be treated to mitigate ambient dust levels i.e. with, water spraying or roads to be surfaced - Dust should be controlled from	The existing ambient monitoring network should be continued throughout the life of the mine	- Maintenance of all monitoring and meteorological stations - The regular	NLGM Operations Manager, with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	- released - Determination of pertinent source parameters, establishment of particle size distributions and chemical compositions of particle emissions - Minimise and control sources of emissions - Protect community and Employee health	crushing and screening operations - All topsoil and overburden storage piles should be vegetated - Dust generation potential for materials handling operations within the open pit can be reduced by 62%, by merely doubling the moisture content of the material handled. A 75% reduction in dust emissions from unpaved in-pit haul roads can be achieved through effective water sprays combined with chemicals - The crushing system will include facilities for water sprayers to reduce the amount of fugitive dust emissions - Dust control measures for open areas can consist of wet suppression, vegetation or wind breaks. - Wet suppressants are generally applied for short storage pile durations; - Measures aimed at reducing the extent of unpaved roads, e.g. paving/surfacing where possible - Locate machinery, fuel and chemical storage and dust generating activities away from site boundaries and sensitive receptors where possible	- Quantifying the proposed project's impact - Tracking progress of air pollution control measures being implemented - Demonstrating compliance with adopted ambient air quality guidelines with monitoring reports submitted annually to authorities - Demonstrating continuous improvement - Existing on-site meteorological station will continue to monitor. Meteorological parameters measured at this station include wind speed, wind direction, ambient temperature, relative humidity, precipitation, solar radiation, pressure and sigma-theta that provide an indication of the fluctuations in wind	refinement of the air quality model to incorporate monitored data, thus improving confidence in the model's results - Corrective action: - Source contribution quantification - Review of current control measures for significant sources (implementation of contingency measures where applicable)	

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Utilise pre-fabricated materials to reduce cutting, grinding and sawing - Use water suppressant systems or dampening down whenever possible - Use of dust extraction techniques if available - Ensure that stockpiles exist for the shortest possible time - Minimise surface areas of stockpiled material to reduce the surface area exposed to wind erosion - Do not build steep sided stockpiles or those that have sharp changes in shape - Whenever possible, keep stockpiles away from the site boundaries, sensitive receptors and surface drains - If possible, keep stockpiles securely sheeted and only remove when necessary - Covering and protecting of stored materials from wind and dampening stored materials where appropriate. - Screen off work areas - Secure covers for all skips, where possible - Minimising drop heights to control	direction - Air quality monitoring at the mining operations to consist of above ground dust monitoring at tipping points, conveyor areas and other identified areas of potentially high dust levels. - Monitoring dust levels on monthly or quarterly basis as necessary		

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		the fall of materials • Sweeping and dampening down working areas regularly to prevent the build-up of fine waste dust material • Implement a vehicle speed limit monitoring system on site, to help prevent/control dust from vehicles and for health and safety purposes • Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds • Measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression • Identify areas and activities of high dust generation or loading risk • Implement control measures for these areas. These activities could include for example, water spraying and dousing, use of controls and traffic management • Scheduled maintenance of Diesel generators to be implemented. • Annual official inspection of site vehicles emission • Limit vehicles idling motors • Regular inspection of site vehicles engines and repairs if required			

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Regular inspection of site power generators and repair if required - Annual official inspection of site power plant emission in relation to appropriate emission limits/standards - Site design with appropriate emissions abatement technology (as appropriate) to minimise emissions to atmosphere and to minimise ground level impacts from combustion emissions - Areas that may be prone to erosion or where signs of erosion are evident will be stabilised. Methods of stabilisation include: brush-cut packing, mulch or chip cover, straw stabilising, sodding, hydro-seeding, the application of soil binders and physical stabilisation methods such as gabions, reno-mattresses, armour flex or retaining walls - The total footprint area to be disturbed / developed will be kept to a minimum by demarcating the construction areas and restricting construction to these areas only			
NOISE					
Increase in noise levels	Reduce noise levels from the mining	- Establishment of an ambient noise monitoring programme - Conduct occupational noise	Blast noise to be recorded and monitored to co-inside	Quarterly reports to be submitted to government	NLGM Operations Manager, with assistance from the

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	operations as far as possible to avoid annoyance to surrounding community and remain within regulation	monitoring system for employees working in high noise level areas - The noise monitoring programme implemented on site will be aimed at detecting deviations from predicted noise levels - Corrective measures will be implemented where warranted if changes in noise level are detected. - Choice of low noise plant alternatives - Noise should be reduced at the source if possible. This includes ensuring silencers on vehicles, using rubber linings, enclosing sources if possible, placement of screens etc. - Implement the service and maintenance plan for vehicles and equipment as faulty vehicles and equipment generate more noise - Consideration of all individual noise contributors, whether continuous low intensity noise or single noise events of high intensity - Ongoing maintenance and assessment of all screening mounds, fences, or walls to control noise along its transmission path - Switch off equipment when not in	with blasting. - Blast noise to be monitored to ascertain compliance to the relevant World Bank standards - The KPI for noise must ensure that baseline levels are not significantly enhanced. - Independent noise monitoring to take place over a period of 2 – 3 days in various locations around the site and general area - Implement an occupational noise monitoring system – report & record - Develop appropriate procedures and implement	Annual reports to include performances	Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		use • Keep as much vegetation as possible to aid in the noise absorption of the construction activities • Fixed noise producing sources such as generators, to be either housed in enclosures or barriers put up around the noise source. The barriers should be installed between the noise source and sensitive noise receptor, closest to the noise source • Blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest • The following with regards to blasting operations is recommended: ○ The use of millisecond delays between rows of blast holes in a given blasting pattern in order to reduce the amount of explosive charge detonated at any given instant is recommended (Sengupta, 1993) ○ Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden (Sengupta,			

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		1993) ○ Maintaining good public relations with the surrounding communities, i.e warning the local communities in advance before blasts • Vehicles and operational equipment selected for use on the project site should have as low sound ratings as possible and all equipment should be regularly maintained • Training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events • Erect berm, screen or barrier at permanent sites and haul roads			
TERRESTRIAL ECOLOGY					
Impact on flora from contamination of soil and water	• Prevent the loss of important species of vegetation and animals • Maintain local biodiversity	• Storage of fuel and lubricants must be contained within bunded areas with appropriate oil separators • The vehicle hard park area should be separated from clean water areas with berms or channels • Accidental hydrocarbon spillages should be reported and cleaned up immediately, and the affected soil should be removed, and	• Various parameters should be measured, both on the rehabilitation sites and in the adjacent undisturbed areas. Monitoring to take place during dry and wet seasons. These parameters include:	• In areas where vegetation has been removed or unnecessarily disturbed, re-vegetation will be initiated • In the event that vegetation is impacted on, mitigation and/or	NLGM Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		rehabilitated - Hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits - Adhere to the Waste Management Guideline	- Species richness, vegetation composition presence of protected species and presence of alien invasive species - Monitoring of rehabilitated areas should be done annually for the first six years, and bi-annually thereafter for a further four years, thus providing for 5 years of intensive post-rehabilitation monitoring	compensation measures will be investigated	
Increased site access and human activity could decrease the areas biodiversity	- Prevention of injury and / or death of individual animals - Limit the disturbances, i.e. noise, transport and dust, to those areas allocated for certain operational activities - Maintain the habitat for	- Plants of importance, such as those of special concern, should be relocated to a safe area such as a nursery or area that will not be disturbed. A nursery should be set up for this purpose as well as to propagate appropriate species for rehabilitation. This nursery could be outsourced to stimulate new business opportunities in the local communities - Where possible access to the site should be controlled - The NLGM employees involved with the operation of the mine should be educated about the	- The fauna monitoring programme implemented during construction should be continued throughout operation The following faunal groups must be monitored throughout the operational phase: - Mammals – observed on site and recorded in an inventory.	Trends and species diversity will be analysed to determine any changes. In the event of decrease in numbers, this will require further investigation to determine the source of the impact and thus possible mitigation measures	NLGM Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	existing and future fauna - Limit the indirect effects of the mine operation, through effective mitigation and monitoring - Limit the cutting down of trees surrounding the mine	importance of protecting the biodiversity - Hunting of animals by Employees must be prohibited - A speed limit should be stipulated and adhered to at all times to prevent road related deaths - Vehicles should be restricted to the demarcated roads and areas around the operation - Certain areas should be fenced off to prevent the larger mammals entering areas which could pose a danger to them			
Ecological disturbance due to noise and dust contamination	- Prevention of injury and / or death of individual animals - Limit the disturbances, i.e. noise, transport and dust, to those areas allocated for certain operational activities - Maintain the habitat for existing and future fauna	- Switch off equipment when not in use - Keep as much vegetation as possible to aid in the noise absorption of the construction activities - Fixed noise producing sources such as generators, to be either housed in enclosures or barriers put up around the noise source. The barriers should be installed between the noise source and sensitive noise receptor, closest to the noise source - Transport activities should also be limited to daylight hours, where possible	N/A	Trends and species diversity will be analysed to determine any changes. In the event of decrease in numbers, this will require further investigation to determine the source of the impact and thus possible mitigation measures	NLGM Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		Dust control measures for open areas can consist of wet suppression, chemical suppressants, vegetation or wind breaks, amongst others			
AQUATIC ECOLOGY					
Decrease in water quality within water courses	Maintain aquatic ecology of the Marvoe Creek	- Storage of fuel and lubricants must be contained within bunded areas - The vehicle hard park area should be separated from clean water areas with berms or channels and oil separator system - Hydrocarbon and chemical spillages should be cleaned up using commercially available equipment and clean-up kits. Details of emergency clean-up procedures should be contained in a Pollution Prevention Plan that will carry through to operation - Correct sewage management technology to cater for the volumes produced - The removal of the smallest required area of vegetation and topsoil (i.e. the proposed servitudes and infrastructure footprints) will reduce the spatial scale of the impact - Runoff water from the waste dumps and stockpiles should be channelled into pollution control	- Mitigation measures need to be maintained throughout the operational phase of the project - Adequate stormwater management needs to be maintained during the operational phase	Bi-annual aquatic assessments should be conducted to analyse trends in species diversity within the diversion channel and the Marvoe Creek. In the event that declines in species are evident then further investigation will be required to determine the source and the appropriate mitigation measures implemented.	NLGM Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		dams to avoid impacts on the receiving environment. The water in these pollution control dams should be reused during the mining operations if possible • These stockpiles and waste dumps should also be placed in areas where groundwater and surface water pollution can be avoided • Sediment traps should be installed and maintained where appropriate • The runoff should be routinely monitored for acidity and salinity as an early warning for potential increases in salinity or acidic drainage water • Adequate stormwater management structures need to be constructed and maintained • Water quality should be routinely monitored at aquatic ecosystems associated with the mining activities. This includes sites upstream and downstream of the tailings storage facility so that further mitigation measures can be implemented			
Lack of connectivity within the Marvov Creek	• Maintain aquatic ecology of the Marvov Creek	• Construction of a fish ladder at the dam wall • Prevent fishing in the diversion trench as well as at the fish ladder	• Mitigation measures need to be maintained throughout the operational phase of the project	• Bi-annual aquatic assessments should be conducted to analyse trends in	NLGM Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		Habitat recreation with the diversion trench	Adequate stormwater management needs to be maintained during the operational phase	species diversity within the diversion channel and the Marvov Creek. In the event that declines in species are evident then further investigation will be required to determine the source and the appropriate mitigation measures implemented.	
SOCIO ECONOMIC					
Increase in traffic and safety hazards	- Maintenance of high safety measures and road infrastructure to prevent accidents - Ensure safe access around site	Refer to construction phase EMP mitigation and control measures above	- Monitor traffic incidents on local roads around the mine - Records to be kept of vehicle accidents, pedestrian and animal accidents The following speed limitations are recommended: The following speed limitations are recommended: 40 km/h in mining	- Noncompliance to be reported and the necessary repairs, maintenance and replacements to be carried out by the responsible parties - If records indicate potential problem areas, additional safety features to be installed at that point	Operational Manager with assistance from the Environmental Manager and Community Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
			areas and on ramps. 50 km/h on the Daniels Town Public Road – reducing speed when in areas that are populated		
Population influx leading to increase in social pathologies	- Assemble adequate, accurate, appropriate and relevant socio-economic information relating to the context of the operation - Assist affected people in adapting to the social and economic changes brought about by the project through information and participation - Focus on an HIV prevention approach rather than a long-term intervention	- An influx management framework is included in the CDP drafted for the NLGM. - List of available skills in the community to be made available to the mine for recruitment purposes - HIV/AIDS awareness programmes/ Voluntary Counselling & Testing Program should be introduced	- Monitor and assess stakeholder satisfaction with the stakeholder engagement strategy as well as the appropriateness and effectiveness of stakeholder engagement mechanisms to identify and manage issues and impacts associated with the mine - Social plans will involve action plans aimed at providing development opportunities and benefits to the affected local communities	Implementation of Social Development Plans	Community Development Manager with assistance from the Environmental Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
Development of local economy, Increased markets for local entrepreneurs	- Contribute to economic diversification - Promote the increase in local economic benefits - Ensure that (potential) local suppliers know what the quality requirements of the broader project area are, and that they can develop their products and services to try to meet these standards - Contribute to national economy - Increase foreign currency earnings diversification	- Support the development of Small Micro and Medium Enterprises (SMMEs) and the Empowerment of women of the affected communities. - Promoting local economic development by maximising local procurement where possible - Establish infrastructure such as markets to facilitate trading.	- The Social Plans involve action plans aimed at developing the local economy, skills & training and recruitment - Specific KPI's which can be used to monitor economic development and progress and audits will be conducted to track performance - Information relating to the above aspects will need to be captured and incorporated into a database - Monitoring of KPI's to be done annually		Community Development Manager with assistance from the Environmental Manager
CULTURAL HERITAGE					
Potential accidental	Minimise disturbance to	To prevent vehicle or other accidental damage the cultural site	Continuation of the mitigation from	Implementation of a grievance and	Community Development

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
damage caused by operational activities to cultural sites	culturally sensitive areas protection of cultural heritage site	be demarcated by means of earth bunds, fencing and signage	operational phase and maintenance throughout	compensation policy	Manager with assistance from the Environmental Manager
Indirect impact caused by the Project's operational activities that may inhibit members of the local community being able to access the cultural sites associated with Jawajei.	Facilitate access to sites Protection of sites during operation	NLGM to provide access or transportation, where and when required (e.g. for the villagers of Jakindo to visit Jawajei for ceremonies).	Monitor grievances from communities	In the event of complaints from local communities, the grievance procedure will be followed and mitigation applied where possible	Community Development Officer with assistance from the Environmental Manager
Visual impacts to visitors and local residents during operation from mining activities	Limit the extent of the visual intrusion during operation	- Due to practical / operational, safety and cost implications, the mitigation potential in this regard is somewhat limited. However, the following measures will be implemented: - The plant area will be fenced - Progressive rehabilitation of all areas affected by mining will be done throughout the operational phase	- Monitor grievances from communities in relation to visual impacts - Monitor rehabilitation as per the fauna and flora plan	In the event of complaints from local communities, the grievance procedure will be followed and mitigation applied where possible	Community Development Officer with assistance from the Environmental Manager

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4.1.3 Management during Decommissioning

During decommissioning infrastructure will be removed, areas will be rehabilitated and the mine pit will be closed. The Closure Management Plan will apply during this phase.

Table 4-3: Decommissioning phase Footprint management plan

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
GENERAL SITE					
Uncontrolled mine footprint	- Adhere to the demarcated areas and access roads - Minimise areas of disturbance	- Mine area to be clearly demarcated and communicated to all personnel going on site - Adequate signage to be erected to indicating PPE to be worn and any dangerous areas - Access roads to be clearly marked as such and off site driving to be reported - Speed controls to be put in place on site - Induction training for all personnel going to site - Restricted access to those personnel not expected at site and to local community members	- Daily inspections of site control and PPE adherence - Incidents reported as per the Non compliance Management Plan - Monitoring of all environmental elements as described in each of the ESHS System	- Contractors or personnel who do not comply with site conditions are to be reported and where necessary additional training programmes implemented or fines applied - Where contractors or personnel impact areas not demarcated, re-vegetation to be undertaken as per the Erosion Control and Re-vegetation Management Plan	NLGM Operations Manager, with assistance from the Environmental Manager. Contractors on site to abide by this Management Plan
SOILS					
Erosion of soils	- Reduce soil erosion on site - Conserve	- Keep vehicles on dedicated roads to avoid compaction - All foundation trenches need to be	- Monitoring should include: - Use of a soil auger	In event of erosion, remediation work	NLGM Operations Manager, with assistance from the

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	topsoil for rehabilitation Vegetate disturbed areas	filled and fertilised - Areas where infrastructure was removed need to be vegetated using site specific species - Add fertilizers to soil where necessary - Monitor erosion and compaction in areas of rehabilitation - Minimise footprint area during decommissioning - Ensure post mining land use suits the land capability.	to establish correct placing of topsoil - Soil balance and depth for volumes of soil - Maintenance of all records on site - Erosion assessments carried out twice yearly in the rehabilitated areas to visually check for erosion channels. Samples will be checked for: - pH (water) - Exchangeable cations – Na, K, Ca, Mg CEC (Cation exchange capacity) - Texture (particle size distribution) - Phosphorus (Bray No1) - Heavy metals - Random inspections around potential areas of contamination - Monitor movement and stability of the	will need to be carried out to improve the vegetation cover or divert rain water runoff	Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
			soil stockpiles ○ Monitor soil balance annually for volumes of soil ○ Erosion assessments carried out twice yearly in the rehabilitated areas to visually check for erosion channels		
Loss of soil quality through contamination	Prevent contamination of soils through spills	- Storage of fuel and lubricants must be contained within bunded areas - Vehicle service areas must be paved or compacted. Water runoff traps should be constructed at the vehicle service sites to prevent polluted water runoff into streams, fitted with an oil trap - Accidental hydrocarbon spillages should be reported and cleaned up immediately, and the affected soil should be removed, and rehabilitated - Alternatively, contaminated soil needs to be disposed of at a waste sites designated to accept such waste; and - Soil hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits - Implement the emergency	- Monitoring should include: - Use of a soil auger to establish correct placing of topsoil - Soil balance and depth for volumes of soil - Maintenance of all records on site - Erosion assessments carried out twice yearly in the rehabilitated areas to visually check for erosion channels. - Samples will be checked for: - pH (water)	Soil remediation to take place in the event of a spillage. The affected soil should be removed, and rehabilitated.	NLGM Operations Manager, with assistance from the Environmental Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- response plan in event of disaster - Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas - Adhere to the Waste Management Guideline	- Exchangeable cations – Na, K, Ca, Mg CEC (cation exchange capacity) - Texture (particle size distribution) - Phosphorus (Bray No1) - Heavy metals - Monthly inspections around potential areas of contamination - Monitor movement and stability of the soil stockpiles - Monitor soil balance annually for volumes of soil. - Erosion assessments carried out twice yearly in the rehabilitated areas to visually check for erosion channels		
SURFACE WATER					
Impact on water quality	Ensure seepage from infrastructure that poses the possibility of	- Erosion control measures must be put into place at all disturbed areas - Storm water management measures should be maintained	Sampling of surface water from the Marvoo Creek both upstream and downstream of the	Review of quarterly & annual reports will determine trends and quality	NLGM Environmental Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	contamination is contained Ensure compliance with the closure plan	during closure - Storage of fuel and lubricants must be contained within bunded areas - Vehicle service areas must be paved or compacted. Water runoff traps should be constructed at the vehicle service sites to prevent polluted water runoff into streams - Accidental hydrocarbon spillages should be reported and cleaned up immediately, and the affected soil should be removed, and rehabilitated - Environmental monitoring should continue for a period of at least five years after mining, or until a trend is established. In the event that water quality is poor, a stream analysis should be performed to determine the possible sources of pollution and recommend mitigation measures - Through decommissioning and post closure monitoring, the mine needs to identify pollution occurring and the success of the rehabilitation programme - The monitoring of surface water must be continued during the decommissioning phase	project area - Additional surface water monitoring from all site surface water storage, use and flow points - Monitoring will be on a monthly basis	fluctuations. These will then be investigated for the source of the impact Hydrocarbon spillages cleared as soon as possible & reported to management	
Decanting of pit after closure impacting on the		Refer to mitigation measures provided in the operational section			

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
Lake Piso RAMSAR wetland		of the report			
GROUNDWATER					
Contamination of groundwater through spillages, reduction in water table and inflow of water into the pit	- To minimise impact on local groundwater users - To ensure proper decommissioning, demolition and decontamination of building structures and waste storage areas	- All potential sources of groundwater contamination should be removed at mine closure, including coal dust, chemicals and effluent - Containment of all oil storage facilities within bunded area - Vehicles will be maintained regularly and kept in a good working order - Vehicle maintenance will not be carried out in random areas of the site, but in the designated workshops - Stop open pit dewatering on closure - Remove water diversion ditches to facilitate filling of the open pit on closure - Rehabilitate TSF, as per closure and rehabilitation plan - Construct spill structures and ditch for the floodwater to spill to the diversion channel - Continued groundwater level monitoring - Evaluate newly-identified impacts	Monitoring of boreholes	- All monitoring data to be collated into a data base on a monthly basis. - The groundwater monitoring system will be used to detect any variance from predicted conditions, for the timeous implementation of corrective action, compensation and enhanced management of contaminant control	NLGM Environmental Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Ensure correct protocols are in place and are taken regarding clean ups of any spills or leaks - Continuation of groundwater monitoring programme during the decommissioning phase - Adhere to the Waste Management Guideline			
Possible decrease in water quality due to the WRD leaching	- To minimise impact on local groundwater users - To ensure proper decommissioning, demolition and decontamination of building structures and waste storage areas	Mineralised rock should be placed on a prepared base and attempt should be made to encapsulate it with remaining waste rock	Monitoring of boreholes and surface draining from the WRD	- All monitoring data to be collated into a data base on a monthly basis. - The groundwater monitoring system will be used to detect any variance from predicted conditions, for the timeous implementation of corrective action, compensation and enhanced management of contaminant control	NLGM Environmental Manager
AIR QUALITY					
Increase in fugitive dust during decommissioning	Minimise and control sources of emissions	The onsite dust suppression and monitoring methods need to be continued during the decommissioning phase	Continue to monitor dust levels	In the event of high dust level, the source will be investigated and	NLGM Operations Manager, with assistance from the Environmental

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		- Dust control measures for open areas can consist of wet suppression, vegetation, wind breaks, etc. - Ensure vegetation cover to disturbed areas as per the rehabilitation plan - The long-term effectiveness of suitable vegetation selected for the site will be dependent on the nature of the cover. Access roads and haul road to be ripped to improve aeration and allow for vegetation re-establishment.		mitigation measures applied	Manager
NOISE					
Increase in noise levels during decommissioning	Reduce noise levels to avoid annoyance to surrounding community	- Switch off equipment when not in use - Reduce the noise at the source. This includes ensuring silencers on vehicles, using rubber linings, enclosing sources, etc. - Place a screen between the source and the receiver; - Enclose the source of the noise - Speed limits must be enforced - Systematic maintenance of all forms of equipment - Training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy	Implement closure and rehabilitation plan	The sources of noise will be determined and mitigated	NLGM Operations Manager, with assistance from the Environmental Manager

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
		events.			
SOCIO ECONOMIC					
Reduction in Employment opportunities and associated decline in economic activities (Post closure)	- Address issues and impacts created through loss of income and Employment - Ensure that decommissioning and retrenchments take place in a legally compliant and humane manner - Ensure that those people in the directly affected project area have an opportunity to learn basic life skills and gain basic education such that they can gain access to other economic opportunities - Adhere to open and	- The workforce should be empowered to develop skills that will equip them to obtain employment in other sectors of the economy - Local partners should be supported to diversify economy and decrease dependence on mining - Identify and implement training needs and training programmes for decommissioning and closure - Implement the RAP and the CDP programs	Monitor the management of retrenchment and unemployment and ensure compliance with relative laws and regulations	In line with the KPI's, an evaluation of mitigation measures and investigation into targeted actions & improvements will take place	HR manager assisted by the CDO

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	transparent communication procedures with stakeholders at all times				
Impact exacerbation and reversal due to road deterioration	Maintain the road in a useable condition after mine closure	In order to mitigate this impact, Aureus and local government should enter into a handover period during which the road maintenance activities performed by Aureus during the NLGM project's construction and operational phases are discussed and handed over to government, in order to assist the government to make the necessary arrangements for fulfilling this role. During this process, Aureus should transfer the necessary skills (if required) and techniques to successfully maintain the road.	Maintenance of the road after closure will be the responsibility of the Liberian Government	Initiate discussions with relevant government departments	Community Development Manager with assistance from the Environmental Manager.
CULTURAL HERITAGE					
Indirect impact caused by the Project's closure and rehabilitation activities that may inhibit members of the local community being able to access the	- Facilitate access to sites - Protection of sites during operation	NLGM to provide alternative routes of access	Monitor grievances from communities	In the event of complaints from local communities, the grievance procedure will be followed and mitigation applied where possible	Community Development Manager with assistance from the Environmental Manager.

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IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
cultural sites associated with Jawajei.					

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5 REPORTING AND DOCUMENT CONTROL

Conformance will be monitored via an annual internal audit program. This will be undertaken to assess broad compliance with requirements of HSE management system (including ESIA and management plans).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the ESHS Management System.

5.1 Document Control

Records generated in the routine implementation of Footprint Management Plan will be filed and maintained by administrative staff under the direction of the Environmental Manager.

Regular reporting will be undertaken which will include:

- A summary of activities undertaken during the reporting period;
- Any material deviations or non-compliances to this Management Plan;
- Planned activities during the next reporting period;
- Any other issues of concern.

Further information on environmental monitoring and reporting requirements and procedures is set out in the ESHS Management System.

Regular internal and external audits will be compiled, a part of which will focus on assessing this Management Plan and determining its effectiveness.

5.2 Change Management

The Footprint Management Plan will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing ESHS and social management needs. The overall effectiveness of the Plan will be assessed in the internal audit and management review processes.

6 IMPLEMENTATION

6.1 Responsibilities

Aureus' Safety Health Environmental Quality Manager:

This position is responsible for providing:

- project assurance that ESHS System legislation, regulations and commitments are being followed;
- ESHS standards and procedures that are consistent with Aureus' corporate standards;
- mechanism for recording and reporting ESHS statistics on documented incidents and other key outcomes;
- an ESHS System management training service;

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- a service to analyze technical risks;
- co-ordination of crisis and emergency response plans and practices;
- means to ensure the application of continuous improvement principles to the documentation, tools and other aspects that make up and support the ESHS System;
- assistance to work areas with the implementation of ESHS Management Plans; and an appropriate level of staffing (in the form of either permanent or contracted environmental, safety, health, security officers) to ensure:
 - Compliance with the environmental and safety obligations under the Contract and Scope of Works and under Technical Criteria:
 - Compliance with obligations under the ESIA, ESHS System, and other Safety Management Plans:
 - The environmental safeguards prescribed in government guidelines are implemented and tested before handover of the operating plant.

Project and Contract Design Engineers:

The design engineers are responsible for ensuring that environmental considerations are taken into account in all activities. Engineers will liaise closely with the Contractor Project Managers to ensure that the environmental controls and procedures contained in this Management Plan are implemented.

6.2 Training

All employees of Aureus and Contractors to Aureus shall be provided with basic training in prior to working on the site. Additional, specialist training shall be provided to mine operators, plant operators and key personnel involved in activities which involve activities likely to impact on the mine footprint and to personnel involved in the activities around site. The general training will form part of the induction programme which every employee and contractor will undertake while the specialist training will involve key personnel and will most likely be in the form of a 1 day workshop.



TERRESTRIAL BIODIVERSITY MANAGEMENT PLAN NEW LIBERTY GOLD MINE

AUREUS MINING

MARCH 2014



This document has been prepared by **Digby Wells Environmental**.

Report Title: Terrestrial Biodiversity Management Plan

Project Number: AUR2025

Name	Responsibility	Date
Leigh-Ann de Wet	Report writer	March 2014
Andrew Husted	Reviewer	March 2014
Liz Hilton-Gray	Reviewer	March 2014

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1 INTRODUCTION

This document forms the Biodiversity Management Plan for the New Liberty Gold Mine (NLGM). It forms part of a suite of Management Plans for the mine and is defined from the outcome of the Impact Assessment completed by Digby Wells Environmental, *Environmental and Social Impact Assessment (ESIA Update) for the New Liberty Gold Mine, Liberia*.

The Project is located within the Grand Cape Mount County of the Republic of Liberia, in the southwest corner of West Africa and is bordered by Sierra Leone, the Republic of Guinea and Cote d'Ivoire. It lies between longitude 7°30' and 11°30' west, latitude 4°18' and 8°30' north. The Project is situated within the south-western part of the greater Bea Mountain Mineral Development Agreement (Bea-MDA) property/concession area. The project is located in an area (West Africa, a biodiversity hotspot) recognised for its biodiversity, and this should be managed accordingly. This is the function of this Management Plan.

2 POLICY STATEMENT

2.1 Statement

We will conserve natural resources through efficient management of impacts on biodiversity. We will apply the mitigation hierarchy and achieve a net gain of biodiversity through mitigation, rehabilitation and offsets. NLGM will try to ensure that the biodiversity of the region is affected positively by the development wherever practical.

2.2 Objectives

The objectives which have been prescribed for the Biodiversity Management Plan are in accordance with the mitigation hierarchy, namely:

- **Anticipate & avoid:** The project designs and mine planning will be altered (within reason) to ensure that ecologically important and sensitive areas are not impacted on by the mining operation, preventing the loss of biodiversity. The footprint areas planned for the mining operation may be reduced (within reason) in order to prevent the unnecessary loss of biodiversity.
- **Minimize:** The identified impacts to biodiversity will be mitigated in order to reduce the significance of the impacts. Mitigations measures prescribed in "*Environmental and Social Impact Assessment (ESIA Update) for the New Liberty Gold Mine, Liberia*" will be implemented.
- **Rehabilitate:** Biodiversity which has been impacted on as a result of the mining operation will be rehabilitated to a "close to natural" state where feasible. The rehabilitation will focus on ecosystems (not species per se), prioritizing areas determined to be ecologically important and sensitive during baseline investigations; and

- **Offset:** The unavoidable loss and impacts to biodiversity must be offset in an attempt to achieve a net gain of biodiversity. This will require the implementation of the offset strategy compiled for the mining operation.

3 APPLICATION AND SCOPE

A Biodiversity Management Plan has been compiled for the mining operation. In summary the Management Plan details the following:

- The Management Plan has been designed for the life cycle of the mine, this will include the construction and operational phases with the management programme (including any offsets) to be transferred to the authorities when the mine is decommissioned;
- The Management Plan is to be implemented by Aureus, with particular emphasis on the environmental department. This will require the department implementing measures as prescribed, as well as ensuring and monitoring that all contractors are aware of the Biodiversity Management plan; and
- The Management Plan discusses numerous options to be considered for monitoring as well as several new studies that will be conducted, these need to be documented and reported on.

4 LEGAL REQUIREMENTS

4.1 National legislation

4.1.1 National Forest Policy (2006)

The National Forest Policy was published in 2006. The aim of the forestry policy of Liberia is to conserve and sustainably manage all forest areas, so that they will continue to produce a complete range of goods and services for the benefit of all Liberians and contribute to poverty alleviation in the nation, while maintaining environmental stability and fulfilling Liberia's commitments under international agreements and conventions.

4.1.2 Forest Development Authority

The Forest Development Authority (FDA) was established in 1976. The FDA is in charge of the sustainable management of the forest and associated resources, including forest lands and wildlife. It provides medium and long term planning within the forest sector, the preparation and promulgation of forest policy, law and administration, the release of forest concession agreements, monitoring activities of timber companies and managing protected area programs and wildlife and national parks.

Other FDA activities include forest conservation, educational awareness, agro-forestry programs, environmental awareness-raising in communities surrounding protected areas, and discussion of trans-border issues (such as hunting in restricted areas, which tend to extend into neighbouring countries).

4.1.3 Environmental Protection Agency Act (2003)

To ensure the effectiveness of the National Environmental Policy, the establishment of a functional, independent and authoritative institutional body for the management of the environment was required. Thus, the EPA of Liberia was established in 2002. The Agency co-ordinates, monitors, supervise and consult with relevant stakeholders on all activities in the protection of the environment and sustainable use of natural resources.

4.1.4 National Environmental Action Plan

The National Environmental Action Plan, prepared every five years, provides general guidelines for the management and protection of the environment and natural resources of Liberia, well as the strategies for preventing, controlling or mitigating any negative effects. The Plan is linked with County Environment Action Plans and forms the basis of national environmental planning and implementation of development programmes.

4.1.5 Biodiversity Legislation and Policy

Liberia ratified the Convention on Biological Diversity (CBD) on 8 November 2000; this acts as the over-arching framework for all Government legislation and policy concerning the conservation and sustainable use of biodiversity and the equitable sharing of its benefits.

4.1.5.1 National Biodiversity Strategy and Action Plan (NDSAP)

This is the key government policy with regard to biodiversity at a national level. The goals and objectives are developed in consonance with the guiding principles. Those relevant to the current project are:

- a) Liberia's economic development must be based on sustainable use and sound management of renewable and non-renewable resources;
- b) Ecosystem approach should be seen as critical to comprehensive and effective conservation and sustainable use of biological diversity;"

The NBSAP has an overall goal in very general terms, and six specific goals, only the first of which has direct relevance to the NLGM, which is:

"To take appropriate measures to protect critical ecosystems against harmful effects or destructive practices for conservation of biological diversity" and in order to meet this, 16 objectives are elaborated, those most relevant to the project being:

- Manage, conserve, protect and maintain game species and agricultural biodiversity as well as representative samples of forest ecosystems, inland water ecosystems, coastal and marine ecosystems, wetlands, natural heritage sites;
- Develop EIA criteria for all programmes and projects that are likely to have significant impacts on biological diversity;
- Leave enclaves of natural forests on higher elevations and along waterways; and
- Regulate the introduction of alien species.

4.1.6 Wildlife and National Parks Act (1988)

This Act covers the policies and objectives, the administration, and the establishment of protected areas, as well as their management including plans, and prohibited acts; controls on hunting; and the establishment of protected species.

4.2 International requirements

4.2.1.1 International obligations, commitments and conventions

Liberia is a party to a range of international conventions, a number of which have relevance to the project. Those of most relevance are presented in Table 4-1 below

Table 4-1: International Conventions under which Liberia has obligations relevant to the project

Convention	Date of Approval/ Consent	Main obligations	Relevance to Project
Convention on Biological Diversity (UN,1992a)	08-Nov-00	1. Three main goals: The conservation of biological diversity; 2. The sustainable use of its components; and 3. The fair and equitable sharing of the benefits from the use of genetic resources.	Construction and Operation of the project should lead as far as possible to no net loss of biological resources including genetic diversity.
Ramsar Convention on Wetlands of International Importance (UNESCO, 1971)	02-Nov-03	Advances conservation and wise use of wetlands and their resources.	Wetlands of International Importance must not be damaged in any way - the wetland area of Lake Piso (near Robertsport), located approximately 30 km south of the Project area, downstream, has been identified as a RAMSAR Wetland.
Convention on International Trade in Endangered Species of Wild Fauna & Flora (Cites)(UNEP, 1979a)	09-Jun	Strictly controls trade in endangered species.	Limits hunting of rare species.

Convention	Date of Approval/ Consent	Main obligations	Relevance to Project
African Convention on the Conservation of Nature and Natural Resources (OAU, 1968)	21-Sep-78	Encourage action to conserve use and develop soil, water, flora and fauna sustainably from economic nutritional scientific educational cultural and aesthetic points of view.	Needs action to conserve soil and prevent erosion; control pollution; and conserve flora and fauna.
United Nations Framework Convention on Climate Change (UN, 1992b)	2003	Requires efforts to combat global warming and a key tool in promoting sustainable development.	Various sources of CO ₂ emissions.

4.3 Lender requirements

In addition to adherence to the relevant national standards, best practice for projects in emerging economies is generally informed by those of the international financing organisations. Prime among these are those established by the International Finance Corporation (IFC). Over several decades the IFC has developed various guidelines, policies, performance standards and directives to ensure that environmental and social safeguards are integrated into the planning and implementation of the projects it finances. These are widely considered to set the international benchmark standards across a range of industries.

The following IFC standards and guidelines have informed:

- The Eight Performance Standards on Social and Environmental Sustainability;
- Guidance Notes and reference documents;
- The IFC's Environmental Health and Safety Guidelines for Mining;
- Guidance and standards for drinking water quality have been taken from the WHO standards; and
- The World Health Organisation Air Quality Guidelines Global Update.

4.3.1 Equator Principles

The Equator Principles (EPs) were launched in 2003 and are based on the Policy and Performance Standards and on the Environmental Health and Safety Guidelines set down by the IFC.

- The IFC has updated its sustainability framework, which includes the Performance Standards, and applied the revised standards from 1 January 2012.

The revised IFC Performance Standards provides simple guidance on how to achieve this:

- The existing Equator Principles refer to the revised IFC Performance Standards from 1 January 2012;

- The revised IFC Performance Standards applied (as per the EPs) to all new and current project finance transactions when the borrower has commissioned an Environmental and Social Impact Assessment (ESIA) on or after 1 January 2012;
- The old IFC Performance Standards can be applied to current project finance transactions when the borrower has commissioned an ESIA before 1 January 2012 on the proviso that it is completed by 30 June 2012; and
- All new transactions after 30 June 2012 to apply the revised IFC Performance Standards.

The EPs are adopted by financial institutions and are applied where total project capital costs exceed US\$10 million. The Equator Principles are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making.

Equator Principles Financial Institutions commit to not providing loans to projects where the borrower will not or is unable to comply with their respective social and environmental policies and procedures.

4.3.2 Corporate Policies

As a local operating company of Aureus, the conduct and operations of NLGM in Liberia will be and are dictated by a suite of guidelines, policies and plans which set out the company's commitment to the environment, sustainability and social issues.

These are summarised in the revised environmental policy statement as:

- Implementation of environmental management systems that are compatible with ISO 14001 EMS;
- ISO 14001 certification for all production facilities;
- Compliance with all relevant environmental laws and regulations and other company commitments;
- Continuous and sustainable improvement in environmental performance, taking advantage of systematic monitoring and aiming at pollution prevention;
- Development, improvement and application of low impact, environmental production methods taking benefit of locally available materials;
- Efficient use of natural resources, energy and land;
- Forest and wildlife management policy;
- Management and reduction where technically and economically feasible of the CO₂ footprint of gold production;
- Employment commitment and responsibility in environmental performance;
- Supplier and contractor awareness and respect of Aureus environment policy; and
- Open communication and dialogue with all stakeholders affected by Aureus Mining's operations.

Key elements of these policies are:

- The implementation of environmental management systems including an EMS, compatible to ISO 14001 system;
- Compliance with all relevant national environmental and community engagement laws and regulations and other company commitments, keeping the Company's environmental impact to a minimum; and
- Working towards a goal of zero accidents, zero significant environmental incidents and social incidents and health injuries to establish and maintain a safe working environment.

To ensure that these policies and plans are delivered at the local level, Aureus is putting into place a management and monitoring framework which will place the onus on its national and international operating companies to deliver the company commitment.

5 IMPACT IDENTIFICATION AND MANAGEMENT

Before the impacts associated with the development of the NLGM are explored, and mitigation measures recommended, it is important to note the following:

- The Precautionary Principle, and
- The Mitigation Hierarchy.

5.1 The Precautionary Principle

The Precautionary Principle, although confusing in its application, is an important part of such assessments, where scientific certainty is not possible (Cooney, 2004). Several organisations, including the IUCN and FFI have partnered to assess the implications of its use, as well as for indicating best practice. Best practice encourages integration of conservation, local and scientific knowledge. It is important that the principle is used with caution and not simply to aid conservationist goals, but to take into account all land use options. The principle grew from the tendency for favouring development, and is designed to weigh unknown scientific information about potential impacts against that tendency to favour development. It is stated: "Where there is uncertainty concerning the impacts of an activity, rather than assuming human activities will proceed until and unless there is clear evidence that they are harmful, the precautionary principle supports action to anticipate and avert environmental harm in advance of, or without, a clear demonstration that such action is necessary. (Cooney, 2004. Pg: 5)" The Convention on Biological Diversity states: "where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat. " (Cooney, 2004).

5.2 Mitigation Hierarchy

The mitigation hierarchy is international best practice for managing risks and impacts, and is listed by the IFC as the primary objective of in Performance Standard 1 as follows: "To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,

and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.” This mitigation hierarchy is represented in Figure 5-1.



Figure 5-1: The Mitigation Hierarchy as defined by the IFC

The IFC further mentions the Mitigation Hierarchy in Performance Standard 6, in the context of natural or critical habitat and states that “biodiversity offsets may only be considered after appropriate avoidance, minimization and restoration measures have been applied” (IFC. 2012).

The Hierarchy follows a strict progression of best practice for dealing with impacts; these are explained in Table 5-1 below:

Table 5-1: The different levels of the Mitigation Hierarchy defined

Avoidance	If impacts on the natural environment can be avoided, this is the best possible way of reducing impacts. Avoidance can involve changes in the location of infrastructure, even though, in mining developments, the pit itself cannot be moved.
Minimization	If impacts cannot be avoided, it is important that these are minimized. This is where mitigation measures usually described in an EIA fall. Minimization may include reducing the footprint of the development as far as possible, restricting access to loggers using drilling roads, or utilising already existing infrastructure.
Restore	If there are still residual impacts, restoration or rehabilitation may be employed to increase the biodiversity value of the site after development activities.
Offset	If residual impacts remain after all efforts to avoid, minimize and restore have been taken into consideration, offsets may be needed. These include

	the setting aside of areas within the mining lease area as corridors and conservation areas, as well as the setting aside of other areas for conservation. Offsets are difficult to determine and manage, and a separate study is often needed in order to identify the best options and those which compensate identical (or as close as possible) biodiversity to that which was impacted by the development.
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5.3 Summary of impacts and their sources

The majority of the impacts on the terrestrial ecology will be realised during the construction phase as vegetation, including Primary Forest, is removed and in so doing reducing the habitats of fauna in the area. These impacts are detailed below in Table 5-2.

Table 5-2: Potential impacts on terrestrial ecology – construction phase

	• Site clearing and leveling; • Topsoil stripping of the infrastructure footprints, pit areas and the diversion trench; • Earthworks during the creation of terraces, cuts and fills; • Blasting; • Construction of buildings and roads; • The movement, maintenance and refueling of vehicles and plant; • Operation and maintenance of construction camp and employee facilities; • The transport and storage of hazardous material including oils, fuels, solvents and curing compounds; • Electricity generation; and • Transportation of materials/waste to and from site.
Environmental aspect	Loss of vegetation communities
	Due to large-scale clearing of vegetation throughout the site for associated infrastructure, different vegetation communities will be lost. The most important of these is the primary forest, of which very little remains in Liberia. Impacts to secondary forest and swamp vegetation are less important, but the mine and associated infrastructure will still have an impact on these. Most important for impacts to secondary forest and swamp vegetation is the dam, where the majority of these vegetation types occur. In order for mitigation to be effective in this case, the impacts to the secondary forest should be increased, and the impacts to the primary forest, decreased.
Receptors	Vegetation communities within the project site will be directly affected by the construction activities. These communities are divided into the following groups: • Swamp Vegetation; • Primary Forest; • Secondary Forest (older than 10 years); • Secondary Forest (5 -10 years); and • Secondary Forest (1 -5 years).

Mitigation	- Disturbed areas that will not be used (especially the area of drilling paths to the North of the site) should be rehabilitated as soon as possible; and - Intact areas of primary forest should be set aside as conservation areas, and preferably linked to large tracts of intact forest to the north. In addition, offsets need to be identified. This would involve the commissioning of an offset report considering all options (contributions to conservation, setting aside new conservation areas, setting aside of additional areas for existing conservation areas).				
Parameters	Severity	Spatial scale	Duration	Probability	Significance rating
Loss of Swamp Vegetation					
Pre-Mitigation Rating	5	5	6	7	112
Post-Mitigation Rating	3	5	6	7	98
Loss of Primary Forest					
Pre-Mitigation Rating	7	6	7	7	140
Post-Mitigation Rating	7	5	7	7	133
Loss of Secondary Forest (older than 10 years)					
Pre-Mitigation Rating	4	2	6	7	84
Post-Mitigation Rating	4	2	6	7	84
Loss of Secondary Forest (5 - 10 years)					
Pre-Mitigation Rating	4	2	4	7	70
Post-Mitigation Rating	4	2	4	7	70
Loss of Secondary Forest (1 - 5 years)					
Pre-Mitigation Rating	2	2	3	7	49
Post-Mitigation Rating	2	2	3	7	49
Environmental aspect	Loss of biodiversity				
Description of impact	Loss of biodiversity will occur primarily in the construction phase of the development as a result of clearing of the vegetation. The stripping of the vegetation will result in the permanent reduction of natural habitat of reptiles, birds, frogs, insects and mammals present within the areas				
Receptors	Fauna and flora on or near to the project site will be affected by the above mentioned impacts. The general biodiversity as well as plant and animal species of special concern will be affected.				

Mitigation	- The footprint of the mine should be kept as small as possible. - Access should be restricted to already impacted areas by ripping the roads and filling in trenches, and letting these areas revegetate; - Direct impacts of the mine on fauna SSC can be ameliorated with controlled vehicular movement, including speed control (see secondary impact section for control options for secondary impacts); - As set-asides for corridors cannot be outlined within the mining lease area, areas of primary forest that can be linked to undisturbed forest to the north of the site should be set aside and managed as conservation areas; and - An offset study should be done in order to determine the options available for offsets.				
Parameters	Severity	Spatial scale	Duration	Probability	Significance rating
Loss of general biodiversity					
Pre-Mitigation Rating	7	6	7	7	140
Post-Mitigation Rating	7	6	6	7	133
With offsets	7	6	5	7	126 (Positive)
Loss of Floral Species of Special Concern					
Pre-Mitigation Rating	7	6	7	7	140
Post-Mitigation Rating	7	6	6	7	133
With offsets	7	6	5	7	126 (Positive)
Loss of Faunal Species of Special Concern					
Pre-Mitigation Rating	7	6	7	7	140
Post-Mitigation Rating	7	6	6	7	133
With offsets	7	6	5	7	126 (Positive)
Environmental aspect	Loss of ecosystem function				
Description of impact	The general functioning and provision of ecosystem services in the greater area ecosystem will be reduced and impaired. Fragmentation occurs with the breaking-up of continuous tracts of vegetation providing corridors for faunal movement and habitat as well as plant dispersal. The position of the mine and associated infrastructure is within a belt of vegetation that remains largely intact and stretches from the general vicinity of the mine location to the North. Fragmentation caused by the mine will thus be severe. Pressure to the west indicates that there is little remaining forest and emerging palm plantations in the surrounding areas have also added to fragmentation. The introduction of alien species will occur, but if managed properly, can be adequately controlled.				
Receptors	Movement of faunal species and plant dispersal				

Mitigation	- The footprint of the mine should remain as small as possible, with new construction limited as far as possible to existing cleared areas; - Alien invasive plants should be monitored and controlled at all times during the construction, operation, decommissioning and closure phase of the mine; and - A corridor set aside within the mine area would mitigate fragmentation substantially, especially if this could be managed with the community over an extended period of time.				
Parameters	Severity	Spatial scale	Duration	Probability	Significance rating
Fragmentation and edge effects					
Pre-Mitigation Rating	7	5	7	7	133
Post-Mitigation Rating	5	3	7	6	90
Influx of alien invasive plants					
Pre-Mitigation Rating	4	3	3	7	70
Post-Mitigation Rating	2	3	3	4	32
Environmental aspect	Ecological disturbance due to noise, dust and contamination				
Description of impact	Dust generation, soil contamination and general truck and human activity may result in damage or loss of fauna and flora species. Noise will also affect a wide range of taxa including avifauna, mammals, reptiles, amphibians and arthropods. Avifauna, especially songbirds, and amphibians may find it difficult to find mates in areas of increased noise. Mammals, reptiles and arthropods may find increased noise disturbing and therefore move away from the area (Brumm, 2004; Canaday and Rivadeneyra, 2001). The spillage of harmful or toxic substances may impact on the fauna and flora of the area in a number of ways. Direct pathways include ingestion of the substances by fauna species resulting in toxicity in that individual, uptake of toxic chemicals by the roots plants which may lead to toxicity in the plants and the chemicals entering the plant or animals system due to contact (through the skin, leaves or stems). Indirect pathways include the ingestion of contaminated plants or animals by other herbivorous or predatory species. The predation of contaminated animals by both other animals and humans is a common occurrence during chemical contamination due to these animals being sluggish, and less likely to escape predation, due to chemical toxicity.				
Receptors	Fauna and flora on or near to the project site will be affected by the above mentioned impacts. Fauna in this area will most likely move away from the area into other habitats.				

Mitigation	- Storage of fuel and lubricants must be contained within bunded areas; - The vehicle hard park area should be separated from clean water areas with berms or channels; - Hydrocarbon and chemical spillages should be cleaned up using commercially available equipment and clean-up kits. Details of emergency clean-up procedures should be contained in a Pollution Prevention Plan that will carry through to operation; - Switch off equipment when not in use; - Keep as much vegetation as possible to aid in the noise absorption of the construction activities; - Fixed noise producing sources such as generators, to be either housed in enclosures or barriers put up around the noise source. The barriers should be installed between the noise source and sensitive noise receptor, closest to the noise source; - Construction and transport activities should also be limited to daylight hours, where possible; - Dust control measures for open areas can consist of wet suppression, chemical suppressants, vegetation or wind breaks, amongst others; - The removal of the smallest required area of vegetation and topsoil (i.e. the proposed servitudes and infrastructure footprints) will reduce the spatial scale of the impact; and - Phased clearing as required by the construction programme to avoid exposing areas prior to commencement of the works.				
Parameters	Severity	Spatial scale	Duration	Probability	Significance rating
Pre-Mitigation Rating	4	3	5	5	60
Post-Mitigation Rating	3	3	5	4	44
Environmental aspect	Loss of biodiversity due to increased site access and influx of people				

Description of impact	Vegetation communities will be lost largely due to clearing for additional farms for the support of the influx of people. Logging will result in the loss of some vegetation communities, as their overall structure will be lost and the dynamics changed. Loss of secondary vegetation is not as concerning as the clear loss of primary forest. These impacts are likely to occur regardless of the current construction activities, which have accelerated them. The general functioning and provision of ecosystem services in the greater area ecosystem will be reduced and impaired by increased logging activities, as well as increased use of natural resources (timber and NTFPs) and increase in slash and burn agriculture. These activities will all result in the influx of alien invasive species. These impacts will occur throughout all phases of the mine, and are not assessed separately as a greenfields and construction site. The bush meat trade was identified as one of the most severe impacts on faunal species in the region. This impact is largely limited to areas in the vicinity of the village and areas that are easily accessible from roads or from the open woodland areas. The clearing or construction of any further roads which are easily accessible by the public are likely to increase this impact in the region.				
Receptors	Small and medium game that inhabits the area surrounding the mine site will be impacted on as hunting activities increases due to both the influx of people to the site as well as the increased access to these areas that the mine affords. Large forest trees located within the NLGM area will be potentially impacted upon as a result of increased logging activities, potentially increase subsistence farming in the area may lead to more land being cleared and the use of plants for medicinal purposes may increase as more people have moved into the area and the increased access to these areas that the mine affords.				
Mitigation	- Workers should be made aware of the importance of maintaining the biodiversity; - In order to avoid hunting, domestic animals such as dogs should not have access to the wildlife; - Disturbed areas that will not be used should be rehabilitated as soon as possible; - Intact areas of primary forest should be set aside as conservation areas, and preferably linked to large tracts of intact forest to the north. Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter - Where possible access to forests along haul and access roads should be controlled; and - An agricultural program should be set up; where local people are taught better farming practices that reduce slash and burn agriculture. Conservation programs involving the local people may also help to reduce logging.				
Parameters	Severity	Spatial scale	Duration	Probability	Significance rating
Pre-Mitigation Rating	7	6	7	7	140
Post-Mitigation Rating	3	3	4	4	40

5.4 Management through all phases of the project

Following on from the impacts identified and assessed, and the mitigation measures that need to be implemented in order to reduce this, a management plan has been developed. The majority of the impacts are due to the loss of vegetation affecting both faunal and floral biodiversity and habitat fragmentation. The impact with the highest residual impacts (impact post mitigation) include: the loss of Primary Forest, which, in the specialist report, was determined to be Critical Habitat.

As there are residual impacts following the mitigation measures described in the plan below, the Mitigation Hierarchy should be followed through to the Offset stage. Several additional studies are required as recommended by the IFC after reviewing the Terrestrial Biodiversity specialist report accompanying the ESIA report. These studies will be done during the preconstruction phase of the project, so that recommendations for the location of infrastructure can be made. They will also be completed with one (1) year of the date of this Management Plan to include assessments over two seasons (wet and dry). The following studies will be done:

- 1) A Critical Habitat Determination study.

Although a brief assessment has been done in the specialist report for terrestrial biodiversity, it will be completed according to IFC standards. This will be done at both the habitat and species level for all floral and faunal groups. A comprehensive species assessment is required. This will also be required for the offset study (see below) so that “like-for-like or better” principles can be met.

- 2) A Biodiversity Action Plan (BAP)

This management tool is required by the IFC for projects in areas of Critical Habitat and will be done once the Critical Habitat Assessment has been compiled.

- 3) An Offset Study

An offset study is required to meet the no net loss of biodiversity required by the IFC, or the net gain of biodiversity required by the IFC for Critical Habitats. The Offset study will be conducted following the Critical Habitat Assessment. The Steps to be followed for the Offset study follow the Management Plan outlined below in Table 5-3 and Table 5-4.

Table 5-3: Terrestrial Biodiversity Management Plan– construction phase

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
Loss of vegetation communities and biodiversity	- Prevent the loss of important species of vegetation - Limit the destruction of the Primary Forests - Restrict removal and disturbance of vegetation to those areas absolutely essential for the development - Preserve the flora, including areas not directly affected by project activities - Reduce the risk of habitat fragmentation and preserve natural corridors - Ensure rehabilitation plans are	- Disturbed areas that will not be used (especially the area of drilling paths to the North of the site) should be rehabilitated as soon as possible - Intact areas of primary forest should be set aside as conservation areas, and preferably linked to large tracts of intact forest to the north. This would involve the commissioning of an offset report considering all options (contributions to conservation, setting aside new conservation areas, setting aside of additional areas for existing conservation areas) The footprint of the mine should be kept as small as possible - Illegal waste dumping should be prohibited - Install/commission a proper waste disposal facility to cater for recycling, re-use, recovery, as well as an area for incinerator. Equip area with hazardous waste storage area under a roof, appropriate oil separator and adequate ventilation – area to be bunded and install clean dirty water separation at waste disposal facility - Domestic waste to be covered to keep animals and scavengers out	- Monitor changes in vegetation communities using LiDAR imagery – when available - Monitor roads for logging trucks – continual basis - It is suggested that the monitoring plan as outlined in the Flora and Fauna Assessment be implemented	- In areas where vegetation has been removed or unnecessarily disturbed, re-vegetation will be initiated - Where areas of habitat disturbance are high, there should be an increase in community awareness of the local biodiversity	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	initiated during the operational phase	- Implement the IEMS and waste guideline principles - Community awareness should be implemented as part of the stakeholder engagement procedure to create awareness of biodiversity and preservation of natural habitats - Progressive rehabilitation of disturbed areas should take place as soon as possible - Report any Red data species found and implement permit to clear procedure - Access should be restricted to already impacted areas (drilling roads, test pits and trenches) by rehabilitating these areas as soon as possible by ripping - Areas where large numbers of plant Species of Special Concern occur should be avoided and demarcated - Access should be restricted to already impacted areas by ripping the roads and filling in trenches, and letting these areas revegetate. - Access should be controlled in areas where the mine has management control to prevent the clearing of vegetation and logging			
Loss of ecosystem function	Minimise domination of alien species	The footprint of the mine should remain as small as possible, with new construction limited as far as	The project area to be monitored visually for alien invasive species	If alien invasive species are found, these will be immediately	NLGM Operations Manager, with

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	- Prevent the introduction and spread of alien invasive species - Reduce the fragmentation of habitats	- possible to existing cleared areas - Alien invasive plants should be monitored and controlled at all times during the construction, operation, decommissioning and closure phase of the mine - A corridor set aside within the mine area would mitigate fragmentation substantially, especially if this could be managed with the community over an extended period of time	The presence of alien species before the establishment of the infrastructure to be recorded and then monitored in terms of introduction and spread	- removed in such a way so as to prevent the spread of any seeds that may be present. - Control methods include removing the invasive plant from the ground then monitoring for re-growth.	assistance from the Environmental Manager and NLGM Construction Manager.
Loss of biodiversity due to increased site access and influx of people	- Prevention of injury and / or death of individual animals - Preservation of animals' habitats - Prevent direct persecution of wildlife - Prevent unnecessary hindrance to wildlife - Prevent disturbance, death or hindrance to protected species - Prevent logging in the forests where	- Workers should be made aware of the importance of maintaining the biodiversity - In order to avoid hunting, domestic animals such as dogs should not have access to the wildlife; - Disturbed areas that will not be used should be rehabilitated as soon as possible - Intact areas of primary forest should be set aside as conservation areas, and preferably linked to large tracts of intact forest to the north. Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter - Where possible access to forests along haul and access roads should be controlled - An agricultural program should be set up; where local people are taught better farming practices that	- Implement the monitoring plan prior to construction to check for protected species - Establish bio-monitoring system and program equivalent to SASS 5	Trends and species diversity will be analysed to determine any changes. In the event of decrease in numbers, this will require further investigation to determine the source of the impact and thus possible mitigation measures	NLGM Operations Manager, with assistance from the Environmental Manager and NLGM Construction Manager.

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	the mine has control	reduce slash and burn agriculture. Conservation programs involving the local people may also help to reduce logging			

Table 5-4: Terrestrial Biodiversity Management Plan– operation phase

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
Impact on flora from contamination of soil and water	- Prevent the loss of important species of vegetation and animals - Maintain local biodiversity	- Storage of fuel and lubricants must be contained within bunded areas with appropriate oil separators - The vehicle hard park area should be separated from clean water areas with berms or channels - Accidental hydrocarbon spillages should be reported and cleaned up immediately, and the affected soil should be removed, and rehabilitated - Hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits - Adhere to the Waste Management Guideline	- Various parameters should be measured, both on the rehabilitation sites and in the adjacent undisturbed areas. Monitoring to take place during dry and wet seasons. These parameters include: - Species richness, vegetation composition presence of protected species and presence of alien invasive species - Monitoring of rehabilitated areas should be done annually for the first six years, and bi-annually thereafter for a further four years, thus providing for 5 years of intensive	- In areas where vegetation has been removed or unnecessarily disturbed, re-vegetation will be initiated - In the event that vegetation is impacted on, mitigation and/or compensation measures will be investigated	NLGM Environmental Manager.

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
			post-rehabilitation monitoring		
Increased site access and human activity could decrease the areas biodiversity	- Prevention of injury and / or death of individual animals - Limit the disturbances, i.e. noise, transport and dust, to those areas allocated for certain operational activities - Maintain the habitat for existing and future fauna - Limit the indirect effects of the mine operation, through effective mitigation and monitoring - Limit the cutting down of trees surrounding the mine	- Plants of importance, such as those of special concern, should be relocated to a safe area such as a nursery or area that will not be disturbed. A nursery should be set up for this purpose as well as to propagate appropriate species for rehabilitation. This nursery could be outsourced to stimulate new business opportunities in the local communities - Where possible access to the site should be controlled - The NLGM employees involved with the operation of the mine should be educated about the importance of protecting the biodiversity - Hunting of animals by Employees must be prohibited - A speed limit should be stipulated and adhered to at all times to prevent road related deaths - Vehicles should be restricted to the demarcated roads and areas around the operation - Certain areas should be fenced off to prevent the larger mammals entering areas which could pose a danger to them	- The fauna monitoring programme implemented during construction should be continued throughout operation The following faunal groups must be monitored throughout the operational phase: - Mammals – observed on site and recorded in an inventory.	Trends and species diversity will be analysed to determine any changes. In the event of decrease in numbers, this will require further investigation to determine the source of the impact and thus possible mitigation measures	NLGM Environmental Manager.
Loss of ecosystem function	Prevent the loss of ecosystem	Set-aside areas should be identified before infrastructure is placed to maintain connectivity to	- Monitoring of alien invasive species - Monitor changes in	In areas where vegetation has been removed or	NLGM Environmental Manager.

IMPACT	OBJECTIVE / TARGET	MITIGATION & CONTROL MEASURES	MONITORING & FREQUENCY	CORRECTIVE ACTION & REVIEW	RESPONSIBILITY
	Maintain current ecosystem function	- intact areas of primary forest. This would maintain ecosystem function as well as corridors for faunal and floral movement and the maintenance of gene flow - The footprint area of the mine should be kept as small as possible, reducing the fragmentation of the landscape - Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter	vegetation communities using LiDAR imagery – when available	- unnecessarily disturbed, re-vegetation will be initiated - In the event that vegetation is impacted on, mitigation and/or compensation measures will be investigated	
Ecological disturbance due to noise and dust contamination	- Prevention of injury and / or death of individual animals - Limit the disturbances, i.e. noise, transport and dust, to those areas allocated for certain operational activities - Maintain the habitat for existing and future fauna	- Switch off equipment when not in use - Keep as much vegetation as possible to aid in the noise absorption of the construction activities - Fixed noise producing sources such as generators, to be either housed in enclosures or barriers put up around the noise source. The barriers should be installed between the noise source and sensitive noise receptor, closest to the noise source - Transport activities should also be limited to daylight hours, where possible - Dust control measures for open areas can consist of wet suppression, chemical suppressants, vegetation or wind breaks, amongst others	N/A	Trends and species diversity will be analysed to determine any changes. In the event of decrease in numbers, this will require further investigation to determine the source of the impact and thus possible mitigation measures	NLGM Environmental Manager.

5.4.1 Critical Habitat Assessment

The Critical Habitat Assessment takes into account all species recorded from the study area, as well as areas of forest that may be unique and thus fall under the Critical Habitat umbrella. Several steps are needed to determine Critical Habitat for an area, these are as follows:

5.4.1.1 Step 1: Determination of Critical Habitat Units

Depending on each potential Critical Habitat for both species and habitat, units needs to be determined. These may be very large, for mammals with large ranges, for example. They may also be quite small for species with small distribution ranges.

5.4.1.2 Step 2: Determination of Critical Habitats

All species occurring in the units will then be assessed according to the IFC criteria, additional information in the general region may also be used to determine the likelihood of species occurring in the area. Species that may trigger Tier 1 or Tier 2 Critical Habitat include:

- Critically Endangered and Endangered Species according to the IUCN;
- Endemic and Restricted-Range Species; and
- Migratory and Congregatory Species.

In addition, habitats may trigger Critical Habitat, criteria include:

- Unique assemblages of species;
- Key Evolutionary Processes;
- Key Ecosystem Services; and
- Biodiversity of Significant Social Importance.

5.4.1.3 Step 3: Make recommendations based on outcomes

These recommendations include adhering to IFC requirements for the habitats defined. Residual impacts after applying the mitigation hierarchy should trigger offsets, which will then constitute an additional study.

5.4.2 Biodiversity Action Plan

The development of the NLGM BAP will involve a number of steps. The steps all contribute to a framework in which biodiversity of the project area is defined and assessed in order to develop a management plan of the biodiversity of the New Liberty Gold Mine. The diagram below in Figure 5-2 illustrates the various steps taken in development of the BAP.

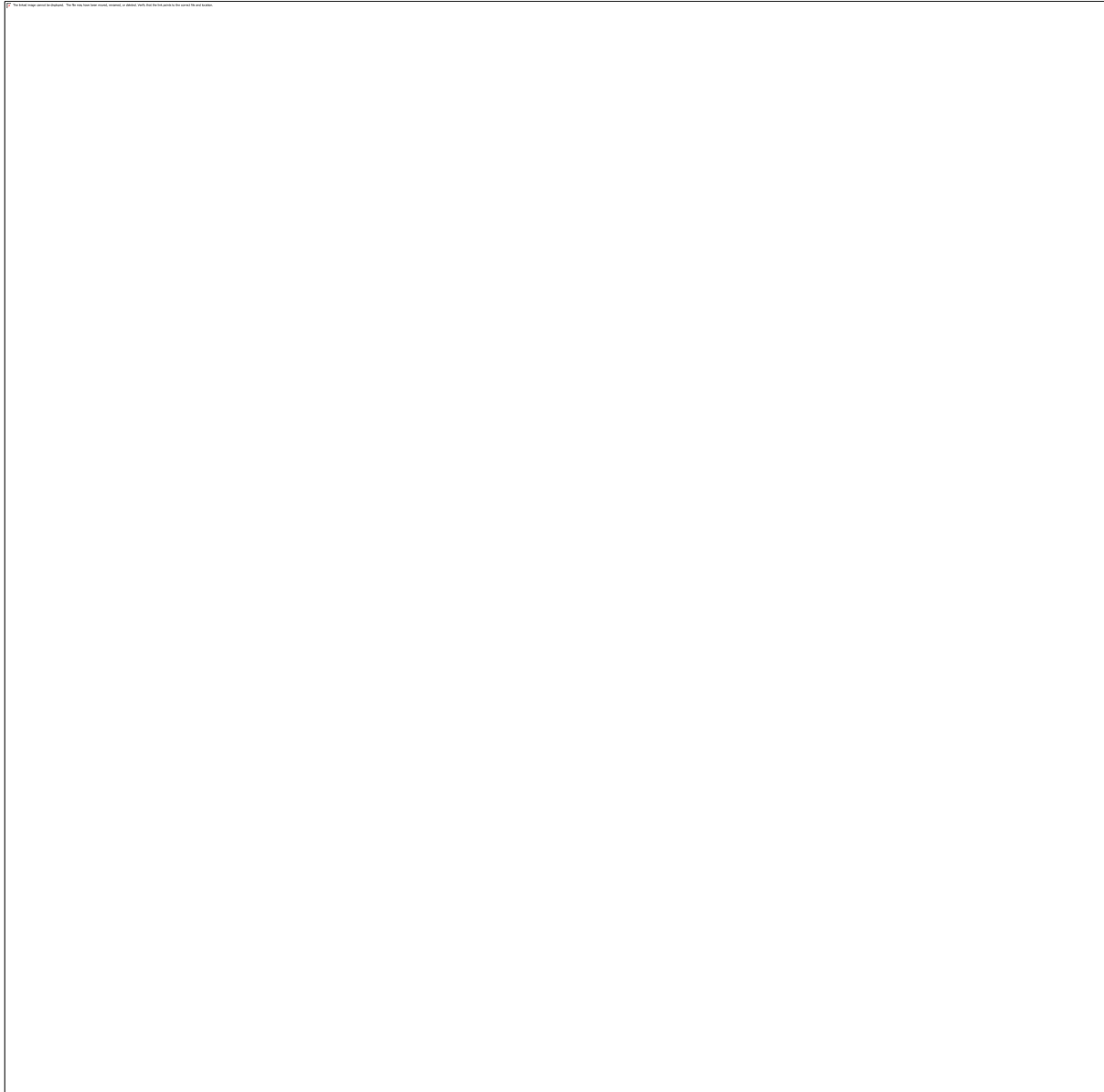


Figure 5-2: Steps taken in development of BMLP

5.4.3 Offset Procedure

5.4.3.1 Step 1: Critical Habitat, and possible Offset Determination

Step one includes the utilization of a Critical Habitat Assessment that will be completed by NLGM, and information available on other areas in order to determine possible offset options.

Offsets should be acceptable and sustainable for the client, as well as meeting stakeholder requirements (such as the IFC and Flora Fauna International).

5.4.3.2 Step 2: Stakeholder Involvement

Possible offset options and associated costs and sustainability can be presented to stakeholders including the local community and Flora Fauna International, the EPA and the FDA. These stakeholders may also be involved in Step 1 above.

5.4.3.3 Step 3: Biodiversity Studies

All possible offset options discussed and investigated should then be investigated in order to determine which fit the “like-for-like or better” principle of the IFC.

5.4.3.4 Step 4: Stakeholder Involvement

The recommended offset strategy will then be discussed once again with the stakeholders.

5.4.3.5 Step 5: Compilation of Offset Strategy

The offset strategy for NLGM will then be developed in the same format as a Management Plan with objectives, goals and timelines.

5.5 Monitoring and Key Performance Indicators

The on-site effects that the mine and related infrastructure have on the flora of the area can be quantified with continuous monitoring of natural areas on the project site. Such a monitoring program must concentrate on the red data species management and alien invasive species management. A monitoring program can be applied to what has been identified as the area of influence of the mine (denoted in Figure 5-3 below). The area of influence includes both the areas directly affected by the mine and associated infrastructure as well as those areas that may be affected by increased access and other possible secondary impacts. It is defined as 500m surrounding all mine infrastructure. An alien invasive management program has been developed that will be utilised during all phases of the project. The monitoring of the red data species will have to take place (leaving as many as possible in place, relocating faunal species where possible, restricting access by rehabilitating unused roads). Seasonal monitoring of the effects of the mine on flora and fauna in the general area must be conducted, this can be accomplished through information sharing with local land owners and surveys conducted on the surrounding forest.

The major management measure to be employed with regards to the Red data species will be access restriction to the Primary Forest area (no-go areas) by rehabilitating roads that are

no longer required. Relocation of some burrowing faunal species may be possible as a mitigation measure. It is unlikely that large plants can be relocated, and larger animals will move away if given sufficient time.

A monitoring program needs to evaluate the management actions on each of these components. The method of monitoring is the Braun Blanquet method, which is a specialised method designed specifically for vegetation survey/monitoring purposes. In terms of fauna, indicator species should be identified and monitored.

- Monitoring must take place every 3 years;
- Monitoring must be completed by qualified specialists;
- Adaptive management must applied;
- Monitoring during the wet season is essential; and
- Findings must be compared to previous years.

The alien vegetation monitoring will be of importance due to the threat posed by site clearance which provides open areas where alien invasive species could establish.

The monitoring program should include search and rescue of areas to be cleared. This search and rescue should take place prior to any clearance of areas, to ensure all species that occur within the areas to be developed are relocated. This is due to the fact that burrowing animals might have young and for this reason will not move despite the disturbance. The search and rescue should continue during the construction phase as required to ensure disturbance to the natural environment is reduced and limited to demarcated areas. During the operational phase, assessments should be done on an ongoing basis. Before the decommissioning phase a final survey could be conducted to determine how the environment can had been be improved based on the mitigation measures put in place over the life of the mine and facilitate in the final closing procedures, rehabilitation and management.

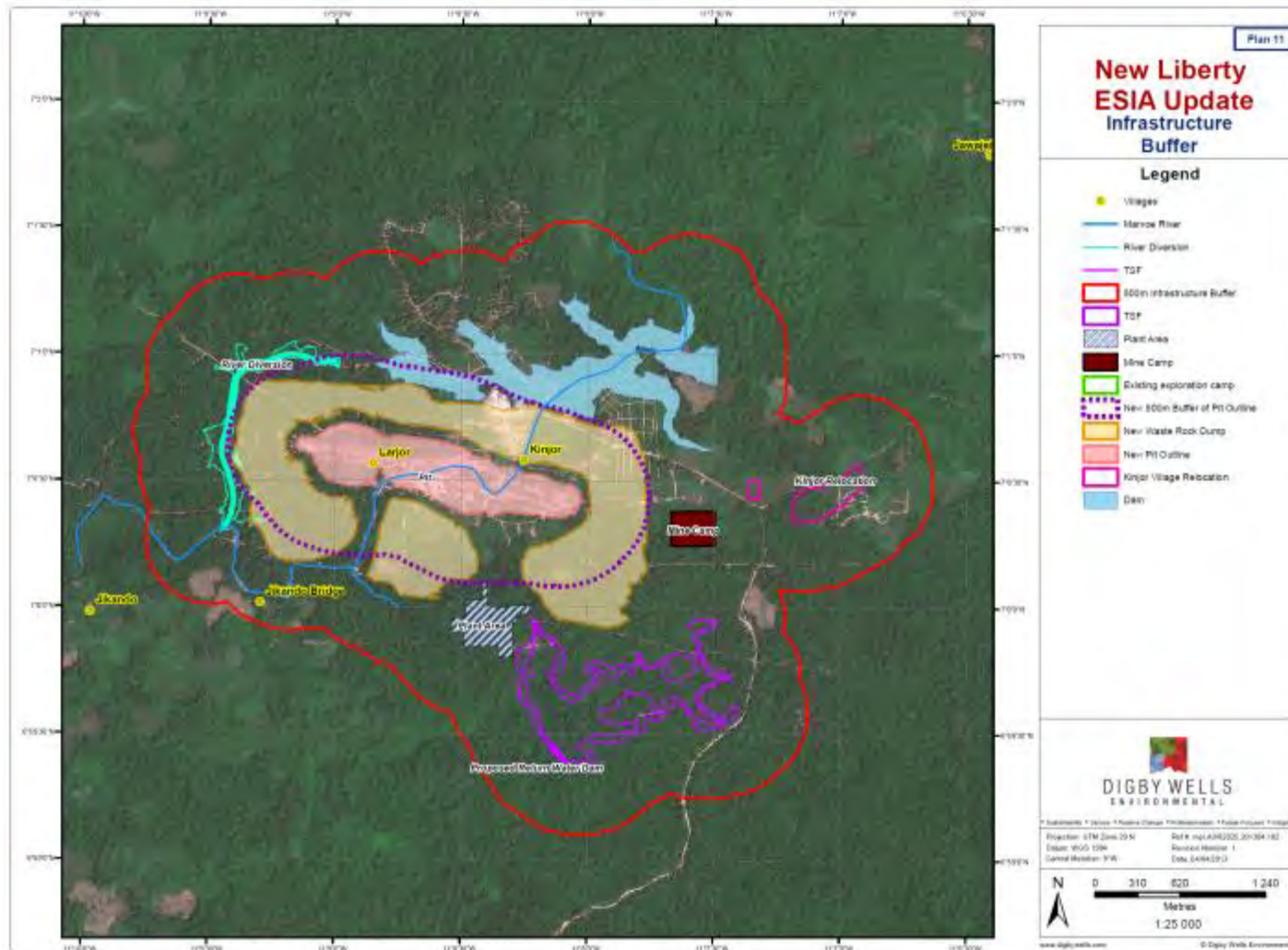


Figure 5-3: Monitoring Buffer of 500m around Infrastructure

The indicators and methods for biodiversity monitoring have been modelled on the discussion document published by the World Bank, Global Environment Division: Guidelines for Monitoring Evaluation for Biodiversity Project (Hawley, 2011).

Indicators are a cost-effective way of monitoring biodiversity changes, and, when applied to all levels, can determine the exact impacts of the mining development as and when they occur. Indicators should be cost-effective, measurable and reveal trends. They should not only take into account natural variation in factors such as climate, but also determine the state of biodiversity directly related to the impacts of the mine. Indicators need to be consistent as they are measured continuously over a long period of time (Hawley, 2011).

The indicators selected for the biodiversity monitoring incorporate three different levels, namely:

1. Regional/landscape
2. Community/ecosystem
3. Species/population

Indicators are given in Table 5-5 below. These are simply descriptions of the indicators and ways that these can be monitored are presented in Table 5-6 (Hawley, 2011):

Table 5-5: Monitoring indicators (Adapted from Hawley, 2011).

Level	Category	Indicators	Comment
Regional/ landscape	Habitat area	Change in total area of particular habitat	Forest in the area of influence will need to be monitored. Change in total area of secondary and primary forest should be detailed, along with areas changed due to rehabilitation.
	Conservation status	Change in area allocated to conservation within project area	As no conservation areas have been identified to be set aside, this indicator is not applicable in this case.
Community/ Ecosystem level	Habitat distribution	Change in vegetation along watercourses	This is important as swamp vegetation should indicate the state of the water habitat. Swamp vegetation can be monitored as far as possible within the area of influence.
	Vegetation structure	Change in crown cover	This would be changes in the cover of the Primary and older secondary forests, giving an indication of tree loss.

Level	Category	Indicators	Comment
	Keystone or indicator species	Change in number and/or distribution of indicator species	Monitor and record plant and animal IUCN listed species as indicators such as the <i>Lophira alata</i> for plants, and the West African Dwarf Crocodile and Lesser Spot-Nosed Monkey as animal species within the area of influence.
	Invasive species	Change in presence, location, area, numbers of invasive plant or animal species	The presence of alien species is an indication of disturbance. Existing and new species need to be monitored.
Species/ Population level	Abundance	Changes in abundance of key animal species	Keep records of species encountered within the area of influence (both flora and fauna).

The monitoring program needs to be done in a systematic and scientific manner, and involves close monitoring of floral and faunal changes in the project area. Table 5-6 below describes the suggested monitoring protocol for the indicators described above within the defined area of influence.

The baseline data gathered on site will also be able to determine indicator species that can be used to monitor impacts on the environment.

Indicators are useful in that they provide a costs-effective way of determining the impacts of the project and surrounding communities without having to do a comprehensive study each year.

Table 5-6: Monitoring plan for the indicators identified (adapted from Hawley, 2011).

Indicators	Description	Sampling method	Number of sampling points	Time periods for sampling	No of sampling events per year	Sample time
REGIONAL INDICATORS						
Change in total area of particular habitat, and those allocated to conservation areas within the project area.	Secondary forest older than 10 years and Primary Forest.	In order to determine the size of the remaining primary and older secondary forest areas, a boundary should be described (prospecting rights area) and the original extent mapped from aerial imagery. The reduction in the extent of the forest as a result of clearing can then be mapped by walking these perimeters with a GPS. Additional aerial imagery can be used where possible to augment this data.	Forest areas in the area of influence must be monitored.	N/A	Once to begin with, then every 3 years thereafter	Weather dependent
HABITAT QUALITY						

Indicators	Description	Sampling method	Number of sampling points	Time periods for sampling	No of sampling events per year	Sample time
REGIONAL INDICATORS						
Change in strata cover	Forest	Observation of forest strata cover (herbaceous, shrub, tree): categorise accordingly Take digital images and GPS points of forests and thicket classified	Forest, points within the areas of Primary Forest remaining within the area of influence should be used.	N/A	Bi annually	Weather dependent
COMMUNITY AND POPULATION DYNAMICS						
Change in number and/or distribution of indicator species	Indicator species need to be identified after a more comprehensive ecological study has been done.	Representative species diversity has been determined through baseline studies. Indicator species need to be identified through further sampling of the area. Sampling strategies must be simple and accurate. The methodology must be replicated and remain	Stratified sampling of the Forest within the area of influence should be undertaken. The number of samples will depend on the organism being monitored. It should be consistent with literature and must	The time period used to sample will be determined by the different organisms and the relevant technique being used. Time periods used for sampling must remain consistent throughout the monitoring plan.	Total species diversity and abundance to be recorded for addition to baseline assessment Bi-annual sampling. Recoding only indicator species	Initially, bi-annual sampling will occur, aligned with seasonal patterns. Bi-annual sampling

Indicators	Description	Sampling method	Number of sampling points	Time periods for sampling	No of sampling events per year	Sample time
REGIONAL INDICATORS						
		consistent throughout the monitoring plan. Sampling taxa include: • Forest species • Reptiles • Rodents and small mammals • Medium-Large mammals • Birds Transect and/or point sampling will need to be employed depending on the organism.	be representative of population.			
Change in presence, location, area, numbers of invasive plant or animal species	The presence of alien species is an indication of disturbance. The project area has two alien invasive species; additional species are likely	Alien plant and animal species need to be investigated and mapped (GIS). Their range and density must be monitored.	Representative samples must be taken of each alien species within the area of influence.	N/A	Bi- annually	Weather dependent



Indicators	Description	Sampling method	Number of sampling points	Time periods for sampling	No of sampling events per year	Sample time
REGIONAL INDICATORS						
	to begin occurring in the region.					

6 REPORTING AND DOCUMENT CONTROL

Records generated in the implementation of this Biodiversity Plan will be filed and maintained by administrative staff under the direction of the Environmental Manager.

Regular reporting will be undertaken which will include:

- A summary of activities undertaken during the reporting period;
- Any risks or issues identified during the monitoring plan;
- Any material deviations or non-compliances to this Management Plan;
- Planned activities during the next reporting period;
- Any other issues of concern.

Further information on environmental monitoring and reporting requirements and procedures is set out in the ESHS Management System.

Regular internal and external audits will be compiled, a part of which will focus on assessing this Management Plan and determining its effectiveness. Where amendments of changes to the plan are required, this will be undertaken both physically on site, and also the actual plan which will then be documented as per the record keeping structure implemented on site.

6.1 Change Management

This plan will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing ESHS System needs. The overall effectiveness of the Plan will be assessed in the internal audit and management review processes.

Changes to this plan will be made after a Critical Habitat Assessment as done, a BAP completed and an Offset study compiled.

7 IMPLEMENTATION

7.1 Responsibilities

The Biodiversity Management Plan will fall under the responsibility of the Aureus' Safety Health Environmental Quality Manager.

This position is responsible for providing:

- project assurance that ESHS System legislation, regulations and commitments are being followed;
- ESHS standards and procedures that are consistent with Aureus' corporate standards;
- mechanism for recording and reporting ESHS statistics on documented incidents and other key outcomes;
- an ESHS System management training service;
- a service to analyse technical risks;
- co-ordination of crisis and emergency response plans and practices;
- means to ensure the application of continuous improvement principles to the documentation, tools and other aspects that make up and support the ESHS System;

- assistance to work areas with the implementation of ESHS Management Plans; and an appropriate level of staffing (in the form of either permanent or contracted environmental, safety, health, security officers) to ensure:
 - Compliance with the environmental and safety obligations under the Contract and Scope of Works and under Technical Criteria:
 - Compliance with obligations under the ESIA, ESHS System, and other Safety Management Plans:
 - The environmental safeguards prescribed in government guidelines are implemented and tested before handover of the operating plant.

Project and Contract Design Engineers:

The design engineers are responsible for ensuring that environmental considerations are taken into account in all activities. Engineers will liaise closely with the Contractor Project Managers to ensure that the environmental controls and procedures contained in this Management Plan are implemented.

Specialist work for future studies

Specialists will be contracted to conduct surveys for additional studies (including the Critical Habitat Assessment, BAP and Offset Strategy). These may include site visits, which will be done in the wet and dry season. Relevant experts in the region will be hired to complete these studies.

7.2 Training

The Biodiversity Management Plan recommends training and workshops at all levels. The training required for the management plan is as follows:

- **Senior management:** A workshop (half-day) to discuss the intricacies of the management plan, as well as the risks and requirements of the Biodiversity Management Plan. The workshop will also require that an approach be defined for the implementation of the plan.
- **Contractors (Management):** An induction (half-day) to discuss the Biodiversity Management Plan, this is intended to communicate the expectations and requirements of Aureus to be adhered to and implemented by the contractors. This must not be a generic induction, but rather relevant to the contractual responsibilities being conducted and the associated impacts to biodiversity as a result. Inductions may include:
 - Impacts to water resources, water quality and quantity;
 - Loss of natural (forested) areas and species; and
 - The translocation of selected species.
- **Employees (labourers):** A full day training exercise to communicate the expectations and requirements of Aureus to be adhered to and implemented by the employees. This training should be tailored to the specific job being conducted and the biodiversity to be impacted on. This should be a practical training exercise with

demonstrations, and should indicate the risks associated with improper implementation. The training may include:

- The methods to correctly conduct “search and rescue” for selected species;
- The removal of alien vegetation;
- How to clean an oil spill; and
- Proper methods for the handling of animals such as snakes, mammals etc



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NON-COMPLIANCE / CORRECTIVE ACTION PROCEDURE

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NEW LIBERTY GOLD MINE LIBERIA

MARCH 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date
		SHEQ Manager and Technical Manager		

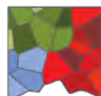
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ENVIRONMENTAL

This document has been prepared by **Digby Wells Environmental**.

Report Title: Non Compliance / Corrective Action Procedure for the New
Liberty Gold Mine, Liberia

Project Number: AUR2025

Name	Responsibility	Date
Liz Hilton Gray	Senior Environmental Consultant	25 March 2014

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1 INTRODUCTION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of an open pit, gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvoe Creek (MCDC), accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drawn up to integrate the management measures applicable to the project. This non compliance and Corrective Action Procedure (CAP) forms part of the ESHS system, the objective of which is to provide the necessary infrastructure, facilitate management control, and support the culture toward project-wide performance improvement.

2 APPLICATION AND SCOPE

When a mining operation process does not conform to defined requirements, it results in potential safety, health, social and environmental incidents, poor service delivery, or fails to comply with regulatory requirements. The challenge is to fix the defects and correct the process in the most cost-effective manner.

The purpose of this procedure is to define a systematic approach for Aureus personnel to identify, document, evaluate, rectify and close-out non-compliances in the areas of environment, social, health and safety that might occur during all project phases. Aureus should be able to control all Project non compliant conditions, equipment, processes procedural requirements or incidents by ensuring that all non compliances are identified and corrected in a formalized and controlled manner. This procedure applies to all company personnel where they observe situations that do not comply with specified requirements.

2.1 Objectives

In all situations it is important to create procedures that help managers and others to identify non-conformance. To prevent faults from recurring, you must learn from mistakes and take the necessary action. Non compliance can arise from different levels within an organisation. The corrective and preventative action must be adapted to the extent of the problem and in proportion to the impacts. There must be clear instructions for when and how the environmental authorities are to be informed.

This procedure is to provide a framework to:

- Identify the non compliance;
- Document the non compliance;
- Determine the required corrective action;
- Allow a reasonable time period to resolve a non-compliant condition;

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- Instruct the responsible party to take remedial or corrective action by a set target date;
- Prevent recurrence of non compliant issues by performing statistical analysis, developing reports on recurring issues and modifying audit and inspection protocols to assess the effectiveness of the remedial actions selected
- Follow up and close out of non compliant issues;
- Report status of non compliant conditions across appropriate levels of organization;

This procedure will apply across the mining operation for contractors and for each department and infrastructure.

3 NON COMPLIANCE IDENTIFICATION AND DOCUMENTATION

Line Managers are responsible for conducting inspections and audits to determine non-compliance with legislation, regulations, management and monitoring plans, policies and the ESHS system, procedures and standards.

Identification of the root cause of non compliance will assist in the process of developing actions to eliminate or reduce the probability of the risk occurring, or to mitigate consequences if the unwanted event should occur.

Corrective and preventative actions will be applied that are:

- • Appropriate – relevant to the magnitude of the risks;
- • Actionable – the action is worded in a clear, concise and easily understandable manner;
- • Achievable - the person designated can complete the action(s) within the timeframe given;
- • Auditable – completion of the action produces evidence that can be verified at a later date.

Any non compliance and other system deficiencies, including legal non compliance, should be analysed to detect patterns or trends.

3.1 Identification of Non Compliance

A number of processes can be used to identify areas of non compliance. These include regular inspections, monitoring and audits.

Key steps to identifying and documenting non compliance include:

- Undertake inspection/audit/identified procedure;
- Identify the problem;
- Investigate to identify the root cause;
- Come up with the solution;
- Implement the solution;
- Document the solution;
- Communicate the solution; and
- Evaluate the effectiveness of the solution.

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3.1.1 Inspections

Inspections are scheduled events to observe specific work activities. The inspections are carried out by the Aureus personnel according to a schedule or as and when deemed necessary.

The Inspectors may be able to deal with non compliance issues on site without the requirement for formalized follow up action. Where this is the case the observation shall be recorded within the inspection checklist, if utilized, or within the weekly or daily reports of the identifying individual. Where close out is not possible within 24 hours one of the tools identified within this procedure shall be implemented.

3.1.2 Monitoring

The monitoring program is designed to monitor if all project requirements are met and to record any non compliances so that solutions and actions can be implemented. Monitoring which will be undertaken at the NLGM includes, but is not limited to: occupational health and safety, noise levels, air emissions, water quality and quantity, biodiversity, grievances, soil, waste and chemical safety. The majority of non compliance situations during monitoring will be picked up in the individual monitoring plans which have been compiled in a number of Management Plans. The monitoring reports will identify non compliance areas as well as action plans to remedy them and following the next monitoring regime, it will be determined if the action plans have been successful. In some cases quick fix solutions will need to be implemented and in other more long term solutions will be required. Continuous non compliances will be flagged for additional investigation.

3.1.3 Audits

Managers and Supervisors are responsible for providing assurance that their work areas follow the ESHS System. A documented auditable trail will be established for assurance purposes. Internal audits will be undertaken regularly across all areas within the NLGM operations and throughout all phases of the project.

All findings shall be presented in a report with all significant findings being documented as Action Plans. All minor findings shall be documented as observations within the audit report.

External audits may be conducted by, but not limited to: regulatory authorities, Shareholder Representatives, consultants, Stakeholders and the Lenders Group. Any non compliance identified during external audits shall be recorded as part of the document control system implemented in the ESHS System, as well as be incorporated into a Corrective Action Review Report.

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3.2 Classification of Non Compliance

Non compliance is classified according to the potential significance of the non compliance. Aureus will develop a system of classification that can be used across the mining operations in order to have a standard approach to classification of the non compliance. An example has been set out below of the type of classification system that can be used.

Table 3-1: Example of a non compliance classification system

Classification	Description	Action Required
Class IV	A critical non compliance, materially inconsistent with the Project Standards or Management Plans, resulting in or reasonably likely to result in irreversible impacts to sensitive receptors or important resources or significant damage or irreversible harm or damage to an ecologically or socially sensitive resource or has the potential for an extreme health and safety incident.	Immediate corrective action or site-specific attention required to correct or to stop the on-going non-conformance and mitigate any effects that have occurred, including temporary work suspension where necessary.
Class III	A material non compliance materially inconsistent with the Project Standards or Management Plans, that has not resulted in clearly identified impacts to sensitive receptors or important resources or material damage or irreversible harm or damage to an ecologically or socially sensitive resource or have the potential for an extreme health and safety incident, but it is reasonably likely to have such effects.	Corrective action or site-specific attention required to correct or to stop the on-going non-conformance and/or to prevent the occurrence of environmental and social impacts. If potential impacts occur, the Class IV notification and reporting process will apply. The Class III notification and reporting process will apply until the issue is resolved.
Class II	A material non compliance with the Project Standards or Management Plans, but not reasonably likely to result in impacts to sensitive receptors or important resources or material damage or irreversible harm or damage to an ecologically or socially sensitive resource or have the potential for an extreme health and safety incident	Corrective or preventative action to be taken if required to comply with Project Standards or Management Plans.
Class I	An incident not materially inconsistent with the Project Standards or Management Plans and not reasonably likely to present a threat to the environment, community or worker health and safety.	Class I non-conformances (and any actions taken to address them) will be reported in the Project's Annual Monitoring

The classification system will be incorporated into the reporting system when any non compliances are identified. This will help to identify those areas of high risk or urgency.

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3.3 Reporting Structure for Non Compliance

A non compliance report documents the details of a non conformance identified in a quality audit or other process review. The objective of the report is to make an unambiguous, defensible, clear and concise definition of the problem so that corrective action can and will be initiated by management.

The elements of an effective statement of non compliance are set out below, however the format will be determined by Aureus and used across the mining operations:

<u>Observation</u>	A statement of the non compliance
<u>Attribution</u>	The standard, plan, procedure, work instruction, policy, documented social norm or organisational ethic violated by the target of the non-compliance
<u>Location</u>	Where the non-compliance was identified. For example, department and geographical location
<u>Root Cause</u>	Determining the root cause of the non compliance so that any trends or problems can be identified and rectified where necessary. If no root cause is identified, further investigation may be triggered.
<u>Objective Evidence</u>	Physical evidence of non compliance. For example, the absence of a required record or incomplete information on an existing record. Note that this element is particularly important as lack of physical evidence will often mean that the non conformance it is not accepted by management and no action is taken. Objective evidence that a design description does not comply with the company's definition of best practice as documented in design standards is likely to trigger corrective action by management.

A table of actions can then be used as a summary/register of non compliances and includes completion dates to close out the issue. This register will be reviewed regularly to determine any outstanding issues and check which non compliances are yet to be closed out. An example of such a table is presented below however Aureus will develop a report format which will be used throughout all mining operations.

Operating Procedure/Area of Operation	Deficiency	Corrective Action Required	Assigned Responsibility	Evidence to verify Corrective Action	Completion Date
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3.4 Corrective Action Process

Once a non compliance has been documented, it must be resolved. Action must be taken as quickly as possible. Assigned responsibilities for actions and schedules must be clear so that correction occurs in a timely manner. The findings of the non compliance should be communicated within the department/area of operations, as well as any other areas in the operation where the potential for similar non compliance exists and any follow-up training must be implemented.

Corrective actions should: (1) resolve the immediate problem; (2) consider whether the same or similar problems potentially exist elsewhere in the operation/organisation; and (3) prevent the problem from recurring.

Once a report on a non compliance has been completed and communicated to the responsible parties, the following actions take place:

Follow Up

The issuer of a non compliance report is responsible for the continued follow-up until the non-compliance has been resolved and that it is positively closed out. The issuer should report back to management weekly on any outstanding non compliances.

Close Out

Each and every non compliance identified will be closed out on a progressive basis, until compliance has been attained. The Action Registers will be regularly monitored by management for implementation and closure of all corrective actions.

3.4.1 Trend Monitoring

Trends of non compliances shall be monitored to identify and detect any systematic issues that require intervention for imposing change to prevent systematic recurrences of specific types of non compliance. Trend reports shall be presented to management on a monthly basis for action and communicated to the relevant departments, as part of the Cycle of Continuous Improvement (Plan, Implement, Review and Improve) and as needed to comply with government and/or IFC commitments.

3.4.2 Change Notification

If a department/contractor/employee recommends resolving a non compliance by requiring a deviation or change from applicable Codes/Standards, project specifications, management

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plans, materials or any other approved documentation, then the relevant person must prepare and submit a Change Notification to Management for its review and approval, as per the Change Management Procedure.

4 REPORTING AND DOCUMENT CONTROL

The Aureus ESHS Department Managers shall issue a monthly report to the general manager informing of any new non compliances and summarizing the resolution status of all other non compliant conditions. As might be required by Lender and/or governmental agreements, similar summary reports to the lenders and/or regulatory agencies may need to be issued.

As per the ESHS System, all non compliance and action reports will be documented and filed.

Regular reporting will be undertaken which will include:

- A summary of rectification activities undertaken during the reporting period;
- Any close out of non compliances;
- Planned activities during the next reporting period;
- Any other issues of concern.

5 RESPONSIBILITIES

The procedures developed to address non compliance, incident and action management outline the requirements to report, review and address incidents and non-conformances and implement corrective and preventive actions. Management at all levels is responsible for ensuring all incidents and non conformances in their respective areas are reported and investigated. They are also responsible for ensuring root cause identification and corrective or preventive actions are taken.

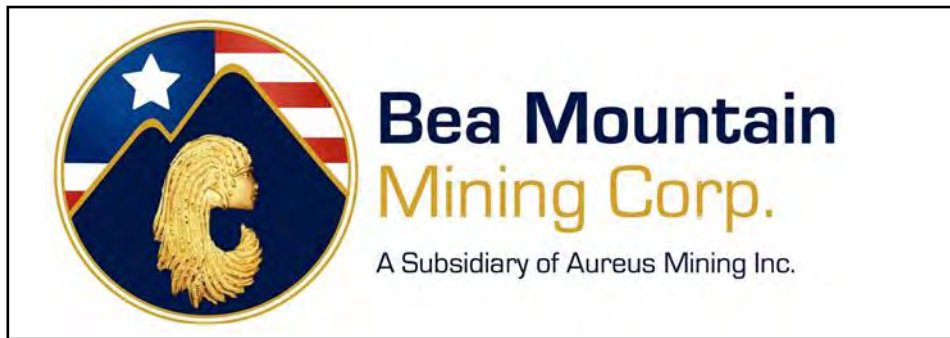
All employees are responsible for taking immediate reasonable action necessary to prevent a potential incident. Personnel are responsible for reporting incidents and non conformances to their supervisor immediately. All employees are empowered to stop work if they experience or observe unsafe working conditions or at risk behaviour.

In addition, Aureus has developed a Grievance Mechanism Procedure and an Incident – complaint procedure which can be triggered and should be followed where necessary.

Aureus' Safety Health Environmental Quality Manager:

The Environmental Quality Manager shall oversee the action tracking registers to ensure that non-compliant issues are followed up and closed out. All personnel will be responsible for reporting non compliances, after which the Environmental Quality Manager will follow up with documenting the corrective action and reporting back to management.

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POLLUTION PREVENTION MANAGEMENT PLAN

A/BMMC-ENV-MP-012

AUREUS MINING INC.

March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date

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**POLLUTION PREVENTION MANAGEMENT
PLAN**

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REVISION INFORMATION

Rev #	Old Section Ref	New Section Ref	Description of Changes
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1. INTRODUCTION

Aureus Mining Inc, through its subsidiaries, is engaged in the exploration and development of gold deposits in highly prospective and under-explored areas of Liberia and Cameroon. Aureus Mining's activities are currently being concentrated on the exploration and development of the New Liberty Gold Mine (NLGM) in Liberia.

An Environmental and Social Impact Assessment (ESIA) for the NLGM has been prepared and approved by the Liberian authorities in 2013. For more detail on the proposed project, please refer to this document.

This Pollution Prevention Plan has been developed to help provide a framework for implementing a number of procedures to address pollution of the receiving environment in terms of the air, water and land around the NLGM.

2. APPLICATION AND SCOPE

2.1 Objectives

- Assess the risk associated with pollution from the NLGM and develop action plans to address the risks;
- Establish a full suite of Standard Operating Procedures (SOPs) for NLGM construction, operations and closure activities that focus specifically on procedures to manage and prevent pollution;
- Define roles and responsibilities to manage and implement this plan; and
- Define monitoring and reporting procedures.

3. RISK ASSESSMENT

The 2013 Environmental, Social Impact Assessment (ESIA) identified a number of areas of impact which will require management and mitigation measures. In order to quantify these impacts, a risk assessment will be undertaken, following which, Action Plans will be compiled. The risks and action plans will define inter alia, the key pollution issues that will have to be managed.

The Action Plans will define the pollution control management measures required and the monitoring programme to be implemented.

4. POLLUTION PREVENTION AND MANAGEMENT

For each of the identified areas of pollution, the following activities will be undertaken in order to develop a comprehensive plan for identifying high risk areas and applying the mitigation and monitoring measures:

- Identification of relevant standards and key performance indicators;
- Description of the baseline environment;
- Risk assessment to identify areas of high risk;
- Development of action plans/procedures which include mitigation measures, timeframes, and responsibilities;

- Developing and implementing a monitoring plan to verify effectiveness of implemented controls, and compliance with relevant regulations;
- Employee awareness training ; and
- Continuous improvement programme.

All of the management plans compiled must comply with the relevant legislation identified in the ESIA, as well as lender requirements. The list below covers all those aspect for which a pollution prevention plan will be developed for the NLGM.

4.1 Air Pollution

- Noise Management;
- Dust Management;
- Emission control from generators and machinery;
- Greenhouse gas inventory and mitigation;

4.2 Water Pollution

- Management of clean and dirty water systems;
- Monitoring of any discharge from site and development of mitigation measures if required;
- Management of stream diversion;
- On site and off site monitoring of ground and surface water;
- Management of grey water and potable water systems;

4.3 Land Pollution

- Prevention and management of spills such as hydrocarbon and chemical spills;
- Management of hazardous waste on site;
- Solid and liquid waste management;

5. MONITORING

A number of monitoring plans have been included in the ESIA which was approved in 2013 by the Liberian government. In addition to these plans, there are monitoring measures included in various Management Plans compiled as part of the ESHS System. Please refer to these document for more detail.

The process of monitoring is a continuous feedback mechanism to monitor against compliance, check for any trends or problem areas, adjust mitigation measures or monitoring programme and report back on the results. It is therefore a vital tool in the process of pollution prevention as it will help to determine potential issues before they occur, as well as highlight when an incident has taken place, and can thus be mitigated.

Detailed monitoring plans will be compiled, or updated in the case of existing plans, for each of the areas of potential pollution described in Chapter 4.

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6. REPORTING AND DOCUMENT CONTROL

6.1 Reporting Structure

The checklists and monitoring reports for environmental monitoring should be kept by the environmental manager and should be stored in a suitable information system. The checklists and reports must be available for use when conducting an audit of projects, programmes, policies etc. It is the responsibility of the person conducting the monitoring to ensure that the environmental monitoring report or checklist is accurately completed, the observations made during the monitoring are correct and true reflection of the actual situation and that the interpretation of the data is logical and factual. The party responsible for performing the environmental must sign the monitoring report.

A monitoring report is not a detailed report, as much of the monitoring information will be contained in the completed checklists.

The monitoring report must begin with basic administrative information related to the monitoring. This includes the date/s that the monitoring was conducted, the type and objective of the monitoring, how the information on the checklist was obtained, who performed the monitoring, which checklists were used, which office or directorate within Aureus was responsible for conducting the monitoring, and any problems encountered during the monitoring process.

The monitoring report should then have a summary that identifies the key findings and recommendations of the monitoring, including a summary of compliance and non-compliance.

A more detailed description of the important monitoring results should then be compiled. The report should also include a physical description of the site, the indicators (if relevant) and monitoring sites. The type of information that will be included in the report is depend on the type of monitoring that was required for the specific purpose.

The report must provide recommendations for corrective actions that will assist Aureus staff or an external party in attaining compliance. Corrective actions will vary widely and should be decided upon by the person with the delegated powers to institute change.

It is crucial that the monitoring report includes all relevant supporting information, the checklists in particular must be completed in full. Diagrams, photographs, and other data may also form part of the report.

Recommendations to address areas of non-compliance or opportunities to reduce the risk of harm or detriment to the environment resulting from the activity, may also be included. The recommendations should be prioritized and dates for instituting corrective actions should be included where necessary.

7. IMPLEMENTATION

The Pollution Prevention Plan should be implemented at all stages of the project, across all areas of operation. It should be undertaken in parallel with the other Management Plans, specifically the following:

- Compliance Monitoring Plan;
- Hazardous Materials Management Plan;
- Arsenic & Cyanide Management Plan;
- Footprint Management Plan;
- Solid and Liquid Waste Management Plan;
- Water Management Plan;
- Non-compliance/Corrective Action Plan;
- Emergency Response Plan.

7.1 Responsibilities

A number of role players will be accountable for implementing the controls needed to control pollution through the Pollution Prevention Plan, however the ultimate responsibility for monitoring and reporting on compliance with the plan will lie with the Safety, Health, Environmental Quality Officer.

Aureus' Safety Health Environmental Quality Manager:

This position is responsible for providing:

- project assurance that ESHS System legislation, regulations and commitments are being followed;
- ESHS standards and procedures that are consistent with Aureus' corporate standards;
- mechanism for recording and reporting ESHS statistics on documented incidents and other key outcomes;
- an ESHS System management training service;
- a service to analyze technical risks;
- co-ordination of crisis and emergency response plans and practices;
- means to ensure the application of continuous improvement principles to the documentation, tools and other aspects that make up and support the ESHS System;
- assistance to work areas with the implementation of ESHS Management Plans; and an appropriate level of staffing (in the form of either permanent or contracted environmental, safety, health, security officers) to ensure:
 - Compliance with the environmental and safety obligations under the Contract and Scope of Works and under Technical Criteria:
 - Compliance with obligations under the ESIA, ESHS System, and other Safety Management Plans:
 - The environmental safeguards prescribed in government guidelines are implemented and tested before handover of the operating plant.

Project and Contract Design Engineers:

The design engineers are responsible for ensuring that environmental considerations are taken into account in all activities. Engineers will liaise closely with the Contractor Project Managers to ensure

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that the environmental controls and procedures contained in the Pollution Control Plan are implemented.

Individuals:

Various individuals are responsible for:

- assisting with the developing of the ESHS Management Plans for their particular work area;
- following ESHS assigned tasks according to the ESHS System;
- identification of hazards and risks and the reporting of incidents and 'near misses'; and
- ensuring that their actions are within the ESHS policies.

Individuals have the authority and responsibility to halt any part of an operation if they believe the action presents an unacceptable risk to themselves, to others or to the environment. Any such action must be reported to their direct supervisor as soon as possible.

Individuals are accountable for completing and ESHS tasks that are assigned to them.

Regulatory Authorities:

Agencies such as the Ministry of Lands, Mines and Energy, and EPA have regulatory responsibility to ensure that the construction and operation of the mine is undertaken in accordance with relevant legislation, and with best practice guidelines.

Officers from these agencies can be expected to visit the site periodically to audit the activities for compliance and to provide advice on issues.

7.2 Training

Whoever undertakes the monitoring and auditing of pollution control measures needs to be proficient in understanding the area being monitored and how to evaluate compliances. In some cases internal resources will be used while in other cases, independent external parties will be called in to perform bi-annual compliance audits. Aureus is to ensure that in each case, the necessary credentials are in place and experience in the field has been obtained.



**Bea Mountain
Mining Corp.**
A Subsidiary of Aureus Mining Inc.

**BEA MOUNTAIN MINING CORP.
New Liberty Gold Mine**

**POLLUTION PREVENTION MANAGEMENT
PLAN**

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MANAGEMENT PLAN: CYANIDE IN SURFACE AND GROUND WATER NEW LIBERTY GOLD MINE

AUREUS MINING

9 APRIL 2014



This document has been prepared by **Digby Wells Environmental**.

Report Title: Aureus NLGM Environmental Cyanide Management Plan

Project Number: AUR2025

Name	Responsibility	Date
André van Coller	Specialist reporting (Hydro-geochemist)	25 March 2014
Graham Trusler	Review	1 April 2014

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Appendix A: Cyanide Management Plan.

1 INTRODUCTION

Cyanide (CN) will be used at the New Liberty Gold Mine (NLGM) to process and extract gold from the ore, after which some of the CN will be discharged along with the tailings material. The fact that the mine will discharge into a valley fill dam (TSF), and that water discharges are necessary from this dam, require that cyanide in the tailings is destroyed prior to discharge from the plant into the Tailings Storage Facility (TSF). Accordingly NLGM is intending to subject the tailings to the INCO cyanide destruction treatment system before being placed on the TSF. This involves the chemical oxidation of cyanide with SMBS and SO₂/Air. Various literature reviews (mainly Logsdon et al. 1999) and expert consultations have been conducted to provide optimal solution to the management of cyanide to enable the discharge of the chemical to acceptable levels in line with the IFC requirements.

This management plan only addresses the environmental management of cyanide with emphasis on the required treatment levels of tailings material/water and the effective management of the effluent discharge from the TSF and Return Water Dam (RWD). The implementation of this management plan will assist with ensuring that acceptable water qualities are met on site and downstream of the operational area.

It has been assumed that the management of cyanide during transportation, loading, unloading and use in the plant has been covered by the Cyanide Management Plan which has been compiled for the site. The cyanide management plan as per international guidelines with more in depth discussions is attached as Appendix A.

The recommendations and action plan stipulated in this environmental cyanide management report is based on literature reviews, water balances and cyanide dilution and degradation models discussed in the Integrated Water Management Report dated 25 March 2014.

2 OBJECTIVES

This environmental cyanide (CN) management plan has the following objectives:

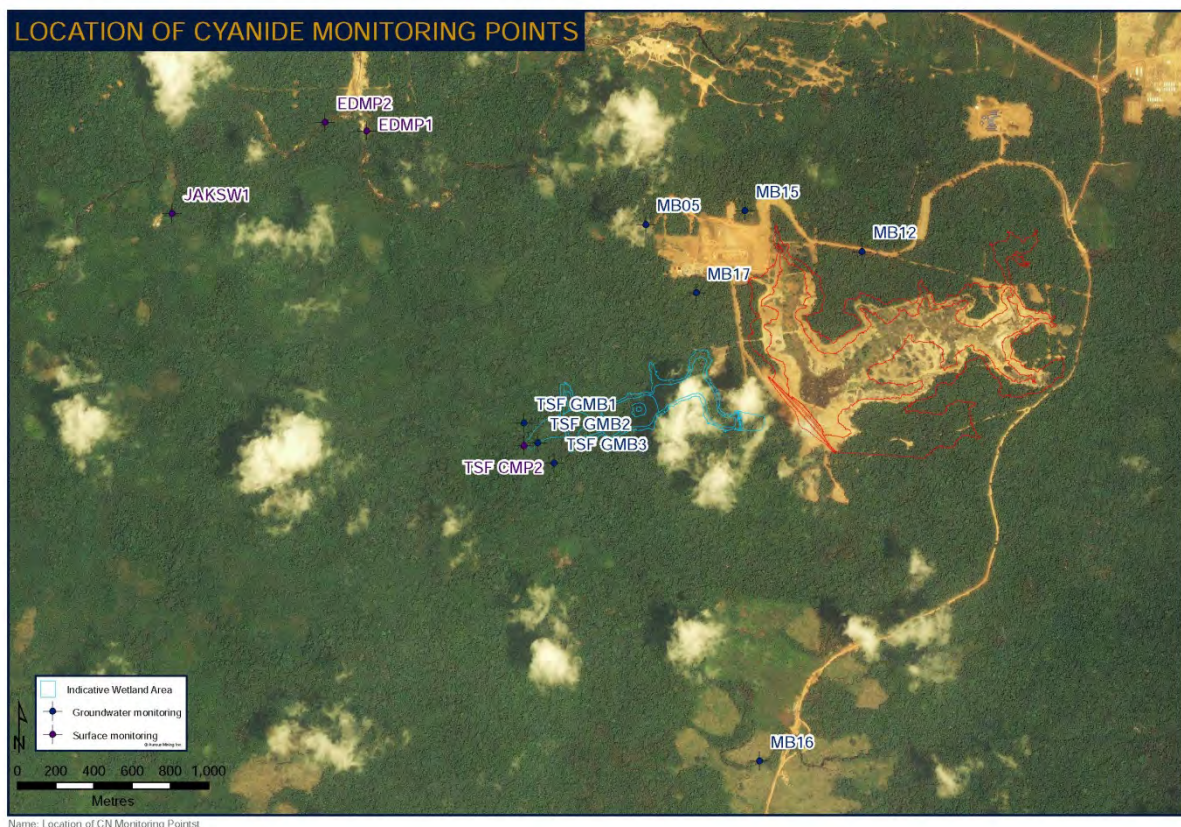
- To recommend CN concentrations which treatment methods should achieve before the waste material is discharged onto the TSF;
- Recommend and list possible mitigation methods to lower CN concentration prior to discharge into the environment;
- Identify compliance concentrations to which discharged effluent and groundwater seepage should adhere to; and
- Identify and recommend compliance points.

3 COMPANY COMMITMENTS

- Aureus has decided to install a wetland system downstream of the TSF to reduce levels of Arsenic and Cyanide in the effluent. The compliance point to meet IFC discharge standards will be at the exit of the wetland (for surface water) and at boreholes immediately down gradient of the wetland (for ground water);

- With the installation of the wetland, and based on the Cyanide balance assessment, the Company will commit to a maximum Cyanide discharge into the TSF of 27 mg/L with the capacity of going down to 5 mg/L. The plan is to start up at 5 mg/L and evaluate actual natural degradation rates to determine if discharge levels of CN into the TSF can go up to 27 mg/L. The Company commits, as a contingency, they will have the capacity in the system to treat the tailings going into the TSF to 0.5 mg/L WAD CN (IFC discharge limits) if warranted;
- The Company will develop a robust surface and ground water monitoring program to assure operational parameters of the TSF are met and concentrations of As and CN are monitored in the TSF and at the various points in the System (TSF, wetland, compliance points, etc).

NLGM commit to meeting IFC standards for discharge at the monitoring point below the wetland outflow for surface water and at the groundwater monitoring points to be installed below the final walls of the wetland. The monitoring points are shown on Plan 1 below as TSF CMP2 for the surface water point and TSF GMB1/2/3 for the groundwater points.



Plan 1: Cyanide Monitoring Points

This will be achieved by treating the cyanide levels in the tailings stream entering the TSF to levels which are low enough so as to achieve the discharge standards. This will be achieved using chemical treatment techniques. With the wetland the passive and chemical treatment techniques will be applied in conjunction with one another to achieve the required discharge standards.

The following limits apply:

Monitoring point	CN Level	Comment
Discharge into TSF	Between 5-27mg/l WAD CN Compliance < 50mg/l WAD CN onto TSF.	Start at 5mg/l and adjust towards 27mg/l once tests enable levels of natural degradation to be quantified. Target is to meet the discharge compliance level of 0.5mg/l WAD CN into the environment. Have the ability to achieve 0.5 mg/l
Discharge to environment	Compliance level = 0.5mg/l WAD CN, 0.1mg/l free CN, 1mg/l Total CN	Compliance point is either below the Wetland (or below the TSF Dam Wall if the Wetland is not constructed) for surface and groundwater.

The company commits to having the ability to treat the Free Cyanide levels down to 5 mg/l in the discharge to the TSF from the plant. The NLGM monitoring programme will then monitor the discharge concentrations at the wetland outflow at TSF CMP2 to determine what the concentrations are at this point. The level of treatment at the plant in the cyanide destruction circuit will then be adjusted accordingly so that full compliance with the IFC standards at the discharge is achieved with the minimum of active chemical treatment. This process will allow the operations personnel to find out what the natural decay of cyanide is in the system as designed and operated at the NLGM. It will also allow for the treatment chemicals and process to be optimised. The modelling indicates that compliance would be achieved if levels were increased to approximately 27 mg/l WAD CN.

The company commits to meeting the IFC standards for discharge of 1 mg/l total CN, 0.5 mg/l WAD CN and 0.1 mg/l free CN at monitoring points TSF GMB 1/2/3 and TSF CMP2

NLGM commit to engaging with the Liberian EPA to ensure that the mixing zone as required in terms of the ICMI Code is agreed to. This will probably mean that the standard of 0.022 mg/l free CN will be met in the Marvov Creek after the river diversion enters into the original water course.

The wetland to be constructed will take into account the long term fate of any heavy metals which may precipitate and it will be professionally designed and constructed.

Contingency measures are discussed in section 9.

4 LEGAL REQUIREMENTS

The following international standards and concentration levels are recommended based on IFC and International Cyanide Code regulations and guidelines:

- The level of CN in the tailings stream from the plant to be placed on the TSF after treatment and destruction methods should be below 50 mg/L WAD CN;
- After natural CN destruction and degradation the discharge downstream of the wetland, to be monitored at point TSF CMP2 (Plan 1), should be below 0.5 mg/L WAD CN. The levels at this point should also not exceed 1 mg/l total CN and 0.1 mg/l free CN;
- Cyanide levels after the mixing zone (to be agreed upon by the Liberian EPA and Aureus) and recommended to be monitoring point EDMP2, should have CN concentration of 0.022 mg/L Free CN; and
- Groundwater monitoring for the TSF area to take place at boreholes TSF GMB 1/2/3 (Plan 1) need to comply to IFC guideline values of 0.5 mg/L WAD CN. The levels at this point should also not exceed 1 mg/l total CN and 0.1 mg/l free CN.

5 IMPACT MANAGEMENT

5.1 Cyanide chemistry and natural degradation

After gold is extracted via the metallurgical processes, three principal types of cyanide compounds are often present in wastewater or process solutions: free cyanide, weakly complexed cyanide (WAD) and strongly complexed cyanide. Together, the three cyanide compounds constitute “total cyanide”.

The IFC recommended effluent concentration not to be exceeded for free cyanide is 0.1 mg/L, WAD cyanide is 0.5 mg/L and total cyanide is 1 mg/L. An understanding of the chemistry of these three types of cyanide provides insights into their behaviour with respect to their environmental risks and management options.

5.1.1 Free Cyanide

Free cyanide is the term used to describe both the cyanide ion (CN^-) which is used to dissolve the gold and hydrogen cyanide (HCN) which is formed when a hydroxide ion reacts with the CN^- .

Nearly all free cyanide is present as HCN when there are ample hydrogen ions present, (i.e. at a pH value of 8 or less). When the pH is greater than 10.5, there is little hydrogen ion present and nearly all of the free cyanide is present as CN^- .

These forms of free cyanide are important because they are considered to be the most toxic cyanides. However, they also happen to be the forms that are readily removed from solutions through both engineered treatment processes and natural dissolution mechanisms.

One of the most important reactions controlling free cyanide concentration is the volatilization of HCN, which, like most gases, will separate from water and escape into the air. Free cyanide is not persistent in most surface waters because the pH of such waters is usually at about 8 or below, so that HCN volatilizes and disperses. The volatilisation and subsequent transformation to benign compounds in air are important because they act as a

natural mechanism for controlling free cyanide concentrations in waste and process waters at mines.

Natural processes alone can reduce the free cyanide concentration from solutions in areas open to the atmosphere, such as process ponds and tailings impoundments, to very low values often to levels below regulatory concern or even the limits of detection as shown in Figure 1.

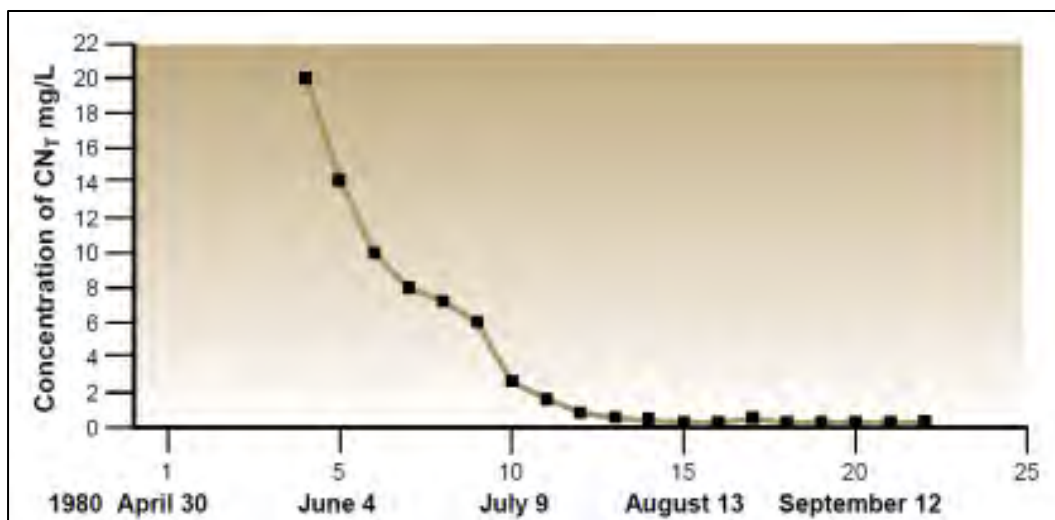


Figure 1: Cyanide degradation in a shallow pond (Logsdon et al. 1999)

5.1.2 Cyanide complexes

While cyanide solutions will be used at the NLGM since it reacts with gold, it also reacts with other metals such as iron, copper, zinc, nickel and silver as well as other elements such as arsenic. In most ore bodies, the concentrations of other metals typically exceed the concentration of gold by several orders of magnitude.

Chemical analyses of process solutions and wastewater derived from the processing indicate that most of the cyanide in solution is chemically linked with metals other than the small amounts of gold. When chemical elements combine in solution to form soluble species, they are referred to as “complexes.” Some complexes are very stable, whereas others are easily destroyed. It is important to distinguish between which of the various cyanide compounds is discharged to ensure the selection of an effective detoxification methodology.

5.1.3 Weak and strong cyanide complexes

Weak cyanide complexes also referred to as “weak acid dissociable” or WAD cyanide, can dissociate in solution to produce free cyanide. The weak complexes include cyanide complexes of cadmium, copper, nickel, silver and zinc. The degree to which these complexes dissociate is dependent on the pH of the solution, the temperature, and the intensity of light, especially ultraviolet radiation.

Strong cyanide complexes, on the other hand, degrade much more slowly than WAD cyanide under normal chemical and physical conditions. For most mining situations, the strong complexes of cyanide are predominantly iron cyanides and are less toxic.

NLGM is planning to abide by the principles of the Cyanide Management Code which is a requirement for IFC funding.

The Cyanide Code: Standard of Practice No. 4.4 states that a concentration of 50 mg/l CN WAD should not be exceeded in any open TSF for the protection of birds, wildlife or livestock. The INCO process employed in the design at NLGM should achieve this limit in the plant tailings stream. Test work conducted by DRA has indicated that the slurry discharged from the plant is less than this limit and in cases as low as 30 mg/l (i.e. 60% of the limit).

The addition of the ferric chloride into the tailings after INCO treatment has a potential side-effect of further lowering the WAD Cyanide and values less than 30 mg/l in the discharge could be achieved. Test work is currently underway by DRA to optimise ferric chloride addition rates which will also determine final expected CN WAD levels. In addition there will be a natural destruction of cyanide in the TSF due to volatilisation, the effect of Ultraviolet Radiation and complexing with various ions.

The design will therefore comply with the standard of practice indicated above for discharge.

The Cyanide Code: Standard of practice No. 4.5 states that the IFC levels for the discharge of cyanide are: 1 mg/l total CN, 0.5 mg/l WAD CN and 0.1 mg/l free CN. These limits should not be exceeded in discharges to surface waters of the receiving environment and/or downstream of any mixing zone approved by the applicable jurisdiction.

5.1.4 Natural degradation

Experience shows that cyanide is likely to be reduced due to natural attenuation, frequently to very low levels. However, the fact that the IFC has recommended the compliance point to be the discharge from the RWD, rather than the initially considered confluence point with the Marvoe Creek, the effect of dilution in reducing the cyanide has been reduced significantly.

The current cyanide detox system at the NLGM is aimed to treat the CN WAD to a level of 50 mg/L before going to the TSF. This is again expected to be reduced to about 15 – 20 mg/L with the addition of ferric chloride for the arsenic treatment.

Cyanide at the TSF will be at its highest concentration during the dry months. During this time, the water is recommended to be returned to the plant and not discharged to the environment.

Based on literature, if the slurry water is held in the TSF and RWD for at about 30 days the cyanide concentration is expected to attenuate naturally by about 50%. If it is held for 60 days, it is estimated to reduce to about 80% and if held for 90 days, it is expected to reduce by 90%.

5.2 NLGM Cyanide balance summary

5.2.1 Input values and scenarios

For the ESIA the environmental compliance points were taken to be EDMP 1 (confluence of the pit stream and the TSF stream) as well as EDMP 2 (confluence of the mine water and the Marvoe Creek). As per the IFC requirements the compliance point is taken at the return water dam (RWD) discharge point TSF CMP2 which is a more conservative than the previous points since there will be no dilution from the Marvoe creek or surface runoffs. These compliance points are indicated in Plan 1.

The INCO detox treatment procedure is planned to be conducted at the NLGM mine. According to the cyanide code and IFC guidelines the level of WAD cyanide onto the tailings should be 50 mg/L or less with the level of discharge at the compliance point to be 0.5 mg/L or less.

As stated above, the natural attenuation of cyanide by volatilisation is enhanced under a low pH environment. Four scenarios have been simulated considering the potential lowering of the slurry pH due to the addition of ferric chloride. These are:

- Scenario CN1 assuming a 50% cyanide reduction due to natural attenuation;
- Scenario CN2 assuming a 75% cyanide reduction due to natural attenuation; and
- Scenario CN3 assuming a 90% cyanide reduction due to natural attention.
- Scenario CN4 assuming a conservative 50% cyanide reduction to allow the sensitivity analysis on the maximum CN input concentration allowed onto the TSF to achieve IFC compliance at the RWD, Wetland discharge point TSF CMP2, EDMP1 and EDMP2.

No other chemical and/or biological degradation was taken into account in attenuating the cyanide. However in each scenario the balance was allowed to continue to allow the inclusion of a proposed artificial wetland as part of a sensitivity analysis. The conservative assumption with the inclusion of a wetland was made that the amount of time allowed in the wetland for further natural degradation of CN is that it achieves a 25% cyanide reduction.

5.2.2 Identified compliance points, concentrations and treatment levels

Compliance points are indicated on the plan in Plan 1.

- The tailings pH should be treated to allow levels to be achieved between 6 and 9;
- To reach IFC compliance at the RWD discharge point the input CN concentration onto the TSF should be 27 mg/L WAD CN with a natural cyanide degradation of 90%;
- If a wetland is included the maximum CN input concentration onto the TSF should be 5.3 mg/L at 50% assumed natural degradation to allow compliance downstream of the wetland;

- If a wetland is included the maximum CN input concentration onto the TSF should be 50 mg/L at 50% assumed natural degradation to allow compliance at EDMP2;
- Discharge into the groundwater systems through seepage from the TSF will be monitored at MB06, MB07, MB12 and MB16 and needs to adhere to IFC discharge concentrations;
- Potential CN contamination into the groundwater systems around the processing plant site should be monitored at MB05, MB15 and MB17 indicated on the plan in Plan 1.
- From the above conclusions it is seen that the option of constructing an artificial wetland will greatly increase the natural degradation and treatment of CN to IFC compliance concentrations; and
- Based on the identification of a mixing zone the most likely position for the compliance of CN concentration to the 0.022 mg/L total CN level is EDMP2.

5.3 Monitoring

5.3.1 Compliance and monitoring points

If treatment levels as indicated in the previous section are achieved discharged water from the mining area will adhere to the various guideline values. However monitoring of the water quality is important and has been taken into account in the Water management plan with a detailed monitoring program. The following locations that is included in the water monitoring program and protocol and indicated in Plan 1 serves as the compliance and monitoring points for CN discharged water:

- TSFDS1 will serve as the CN compliance point downstream of the RWD at which water qualities should be 0.5 mg/L WAD CN or lower;
- Discharge into the groundwater systems through seepage from the TSF will be monitored at MB06, MB07, MB12 and MB16 and needs to adhere to IFC discharge concentrations;
- Groundwater monitoring around the processing plant will take place at MB5, MB15 and MB17 and CN levels should comply with the 0.5 mg/L IFC guideline value for CN WAD; and
- If a mixing zone is agreed upon between Aureus and the Liberian EPA compliance monitoring point EDMP2 should be monitored and comply to 0.022 mg/L free CN.

5.3.2 Sampling requirements

The following sampling requirements based on IFC and ICMC guidelines will be implemented.

5.3.2.1 Sampling locations and frequency

Plant and tailings stream monitoring:

- On-line monitoring as discussed in section 7.3 of the Cyanide management plan attached in Appendix A will be in place to monitor the plant and tailings stream CN levels.

TSF open water monitoring:

- The open water stream and pool that will be contained on the TSF needs to be monitored for CN on a once weekly basis; and
- The sample needs to be taken within a 10 m radius of the tailings spigot from which the tailings is discharged onto the pool.

Groundwater monitoring:

- Monitoring for CN seepage into the groundwater system from the TSF will be monitored at MB06, MB07, MB12 and MB16 on a daily and weekly basis; and
- Monitoring for CN seepage into the groundwater system from the processing plant will be monitored at MB5, MB15 and MB17 on a weekly basis.

Discharge point monitoring:

- Discharge monitoring for CN will take place at TSFDS1 on a daily and weekly frequency to monitor the discharged water quality and CN levels to comply with the IFC guideline values.

Downstream surface water monitoring

- Surface water monitoring for CN at EDMP1 and EDMP2 will be done on a weekly basis; and
- Surface water monitoring for CN at JAKSW1 will be done on a monthly basis.

5.3.2.2 Cyanide sample preservation

The international cyanide code guidelines indicate that samples for CN detection should be handled in the following manner:

- Protective clothing and rubber gloves should be worn by the person taking the samples at all locations;
- sample solutions must be tested on site prior to cyanide analysis to preserve them against the main interfering substances, oxidizing matter and sulphides;
- Oxidizing agents must be reduced prior to sending the sample to the laboratory in the following manner:
 - Remove and retain any solids by decantation or pressure filtration.
 - Add sodium arsenide and mix. About 0.1g/L is usually sufficient.
 - Retest, and if test strip is discoloured, retreat as per Step 2.
 - Return solids to sample solution and raise pH to 12 by adding 1-2 pellets of solid analytical grade sodium hydroxide.

- The following procedure should be followed for the removal of sulphides prior to sending samples to laboratories or commencing detection tests:
 - o Remove any solids by decantation or pressure filtration and hold.
 - o Add lead carbonate (about 0.1 g/L) and mix.
 - o Remove formed lead sulphide by pressure filtration and discard PbS precipitate.
 - o Retest sample solution. If test strip is discoloured, retreat as in Steps 2 and 3.
 - o Return solids to sample and raise pH to 12 with solid analytical grade sodium hydroxide.
- Samples should be stored in a dark place at about 4 deg. C, such as in a cooler box during transport and then refrigerated at the laboratory. Soil samples for cyanide analysis (in cores or jars) must be wrapped in dark plastic and kept cool at 4 C without further treatment.

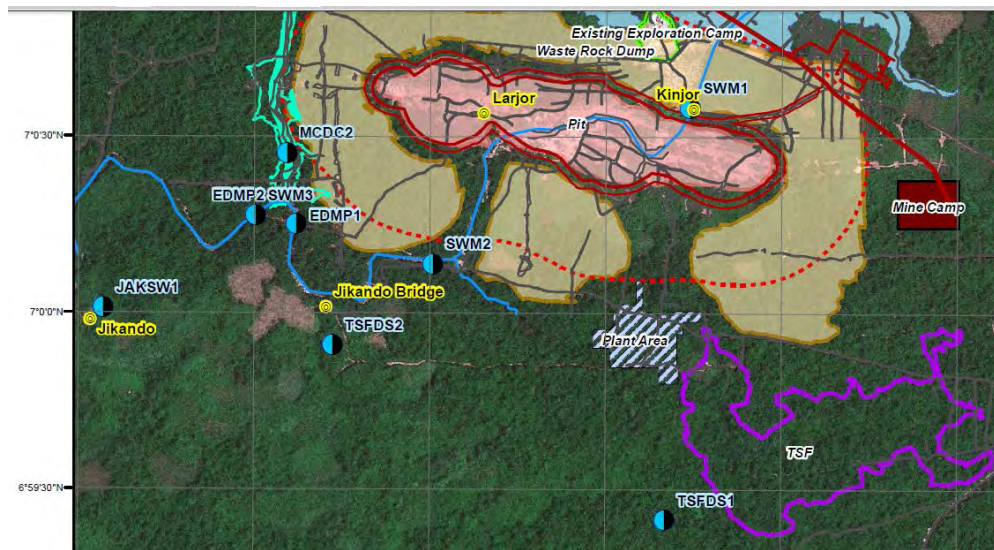
Once correctly preserved and packaged, samples should be sealed and each container (bottle or jar) individually placed in a sealed plastic bag. All samples should then be packed in a cooler box with some ice bricks to keep them cool during transport. Shipment to the analytical laboratory should occur as soon as practical by overnight truck or airfreight courier. It is essential that the sampling protocol be recorded and a chain of custody included with the shipment to allow tracking prior to and during storage and analysis.

5.3.2.3 Sample analysis locations and parameters

Laboratory analysis of the samples will be done at the following locations:

- Daily and weekly samples will be tested for CN and relevant parameters like pH, TDS and dissolved oxygen at an on-site laboratory purpose built for the fast analysis of samples; and
- Monthly and Quarterly sample will be sent to an accredited laboratories in Monrovia and Ghana.

CN levels will be measured both on site and at offsite laboratories using the following recommended methodsFigure 2.



Plan 2: Water Management Sampling Points showing points EDMP2 and JAKBH1 in the west and downstream of the mining area

Figure 2: Analytical methods (ICMC, n.d.)

Analyte	Method	Comments
Free Cyanide	AgNO ₃ titration	Preferred method For process solutions primarily above 1 mg/l LQL ₁ : 1 mg/l HCN(aq), CN ⁻ , Zn(CN) _x , parts of Cu(CN) ₄
	AgNO ₃ titration with potentiometric endpoint determination	Alternate method Precise method of endpoint determination Measures same species as primary method
	Micro diffusion of HCN from static sample into NaOH [ASTM D4282]	Alternate Method Close to "free cyanide"
	Ion Selective Electrode	Alternate Method Close to "free cyanide"
	Direct colorimetry	Alternate Method HCN(aq), CN ⁻ , Zn(CN) _x , parts of Cu(CN) ₄ + ?
	Amperometric determination	Alternate Method Measures same species as primary method
WAD Cyanide	Manual distillation pH 4.5 + potentiometric or colorimetric finish [ISO/DIS 6703/2, DIN 38405 Part 13.2: 1981-02]	Preferred method LQL ₁ : 0.05 mg/l HCN(aq), CN ⁻ , Zn/Cd/Cu/Ni/Ag(CN) _x Better results than ASTM method in presence of high copper concentration
	Amenable to chlorination (CN Total - non-chlorinatable part) [ASTM D2036-B, US-EPA 9010]	Alternate Method Measures same species as primary method
	SFIA in-line micro-distillation pH 4.5 + colorimetric finish [ASTM D4374]	Alternate Method Measures same species as primary method
	FIA In-line ligand exchange + amperometric finish [US-EPA OIA-1677]	Alternate Method Measures same species as primary method
	Picric Acid, Colorimetric determination	Alternate Method Measures same species as primary method
Total Cyanide	Manual batch distillation + titration/potentiometric or colorimetric finish [ISO/DIS 6703/1, DIN 38405 Part 13.1: 1981-02]	Preferred method LQL ₂ : 0.10 mg/l HCN(aq), CN ⁻ , Zn/Cd/Cu/Ni/Ag/Fe(CN) _x , parts of Au/Co/Pt/Pd(CN) _x
	SFIA, in-line UV irradiation, micro-distillation + colorimetric finish [ASTM D4374]	Alternate Method Measures same species as primary method

5.4 Contingency measures in plant processes

5.4.1 Contingency measures for reducing HCN Levels

5.4.1.1 Procedure

The following procedure indicates when contingency measures will be used to reduce HCN levels for employee safety:

- Step 1 – Personal or ambient monitoring alarms sound indicating HCN levels are at or above 10 ppm. In the case of an ambient monitor, a siren and flashing lights will be activated and HCN levels will be displayed in the process control centre. In the case of a personal monitor, the monitor will vibrate and emit a high pitched alarm.
- Step 2 – Personnel will be evacuated from the alarm-activated area and the appropriate standard operating procedure will be initiated. pH levels will be checked by meter, litmus paper and titration. Personnel will not be permitted to enter the area in question without the correct personal protective equipment. The area will be frequently Dräger tested until the environment has been deemed clear of HCN
- Step 3 – Process control centre personnel will investigate the possible causes of the alarm and implement appropriate contingency measures where necessary.

5.4.1.2 Contingency Measure

In the event HCN levels reach 10 ppm in the cyanide storage area, personnel will be evacuated, and the appropriate standard operating procedure will be initiated. Personnel will not be permitted to return to the cyanide storage area without the correct personal protective equipment or until safe HCN levels are achieved. The contingency measures implemented by the process control centre to reduce HCN levels in the processing plant will vary depending on the circumstances (e.g. the particular HCN levels, the cause of the increased levels and the plant location). The following measures will be available to reduce HCN levels in the processing plant:

- Reduce the amount or rate of cyanide addition;
- Increase the pH of the cyanide solution/process stream;
- Reduce the rate of ore feed;
- Change the blend of the ore; or
- Shut down the process plant.

Each of the above measures will take some time to reduce the level of HCN. Employees will not be permitted to access the area in question without the correct personal protective equipment or until safe HCN levels are achieved.

5.4.2 Contingency measures for reducing CN WAD levels

The Project's processing plant will be designed so that CN WAD levels at the discharge point to the tailings storage do not exceed 45 mg/L (90 percentile over six months) and 50 mg/L

(at any time). As a result, it is not anticipated that the contingency measures provided below would ever need to be activated.

5.4.2.1 Contingency measures

In the event CN_{WAD} levels at the discharge point to the tailings storage exceed 45 mg/L (90 percentile over six months) or 50 mg/L (at any time), one or more of the following contingency measures will be implemented to reduce CN_{WAD} levels to below these levels:

- In the event CN WAD levels exceed 50 mg/L in the aqueous component of the tailings slurry stream at the discharge point to the tailings storage at any time, discharge to the tailings storage will cease until CN WAD levels can be achieved below the required levels;
- Increase the amount or dosage rate of cyanide destruction chemicals being used in the cyanide destruction circuit to achieve lower cyanide levels at the tailings discharge point;
- Reduce the amount or rate of cyanide addition;
- Reduce the rate of ore feed;
- Change the blend of the ore;
- Modify the cyanide destruction circuit being used
- Add cyanide destruction chemicals directly to the tailings storage; or
- Add dilution water, if available.
- Monitoring of the effectiveness of the contingency measures will be undertaken.

6 REPORTING AND DOCUMENT CONTROL

6.1 Water quality monitoring reports

6.1.1 Reporting Structure

Water monitoring reports containing and summarising weekly, monthly and quarterly data need to be produced. This will take the form of quarterly and annual reports with water quality and water quantity trends illustrated and interpreted. These reports will be circulated to the Liberian EPA, IFC and local stakeholders and community representatives.

6.1.2 Type and frequency of reports

- Quarterly monitoring reports to be sent to the IFC and Liberian EPA;
- Annual reports summarising the four annual quarters to be sent to the Liberian EPA, IFC and local stakeholders; and
- Annual Environmental Monitoring Audit and Report to be sent to the Liberian EPA.

6.1.3 Audits

Annual independent environmental monitoring audits are to be done and reported on with feedback and reports given on an annual basis to the Liberian EPA at the end of each calendar year.

6.2 Cyanide management and incident reporting

6.2.1 Annual Environmental Management Report

The AEMR (Aureus Environmental Management Report) will report on cyanide management and use and the cyanide monitoring programme. All cyanide monitoring results shall be included in the AEMR. The AEMR will be made available to the relevant governmental departments and any other interested stakeholders on request.

6.2.2 Incident Reporting

An incident report within 24 hours or the next working day of any incident or potential incident with actual or potential significant off-site impacts on people, or the biophysical environment (including wildlife), shall be supplied to the EPA outlining the basic facts and mitigation measures undertaken at the time. The incident report must be submitted to the EPA no later than 14 days after the incident or potential accident' and to include the following information:

- Location of the incident;
- Person's name and contact number who discovered the incident;
- The best estimate of the time the incident occurred;
- The time the person reported the incident and/or the organisation/company they represent became aware of the incident;
- A description of the incident;
- The suspected cause of the incident;
- The environmental harm or environmental nuisance caused, threatened or suspected to be caused by the incident; and

Actions taken to prevent further similar incidents and mitigate any environmental harm or environmental nuisance caused by the incident. NLGM will maintain a register of such accidents, incidents, and potential incidents. The register shall be made available for inspection at any time by the EPA.

NLGM will notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable. NLGM will provide written details of the notification to the EPA within seven days of the date on which the incident occurred.

NLGM will maintain a record of/and report on any cyanide-related incidents. An example of the NLGM Incident Report Form is provided as annexure A. The form will be completed when recording incidents at the site.

6.2.3 CN WAD Reporting

Any CN WAD measurements of the aqueous component of the tailings slurry stream at the discharge point to the tailings storage verified by the off-site laboratory as exceeding 50 mg/L CN WAD will be assessed daily (to ensure that CN WAD levels do not exceed 45 mg/L [90 percentile over six months]) and reported monthly to the DMM and EPA.

In the event CN WAD levels verified by the off-site laboratory as exceeding 50 mg/L in the aqueous component of the tailings slurry stream at the discharge point to the tailings storage at any time will be reported to the Project management immediately.

A summary of the cyanide monitoring results will be provided to EPA and the DMM on a quarterly basis.

7 CYANIDE LICENCING AND AUDITS

The CN audits and licencing procedure and timeframes is discussed in detail in Appendix A section 13.

8 IMPLEMENTATION

This plan and the subsequent monitoring program and protocol contains aspects that have already been implemented with additional or outstanding items to be set in progress as the project continues and monitoring indicates the need for mitigation.

8.1 Responsibilities

The responsibility for implementing the different aspects of this plan at construction, operation and decommissioning and closure phases lies with the Engineering, Procurement and Construction (EPC) contractors (during construction) and the environmental management functions within Aureus for the remainder of the time.

8.2 Training

All employees of Aureus and Contractors to Aureus shall be provided with basic training in prior to working on the site. Additional, specialist training shall be provided to mine operators, plant operators and key personnel involved in activities which involve activities likely to impact on the mine footprint and to personnel involved in the activities around site.

9 CONTINGENCY PLANS

If the envisaged discharge standards are not met by the chemical treatment process proposed by NLGM then the following will be evaluated as potential plans to be instituted as required:

9.1 Treatment during operation

If the proposed water treatment methods do not achieve the required outflow levels of total, WAD and Free cyanide then alternative water treatment technologies will be investigated and implemented. This could include:

- Separation of the liquid fraction from the solids and practising treatment on the liquid fraction. The treatment could include oxidation processes.

9.2 Collection and treatment of seepage after closure

Ground water flows will be collected from the seepage collection trenches which will be installed below the TSF walls. This is proposed as there is a small risk that the longer term concentrations will not be met at the compliance points if the natural degradation does not occur as planned for the ground water component. There is a minimal risk of not meeting surface water concentrations as there will be a covering placed over the tailings dam at closure and there will be no ponding of surface water at closure. The risk is therefore entirely in the groundwater component. This treatment will involve:

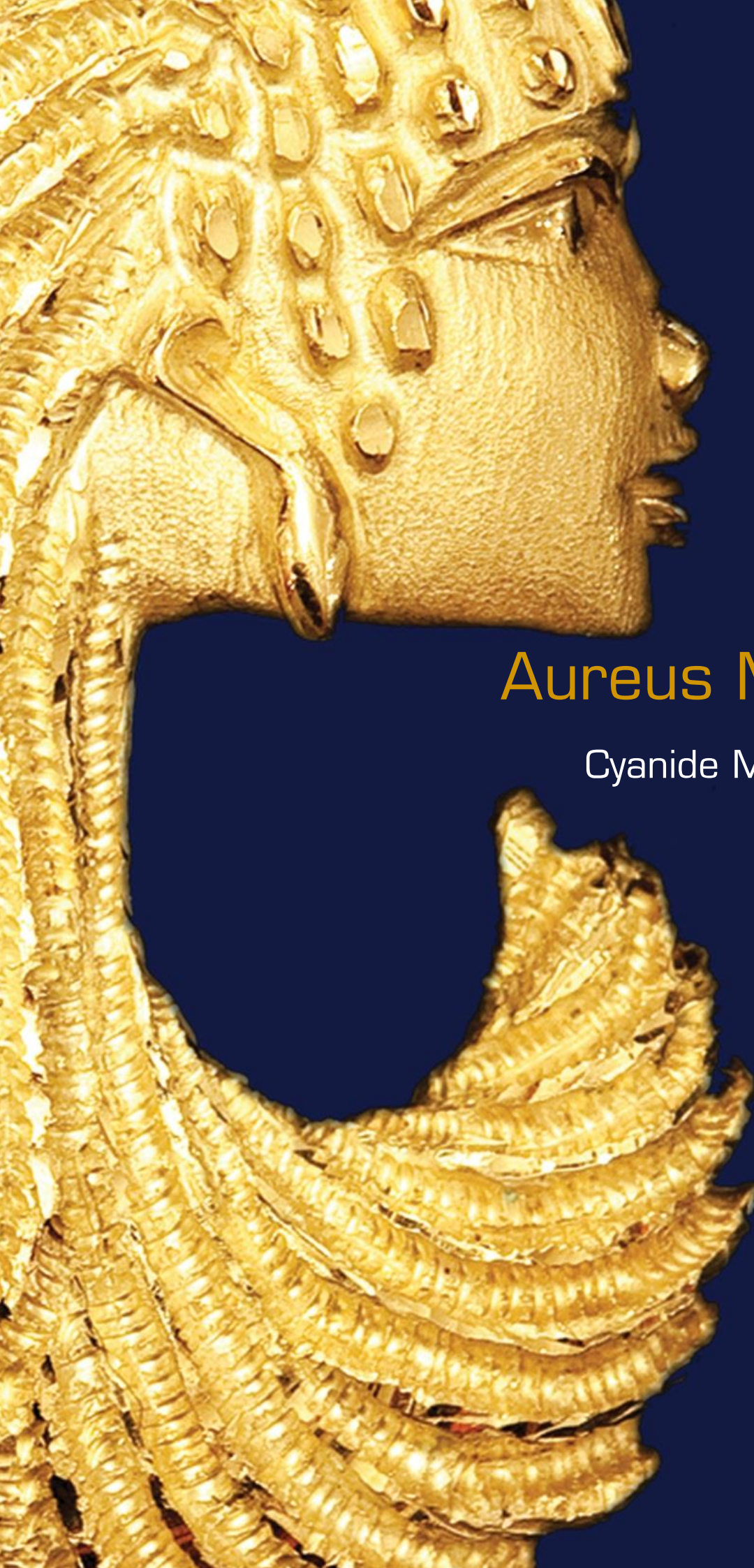
- Directing the seepage through a specially constructed wetland and passive treatment system containing iron rich boulders as a substrate and the provision of a growth medium. This will allow for complexation of the iron with cyanide, as well as biological reduction of the cyanide.
- This seepage water will be kept separate from other surface water flows.
- If there is seepage bypassing the seepage collection system causing contamination then this seepage will be collected and pumped into this treatment system.
- If this system does not produce an acceptable discharge then alternative water treatment technologies will be investigated.

10 REFERENCES

ICMC. (n.d.). International Cyanide Management Code. Retrieved March 26, 2014, from <http://www.cyanidecode.org/cyanide-facts/sample-analysis>

Logsdon, M. J., Hagelstein, K., & Mudder, T. (1999). *The management of cyanide in gold extraction*.

Appendix A



Aureus Mining Inc.

Cyanide Management Plan

EMS/MP/Cn01



aureus mining

Cyanide Management Plan

EMS/MP/Cn01

February 2014

Date Issued: 07/01/2013

Report Issue: Draft

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Date	19 February 2014
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Appendix B: Incident Reporting Form

Appendix C: Hydrogen Cyanide, Anhydrous Stabilizer – MSDS

Appendix D: Sodium Cyanide – Chemical Alert Report

Where there is any conflict between the provisions of this Cyanide Management Plan and the applicable statutory requirements (i.e. licences, permits, consents and relevant laws) the statutory requirements are to take precedence.

This Cyanide Management Plan is to be revised / updated at least every five years, or as otherwise directed by the EPA in consultation with the relevant government authorities. The cyanide monitoring programme is to be revised / updated bi-annually, unless otherwise directed by the EPA through the Environmental Management system process.

It is the responsibility of NLGM to refer to the latest versions of statutory instruments or guidelines that are referenced in this Cyanide Management Plan, but have not been appended.

1.0 Introduction

1.1 Purpose of the Plan

The Project is located within the Grand Cape Mount County of the Republic of Liberia, which is situated on the coast of the southwest corner of West Africa and is bordered by Sierra Leone, the Republic of Guinea and Cote d'Ivoire. It is located between longitude 7°30' and 11°30' west, latitude 4°18' and 8°30' north.

The Project is situated within the south-western part of the greater Bea Mountain Mineral Development Agreement (Bea-MDA) property/concession area. (Note that the Project refers to the NLGM license only of the Class A area as shown in **Error! Reference source not found.**).

The Project is accessible from Monrovia by vehicle, with approximately 100 kilometres ("km") of paved road to the town of Danielstown and then a small 18 km section of laterite road to the New Liberty Project site. The paved road forms the main highway between Monrovia and the border to Sierra Leone. The Danielstown road has been renovated during 2012 and grading operations are undertaken at regular intervals to maintain the road which allows easy all year round access to the Project site. Secondary roads on the license territory, built by Aureus, provide access across the property. The lateritic, sandy nature of the roads allows for free draining running surfaces, which provides year round access, including during the height of the rainy season.

The EPA granted development consent for the NLGM Project, subject to conditions, as per the EPA permit dated on the 15 October 2012.

Consent Condition 6 for the mine requires:

- a) Submission of an integrated cyanide management plan to the Agency for Environmental Clearance prior to importation and subsequent usage.
- b) The mine to comply with all international standards and requirements for shipment of cyanide

1.2 Plan Objectives and Scope

The objectives of this Plan are to fulfil the consent conditions by providing:

- | | |
|------------|--|
| Section 1: | Introduces the Project and outlines the objectives and structure of the Plan. |
| Section 2: | Outlines the site management system, plans and studies relevant to cyanide management. |
| Section 3: | Describes cyanide containment and management measures. |
| Section 4: | Describes wildlife management in relation to cyanide. |
| Section 5: | Describes the cyanide monitoring programme. |
| Section 6: | Outlines contingency measures for cyanide reduction and the process for EPA review of cyanide levels in the event of wildlife deaths occurring due to cyanide. |

- Section 7: Summarises stakeholder consultation and complaints receipt.
- Section 8: Details reporting requirements for issues related to cyanide management and monitoring.
- Section 9: Outlines auditing and review requirements.

1.3 Overview of Existing Environment

The natural environment (especially the streams and riparian areas) have been impacted upon on a localised scale due to the mining activities of artisanal miners. Relatively large areas of land have been modified by the creation of open pits for artisanal mining and through the stripping of vegetation and erosion. A number of forest areas have been altered for subsistence agriculture purposes. The food crops, notably rice and cassava, are cultivated utilising slash and burn agricultural techniques converting large areas of land to secondary forest and agricultural land.

The project area is well drained by several small creeks. The dominant drainage feature in the study area is the Marvoe Creek. Numerous small, unnamed creeks that are all similar in character feed the Marvoe Creek. The Marvoe Creek is situated within the mining lease area. It is a tributary of the Mafa River, which flows into the Atlantic Ocean at the mouth of Lake Piso in the vicinity of the town of Robertsport.

2.0 Project Overview

2.1 Sub heading 1

In terms of the Project concept, based on the exploration program that has been undertaken on the NLGM site to date, BMMC is proposing the development of an open pit gold mine and associated infrastructure.

The NLGM Project forms part of a Minerals Development Agreement (“MDA”) between BMMC and the Liberian Government, (which was signed on the 14th March 2002). The Liberian Government retains a 10% ownership in the Project and a 3% Net Smelter Return. The terms of the MDA are for 25 years, which can be further extended for another 25-year period and falls under the auspices of the Mining Code of 2000.

From a project development perspective, the Project is in the Feasibility Phase, whereby feasibility studies for the main Project components including the Open Pits, Waste Rock Dump (“WRD”), Tailings Storage Facility (“TSF”), Marvov Creek Diversion (“MCDV”), and gold processing plant are underway. The key phases of the Project are as follows:

- Pre-construction Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning and Closure Phase.

The impact assessment and EMP completed during the EIA have thus been based on the phases as noted above, and the activities associated with each of these phases are elaborated on further on in the approved EIS.

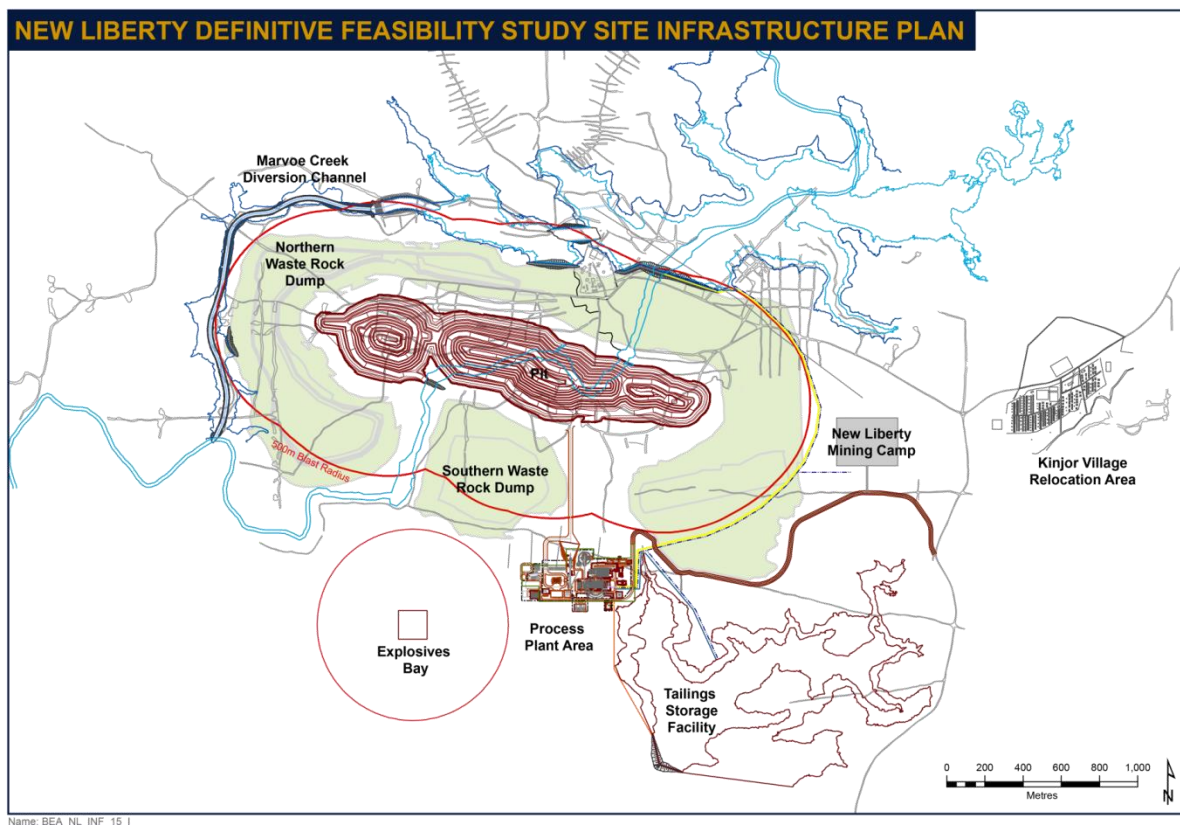
The proposed Project will comprise of an open-pit gold mine that is planned to operate for approximately 8 years with an ore production and treatment rate of approximately 3,143 tonnes per day. Waste rock will be mined at an average daily production rate of 45,000 tonnes per day. (Whilst mining operations are taking place within the NLGM mine site, BMMC will continue with gold exploration activities within its greater Bea-MDA license area).

The Project includes all activities and physical works associated with the construction, operation, modification and decommissioning of the Project, including, but not limited to, the following key activities and components:

- Resettlement of the Kinjor and Larjor communities (as part of the pre-construction phase);
- Open pit gold mine and associated waste rock dump (WRD);
- Topsoil stockpiles;
- Gold processing plant, including an associated power plant made up of eight diesel or heavy fuel oil generators;
- Water dams associated with the processing plant, used for storage purposes;

- Tailings Storage Facility (TSF);
- Support facilities and infrastructure at the mine site, including water, waste infrastructure and storage facilities;
- Diversion Channel (DC) of the Marvov Creek;
- Staff accommodation and associated facilities such as a sewerage treatment plant. (The sewerage will be disposed to a sewerage treatment plant which will service the accommodation camp and processing plant areas. The sewerage treatment plant will comprise of an underground tank, and an aerobic treatment unit, settling/drying ponds and sludge disposal to the TSF;
- General waste landfill site for domestic waste, and an associated incinerator; for the incineration of hazardous wastes;
- Power and water supply;
- Ancillary facilities and buildings, such as administrative offices, service buildings, laboratory, hydrocarbon storage, explosives storage; and
- Non-paved roads and haul roads; existing and new.

Figure 2-1: New Liberty Project Infrastructure



A description of activities associated with the Project is provided in Table 1. Further details of activities associated with the mine site are provided in Section 2 of the Project Environmental Impact Statement (“EIS”) and in various Project management and operational plans.

Table 2-1: Project Summary

Activity	Description
Exploration Activities	• Mapping and rock chip sampling; • Stream sediment sampling; • Opening up tracks and roads to gain access; • Siting of the drill rigs; • Soil sampling; • Digging of borrow pits; • Trenching – to obtain rock and soil samples; • Core drilling (on a grid pattern); • Managing water used in the drilling process; • Transporting and using diesel and oil for vehicles, drill rigs and mobile generators; and • Managing the core – transport to core shed, recording and analysing core.
Pre-construction Activities	• Resettlement of the Kinjor and Larjor communities; • Construction of the new resettlement village and associated infrastructure; and • Initial vegetation clearing and ground levelling.
Open pit development/earth moving activities	• Clearing of vegetation; • Topsoil stripping and development of stockpiles; • Development of open pit (by means of drilling and blasting); • Blasting activities for the ore and waste rock; • Excavation and loading of ore and waste rock (separately); • Transportation by truck of the ore to the crushing area of the plant, and waste rock to the waste rock dump; and • Storage of topsoil.
Development of Waste Rock Dump(s) as mining progresses	• Hauling of waste rock to the waste rock dump site (by truck); • Shaping of the waste rock dump according to the design; and • Progressive rehabilitation of the waste rock dump side slopes as mining progresses.
Construction of TSF	• Site clearing (i.e. removal of all vegetation from TMF footprint); • Construction of TSF; and • Construction of TSF water management facilities.

Construction of Ore Processing Plant	• Development of roads on site; • Site clearing and construction of the processing plant; • Construction of a crusher; • Construction of a site office and workshops; • Construction of concreted and bunded areas for diesel storage; • Construction of storage areas; • Construction of power related infrastructure; • Construction of water management facilities; and • Provision of security to the site; also aimed at providing health and safety for BMMC personnel and local people
Construction of Diversion Channel of the Marvov Creek	• Clearing and grubbing of the vegetation cover; • Removal of unsuitable materials, including topsoil; • Installing of access road around the channel; • Construction of run-off management ditch or berm around the channel; • Excavation of the overburden soil and drilling and blasting of bedrock, if encountered; • Construction of cofferdams upstream of the flood control dykes; • End dumping of soil upstream of the flood control dykes to create cofferdams; and • Placement and compaction of fill material at the flood control dykes
Construction of staff accommodation area	• Construction of a staff accommodation camp near the processing plant; • Construction of power related infrastructure; and • Construction of water management facilities
Management of Hazardous Materials	• Fuel and Lubricant storage; and • Storage/handling of chemicals
Vehicular Movement	• Transport of ore to plant by truck and transport of waste rock to waste rock dump by truck; • Blasting and/or excavating, loading and hauling; and • Vehicular transport for personnel and materials
Management of Waste	• Waste disposal and management of waste water; and • Waste recycling, where possible
Maintenance of Infrastructure	• Maintenance of processing plant and associated infrastructure; • Maintenance of roads and other equipment; and • Maintenance of staff accommodation area and associated infrastructure

Monitoring and rehabilitation, which will be ongoing throughout the project's life	• Ongoing monitoring and rehabilitation; • Rehabilitation of final open pit; • Spreading of sub-soils and topsoil; • Profiling and contouring of the area to preserve natural drainage lines; • Re-vegetation of disturbed areas; and • Rehabilitation of areas disturbed by quarrying and hauling activities
Water use	• Use of water for the processing plant operations; and • Use of water in the staff accommodation area.
The Liberian Government will take over the mine infrastructure upon closure, as per the MDA	• Vehicle and heavy machinery movement to dismantle and remove infrastructure; and • Decommissioning of the processing plant and associated infrastructure
Monitoring and Maintenance	• Monitoring of all aspects which had been impacted by the mining activities; • Monitoring of rehabilitated areas; and • Maintenance of rehabilitated areas.

3.0 Development Consent, Mining Lease and EPA Conditions

Development Consent, Environmental Impact Statement Licence (EPA) conditions relevant to this CMP are outlined below.

3.1 Development Consent Conditions

Consent Conditions 6 is outlined in Section 1.1 of relevance to the CMP.

4.0 Project Management System, Plans and Studies

Environmental management of the Project encompasses a range of management plans, studies and monitoring programmes that are overseen by statutory planning provisions and NLGM's Environmental Management System (EMS), many of which are relevant to the management of cyanide including those described below. For example, the Emergency Plan will detail cyanide-related emergency procedures, the Safety Management System will include cyanide-related safety procedures and the Transport of Hazardous Materials Study will address issues associated with the transport of cyanide.

4.1 Environmental Management System

NLGM's EMS is in the process of being developed. The core environmental elements of the EMS incorporate:

- Environmental policy;
- Planning;
- Implementation and operation;
- Checking and corrective actions; and
- Management review.

The Project's environmental policy complies with the principles of NLGM's overall environmental policy which commits the Project to continual improvement in line with best practice environmental management and compliance with relevant legislation and statutory requirements.

The planning component reviews all environmental aspects of the Project, identifies and evaluates legal requirements, establishes environmental targets and objectives and formalises environmental monitoring programmes.

The implementation and operation phase comprises:

- Establishment of structure and delegation of responsibility;
- Implementation of training and awareness programmes and improving competence;
- Establishment of communication channels;
- Establishment of a document control system; and
- Preparation of emergency contingencies and response plans.

The checking and corrective action phase involves the review of environmental records and subsequent assessment of the Project's performance in relation to environmental objectives.

Monitoring records will be maintained in the Project's data management system, to demonstrate compliance with the requirements of the system. The management review phase includes regular reviews of the EMS to ensure continual improvement in environmental performance of the Company.

4.2 Environmental Management Plans

A number of environmental management plans are relevant to the management of cyanide including those summarised in Table 2 below. Some of these plans are in a development phase.

Table 4-1: Environmental Management Plans

Environmental Management Plans	Description
Mining Operations Plan (MOP)	A MOP has been prepared for the Project and describes the proposed mining operations
Hazardous Waste and Chemical Management Plan(HWCMP)	The HWCMP will includes details of the management of Project chemicals (including cyanide) and wastes, emergency spill response procedures and details of the Hazardous Substance and Dangerous Goods Register (HSDGR). The HWCMP will be developed for the completion of this CMP and prior to commissioning
Site Water Management Plan (SWMP)	A SWMP will be prepared for the Project. The SWMP to includes site water management measures for the management and mitigation of potential water quality and quantity (surface and groundwater) impacts including the development of a site water management system designed to contain all potentially contaminated water generated within the Project area while directing all other water around the perimeter of the site
Flora and Fauna Management Plan	The Flora and Fauna Management Plan (FFMP) will includes measures to keep fauna and avifauna away from tailings storage, wildlife rescue procedures, methods for monitoring daily and seasonal fauna usage of the tailings dam and contingency measures for reducing cyanide levels in the tailings dam in the event it is established that fauna deaths are occurring from cyanide in tailings dam water.
Implementation Plan to Protect Fauna from Interactions with the Tailings Storage Facilities	An Implementation Plan to Protect Fauna from Interactions with the Tailings Storage Facilities will be prepared for the Project. The plan includes actions to deter fauna visitation to the tailings storage facilities, actions to apply best available technology and practices for monitoring fauna visitation and actions to apply best available technology and practices for monitoring fauna deaths caused by cyanosis
Safety Management System	The preparation of a safety management system prior to commissioning of the Project, covering all operations on-site and associated transport activities involving hazardous materials. The document system is to specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to procedures.
Emergency Plan	An Emergency Plan will be prepared prior to commissioning of the Project. The plan will include detailed procedures for the safety of all people outside of the development who may be at risk from the development. The plan is also to include procedures for spillage, clean-up, control and protection, and rescue of wildlife during the emergency.

5.0 Cyanide Containment and Management

Many gold-containing ores comprise finely disseminated gold particles locked up with other constituents of the ore. Gold is separated from the other minerals by chemically extracting it after physical processing (e.g. crushing and grinding) of the ore. After more than 100 years of operational use and research into alternative technologies, cyanide remains the preferred reagent for extracting gold where leaching is required. Cyanide is a potentially hazardous chemical which requires careful management and control.

The focus of this CMP is on the management of cyanide within the mining lease. The Transport of Hazardous Materials Study details the management of cyanide transport.

5.1 Handling and Storage of Cyanide

In accordance with the Project Chemical Management Strategy which will be detailed in the HWCMP, all raw materials/consumables brought on site for use at the Project will be recorded in an Inventory

Register to be updated (as materials arrive on site) and available for inspection by the appropriate authorities. Material Safety Data Sheets (MSDSs) for solid sodium cyanide, sodium cyanide solution and HCN gas will also be included in the Inventory Register. The MSDSs are provided in **Appendix C**.

In accordance with the Chemical Management Strategy, chemicals such as cyanide, recorded on the

Inventory Register that are designated as hazardous substances and/or dangerous goods will also be included in the HSDGR. The purpose of the HSDGR is to facilitate efficient audit functions as well as conform to best practice environmental and safety management.

Delivery and storage of cyanide on site will take place in a controlled area. Cyanide delivery and storage will be within a concrete-bunded area located away from general work areas and incompatible reagents.

Cyanide will be handled and stored in accordance with the relevant MSDS. The abovementioned Standard sets out the requirements for storage and handling of toxic substances in bulk, including:

- design and construction requirements for containers;
- requirements for portable and fixed tanks;
- bunds and compounds;
- locations of bulk containers; and
- filling of bulk containers.

The drainage provision for the storage area will slope away from the tanks to a sump. A pump will be fitted at the sump and will transfer any rainfall, hose down or spilt liquid collected to the leach tanks, or alternatively back into the cyanide solution tanks. In the event that spillage does occur within the bunded area, the affected area will be cleaned in accordance with the procedures contained in the HWCMP.

Storage areas, tanks, pipelines, pumps and valves will have high visibility labelling and will be inspected regularly for signs of leakage, presence of solution outside of the tanks in the bunded areas and integrity of the containment. Any aspects requiring maintenance or repair will be noted and records documenting the inspection and corrective measures will be kept.

Cyanide will be received in one-tonne boxes, containing a bulk bag which holds one tonne of plastic-wrapped sodium cyanide briquettes. The boxes will be offloaded from the trucks by forklift, which will deliver the cyanide to a locked area in the Chemical Shed. When cyanide is required by the operation, a reagent attendant will collect the required number of boxes from the Chemical Shed, and hoist the bulk bags into an enclosed bag-breaker-located above the Cyanide Mixing Tank. Cyanide bags will be broken into the Cyanide Mixing Tank, which will also receive caustic soda to ensure no HCN gas evolution can occur. Once the required mass of cyanide has been mixed, the liquor in the mixing tank will be transferred to the storage tank, from which it will be distributed to the leach tanks via the cyanide ringmain. The reagent attendant mixing cyanide will be totally enclosed in PPE, including appropriate breathing equipment and cyanide mask. Plastic bags and bulk bags will be incinerated in the burning pits, and the plywood boxes will be hosed and stored for construction and social purposes.

5.2 Use of Cyanide in Operations

5.2.1 Overview of Cyanide Use

Cyanide will be used at the Project for the leaching of gold from ore and gravity concentrates, as well as the elution of gold from carbon. The cyanide solution will be pumped from the storage tank to the leaching circuit, where it will be added to the slurry to dissolve the gold into an auro-cyanide complex. Gold leached from the ore will adsorb onto activated carbon in the tanks. The adsorbed gold will be transferred to an enclosed system where the gold will be eluted using hot cyanide and caustic soda solution. The hot eluate formed in this process will be transferred to the electrowinning circuit where gold will be electroplated, and the cyanide solution will be recycled to the Elution section.

Following processing, the tailings slurry will pass through a cyanide destruction process before being discharged to tailings storage. Cyanide destruction has been incorporated into the process to ensure CN_{WAD} levels at the discharge point to the tailings storage are maintained at the required levels (as described in Section 4.2.2). The tailings slurry will be deposited peripherally via a spigotted ring main allowing for the progressive wall construction around the tailings storage dam.

5.2.2 Maintaining CN_{WAD} Levels at the Discharge Point to the Required Levels

CN_{WAD} levels of the aqueous component of the tailings slurry stream will be maintained so that they do not exceed 20 mg/L CN_{WAD} (90 percentile over six months) and 50 mg/L CN_{WAD} (maximum permissible limit at any time) at the discharge point to the tailings storage. Cyanide destruction has been incorporated into the process to ensure CN_{WAD} levels at the discharge point to the tailings storage will be maintained to the levels stated above. The INCO cyanide detoxification process, using sodium metabisulphite and ferric chloride will be installed

5.2.3 Containment of Cyanide Contaminated Waters Entirely within the Mine Site

Process Plant Water Management

Tanks holding process solutions (e.g. leach tanks) will be located in bunded concrete containments. The processing plant will be designed such that process water containing cyanide is recycled and therefore kept within the area encompassed by the processing plant. In the event of high rainfall run-off collection drains will deliver possible cyanide contaminated water to an Emergency Pond, for return to the Process Plant at the earliest opportunity. In the event of spillages, all solutions will therefore be contained within the process plant bunds, and the appropriate spill response procedure will be initiated (as described in the HWCMP). Portable pumps will be provided within the processing area for the pumping of spills within the bund areas back to the storage tanks or emergency holding tanks.

Tailings Delivery and Return Water Management

The tailings slurry will be pumped to the tailings storage at ground level. Daily inspections of the tailings delivery and water return pipelines will be undertaken for physical integrity and to identify any minor leaks. Opportunistic inspections will also be made by personnel working in the area. In addition, an automatic, pressure activated shut-down mechanism will be provided on the tailings discharge pipeline to enable the early detection and stoppage of significant leaks or failures. In the event that spillage does occur along the pipeline route, the affected area will be cleaned at the earliest opportunity.

Tailings Water Management

The tailings storage have been designed with sufficient freeboard to store water from a 1 in 100 year occurrence rainfall event. The required free-board will be maintained during the Project life as the storage fills with tailings via a series of embankment lifts to ensure sufficient freeboard and slurry retention volume. Detailed analyses and modelling will be undertaken as part of the Project EIS to establish any seepage from the tailings storage that would occur through the storage floor.

Any seepage flow entering the aquifers (during mining operations and for a limited time, post-closure) would be permanently diverted to flow towards the TSF. Any residual contaminants which enter the groundwater system below the tailings storage will be expected to either be immobilised or substantially reduced in concentration near the base of the storage.

In summary, any limited seepage from the tailings storage likely to have a negligible impact on existing groundwater levels or quality. Within a short period following Project closure, the tailings storage would be essentially depleted of all cyanide and measurable cyanide seepage would cease.

A number of seepage control measures will be incorporated into the tailings storage including:

- the pre-stripping of surficial soils beneath the embankment footprint;
- construction of a moisture-conditioned and compacted-low-permeability storage floor are necessary, to achieve permeability criteria; and
- installation of an under drainage and decant network.

The tailings storage will be constructed to the requirements of Liberia standards.

Following tailings deposition, supernatant water will drain to a central pond. The bulk of the water from the tailings will be pumped from the surface of the TSF back to the Process Plant.

Tailings Storage Movement

Survey monitoring will be conducted at regular intervals, or after seismic events, to detect any movement of the tailings storage and measurements will be recorded.

Visual assessments of the tailings structures will be undertaken routinely (i.e.daily), following review of surface and groundwater monitoring data and following seismic events to identify the initial signs of movement. The movement of slurry deposition sites around the dam periphery is essential for strong wall construction and a serviceable decant pond

6.0 Wildlife Management

The Plan to Protect Fauna from Interactions with the Tailings Storage Facilities outline a number of measures relevant to cyanide and wildlife management including:

- Mechanisms to keep fauna and avifauna away from the tailings storage including:
 - minimising the area of open water in the tailings dam;
 - making the area non-conducive to the establishment of wildlife habitats, as far as possible; and
- use of current best practice methods for avifauna deterrence.
- Methods for monitoring the daily and seasonal fauna usage of the tailings storage
- Plans for the rescue and rehabilitation of wildlife
- Protocol for deaths or other incidents involving native fauna recorded on the mining lease (including monitoring of deaths or other incidents involving native fauna, reporting of deaths or other incidents involving native fauna and provision of fauna autopsy facilities).
- Investigation of fauna deaths recorded off the mining lease
- Investigation of whether fauna death(s) recorded on the mining lease occurred as a result of cyanide in the tailings dam
- Contingency measures for reducing cyanide levels in the tailings dam in the event it is established that fauna deaths are occurring from cyanide in tailings dam water
- Training of environment department staff.

6.1 Death Investigations

6.1.1 Cyanide in the Tailings Dam

The following procedure will be implemented to investigate whether native fauna death(s) recorded on the mining lease have occurred as a result of cyanide in the tailings dam:

Step 1 – Report fauna death(s) to the Department of Minerals & Mining (DMM), EPA and Department of Forestry within 24 hours of discovering the death;

Step 2 – Conduct autopsy of dead fauna and report findings to the DM&ML and EPA

7.0 Cyanide Monitoring Programme

The cyanide monitoring programme to include:

- monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream at the discharge point to the tailings dam
- monitoring CN_{WAD} levels in the decant water of the tailings dam
- an onsite laboratory for quickly establishing CN_{WAD} levels in the liquid at the discharge point to tailings dam and in the decant ponds for monitoring purposes (Section 6.2);
- on-line monitoring of HCN at locations where employees are operating and
- A monitoring regime for the detection of cyanide movement beneath and adjacent to the tailings storage.

In addition, CN_{FREE} and CN_{WAD} levels will be monitored in the processing plant to provide information relevant to process control and/or cyanide destruction.

7.1 Reporting of Monitoring

A summary of the cyanide monitoring results will be provided to EPA and DMM on a quarterly basis, unless otherwise agreed.

7.2 CN_{WAD} Levels at the Discharge Points

Section 7.2.1 describe the monitoring locations and frequency, sample collection, laboratory analysis, and data management for monitoring CN_{WAD} levels at the discharge point to the tailings storage and for monitoring CN_{WAD} levels in the decant water of the tailings storage. Section 7.2.5 outlines the review of this monitoring programme.

7.2.1 Monitoring Locations and Frequency

CN_{WAD} levels of the aqueous component of the tailings slurry stream and the decant water of the tailings storage will be monitored at the discharge point to the tailings storage daily.

7.2.2 Sample Collection

CN_{WAD} samples will be collected at the discharge point to the tailings storage and in the decant water of the tailings storage using the following procedures and methodologies.

- CN_{WAD} samples will be collected daily at the discharge point to the tailings storage and in the decant water in accordance with Liberian and international standards.
- CN_{WAD} samples will also be collected daily at the discharge point to the tailings storage and in the decant water (at the same time as the abovementioned samples) in accordance with Liberian and international standards for analysis at the on-site laboratory.

- Additional CN_{WAD} samples will be collected at the discharge point to the tailings storage weekly (at the same time as the abovementioned samples) in accordance with Liberian and international standards for analysis at an Association of Testing Authorities (NATA) accredited laboratory.
- The sampling programme will be consistent with the quality assurance/quality control measures required by the relevant Liberian and international standards.
- A sample register will be maintained on site for each sample collected.
- Sample collection will be undertaken by appropriately qualified staff and appropriate safety precautions (such as gloves and protective clothing) will be employed.

7.2.3 Laboratory Analysis

On-Site Laboratory Analysis

Provision of an on-site laboratory for quickly establishing CN_{WAD} levels in the liquid at the discharge point to the tailings dam and in the decant pond for monitoring purposes will be implemented and will be analysed for CN_{WAD} at the on-site laboratory.

Off-Site Laboratory Analysis

CN_{WAD} samples collected monthly at the discharge point to the tailings storage and in the decant water of the tailings storage in accordance with Liberia and international standards will be analysed at an off-site laboratory. The samples will be analysed for CN_{WAD} at the off-site laboratory in accordance with Liberia and international standards.

The additional CN_{WAD} samples collected at the discharge point to the tailings storage weekly in accordance with Liberian and international standards will be sent as soon as practicable² for analysis at an off-site accredited laboratory. The CN_{WAD} results from the accredited laboratory can be used to verify the CN_{WAD} results from the site laboratory. For samples sent to laboratories, a sample chain-of-custody ("CoC") form will be completed for each sample collected. A copy of the CoC will be provided to the laboratory with the samples. A copy of the CoC will be held on site for the life of the Project.

7.2.4 Data Management

Data obtained by the monitoring of CN_{WAD} levels at the discharge point to the tailings storage and in the decant water of the tailings storage will be maintained on site by the Environmental Department.

7.2.5 Monitoring Programme Review

The monitoring programme for CN_{WAD} levels at the discharge point to the tailings storage and in the decant water of the tailings storage will be reviewed subsequent to the first two months of operations in consultation with the EPA and DMM.

As described in Section 12.2, the monitoring programme outlined in Section 7.2 will also be revised /updated annually, unless otherwise directed by the EPA and the changes will be made and approved through the EMS system.

7.3 Monitoring of CN_{FREE}

Monitoring of CN_{FREE} levels at locations where employees are operating will be monitored at location where:

- Cyanide will be discharged from bulk bags hoisted from plywood boxes, into a mixing tank. Employee contact with solid cyanide (i.e. fine cyanide dust) will not occur during bag discharging or storage, as employees will be dressed in appropriate personal Protective Equipment (PPE). As a result, on-line monitoring will only be conducted for HCN gas. In the event that an emergency brings employees into contact with solid cyanide (e.g. ruptured bags, leaking bag-breaker), the appropriate emergency response will be initiated. This section outlines the on-line (i.e. ambient) monitoring of HCN gas that will be undertaken with regard to employee safety
- The on-line monitoring of HCN gas will be carried out at the cyanide storage area and in the processing plant, as follows:
 - above the leach tanks;
 - at cyanide destruct tanks;
 - at the CIL tail safety screen;
 - in the elution section
 - at the electrowinning section.

The monitoring units will take continuous readings and alarm high values.

Ambient monitoring units will be equipped with a flashing light and siren. Personal monitoring units will vibrate and sound a high pitched alarm.

Section 8.1.1 describes the procedure that will be followed in the event the ambient or personal monitoring units trigger an alarm, while Section 8.1.2 outlines the contingency measures available to reduce levels of HCN gas for employee safety.

7.4 Detection of Cyanide Beneath

A monitoring programme will be established for the detection of cyanide beneath and adjacent to the tailings storage area.

As discussed in Section 5.2.3.3, the tailings storage facility was assessed in the Project EIS for their potential seepage impacts on groundwater (quality, flows and levels).

Monitoring of CN_{WAD} levels will be undertaken at a network of groundwater monitoring bores to monitor cyanide movement beneath and adjacent to the tailings storage.

- down-gradient bores (4)
- Up-gradient bores (2); and
- Tailings storage monitoring bores (2)

The groundwater monitoring bores will be sampled for CN_{WAD} weekly. Sampling of the groundwater monitoring bores will be undertaken using the Liberian and international standards. Water quality samples will be labelled and placed in a refrigerator within one hour

(or chilled on ice and kept in a cooler box). Samples will be sent by the following working day for analysis at an accredited laboratory. Regular water quality sampling of the water collected in the seepage cut-off drain will also be conducted and analysed for CN_{WAD} levels. A laboratory CoC will be completed for each batch of samples. A copy of the CoC will be provided to the laboratory along with the water samples. A copy of the CoC will be retained on-site. In addition to the abovementioned bores, groundwater quality monitoring bores (4) will also be monitored for CN_{WAD} in accordance with Liberian and international standards. The CN_{WAD} results that are obtained for the groundwater bores will be recorded and retained.

7.5 CN_{FREE} and CN_{WAD} Levels in the Processing Plant

CN_{FREE} and CN_{WAD} levels will be monitored in the processing plant to provide information relevant to process control and/or cyanide destruction, as described below. As described in Section 7.3, on-line monitoring of the HCN gas will be undertaken at locations where employees are operating.

CN_{FREE} levels in solution will be monitored at a number of locations in the processing plant for process control and cyanide destruction (i.e. to regulate the dosage of metabisulphite and to ensure cyanide in the tailings is destroyed down to required levels). Manual monitoring of CN_{FREE} levels in solution will be conducted by titration. Elevated levels of CN_{FREE} will be adjusted by the CIL operator.

- Manual determination of CN_{FREE} levels in solution will be conducted in the first and/or second leach tanks to control the rate and efficiency of dissolution of the gold in the leach circuit. The rate of cyanide addition will be determined by the concentration of free cyanide measured by titration. .
- Routine geochemical assays of the ore feed will be conducted so that the anticipated cyanide levels can be derived from known concentrations of metals (copper & zinc).
- Manual determination of residual CN_{FREE} levels in solution will also be conducted in the final leach tank; the rate of cyanide addition will be fine-tuned in the plant to control the level of cyanide in the final leach tank. The aim is for the CN_{FREE} level to be as low as possible. The CN_{FREE} level will determine the quantity of detoxification reagents required to be used in the cyanide destruction process. On-line monitoring of CN_{FREE} levels and pH in solution will also be conducted in the tailings discharge water. In the event this on-line monitoring indicates that CN_{FREE} levels in the tailings discharge water would result in CN_{WAD} levels that would exceed 50 mg/L in the aqueous component of the tailings slurry stream at the discharge point to the tailings storage at any time, system alarms will be triggered.
- CN_{WAD} levels will also be sampled at a number of locations and analysed at the on-site laboratory. Samples will be taken of the final Carbon-In-Leach tank discharge and the cyanide destruction system discharge, the latter by an automatic sampler.

- CNWAD levels will also be sampled in the aqueous component of the tailings slurry stream at the discharge point to the tailings storage and in the decant water of the tailings storage, as described in [Section 7.2](#).
- Samples collected at these points will be analysed at off-site and on-site laboratories
- In the event CN_{WAD} levels at the discharge point to the tailings storage exceed 45 mg/L (90 percentile over six months) or 50 mg/L (at any time), one or more of the contingency measures outlined in Section 8.2.1 will be implemented to reduce CN_{WAD} levels to below these levels.

8.0 Contingency Measures for Cyanide Reduction

Section 8.1 provides contingency measures for the reduction of HCN levels in areas where employees are operating. Section 8.2 provides contingency measures for reducing CN_{WAD} levels in the event CN_{WAD} levels exceed 45 mg/L (90 percentile over six months) or 50 mg/L (at any time) at the discharge point to the tailings storage. Section 8.3 outlines contingency measures for reducing cyanide levels in the tailings dam in the event it is established that fauna deaths are occurring from cyanide in tailings dam water. Section 8.4 describes the process for EPA review of cyanide levels in the event of wildlife deaths occurring due to cyanide.

8.1 Contingency Measures for Reducing Hydrogen Cyanide Levels

8.1.1 Procedure

The following procedure indicates when contingency measures will be used to reduce HCN levels for employee safety:

Step 1 – Personal or ambient monitoring alarms sound indicating HCN levels are at or above 10 ppm. In the case of an ambient monitor, a siren and flashing lights will be activated and HCN levels will be displayed in the process control centre. In the case of a personal monitor, the monitor will vibrate and emit a high pitched alarm.

Step 2 – Personnel will be evacuated from the alarm-activated area and the appropriate standard operating procedure will be initiated. pH levels will be checked by meter, litmus paper and titration. Personnel will not be permitted to enter the area in question without the correct personal protective equipment. The area will be frequently Dräger tested until the environment has been deemed clear of HCN

Step 3 – Process control centre personnel will investigate the possible causes of the alarm and implement appropriate contingency measures where necessary.

8.1.2 Contingency Measure

In the event HCN levels reach 10 ppm in the cyanide storage area, personnel will be evacuated, and the appropriate standard operating procedure will be initiated. Personnel will not be permitted to return to the cyanide storage area without the correct personal protective equipment or until safe HCN levels are achieved. The contingency measures implemented by the process control centre to reduce HCN levels in the processing plant will vary depending on the circumstances (e.g. the particular HCN levels, the cause of the increased levels and the plant location). The following measures will be available to reduce HCN levels in the processing plant:

- reduce the amount or rate of cyanide addition;
- increase the pH of the cyanide solution/process stream;
- reduce the rate of ore feed;
- change the blend of the ore; or
- shut down the process plant.

Each of the above measures will take some time to reduce the level of HCN. Employees will not be permitted to access the area in question without the correct personal protective equipment or until safe HCN levels are achieved.

9.0 Contingency Measures for Reducing CN_{WAD} Levels

This section provides contingency measures for the reduction of CN_{WAD} levels at the discharge point to the tailings storage. The Project's processing plant will be designed so that CN_{WAD} levels at the discharge point to the tailings storage do not exceed 45 mg/L (90 percentile over six months) and 50 mg/L (at any time). As a result, it is not anticipated that the contingency measures provided below would ever need to be activated.

9.1 Contingency Measures

In the event CN_{WAD} levels at the discharge point to the tailings storage exceed 45 mg/L

(90 percentile over six months) or 50 mg/L (at any time), one or more of the following contingency measures will be implemented to reduce CN_{WAD} levels to below these levels:

- in the event CN_{WAD} levels exceed 50 mg/L in the aqueous component of the tailings slurry stream at the discharge point to the tailings storage at any time, discharge to the tailings storage will cease until CN_{WAD} levels can be achieved below the required levels;
- increase the amount or dosage rate of cyanide destruction chemicals being used in the cyanide destruction circuit to achieve lower cyanide levels at the tailings discharge point;
- reduce the amount or rate of cyanide addition;
- reduce the rate of ore feed;
- change the blend of the ore;
- modify the cyanide destruction circuit being used
- add cyanide destruction chemicals directly to the tailings storage; or
- add dilution water, if available.
- Monitoring of the effectiveness of the contingency measures will be undertaken.

10.0 Contingency Measures for Reducing Cyanide Levels in the Tailings Dam Following Fauna Deaths

The process for determining whether fauna deaths are occurring from cyanide in the tailings dam water is contained in Section 6.1 of this Plan. The following are contingency measures that may be implemented to reduce cyanide levels in the tailings dam in the event it is established that fauna deaths are occurring from cyanide in the tailings dam water:

- increase the amount or dosage rate of cyanide destruction chemicals being used in the cyanide destruction circuit to achieve lower cyanide levels within the tailings dam;
- reduce the amount or rate of cyanide addition;
- reduce the rate of ore feed;
- change the blend of the ore;
- modify the cyanide destruction circuit being used;
- add cyanide destruction chemicals directly to the tailings dam to lower existing cyanide levels; or
- add dilution water, if available.
- In the event that one or more contingency measures are implemented, regular monitoring of the effectiveness of the contingency measures will be undertaken.

10.1 Review of Cyanide Levels Following Fauna Deaths

Any decision to require cyanide reduction will include, but not be limited to, the consideration of:

- (a) The number of fauna deaths;
- (b) The species of fauna involved in deaths;
- (c) The antecedent condition of the species;
- (d) Methods employed at the time to prevent use of tailings by fauna; and

NLGM will notify the EPA of any reductions in cyanide levels as soon as practicable.

11.0 Stakeholder Consultation

The stakeholder consultation process will communicate and address issues of concern via the CDP and RAP committee which constitute members of the committee, government and NLGM. The chairperson will be the same as for the RAP committee as outlined in the NLGM RAP 2012 report.

11.1 Complaints Register and Records

11.1.1 Complaints Register

A process for the handling of complaints is provided below to facilitate prompt and comprehensive responses to any community concerns.

A complaints register will be maintained by the Environmental Department as part of the EMS.

(a) Complaints

The Environmental Officer, with the assistant of the plant manager, shall be responsible:

- (i) for receiving complaints with respect to construction works and mine operations on a dedicated and publicly advertised telephone line, 24 hours per day 7 days per week, entering complaints or comments in an up-to-date log book, and ensuring that a response is provided to the complainant within 24 hours; and
- (ii) providing a report of complaints received annually throughout the life of the project to the EPA and DMM.

(b) Information recorded in the complaints register with respect to each complaint will include:

- Date of complaint;
- Name, address and telephone number of complainant;
- Nature of complaint; and
- Response action taken to date of record.

11.1.2 Complaints Records

Keeping record will include details of the following:

- The date and time of the complaint;
- The method by which the complaint was made;
- Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- The nature of the complaint;
- The action taken by NLGM in relation to the complaint, including any follow-up contact with the complainant; and
- If no action was taken by NLGM, the reasons why no action was taken.

The record of a complaint will be kept for at least five years after the complaint was made. The record will be available for inspection by the EPA. NLGM operates during operating hours, a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant.

The community complaints line will be established and will operate 24 hours per day. Once the line has been established NLGM will notify the public of the complaints line telephone number and how to make a complaint.

12.0 Reporting

12.1 Annual Environmental Management Report

The AEMR (Aureus Environmental Management Report) will report on cyanide management and use and the cyanide monitoring programme. All cyanide monitoring results shall be included in the AEMR.

The AEMR will be made available to the relevant governmental departments and any other interested stakeholders on request.

12.1.1 Incident Reporting

An incident report within 24 hours or the next working day of any incident or potential incident with actual or potential significant off-site impacts on people, or the biophysical environment (including wildlife), shall be supplied to the EPA outlining the basic facts and mitigation measures undertaken at the time. The incident report must be submitted to the EPA no later than 14 days after the incident or potential accident' and to include the following information:

- Location of the incident;
- Person's name and contact number who discovered the incident;
- The best estimate of the time the incident occurred;
- The time the person reported the incident and/or the organisation/company they represent became aware of the incident;
- A description of the incident;
- The suspected cause of the incident;
- The environmental harm or environmental nuisance caused, threatened or suspected to be caused by the incident; and
- Actions taken to prevent further similar incidents and mitigate any environmental harm or environmental nuisance caused by the incident.

NLGM will maintain a register of such accidents, incidents, and potential incidents. The register shall be made available for inspection at any time by the EPA.

NLGM will notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable. NLGM will provide written details of the notification to the EPA within seven days of the date on which the incident occurred.

NLGM will maintain a record of/and report on any cyanide-related incidents. An example of the NLGM Incident Report Form is provided as Annex B. The form will be completed when recording incidents at the site.

12.2 CN_{WAD} Reporting

Any CN_{WAD} measurements of the aqueous component of the tailings slurry stream at the discharge point to the tailings storage verified by the off-site laboratory as exceeding 50

mg/L CN_{WAD} will be assessed daily (to ensure that CN_{WAD} levels do not exceed 45 mg/L [90 percentile over six months]) and reported monthly to the DMM and EPA.

In the event CN_{WAD} levels verified by the off-site laboratory as exceeding 50 mg/L in the aqueous component of the tailings slurry stream at the discharge point to the tailings storage at any time will be reported to the Project management immediately.

A summary of the cyanide monitoring results will be provided to EPA and the DMM on a quarterly basis.

13.0 Auditing and Review

13.1 External Audits

13.1.1 Third Party Audit

An Independent Environmental Audit will be conducted and may include cyanide-related issues. The condition is reproduced below:

13.2 Third Party Monitoring / Auditing

(a) An Independent Environmental Audit shall be completed:

- 12 months after commencement of ore processing;
- Then every three years thereafter until decommissioning of the mine and ore processing operations respectively. The Applicant shall conduct an environmental audit of the mining and infrastructure areas of the development in accordance with ISO 14010 - Guidelines and General Principles for Environmental Auditing, and ISO 14011 - Procedures for Environmental Auditing (or the current versions. Copies of the report shall be submitted by the Applicant to the DMM & EPA within 1 month of the report's completion for comment.

(i) The audit shall:

- assess compliance with the requirements of the EIS permit, licences and approvals;
- in the event of any non-compliance, report on the effectiveness of the environmental management of the mine as it may relate to the area of non-compliance;
- be carried out at the Applicant's expense; and
- be conducted by a duly qualified independent person or team approved by the EPA

(ii) The EPA, after considering any submission made by the relevant government agencies, on the report, notify the Applicant of any requirements with regard to any recommendations in the report. The Applicant shall comply with those reasonable requirements within such time as the EPA may require.

This process provides a mechanism by which management and monitoring of cyanide at the Project can be assessed against relevant consent, mining lease and licence conditions, legislation and International Standards.

13.3 Internal Review

The CMP will be revised /updated at least every five years, or as otherwise directed by the EPA, in consultation with the relevant government authorities.

The cyanide monitoring programme will be revised / updated bi-annually, unless otherwise directed by the EPA, to reflect changing environmental requirements, significant changes in technology/operational practices and results from the monitoring conducted.

APPENDIX A: ICMC Code for Manufacture, Transport and Use of Cn

International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold (International Cyanide Management Institute, 2002)

The International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold (the Code) has been developed as a voluntary industry code to encourage improvement on an industry-wide basis. The principles of the Code are as follows:

- Production: Encourage responsible cyanide manufacturing by purchasing from manufacturers who operate in a safe and environmentally protective manner.
- Transportation: Protect communities and the environment during cyanide transport.
- Handling and Storage: Protect workers and the environment during cyanide handling and storage.
- Operations: Manage cyanide process solutions and waste streams to protect human health and the environment.
- Decommissioning: Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities.
- Worker Safety: Protect workers' health and safety from exposure to cyanide.
- Emergency Response: Protect communities and the environment through the development of emergency response strategies and capabilities.
- Training: Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.
- Dialogue - Engage in public consultation and disclosure.

APPENDIX B: Incident reporting Form - 3 pages

INCIDENT REPORT		aureus mining	
SAFETY	HEALTH	ENVIRONMENT	INCIDENT No: _____
TITLE: _____			
PART 1 NOTIFICATION - REQUIRED WITHIN 24 HOURS OF THE INCIDENT (To be submitted by the HOD/ Supervisor TO the Environmental department)			
Incident Date: Discovered:		Incident Time: Time incident Discovered	
Department		Asset Site:	Country: Liberia
Description of the Incident: (what happened and why it happened)			
Details of Injury/Damage/Impact: (Nature and extent of injuries/damage/impact)			
Immediate Actions Taken:			
Employee, Contractor and/or Third Party Incident?			
Work category of person injured or involved			
Is the activity Controlled, Monitored or Uncontrolled?			
Was a risk assessment conducted for this task? Yes/No			
Does a site standard or procedure exist to control this risk? Yes/No			
The most causal Major Incident Type			
Was this a zero barrier incident? Yes ☐ No ☐		Was this a repeat incident? Yes ☐ No ☐	
Was this incident a Refining/Process Failure? Yes ☐ No ☐		Property /Equipment damage Yes ☒ No ☐ Repair Amount US\$: \$	
Status of Investigation?		Date investigation completed	10 Nov 2012

DISTRIBUTION - REQUIRED WITHIN 1 WEEK OF THE INCIDENT

Note: Should there be a need to edit this form, please perform the following actions:
Notify the environmental manager at: patrya.leubsch@sureus-mining.com

APPENDIX C: Hydrogen Cyanide, Anhydrous, Stabilizer - MSDS



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MATERIAL SAFETY DATA SHEET**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: HYDROGEN CYANIDE, ANHYDROUS, STABILIZED

TRADE NAMES/SYNONYMS:

MTG MSDS 119; HYDROCYANIC ACID; PRUSSIC ACID; FORMONITRILE; CARBON HYDRIDE NITRIDE; HYDROCYANIC ACID, LIQUEFIED; HYDROGEN CYANIDE; RCRA P063; UN 1051; CHN; MAT11160; RTECS MW6823000

CHEMICAL FAMILY: inorganic, gas

CREATION DATE: Jan 24 1989

REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: HYDROGEN CYANIDE, ANHYDROUS, STABILIZED

CAS NUMBER: 74-90-8

PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=4 REACTIVITY=2

**EMERGENCY OVERVIEW:**

COLOR: colorless

PHYSICAL FORM: liquid

ODOR: almond odor

MAJOR HEALTH HAZARDS: potentially fatal if inhaled or swallowed, respiratory tract irritation, eye irritation

PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire. May polymerize. Containers may rupture or explode. May react on contact with air, heat, light or water.

POTENTIAL HEALTH EFFECTS:

**INHALATION:**

SHORT TERM EXPOSURE: irritation, rash, nausea, chest pain, irregular heartbeat, headache, blindness, bluish skin color, suffocation, lung congestion, paralysis, convulsions, coma, death

LONG TERM EXPOSURE: vomiting, digestive disorders, dizziness

SKIN CONTACT:

SHORT TERM EXPOSURE: suffocation

LONG TERM EXPOSURE: same as effects reported in long term inhalation, rash, itching

EYE CONTACT:

SHORT TERM EXPOSURE: irritation, suffocation, death

LONG TERM EXPOSURE: same as effects reported in short term exposure

INGESTION:

SHORT TERM EXPOSURE: suffocation, death

LONG TERM EXPOSURE: no information is available

4. FIRST AID MEASURES

INHALATION: When safe to enter area, remove from exposure. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention immediately.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

ANTIDOTE: amyl nitrite, inhalation; sodium nitrite, intravenous; sodium thiosulfate, infusion; oxygen.

NOTE TO PHYSICIAN: Consider amyl nitrite inhalation, 1 ampoule (0.2 mL) every 5 minutes, and oxygen. For ingestion, consider gastric lavage. Consider oxygen.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Containers may rupture or explode if exposed to heat. Vapor/air mixtures are explosive. Gas or vapor is lighter than air. Vapors or gases may ignite at distant ignition sources and flash back.

EXTINGUISHING MEDIA: Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray.



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FIRE FIGHTING: Move container from fire area if it can be done without risk. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Cool containers with water spray until well after the fire is out. Keep unnecessary people away; isolate hazard area and deny entry. For tank, rail car or tank truck, evacuation radius: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

FLASH POINT: 0 F (-18 C) (CC)

LOWER FLAMMABLE LIMIT: 5.6%

UPPER FLAMMABLE LIMIT: 40%

AUTOIGNITION: 1000 F (538 C)

FLAMMABILITY CLASS (OSHA): 1A

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

Do not touch spilled material. Stop leak if possible without personal risk. Avoid heat, flames, sparks and other sources of ignition. Remove sources of ignition. Reduce vapors with water spray. Do not get water directly on material. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet. For tank, rail car or tank truck: 800 meters (1/2 mile). Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Avoid heat, flames, sparks and other sources of ignition. Shelf life is 90 days. Keep separated from incompatible substances. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355 Part B).

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

HYDROGEN CYANIDE, ANHYDROUS, STABILIZED:

HYDROGEN CYANIDE:

10 ppm (11 mg/m³) OSHA TWA (skin)



4.7 ppm (5 mg/m³) OSHA STEL (skin) (vacated by 58 FR 35338, June 30, 1993)
 4.7 ppm(CN) ACGIH ceiling (skin)
 4.7 ppm (5 mg/m³) NIOSH recommended STEL (skin)

VENTILATION: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

47 ppm

Any supplied-air respirator.

50 ppm

Any supplied-air respirator operated in a continuous-flow mode.

Any self-contained breathing apparatus with a full facepiece.

Any supplied-air respirator with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape -

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.

Any appropriate escape-type, self-contained breathing apparatus.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid

COLOR: colorless

ODOR: almond odor

MOLECULAR WEIGHT: 27.03

MOLECULAR FORMULA: H-C-N

BOILING POINT: 79 F (26 C)

FREEZING POINT: 7 F (-14 C)

VAPOR PRESSURE: 620 mmHg @ 20 C

VAPOR DENSITY (air=1): 0.941

SPECIFIC GRAVITY (water=1): 0.699 @ 22 C

WATER SOLUBILITY: soluble



PH: weakly acidic
VOLATILITY: Not available
ODOR THRESHOLD: 2-5 ppm
EVAPORATION RATE: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: alcohol
Slightly Soluble: ether

10. STABILITY AND REACTIVITY

REACTIVITY: May react with evolution of heat on contact with water.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers.

INCOMPATIBILITIES: combustible materials, bases, amines, oxidizing materials, acids

HAZARDOUS DECOMPOSITION:
 Thermal decomposition products: cyanides

POLYMERIZATION: Polymerizes with evolution of heat. Avoid contact with air, light, water, incompatible material or storage and use above room temperature.

11. TOXICOLOGICAL INFORMATION

HYDROGEN CYANIDE, ANHYDROUS, STABILIZED:

TOXICITY DATA: 150 ppm/30 minute(s) inhalation-rat LC50; 3700 ug/kg oral-mouse LD50

LOCAL EFFECTS:

Irritant: inhalation, eye

ACUTE TOXICITY LEVEL:

Highly Toxic: inhalation, ingestion

TARGET ORGANS: blood

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: blood system disorders, heart or cardiovascular disorders, nervous system disorders

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 5 ug/L 12 week(s) (Physiological) Atlantic salmon (*Salmo salar*)



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INVERTEBRATE TOXICITY: 21 ug/L 83 hour(s) NOEC (Reproduction) Scud (Gammarus pseudolimnaeus)

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): P063.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Hydrogen cyanide, stabilized
ID NUMBER: UN1051
HAZARD CLASS OR DIVISION: 6.1
PACKING GROUP: I
LABELING REQUIREMENTS: 6.1; 3
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: Forbidden
MARINE POLLUTANT: HYDROGEN CYANIDE, ANHYDROUS, STABILIZED

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Hydrogen cyanide, stabilized
UNNUMBER: UN1051
CLASS: 6.1; 3
PACKING GROUP/CATEGORY: I



15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
HYDROGEN CYANIDE: 10 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B):
HYDROGEN CYANIDE: 100 LBS TPQ

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C):
HYDROGEN CYANIDE: 10 LBS RQ

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):



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ACUTE: Yes
 CHRONIC: No
 FIRE: Yes
 REACTIVE: Yes
 SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65):
HYDROGEN CYANIDE

OSHA PROCESS SAFETY (29 CFR 1910.119):
HYDROGEN CYANIDE: 1000 LBS TQ

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: ABD1F

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

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APPENDIX D: Sodium Cyanide – Chem Alert Report

Chem Alert Report

Product Name **SODIUM CYANIDE**

IDENTIFICATION			
Ingredient	Concentration		CAS No.
SODIUM CYANIDE	>60%		143-33-9
HYDROGEN CYANIDE	Not Available		74-90-8
CLASSIFIED AS HAZARDOUS ACCORDING TO WORKSAFE AUSTRALIA CRITERIA.			
Shipping	SODIUM CYANIDE		
Synonyms	CYANIDE OF SODIUM, HYDROCYANIC ACID, SODIUM SALT.		
Appearance	WHITE GRANULAR OR CRYSTALLINE SOLID		
Odour	FAINT ALMOND ODOUR		
Use(s)	LABORATORY REAGENT, ELECTROPLATING, METAL TREATMENT, GOLD PROCESSING REAGENT.		
Supplier	CIMBRIA RESOURCES PTY LTD (PAST DISTRIBUTOR), NSW		
Stock ID	Not a Stock Item		
Poison Sched	7	Hazchem 4X	U.N. # 1689
Pkg Group	1	EPG EPG	D.G. Class 6.1 Sub/Text Risk None Allocated

HEALTH HAZARDS	
Health Hazard Summary	Highly toxic. Use safe work practices to avoid exposure. Individuals with pre-existing kidney, respiratory, skin or thyroid diseases are at a greater risk of developing toxic cyanide effects. Cyanide is reported to cause damage to the central nervous system. Death usually occurs due to respiratory arrest.
Eye	Corrosive - Irritant. Contact may result in pain, redness, corneal burns and ulceration with possible permanent damage.
Inhalation	Highly toxic - potentially fatal in low concentrations. Exposure may result in weakness, headache, nausea, vomiting, confusion, numbness, breathing difficulties, convulsions, and death from respiratory arrest.
Skin	Highly toxic - potentially fatal. Direct contact may result in irritation, skin rash and possible burns. Absorbed through the skin with toxic system effects.
Ingestion	Highly toxic - potentially fatal. Ingestion may result in burns to the mouth and throat, nausea, vomiting, breathing difficulties, convulsions and death.

PRECAUTIONS	
Flammability	Not flammable. May evolve highly flammable and toxic hydrogen cyanide gas when added to water or upon contact with moist air, acids, acid salts, or carbon dioxide.
Reactivity	Contact with oxidising agents (e.g. nitrates, chlorates) may cause fires-explosions. Contact with acids, carbon dioxide or moisture releases flammable and highly toxic hydrogen cyanide gas.
Ventilation	Do not inhale vapours (odorous) or dusts. Use in well ventilated areas. In poorly ventilated areas, mechanical extraction ventilation is recommended.

PERSONAL PROTECTIVE EQUIPMENT	
PPE	Wear full-length nitril or full-length neoprene gloves, coveralls, rubber or PVC boots and a Full-face Type B2 (Acid gas and Hydrogen cyanide) respirator. With prolonged use, wear impervious coveralls and an Air-line respirator.



Chem Alert Report

Product Name **SODIUM CYANIDE**

EMERGENCY

Spillage	If spill (pink) contact emergency services. Wear nitrile/neoprene gloves, a Full-face Air-line respirator or Self Contained Breathing Apparatus (SCBA), full-length impervious coveralls and boots. Clear area of all unprotected personnel. Absorb spill with sand or similar (if liquid) or if solid, collect and place in containers for disposal.
Environment	Soluble cyanide salts are highly toxic to most plants and animals. Toxic to livestock above 0.02 ppm; toxic to aquatic life above 0.07 ppm. However, they will decompose fairly rapidly in water, and in some situations they may biodegrade. AQUATIC FATE: If released to water, soluble cyanide salts will dissolve. The cyanide ion may then form highly toxic hydrogen cyanide gas, or react with various metals present. If the cyanide ion is present in excess in water, complex metalocyanides may form; however, if metals are present, simple metal cyanides may form. Cyanide will gradually oxidise to cyanate, which dissociates to carbon dioxide and nitrogen.
Fire and Explosion	Not flammable. Evacuate area and contact emergency services. HIGHLY TOXIC and flammable gases (hydrogen cyanide) may be evolved when exposed to acids, acid salts, carbon dioxide or water - moist air or if heated. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire.
Extinguishing	Not flammable. Carbon dioxide extinguishers should not be used as contact with cyanides may result in the evolution of flammable hydrogen cyanide gas.

FIRST AID

Eye	Flush gently with running water, holding eyelids open for 15 minute period. Seek immediate medical attention.
Inhalation	If assisting a victim avoid becoming a casualty, wear a Full-face Type B2 (acid gas and hydrogen cyanide) or Full-face Air-line respirator. Give oxygen and if necessary, artificial respiration. If giving mouth to mouth, wash out patient's mouth & lips - do not intake patient's expired air. Remove contaminated clothing & wash before reuse.
Skin	Remove contaminated clothing and gently flush affected areas with soap and water. Product may penetrate skin and cause toxic systemic effects. Seek immediate medical attention. Launder clothing before reuse.
Ingestion	If poisoning occurs contact a Doctor or Poisons Information Centre on 13 11 26 (Australia Wide). Give oxygen & if necessary, artificial respiration. If giving resuscitation, wash out patient's mouth and lips - do not intake patient's expired air. Remove contaminated clothing and wash skin thoroughly. Seek urgent medical attention.
Advice to Doctor	Inhaled: Give amyl nitrite inhalation, 1 ampule (0.2 mL) every 5 min. Stop administration if the systolic blood pressure goes below 80 mm Hg. Antidote: Sodium nitrite should be drawn up from the ampule and injected intravenously over at least 5 min to avoid hypotension (Adult 300 mg in the 10 mL ampule injected). The average child (with normal haemoglobin concentration) will require 0.15 to 0.33 mL/kg up to 10 mL, administered intravenously over no less than 5 minutes. The amount of nitrite administered must be based on the haemoglobin level and on the weight of the individual. Ingested: Give amyl nitrite inhalation, 1 ampule (0.2 mL) every 5 min. Gastric lavage should be delayed until nitrite antidote has been given. Give artificial respiration with 100 % O₂. Inhaled: Give amyl nitrite inhalation, 1 ampule (0.2 mL) every 5 min. Stop administration if the systolic blood pressure goes below 80 mm Hg. Antidote: Sodium nitrite should be drawn up from the ampule and injected intravenously over at least 5 min to avoid hypotension (Adult 300 mg in the 10 mL ampule injected). The average child (with normal haemoglobin concentration) will require 0.15 to 0.33 mL/kg up to 10 mL, administered intravenously over no less than 5 minutes. The amount of nitrite administered must be based on the haemoglobin level and on the weight of the individual. Ingested: Give amyl nitrite inhalation, 1 ampule (0.2 mL) every 5 min. Gastric lavage should be delayed until nitrite antidote has been given. Give artificial respiration with 100 % O₂.

Chem Alert Report

Product Name **SODIUM CYANIDE**

SAFE HANDLING

Storage	Store (bulk) in a secured, windowless but well ventilated area with a minimum 2 metre clearance with rain and fire proof cover, removed from direct sunlight, oxidising agents (peroxides, hypochlorites), acids, heat sources & food stuffs. Ensure containers are adequately labelled protected from physical damage & sealed when not in use. Containers should be stored off ground.
Waste Disposal	For small quantities, wear protective equipment and collect (if solid) or absorb with vermiculite or similar (if liquid). Treat with strongly alkaline solution of calcium hypochlorite (CAUTION: toxic gases may be generated), let stand for 24 hours, absorb with sand or similar and dispose of to an approved landfill site. Contact Risk Management Technologies on (08) 9322 1711 for additional information.
Transport	Class 6.1 Poison. Do not transport with chemicals of class; 1 (Explosives), 3 (Flammable liquids), 5.1 (Oxidising agents), 5.2 (Organic peroxides), 8 (Corrosives - where the Corrosive is an acid and the Poison is a cyanide) and foodstuffs.

PHYSICAL AND CHEMICAL PROPERTIES

Flammability: NON FLAMMABLE	Flash Point: -17 °C Hydrogen Cyanide (68)
Boiling Point: 1496 °C	Melting Point: 564 °C
Exposure Standard: 5mg/m ³ Cyanides (10 ppm Hydrogen cyanide)	Evaporation Rate: NOT RELEVANT
pH: 11.3-11.7 (5%)	% Volatile: NOT RELEVANT
Specific Gravity: 1.16	Solubility: 37 %
Vapour Pressure: 0.76 mm Hg @ 800 °C	Upper Explosion Limit: 40 %
Lower Explosion Limit: 5.6 %	

ADDITIONAL INFORMATION

RISK AND SAFETY PHRASES

Risk and Safety Phrases are standardised phrases published by Worksafe Australia, which are used to describe the risks to health of particular chemicals and measures to control those risks. They are required on labels for hazardous substances under the National Code of Practice for Labelling of Workplace Substances (NO HSC:2012).

R32 Contact with acids liberates very toxic gas.
 R26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
 R29 Contact with water liberates toxic gas.
 S1/2 Keep locked up and out of reach of children.
 S28 After contact with skin, wash immediately with plenty of water.
 S45 In case of accident or if you feel unwell, contact a doctor or Poisons Information Centre immediately & show the label where possible.
 S7 Keep container tightly closed.

HAG PHRASES

HAG stands for Hazmat Action Guide. HAG phrases describe in simple terms the hazard associated with chemical products and the appropriate action to take in the event of an emergency involving the product. HAG phrases are commonly used by emergency services.

(3D) Toxic fumes/gas released with acids.
 (2T) Very toxic perhaps fatal on contact.
 (5D) Mixes with or is soluble in water.
 (64) Avoid dust.
 (65) Prevent from entering drains.
 (66) Contains spillage by any means.
 (8) Form: Solid.
 (8D) Fire fighting: Does not burn.

Chem Alert Report

Product Name **SODIUM CYANIDE**

ADDITIONAL INFORMATION cont.

ADDITIONAL INFORMATION FOR : HYDROGEN CYANIDE

Concentration in this product: Not Available
 Molecular Formula: HCN
 Molecular Weight: 27.03

HEALTH HAZARDS - INGESTION

A severe metabolic acidosis (body fluids more acidic than normal) may occur with acute cyanide poisoning. An odor of bitter almonds may be noted on the breath after poisoning.

LDLo (ingestion): 570 mg/kg (human)
 LD50 (ingestion): 3700 mg/kg (mouse)

HEALTH HAZARDS - SKIN

Absorption of hydrogen cyanide via the skin may be rapidly fatal. Maintain good personal hygiene standards.

HEALTH HAZARDS - EYE

Rabbit; LD50: 1040 mg/kg @eye irritation, behavioural effects -defective muscular coordination, respiratory stimulation).

HEALTH HAZARDS - HEALTH HAZARD SUMMARY

Hydrogen cyanide should ONLY be available to authorised or licensed persons, for research purposes, or for approved industrial and manufacturing purposes. Cyanide is a potent and rapidly acting asphyxiant. It prevents tissue utilisation of oxygen by inhibiting the tissue enzyme 'cytochrome oxidase' present in practically all aerobic cells. The venous blood retains a bright red colour due to the presence of oxyhaemoglobin (evidence as flushed face). The critical organs most sensitive to oxygen deficiency are the brain and heart. A transient stage of central nervous system stimulation followed by depression and hypoxic convulsions may occur, followed by respiratory arrest and death. Cardiac irregularities are often observed.

HEALTH HAZARDS - INHALATION

A few breaths at high concentrations may result in instantaneous collapse and respiratory arrest. At 270 ppm HCN is immediately fatal to humans, 181 ppm is fatal after 10 minutes (135 ppm-30 mins; 110 ppm fatal after 1 hour). Humans may tolerate 45-64 ppm for 1/2 hour to 1 hour.

TWA: 10 ppm (11 mg/m³) Peak limitation; SKIN
 IDLH (inhalation): 50 ppm
 TCLo (inhalation): 120 mg/m³/1 hour (human)
 LCLo (inhalation): 400 mg/m³/2 minutes (male)
 LC50 (inhalation): 160 ppm/30 M (rat)
 Odour Threshold: 1 mg/m³ (1-2 ppm) (not detectable by 20-40 % people).

ADDITIONAL INFORMATION FOR : SODIUM CYANIDE

Concentration in this product: >60%
 Molecular Formula: NaCN
 Molecular Weight: 49.02

HEALTH HAZARDS - INGESTION

All cyanide salts are extremely toxic via ingestion. The probable oral lethal dose is < 5 mg/kg, or a mere taste (< 7 drops) for a 70kg person or 1 teaspoon of a 2% HCN solution.

Chem Alert Report

Product Name **SODIUM CYANIDE**

ADDITIONAL INFORMATION cont.

TDLo (ingestion) : 714 ug/kg (male)
 LDLo (ingestion) : 2857 ug/kg (male)
 LD50 (ingestion) : 6440 ug/kg (rat)

HEALTH HAZARDS - SKIN

Cyanide solutions may produce a cyanide rash (scarlet rash). Itching, eruptions and secondary infections, and skin absorption were also reported with occupational exposure.

LD50 (Subcutaneous) : 3600 ug/kg (mouse)
 LDLo (Subcutaneous) : 2200 ug/kg (rabbit)

HEALTH HAZARDS - EYE

Direct contact with the eye may result in severe irritation, burns and ulceration.

HEALTH HAZARDS - HEALTH HAZARD SUMMARY

On top of all aqueous solutions of sodium cyanide there is a level of hydrogen cyanide (HCN) gas. The level of HCN decreases with increasing free hydroxide or increasing pH. In an unventilated tank at 30C-40C, HCN levels may reach 100-200 ppm. However as HCN has similar density to air, vapours are readily dissipated. Few poisons are more lethal than cyanide. Cyanide is a chemical asphyxiant and therefore those organs most sensitive to oxygen deficiency are affected, such as the heart, brain and lungs. Cardiac irregularities may occur, however respiratory arrest usually leads to death. Cyanide has been reported to cause damage to the nervous system. Blindness has been reported as a result of damage to the optic nerve.

LD50 (Intraperitoneal) : 4300 ug/kg (rat)
 LDLo (Intraperitoneal) : 1300 ug/kg (dog)
 LD50 (Intramuscular) : 1666 ug/kg (rabbit)

HEALTH HAZARDS - INHALATION

The main hazard is the potential for inhalation of hydrogen cyanide gas, which may be formed in solution or in contact with acids. Hydrogen cyanide at 270 ppm is immediately fatal, 181 ppm is fatal after 10 minutes, 110 ppm may be fatal after 1 hour.

TWA : 5 mg/m³ (as Cyanide)
 LCLo (Inhalation) : 120 mg/m³/1 hour (male - hydrogen cyanide)
 LC50 (Inhalation) : 323 ppm/5 minutes (mouse - hydrogen cyanide)

EMERGENCY - ENVIRONMENT

Soluble cyanide salts are highly toxic to most plants and animals. Toxic to livestock above 0.02 ppm; toxic to aquatic life above 0.07 ppm. However, they will decompose fairly rapidly in water, and in some situations they may biodegrade.

ADDITIONAL SAFE HANDLING INFORMATION

The use, handling and storage of cyanides is regulated by the Poisons Act, 1965 (in WA). The purchase, sale and use requires a licence or permit.

The manufacturers of cyanide salts recommend the following items be available where cyanides are used: oxygen resuscitator, oxygen bottles, a clearly marked Cyanide Antidote kit containing an approved airway, elasticked tourniquet, intravital intravenous cannulae, 20mL disposable syringes & needles, fluoride heparinised blood sample tubes, amples of Kelco Cyan (diborotetradecate), a copy of the MSDS and a copy of the Worksafe Australia guide

Chem Alert Report

Product Name **SODIUM CYANIDE**

ADDITIONAL INFORMATION cont.

"Cyanide Poisoning".

ABBREVIATIONS: *** mg/m³ - Milligrams per cubic metre *** ppm - Parts Per Million *** TWA/ES - Time Weighted Average or Exposure Standard. *** pH - relates to hydrogen ion concentration - this value will relate to a scale of 0 - 14, where 0 is highly acidic and 14 is highly alkaline. *** CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds. *** M - moles per litre, a unit of concentration. *** IARC - International Agency for Research on Cancer.

COLOUR RATING SYSTEM: A Green colour rating indicates that the product presents a Low hazard with normal use. An Amber colour rating indicates that the product presents a Moderate hazard with normal use. A Red colour rating indicates that the product presents a High hazard with normal use.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this Chem Alert Report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made. Information provided by Risk Management Technologies is summarised for ease of use. Additional technical information is available by calling (08) 9322 1711.

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HEALTH EFFECTS FROM EXPOSURE:

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MANAGEMENT PLAN: ARSENIC IN SURFACE AND GROUND WATER NEW LIBERTY GOLD MINE

AUREUS MINING

9 APRIL 2014



This document has been prepared by **Digby Wells Environmental**.

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1 INTRODUCTION

The climate in which the New Liberty Gold Mine (NLGM) is situated is one with high precipitation (3.3 m/annum) and the precipitation exceeds evaporation (approx. 1 m/annum) by a large margin. With the implementation of the currently planned management systems and processes there will be a positive water balance in all areas where water is collected with discharge being necessary. The ore body contains arsenic which can be soluble and hence the potential discharge of water containing elevated arsenic levels needs to be well managed to ensure that the required standards are met and that downstream water users are not adversely affected.

Based on the background knowledge and data review, the following issues were noted:

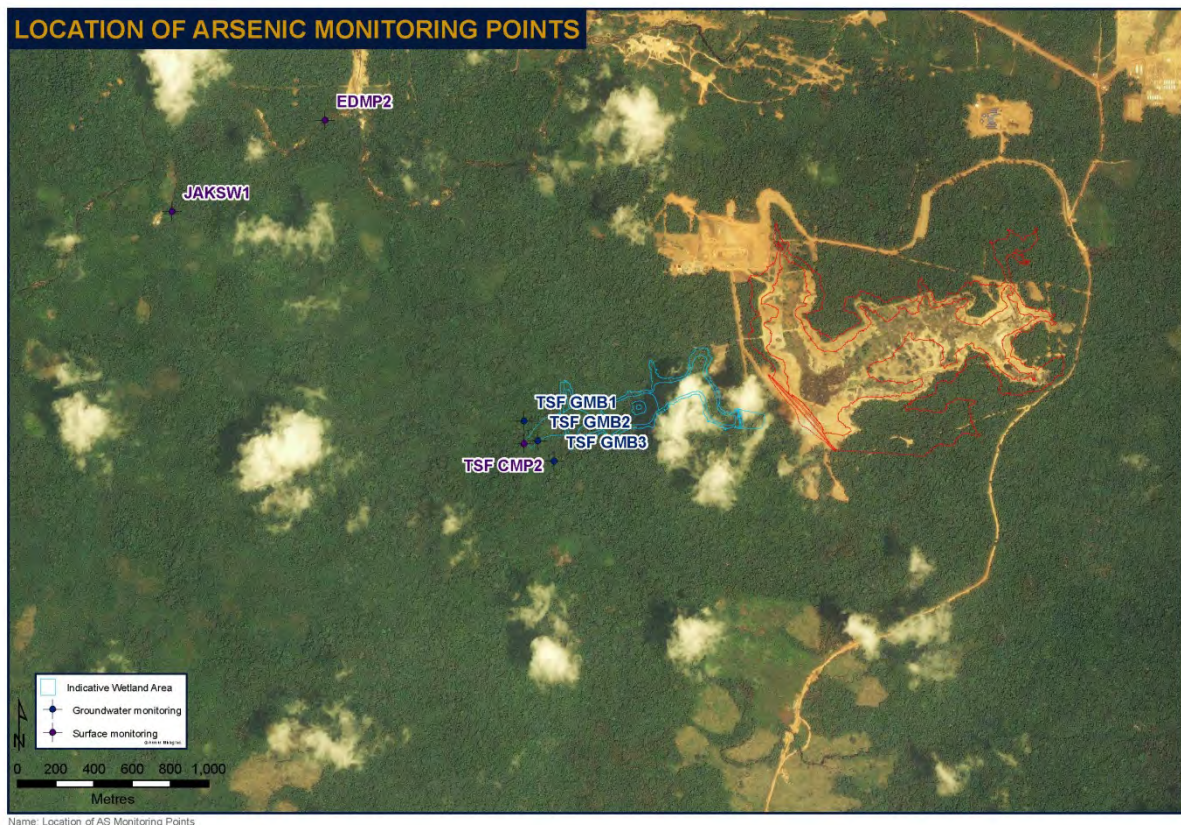
- It is expected that the tailings material to be produced from New Liberty will have leachable arsenic (As) at or above 0.2 mg/L (DRA, 2013) into the TSF. This exceeds the IFC discharge standards of 0.1 mg/L into the groundwater.
- There are other inputs into the arsenic levels such as naturally high levels associated with the site geology, leachate from the waste rock dumps and the pit wall. These inputs need to be considered and efficient and effective management measures to ensure that discharge standards are met need to be implemented for the combined water flow regime at NLGM; and
- Discharged water may need to be treated to ensure that discharge standards are met and the process and discharged water need to be monitored to ensure that compliance with standards is being achieved.

2 OBJECTIVES

This Arsenic (As) management plan is implemented with the following objectives:

- To recommend As concentrations which should be achieved before the tailings material is discharged onto the TSF;
- Identify compliance concentrations to which discharged effluent and groundwater seepage should adhere to; and
- Identify and recommend compliance points and monitoring programmes.

The compliance points are given on Plan1 below. For surface water compliance there is point TSF CMP2 and for groundwater compliance TSF GMB1/2/3.



Plan 1 – Compliance monitoring points below the TSF and Wetland

3 COMPANY COMMITMENTS

- Aureus has decided to install a wetland system downstream of the TSF to reduce levels of Arsenic and Cyanide in the effluent. The compliance point to meet IFC discharge standards will be at the exit of the wetland (for surface water) and at boreholes immediately down gradient of the wetland (for ground water);
- With the installation of the wetland, and based on the Arsenic balance assessment, the Company will commit to a maximum Arsenic discharge into the TSF of 0.8 mg/L, with the capacity, as a contingency, to be able to reduce (treat) levels into the TSF to as low as 0.1 mg/L (IFC discharge limits) if warranted;
- The Company will develop a robust surface and ground water monitoring program to assure operational parameters of the TSF are met and concentrations of As and CN are monitored in the TSF and at the various points in the System (TSF, wetland, compliance points, etc).

NLGM commit to meeting IFC standards for discharge at the monitoring point below the wetland outflow for surface water and at the groundwater monitoring points to be installed below the final walls of the wetland. The monitoring points are shown on Plan 1 as surface water compliance point TSF CMP2 and for groundwater compliance TSF GMB1/2/3.

The following limits apply:

Monitoring point	CN Level	Comment
Discharge into TSF	Between 0.24 and 0.8mg/l As	Start at 0.24mg/l and adjust towards 0.8mg/l once sampling enables levels of As in the discharge to be quantified. The target is to meet the discharge compliance level of 0.1mg/l As into the environment. The company commits to having the ability to reach 0.1 mg/l soluble As in the discharge to the TSF if required.
Discharge to environment	Compliance level = 0.1mg/l As	Compliance point is at the Wetland discharge point.

This will be achieved by treating the soluble arsenic levels in the tailings stream entering the TSF to levels which are low enough to achieve the discharge standards of 0.1 mg/l soluble arsenic. This will be achieved using chemical treatment techniques. With the wetland the passive and chemical treatment techniques will be applied in conjunction with one another to achieve the required discharge standards.

The wetland design will take into account the long term fate of any heavy metals which may precipitate and it will be professionally designed and constructed. The heavy metal sludge will be suitably disposed of onto a specially prepared site which would ensure that it meets sustainability criteria and IFC standards.

With the wetland in place, the company commits to treating the soluble arsenic levels down to 0.24 mg/l in the discharge to the TSF from the plant. The NLGM monitoring programme will then monitor the discharge concentrations at the wetland outflow to determine what the concentrations are at this point. The level of treatment at the plant in the arsenic precipitation circuit will then be adjusted accordingly so that full compliance with the IFC standards at the discharge is achieved with the minimum of active chemical treatment. This process will allow the operations personnel to find out what the natural fate of arsenic is in the system as designed and operated at the NLGM.

Groundwater concentrations of soluble arsenic will be tested to ensure that IFC discharge standards are met at the down gradient monitoring boreholes.

Contingency Plans are discussed in Section 8.

4 LEGAL REQUIREMENTS

Water management plans for both effluent discharge and drinking water quality will be based on the current Liberian EPA recommendations as summarised below and the IFC discharge Guidelines.

- The EPA documents indicate the following:
 - o In the Environmental Protection and Management Law of Liberia (EPA, 2003) the Liberian government states that the agency is in place to provide clear guidelines for water management and environmental monitoring with regards to water quality (Part IV, Section 35);
 - o The above instruction has, however, not been completed, and research into the topic reveals that no clear water quality standards for drinking water or discharge guidelines has been established by the Liberian government post 1987 except a recommendation for the use of WHO standards until new guidelines are produced;
 - o This is confirmed by the National Integrated Water Resources Management Policy of Liberia (EPA, 2007) that quotes the following regarding drinking water quality:
 - o “WHO drinking water standards (guidelines) should be used until one is produced according to section 35 of the Environmental Protection and Management Law of the Republic of Liberia. Due consideration shall be given to specific local conditions and water use habits which may dictate a local relaxation of these standards.” (EPA, 2007).

Based on the above research drinking water classification should adhere to the latest WHO drinking water standards. The Liberian government last issued water quality guidelines in 1987 with three classes of water guidelines identified:

- Class 1 was for drinking water, which in the New Liberty Mine Water Management study, will be considered the WHO drinking water standards as discussed;
- Class 2 was issued for classification of water to be used for natural and cultivated fisheries, public bathing places and recreational water sports.
- Class 3 was issued for classification of water to be used for industrial supplies and irrigation of agricultural land; and
- The Liberian drinking water guideline (Class 1) has in recent legislation been replaced with the WHO standards. However Class 2 and Class 3 can still be applicable based on a current lack of legislation for the impact on downstream users besides drinking water guidelines.

No guidelines for effluent discharge exist in Liberian legislation and thus:

- Effluent discharge water quality at the point of discharge into the environment downstream of the wetland to be monitored at TSF CMP2 (Appendix A) should adhere to IFC guidelines;

- Groundwater monitoring is also included in the water management plan and arsenic should be monitored in the groundwater downstream of the wetland area at boreholes TSF GMB1, 2 and 3 as indicated on the plan in Appendix A. The water qualities in these boreholes should adhere to the IFC guideline value for arsenic of 0.1 mg/L;
- In light of the current baseline water qualities which show elevated arsenic concentrations, all downstream water qualities monitored at compliance point EDMP2 (Appendix A) should not be rendered less fit for use by mine discharges. With the planned management measure in place it seems that this can be achieved based on modelled concentrations.

All downstream water qualities should not be compromised by mine discharge. This will be achieved by controlling discharge water qualities by keeping it within the recommended IFC standards;

5 IMPACT MANAGEMENT

5.1 NLGM Arsenic balance summary

5.1.1 Input values and scenarios

IFC effluent compliant discharge should occur at concentrations of less than 0.1 mg/L. WHO drinking water standards indicate a maximum allowable limit of 0.01 mg/L with Liberian Class 2 guidelines of 0.05 and a Class 3 limit of 0.2 mg/L. For water management purposes the ideal concentration in downstream location close to water users will be that of the WHO for drinking water. However, achieving this may not always be possible due to high background levels.

Currently the average As concentrations in the NLGM area surface water is 0.01 mg/L, with a maximum during the dry season at 0.038 mg/L and a minimum during the wet season below the detection limit (<0.002 mg/L).

All available data and test results on arsenic leachability from the tailings material and the treatment methods thereof up to date has been reviewed. The following arsenic balance scenarios were simulated:

- **Scenario A1** was simulated using all flow volumes and rates as per monitoring data and the water balance with arsenic input concentrations of 1.26 mg/L;
- **Scenario A2** was simulated using all flow volumes and rates as per monitoring data and the water balance with arsenic input concentrations of 0.8 mg/L;
- **Scenario A3** was simulated using all flow volumes and rates as per monitoring data and the water balance with arsenic input concentrations of 0.004 mg/L; and
- **Scenario A4** was simulated to evaluate what the maximum input concentration is needed to allow IFC discharge guidelines to be reached throughout the year.

5.1.2 Identified compliance points, input concentrations and management options

From the four arsenic balance scenarios the following can be concluded (compliance point indicated in Appendix A:

- To achieve discharge concentration below the RWD a maximum input value of 0.24 mg/L As is allowed onto the TSF; and
- The inclusion of a wetland allows rainfall dilution and evaporation to help the system and allows IFC compliance throughout the year at TSF CMP2 at input concentrations below 0.8 mg/L into the TSF.

If monitoring indicates that the predicted concentrations are not achieved, two management options are recommended:

- Treat the TSF stream from the processing plant to comply with concentrations equal to or lower than 0.8 mg/L As (current indications are that 0.2 mg/L are achievable) to allow discharge from the wetland to comply with IFC guidelines. This will be monitored at point TSF CMP2;
- Keep flow rates in the Marvoe Creek Diversion channel and the Marvoe creek section downstream from the pit at an average flow rates throughout the year through the use of a siphon.

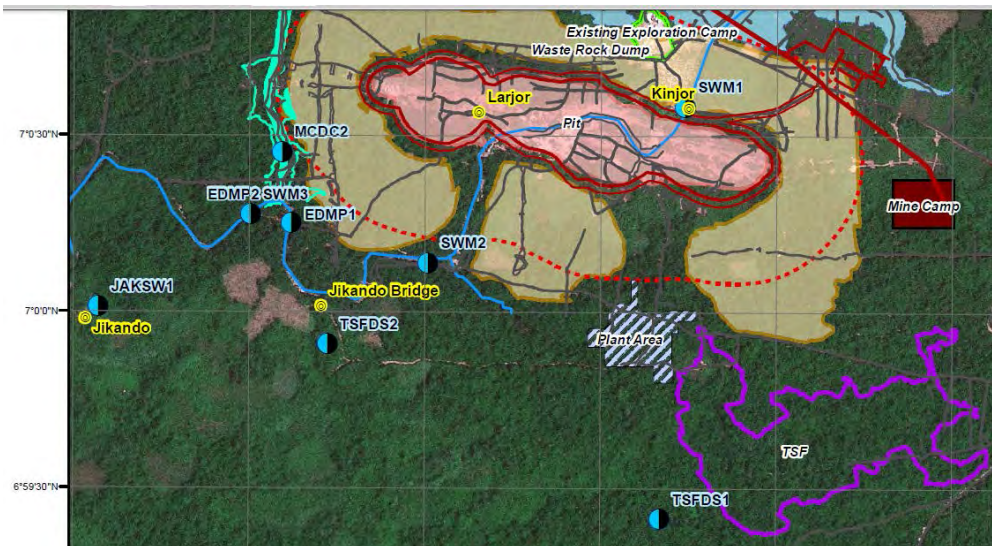
The table below contains some of the leachability data from recent tests for tailings material which has been treated with ferric chloride and then subjected to kinetic column leaches:

Arsenic Leach results (mg/l)	Test JR860	Test JR929	Test JR930
Ferric Chloride addition rate	4kg/t	5 kg/t	6 kg/t
Week 1	0.222	0.038	0.064
Week 2	0.1	0.231	0.212
Week 3	<0.001	0.021	0.031

5.2 Monitoring

The monitoring of arsenic levels was included in the water monitoring program and protocol forming part of the water management plan. The following compliance points and concentrations should be adhered to and are indicated in Appendix A:

- IFC discharge compliance of 0.1 mg/L should be monitored and adhered to at TSFDS1 which serves as the discharge point downstream of the RWD;
- The input level to which arsenic should be treated prior to discharge onto the TSF should be 0.24 mg/L to achieve IFC compliance at TSFDS1;
- If a Wetland is included the IFC discharge compliance of 0.1 mg/L will be monitored at TSF CMP2; and
- Groundwater monitoring is also included in the water management plan and arsenic should be monitored in the TSF area at boreholes TSF GMB 1,2 and 3 as indicated on the plan in Appendix A. The water qualities in these boreholes should adhere to the IFC guideline value for arsenic of 0.1 mg/L; and
- Water quality being monitored at EDMP2 and JAKSW1 should be kept close to baseline levels and the fitness for use not affected.



- Plan 2: Water Management Sampling Points showing points EDMP2 and JAKBH1 in the west and downstream of the mining area

6 REPORTING AND DOCUMENT CONTROL

6.1 Reporting Structure

A water monitoring report containing and summarising weekly, monthly and quarterly data should be produced. Quarterly and annual reports should be produced with water quality and water quantity trends illustrated and interpreted. These reports will be circulated to the Liberian EPA, IFC and local stakeholders and community representatives.

6.2 Type and frequency of reports

- Quarterly monitoring reports to be sent to the IFC and Liberian EPA;

- Annual reports summarising the four annual quarters to be sent to the Liberian EPA, IFC and local stakeholders; and
- Annual Environmental Monitoring Audit and Report to be sent to the Liberian EPA.

6.3 Audits

Annual independent environmental monitoring audits need to be done and reported on with feedback and reports given on an annual basis to the Liberian EPA at the end of each calendar year.

7 IMPLEMENTATION

This plan and the subsequent monitoring program and protocol contains aspects that have already been implemented with additional or outstanding items to be set in progress as the project continues and monitoring indicates the need for mitigation.

7.1 Responsibilities

The responsibility for implementing the different aspects of this plan at construction, operation and decommissioning and closure phases lies with the Engineering, Procurement and Construction (EPC) contractors (during construction) and the environmental management functions within Aureus for the remainder of the time.

7.2 Training

All employees of Aureus and Contractors to Aureus shall be provided with basic training in prior to working on the site. Additional, specialist training shall be provided to mine operators, plant operators and key personnel involved in activities which involve activities likely to impact on the mine footprint and to personnel involved in the activities around site.

8 CONTINGENCY PLANS

If the envisaged discharge requirements are not met by the chemical treatment process proposed by NLGM then the following will be instituted as required:

8.1 Treatment during operation

If the proposed water treatment methods do not achieve the required outflow levels of soluble arsenic then alternative water treatment technologies will be investigated and implemented. This could include:

- Separation of the liquid fraction from the solids and treatment on the liquid fraction. The treatment could include electrochemical means, precipitation or membrane processes.

8.2 Collection and treatment of seepage after closure

Ground water flows will be collected from the seepage collection trenches which will be installed below the TSF walls. This is proposed as there is a possible risk that the longer term concentrations will not be met at the compliance points if the scorodite/ferric arsenate

which will be precipitated in the arsenic precipitation stage does not keep from going in to solution. With groundwater pH's at between 6 and 7, the ferric arsenate precipitates should naturally remain stable. There is a minimal risk of not meeting surface water concentrations as there will be a covering placed over the tailings dam at closure and there will be no ponding of surface water at closure. The risk is therefore entirely in the groundwater component. This treatment will involve:

- Directing the seepage through a specially constructed wetland and passive treatment system containing iron rich boulders as a substrate. This will ensure additional precipitation of arsenic containing water.
- This seepage water will be kept separate from other surface water flows.
- If there is seepage bypassing the seepage collection system causing contamination then this seepage will be collected and pumped into this treatment system.
- If this system does not produce an acceptable discharge then alternative water treatment technologies will be investigated.

9 REFERENCES

DRA. (2013). *New Liberty Arsenic Stability Evaluation*.

EPA Environmental Protection and Management Law of Liberia (2003). Ministry of Foreign Affairs.

EPA. (2007). *The Republic of Liberia National Integrated Water Resources Management Policy*. Ministry of Lands,, Mines and Energy.



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Mining Corp.

A Subsidiary of Aureus Mining Inc.

**ENVIRONMENTAL COMPLIANCE MONITORING
PLAN**

NEW LIBERTY GOLD MINE

AUREUS MINING

9 APRIL 2014

The document is prepared by the Environmental Department, New Liberty Gold Mine, Liberia

Report title: Environmental Compliance Monitoring Plan

Name	Responsibility	Date

ABBREVIATIONS

Abbreviation	Description
ABA	Acid base Accounting
AMD	Acid Mine Drainage
ANC	Acid Neutralising Capacity
APP	Acid Production Potential
ARD	Acid Rock Drainage
BH	Borehole
C	Concentration
EC	Electrical Conductivity
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
FW	Footwall
HW	Hanging wall
IFC	International Finance Corporation
l/s	Litre per second
m ³ /d	Cubic metre per day
m ³ /month	Cubic metre per month
m ³ /ton	Cubic metre per ton
MAE	Mean Annual Evaporation
mamsl	Metre above main sea level

MAP	Mean Annual Precipitation
mbcl	Metre below collar level
mbdl	Metre below datum level
mbgl	Metre below ground level
MCD	Marvoe Creek Dam
MCDC	Marvoe Creek Diversion Channel
mg/kg	Milligram per kilogram
mg/L	Milligram per litre
ML	Metal Leach
NAG	Net Acid Generating
NAPP	Net Acid Production Potential
NLGM	New Liberty Gold Mine
NP	Neutralising Potential
ppm	Parts per million
Q	Flow rate
RWD	Return Water Dam
S%	Sulphur percentage
SPLP	Synthetic Precipitation Leaching Procedure
STP	Sewage Treatment Plant
SWD	Storm Water Dam
SWD	Surface Water
TAPP	Total Acid Production Potential
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
ton/d	Tonnage per day
ton/m	Tonnage per month
TSF	Tailings Storage Facility
TSS	Total Suspended Solids
WHO	World Health Organisation
WRD	Waste Rock Dump

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1 INTRODUCTION

The New Liberty Gold Mine (NLGM) project is situated in a high rainfall area (3.5m/annum) with a drier period occurring during December to February and the wet season from July to September. The project consists of an open pit, a processing facility, a tailings storage facility (TSF), waste rock dump (WRD), a dam and river diversion, and various accommodation and housing areas. Previously there have been numerous artisanal miners operating in the area and construction is currently underway for the larger mining project. This document serves as a guideline document for managing all environmental monitoring which is necessary to ensure a stable environment in which NLGM will cause as low an impact as practically possible. The monitoring programme will also be used to guide management actions and mitigation programmes to ensure their continued effectiveness. It will also serve as a warning system if any control element is not working and further remedial action is required.

2 APPLICATION AND SCOPE

2.1 Objectives

The general objectives for compliance monitoring and ongoing assessment are to:

- Supply information on the performance of the operation to assess if it meets environmental targets – legal compliance, internal targets or guidelines;
- Provide target thresholds for a component out of compliance and to initiate a reaction;
- Supply information on mine control and efficiencies;
- Provide a baseline for the understanding of the operation's impact on the environment and to measure improvements;
- Provide trends in environmental measurements;
- Provide advance warning of a critical situation where the potential failure of pollution prevention and control systems can be detected; and
- Provide information on the impact of the operation on the surrounding communities and environment.

2.2 Monitoring Standards and Safe Guards

It is essential that the users of monitoring results are confident that the work has been done in an objective and rigorous manner and to a recognised standard. This means that whoever does the work must not only achieve a high level of quality, but also must demonstrate this to data users. Appropriate quality requirements are defined in some instances and in others the competent authority may establish them.

NLGM embarked on a principle to use third party certification and accreditation schemes. These can certify or accredit equipment, personnel and laboratories as

conforming to relevant standards specified by the competent authority. Such schemes must be applied at each stage i.e. when designing the monitoring programme, taking samples, making measurements, analysing for chemical content, and interpreting and reporting the results. In addition quality considerations, including for example a range of safeguards involving auditing and checking, are essential to achieve best practice and to ensure that the results of compliance monitoring can be relied on for decisions. Safeguards apply to operators and authorities and to any contractors appointed to do monitoring work.

As well as these safeguards for on-site and laboratory work, safeguards must be applied to the processing, evaluation and assessment of monitoring data, for example by checking that:

- Appropriate statistical methods have been selected and correctly applied,
- Uncertainties in sampling and analyses have been correctly assessed and included.

3 COMPLIANCE MONITORING.

3.1 Monitoring process.

The purpose of monitoring is to follow changes over a period of time and to assess the efficiency of control measures, through a process of repetitive and continued observation, measurement and evaluation of environmental data. Checklists are the most widely used monitoring tools however other monitoring tools include electronic decision support instruments, online digital monitoring instruments and before and after pictures.

The monitoring process is designed such that the process is applicable at a strategic, programme or project level. Specific indicators need to be monitored regularly to ensure that projects/programmes are socially, environmentally and ecologically sustainable. Further, the monitoring process is applicable to all types of monitoring.

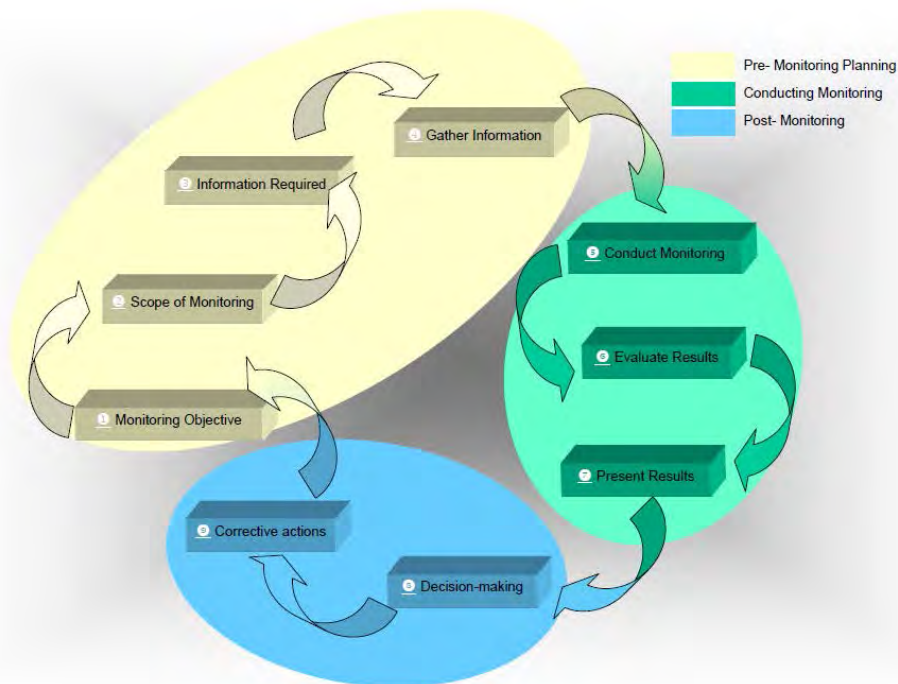


Figure 1: Overview of monitoring process (Ref: Department of Water Affairs and Forestry, 2005 Environmental Monitoring and Auditing Protocol. Integrated Environmental Management Sub-Series No.1.7. Second Edition. Pretoria)

The monitoring process that is adopted by NLGM is regarded as an integrated process in which the results of the monitoring process enables management to take decisions that are based on facts and not speculation. At the same time, monitoring cannot be undertaken unless the process has been thoroughly planned and evaluated. (See Figure 1)

3.2 Legislative requirements necessitating monitoring

NLGM's mining activities are subjected to a number of legislative requirements and standards. A compliance monitoring program therefore has to consider these to ascertain compliance to all of them. A short summary of most of these follows.

3.2.1 National Liberian Legislation and Policies

- o The Liberian Constitution (1986) Article 7
- o The Mineral Policy of Liberia (2010)
- o Ministry of Lands, Mines and Energy
- o Mineral Resources Department
- o National Environmental Policy (2002)
- o National Forest Policy (2006)
- o Forest Development Authority
- o Environmental Protection Agency Act (2003)
- o National Environmental Action Plan
- o Liberia Land Commission Act (2009)
- o Liberia Extractive Industries Transparency Initiative Act (LEITI), (2009)
- o Biodiversity Legislation and Policy

- o National Biodiversity Strategy and Action Plan (NDSAP)
- o Wildlife and National Parks Act (1988)

3.2.2 Management at a local level

- o Statutory Management Practices
- o Traditional Management Practices

3.2.3 International best practice

In addition to adherence to the relevant national standards, best practice for projects in emerging economies is generally informed by those of the international financing organisations. Prime among these are those established by the International Finance Corporation (IFC). Over several decades the IFC has developed various guidelines, policies, performance standards and directives to ensure that environmental and social safeguards are integrated into the planning and implementation of the projects it finances. These are widely considered to set the international benchmark standards across a range of industries.

The following IFC standards and guidelines have informed:

- o The Eight Performance Standards on Social and Environmental Sustainability;
- o Guidance Notes and reference documents;
- o The IFC's Environmental Health and Safety Guidelines for Mining;
- o Guidance and standards for drinking water quality have been taken from the WHO standards; and
- o The World Health Organisation Air Quality Guidelines Global Update.

3.2.4 Equator Principles

The Equator Principles (EPs) were launched in 2003 and are based on the Policy and Performance Standards and on the Environmental Health and Safety Guidelines set down by the IFC.

3.2.5 Corporate Policies

As a local operating company of Aureus, the conduct and operations of NLGM in Liberia will be and are dictated by a suite of guidelines, policies and plans which set out the company's commitment to environmental and social good.

To ensure that these policies and plans are delivered at the local level, Aureus is putting into place a management and monitoring framework which will place the onus on its national and international operating companies to deliver the company commitment.

3.2.6 International obligations, commitments and conventions

Liberia is a party to a range of international conventions, a number of which have relevance to the project.

3.3 Evaluating and Presenting Monitoring Results

The results of the monitoring are evaluated by comparing the information gathered with the targets that were originally identified.

Evaluating monitoring results would involve a similar process to that for auditing, with the exception that certain specific monitoring tools will have their own methods of evaluation. An example of specific methods of evaluation may be the guidelines which describe how to evaluate the results of water quality monitoring. The evaluation/interpretation of the monitoring data is considered the most crucial step of the monitoring process. Decisions on instituting corrective actions are based on the interpretation of the monitoring data.

Monitoring results can be presented as a completed checklist, however it is advisable that trends analyses are compiled. Trend reports are an interpretation of the results of the monitoring reports, and are presented in the form of easily understood graphics.

Unlike audit results, it is not likely that monitoring results will be included in annual reports, though they will probably form part of project reports. The monitoring results must be stored in a suitable information system as they will be required for auditing purposes.

3.4 Decision Making and Corrective Action

The decision-making process will be less strategic and more focussed on correcting environmental performance problems. In monitoring, the decision making process is driven by the need to resolve the non-compliance immediately.

Instituting corrective action in the monitoring process is more immediate than the auditing process. All non-compliance issues will need to be corrected immediately in other words it may not be possible from a timing perspective to implement policy changes in order to improve monitoring results.

The corrective action will be specific to each project and may need the input from all parties working on the project such as the planners, engineers, contractors, IAPs, etc.

Corrective action for monitoring usually involves simple measures designed to stop the immediate problem for the short-term.

Identifying the simple cause of a monitoring finding is fairly straightforward. The checklists should allow the monitor to highlight the areas where environmental problems have arisen. An examination of the facts should then enable the monitor to understand the problem and identify the cause.

Corrective actions need to be devised which are specific to each problem. The assistance of a higher-level decision-maker may be useful in establishing appropriate corrective actions. A suitable deadline for the implementation of a corrective action should be determined. Further monitoring of this corrective action must be included in all future monitoring programmes.

Refer to the Non-compliance and Corrective Action Procedure developed as part of the Management Plans for the NLGM.

4 MONITORING PARAMETERS AT NLGM.

4.1 Water monitoring

A water monitoring program for the majority of sampling was compiled and is illustrated in paragraph 6.2. Water sampling locations are tabled in paragraph 6.1. The following water quality guidelines have to be adhered to:

4.1.1 Surface water quality

Surface water monitoring locations have been selected to include both upstream and downstream locations on streams and rivers that can be potentially influenced by the mining activities. Refer to paragraph 6.1 as well as Figure 2 for the locations of the surface water monitoring points):

- Monitoring points SWM1 and SWM2 are located upstream of the open pit area and are currently being monitored on a quarterly basis to develop a database of water quality that will be representative of upstream water quality before any potential mining influences. The water quality at these two locations should adhere to WHO drinking water standards as well as Liberian Class 2 and 3 guidelines;
- SWM3 forms part of the current monitoring program to evaluate downstream water quality of the Marvoe Creek. Monitoring of this location should continue to evaluate the water quality changes due to effluent discharge from the open pit dewatering program and should adhere to IFC guidelines for effluent discharge;
- TSFCMP2 is a monitoring point located in the stream that will contain discharged water from the Wetland and the TSF circuit. Monitoring results of this point will evaluate the water quality changes resulting from discharge of effluent from the Wetland and TSF and guide the operational team towards the correct treatment regime mitigation to use. Water quality at this point needs to adhere to IFC discharge standards;
- EDMP1 and EDMP2 are two monitoring points within the Marvoe Creek to monitor the dilution of effluent discharged from the open pit and the TSF. EDMP2 should be monitored and should be compared to baseline data;
- MCDC1 will monitor water quality discharged from the Marvoe Creek dam within the Marvoe Creek Diversion Channel (MCDC);
- MCDC2 will monitor water quality of the MCDC downstream from smaller tributaries to measure their influence on the Marvoe Creek before the MCDC converges with the Marvoe Creek and flows to downstream users;
- JAKSW1 is a downstream monitoring point in the surface water stream being used by Jikando village during the wet season. The water quality at this point should be compared to WHO drinking water and Liberian Class 2 and 3

guidelines. It should be noted that this water may not always comply with these standards in pre-mining conditions.; and

- NVSW1 is a monitoring point in the surface water stream located near the position of the relocation village. This point will most probably be used by the new village as water supply for various activities. It should be assessed whether water quality is sufficient for the purposes for which it is used. If not it should be brought to the attention of residents. Drinking water would probably come from boreholes and should adhere to WHO drinking water standards as well as Liberian Class 2 and 3 guidelines. If natural water levels of pollutants are exceeded at this point then alternatives sources of water need to be investigated. It should be noted that naturally high levels of some pollutants may already occur.

4.1.2 Surface water flow and level monitoring

The following monitoring is being implemented for flow and levels in the surface water streams of the area (Refer to paragraph 6.1 for the locations of the surface water monitoring points as well as Figure 2):

- Surface water level monitoring will take place by means of a level logger installed at SWM1. The level logger will be configured to take hourly readings and this data will be downloaded once a month; and
- Weekly flow monitoring at points SWM1, SWM2, and SWM3 by means of portable flow gauges.

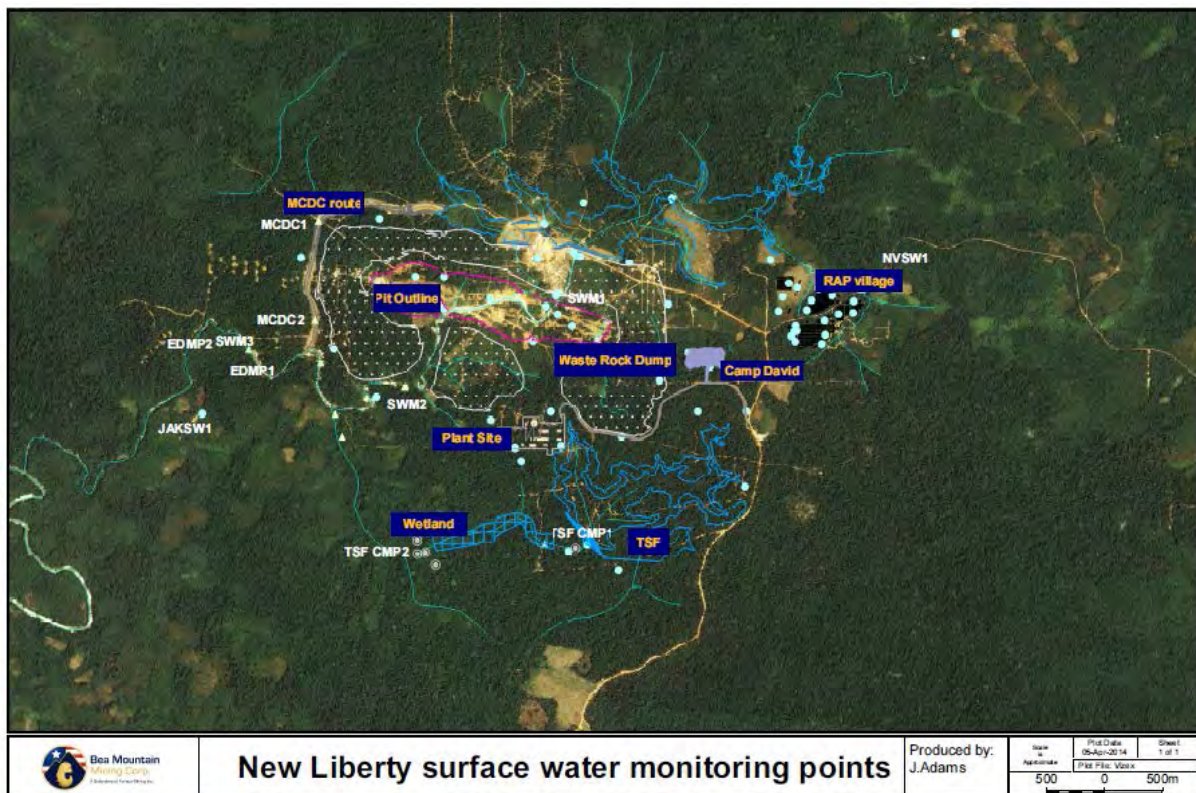


Figure 2: NLGM surface water monitoring points.

4.1.3 Groundwater monitoring points.

4.1.3.1 Water quality.

The following locations were selected for groundwater quality and groundwater level monitoring to include monitoring of both upstream and downstream groundwater receptors that can potentially be influenced by the mining activities (Refer to paragraph 6.1 as well as Figure 3 for the locations of the groundwater monitoring points):

- Monitoring of pit dewatering and potential WRD seepage in boreholes DTW01, DTW02, DTW03, DTW04, DTW05, DTW06, DTW07 and PW002 (to be updated and revised once mining commences);
- Monitoring of potential WRD seepage in boreholes MB01, MB02, MB03, MB04, MB05, MB08, MB09, MB10 and MB15;
- Monitoring of potential TSF seepage in boreholes MB07, MB12, MB13, MB14, MB16 and MB17;
- Monitoring of groundwater flows from the wetland area at TSF GMB1/2/3 to ensure compliance with IFC discharge standards;
- Monitoring of groundwater levels and quality upstream of the Marvoe Creek dam in boreholes MB11 and MB18; and
- Monitoring of water supply boreholes in Jawajai village at borehole JAVBH1 and Jikando village at borehole JAKBH1.

Monitoring of water quality should be evaluated and classed against WHO drinking water and Liberian Class 2 and 3 guidelines.

Newly drilled boreholes used for water supply and monitoring should be included to the monitoring program and plan. Potable water supply for camp and kitchen water should continue in the current manner and is not included in this monitoring protocol description.

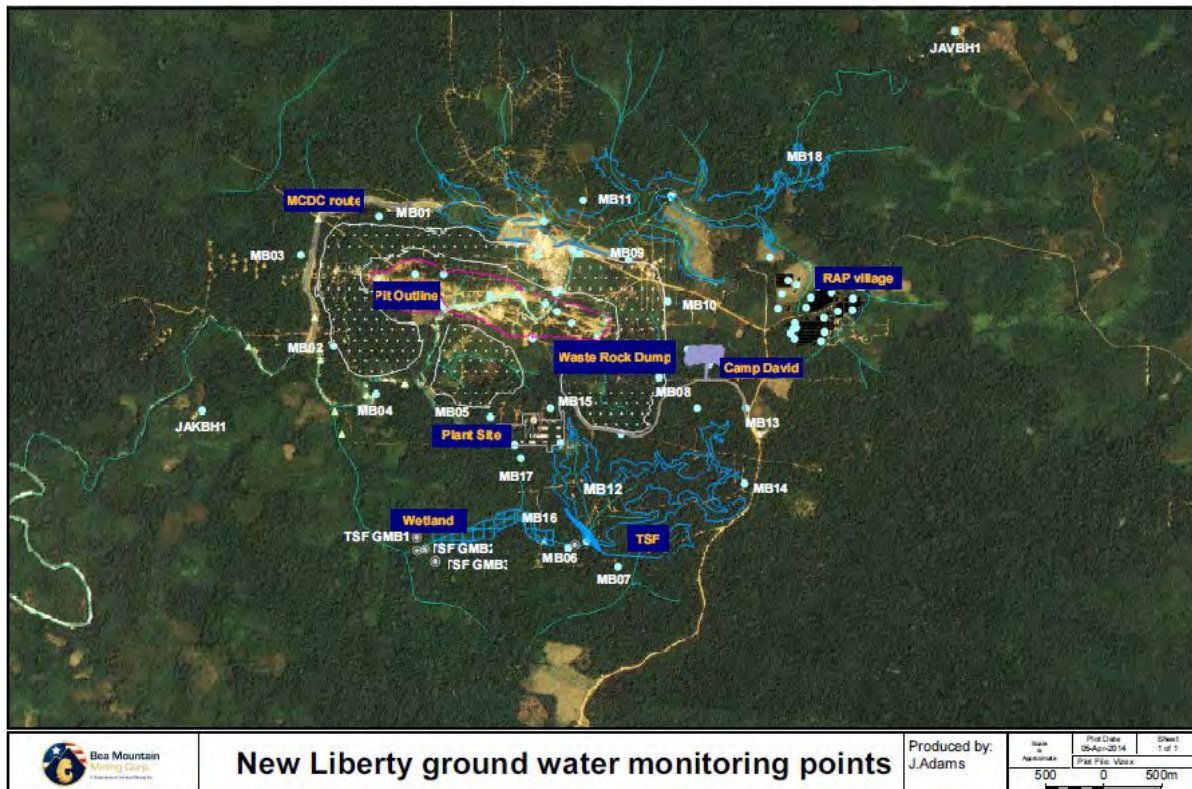


Figure 3: NLGM ground water monitoring points.

4.1.3.2 Groundwater level monitoring.

Groundwater level monitoring is undertaken monthly of all boreholes listed in paragraph 6.1 and visible on Figure 3.

4.1.3.3 Potable water.

All potable water on site and downstream is monitored daily and must adhere to:

- o WHO Drinking water guidelines or existing levels pre-mining activities; and
- o Liberian Class 2 and 3 guidelines.

The parameters measured include pH, EC, TDS, Dissolved oxygen and temperature. These boreholes are situated in the RAP village and sources that will supplies potable water to the present Campsite, Camp David and Plant site.

4.1.4 Effluent discharge

- o Discharged water must adhere to IFC guidelines for discharge at compliance monitoring point TSF CMP2;
- o Boreholes TSF GMB1/2/3 must adhere to IFC Guidelines for discharge; and
- o Downstream quality will be monitored and classed against WHO drinking water and Liberian Class 2 and 3 guidelines. If existing background water qualities do not meet these standards then the quality should meet or better the existing qualities currently observed in the baseline conditions.

4.1.5 Cyanide sampling requirements.

The following sampling requirements based on IFC and ICMC guidelines will be implemented. (Refer to paragraph 6.1, Figure 2 and Figure 3 for locations of these monitoring points)

Sampling locations and frequency

Plant and tailings stream monitoring:

- On-line monitoring as discussed in section 7.3 of the Cyanide management plan will be in place to monitor the plant and tailings stream CN levels.

TSF open water monitoring:

- The open water stream and pool that will be contained on the TSF needs to be monitored for CN on a once weekly basis; and
- The sample needs to be taken within a 10 m radius of the tailings spigot from which the tailings is discharged onto the pool.

Groundwater monitoring:

- Monitoring for CN seepage into the groundwater system from the TSF will be monitored at TSF GMB01, TSF GMB02, and TSF GMB03 on a weekly basis; and
- Monitoring for CN seepage into the groundwater system from the processing plant and TSF will be monitored at MB5, MB15 and MB17 on a weekly basis.

Discharge point monitoring:

- Discharge monitoring for CN will take place at TSFCMP02 on a daily and weekly frequency to monitor the discharged water quality and CN levels to comply with the IFC guideline values.

Downstream surface water monitoring

- Surface water monitoring for CN at EDMP1 and EDMP2 will be done on a weekly basis; and

Surface water monitoring for CN at JAKSW1 will be done on a monthly basis.

4.1.6 Arsenic monitoring.

The monitoring of arsenic levels was included in the water monitoring program and protocol forming part of the water management plan. The following compliance points and concentrations should be adhered to and are indicated in Figure 2 and Figure 3:

- The input level to which arsenic should be treated to prior to discharge onto the TSF should be 0.8 mg/L to achieve IFC compliance of 0.1mg/l at TSFCMP2 below the Wetland;

- Groundwater monitoring is also included in the water management plan and arsenic should be monitored in the TSF area at boreholes TSF GMB 1, 2 and 3 as indicated on Figure 2. The water qualities in these boreholes should adhere to the IFC guideline value for arsenic of 0.1 mg/L; and
- Water quality being monitored at EDMP2 and JAKSW1 should be kept close to baseline levels and the fitness for use not affected (see Figure 3).

The following sampling requirements based on IFC and ICMC guidelines will be implemented.

Sampling locations and frequency

Plant and tailings stream monitoring:

- On-line monitoring as discussed in section 5.2 of the Arsenic management plan will be in place to monitor the plant and tailings stream arsenic levels.

TSF open water monitoring:

- The open water stream and pool that will be contained on the TSF needs to be monitored for arsenic on a once weekly basis; and
- The sample needs to be taken within a 10 m radius of the tailings spigot from which the tailings is discharged onto the pool.

Groundwater monitoring:

- Monitoring for arsenic seepage into the groundwater system from the TSF will be monitored at TSF GMB01, TSF GMB02, and TSF GMB03 on a weekly basis; and
- Monitoring for arsenic seepage into the groundwater system from the processing plant will be monitored at MB5, MB15 and MB17 on a monthly basis.

Discharge point monitoring:

- Discharge monitoring for arsenic will take place at TSFCMP02 on a daily and weekly frequency to monitor the discharged water quality and arsenic levels to comply with the IFC guideline values.

Downstream surface water monitoring

- Surface water monitoring for arsenic at EDMP1 and EDMP2 will be done on a weekly basis; and
- Surface water monitoring for arsenic at JAKSW1 will be done on a monthly basis.

4.2 Air quality.

Applicable air quality standards at NLGM can be summarized as follows:

- The Liberian Environmental Protection and Management Law 2002, Part IV, Section 36 – focussed on Air Quality Standards and guiding principles.
- World Health Organization Ambient Air Quality Guidelines (as used by IFC)
- South African Bureau of Standards (SABS/SANS).

4.2.1 Dust monitoring program.

New Liberty Gold Mine is conducting an ongoing dust monitoring campaign and results are to be used as a baseline. Dust monitoring will continue during the project life in order to establish historical repository of data needed to fully understand/address airborne dust emissions from the construction, operation and closure activities. Managing dust effectively will result in the reduction of respiratory diseases that are as a result of air pollution, reduced risk of damage to property, improved visibility, and fewer disturbances to existing flora and fauna habitats. Dust fallout buckets are installed at all 8 principal wind directions. For the second dust monitoring campaign, monitoring sites will be selected, with emphasis on sensitive receptor sites - downwind of the main sources of dust. (See paragraph 6.2 for a program of dust bucket monitoring)

In the dry season, the Harmattan dust-laden winds blow dust from the Sahara across Liberia and this often causes hazy conditions and dust to settle on surfaces. This natural phenomenon needs to be taken into account in the assessment of the dust levels generated by the mining operation.

In relation to perceived loss of amenity caused by dust, international guidelines advise that dust deposition levels should not exceed 130-350 mg/m²/day to prevent amenity impacts due to dust soiling (e.g. TA Luft). The South African action level for residential areas (SANS 1929, 2004) is 600 mg/m²/day over a 30 day averaging period for mining operations, stockpiles, payloads and unpaved roads (See Table 1). However, the perception of dust will be influenced by the rate of deposition and the time it takes for dust depositions to become visible. Deposition rates may vary widely depending on meteorological factors such as wind speed and direction and variations in the background dust concentrations. The coarser particles causing dust amenity loss are likely to settle close to the source. The dust assessment included within this report therefore focuses on receptors located within 200 m of the facility and any associated infrastructure.

Table 1: Bands of dust fall rates proposed for adoption in South Africa (SANS 1929:2005)

Band number	Band description label	Dust rate (D) (30-day avg.: mg/m ² /day)	Comment
1	Residential	D<600	Permissible for residential and light commercial areas.
2	Industrial	600<D<1200	Permissible for heavy commercial and industrial areas.
3	Action	1200<D<2400	Requires investigation and remediation if two sequential months lie in this band, or if there are more than 3 occurrences in any 12 month period.
4	Alert	D>2400	Immediate action and remediation required following the first exceedance, with an incident report to be submitted to the relevant authority.

4.2.2 PM10 Monitoring program.

NLGM considers establishing a fine particulate monitoring programme, which should include one particulate instrument to monitor PM₁₀ and preferably PM_{2.5} from the open pit and plant area. PM₁₀ instrument should be located to the northeast of the plant area, but not too close to south east pit. The World Health Organisation Standards are relevant (See Table 2).

Table 2: WHO Air Quality Standards to be applied in the Air Quality Assessment

Air quality parameter	Units	Project Standard	
		Averaging period	Concentration
Sulphur dioxide (SO ₂)	µg/m ³	24 hour 10 minute	20 500
Nitrogen Dioxide (NO ₂)	µg/m ³	1 year 1 hour	40 200
Particulate matter PM ₁₀	µg/m ³	1 year 24 hour	20 50
Particulate Matter PM _{2.5}	µg/m ³	1 year 24 hour	10 25
Ozone (O ₃) ¹	µg/m ³	8 hour	100

4.2.3 Gaseous Monitoring Program.

NLGM would establishing an annual monitoring programme during the production phase, which should deploy US EPA approved methods for gaseous pollutants (NO_x, SO₂), as well particulate matter from stacks in the plant and the generators. It is recommended for the stack measurements to use Method 7 for determining NO_x, and Method 6 for determining SO₂ as prescribed by the US EPA (See Table 2), as well as Method 5 for Particulate Matter in order to acquire more accurate stack measurement results. Consideration is also given to measure emissions from the gold room stack in the production phase, even though the assumption is that it will be operational for 832 hours per year. Potential air pollutants that can be discharged

from the gold room stack include arsenic, cadmium, chromium, lead, manganese, mercury, nickel and selenium, depending on the composition of gold ore.

4.3 Noise monitoring.

NLGM will perform six monthly occupational noise measurements at the mine village and the resettlement village. This will be conducted twice a year throughout the construction and operational phase. The standard applicable will be that of the IFC (See Table 3)

Table 3: IFC Standard of noise levels.

Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Night-time 22:00 - 07:00
Residential; institutional; educational.	55	45
Industrial; commercial	70	70

4.4 Meteorological Monitoring Program.

NLGM will continue to deploy meteorological stations at its premises at the Base Camp as well as at the Ndablama camp that measure and record hourly values. The existing stations will be calibrated and programmed to collect hourly values for all the parameters. The following parameters are measured:

- Precipitation. Measured as mm.
- Temperature. Measured as °C.
- Relative Humidity. Measured as %.
- Electromagnetic Radiation. Measured as MJ m².
- Wind direction.
- Barometric Pressure. Measured in mbar.
- Evapotranspiration

5 REPORTING STRUCTURE

The checklists and monitoring reports for environmental monitoring should be kept by the environmental manager and should be stored in a suitable information system. The checklists and reports must be available for use when conducting an audit of projects, programmes, policies etc. It is the responsibility of the person conducting the monitoring to ensure that the environmental monitoring report or checklist is accurately completed, the observations made during the monitoring are correct and true reflection of the actual situation and that the interpretation of the data is logical and factual. The party responsible for performing the environmental must sign the monitoring report.

A monitoring report is not a detailed report, as much of the monitoring information will be contained in the completed checklists.

The monitoring report must begin with basic administrative information related to the monitoring. This includes the date/s that the monitoring was conducted, the type and objective of the monitoring, how the information on the checklist was obtained, who performed the monitoring, which checklists were used, which office or directorate within Aureus was responsible for conducting the monitoring, and any problems encountered during the monitoring process.

The monitoring report should then have a summary that identifies the key findings and recommendations of the monitoring, including a summary of compliance and non-compliance.

A more detailed description of the important monitoring results should then be compiled. The report should also include a physical description of the site, the indicators (if relevant) and monitoring sites. The type of information that will be included in the report, depends on the type of monitoring that was required for the specific purpose.

The report must clearly suggest recommendations or corrective actions that will assist Aureus staff or an external party in attaining compliance. Corrective actions will vary widely and should be decided upon by the person with the delegated powers to institute change.

It is crucial that the monitoring report includes all relevant supporting information, the checklists in particular must be completed in full. Diagrams, photographs, and other data may also form part of the report.

Recommendations to address areas of non-compliance or opportunities to reduce the risk of harm or detriment to the environment resulting from the activity, may also be included. The recommendations should be prioritized and dates for instituting corrective actions should be included where necessary.

5.1 Training

Whoever undertakes the monitoring and auditing needs to be proficient in understanding the area being monitored and how to evaluate compliances in some cases internal resources will be used while in other cases, independent external parties will be called in to perform bi-annual compliance audits. Aureus is to ensure that in each case, the necessary credentials are in place and experience in the field has been obtained.

6 APPENDICES

6.1 NLGM Sampling coordinates.

Monitoring target	Planned ID	Easting	Northing	Type	Date	Taken by	Comments	Actual ID
Marvoe creek upstream	SWM1	263863	775368	Surface monitoring	04/04/2014	Serf Serfontein		SWM1
Marvoe creek upstream	SWM2	262509	774565	Surface monitoring	04/04/2014	Serf Serfontein		SWM2
Marvoe creek downstream (Pit dewatering)	SWM3	262502	774553	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	SWM3
Discharge into the TSF							Point variable as TSF builds	PD1
TSF discharge monitoring	TSFCMP1	263713	773210	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	TSFDS1
TSF discharge monitoring (Wetland)	TSFCMP2	261974	774129	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	TSFDS2
Mine effluent dilution monitoring (Marvoe Creek)	EDMP1	261788	774763	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	EDMP1
Marvoe Creek Diversion Channel (Dam discharge)	MCDC1	261768	775990	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	MCDC1
Marvoe Creek Diversion Channel	MCDC2	261738	775134	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	MCDC2
Jikando surface water use monitoring	JAKSW1	260775	774330	Surface monitoring	04/04/2014	Serf Serfontein		JAKSW1
Mine effluent dilution monitoring (Marvoe Creek)	EDMP2	261165	774881	Surface monitoring		Serf Serfontein	exist but not currently monitored: taken from GW list	EDMP2
New relocation village surface water use monitoring	NVSW1	266442	775410	Surface monitoring	04/04/2014	Serf Serfontein		NVSW1

Monitoring target	Planned ID	Easting	Northing	Type	Date	Taken by	Comments	Actual ID
Q Liner flow measurements	MC1	263863	775368	Q Liner flow measurements	04/04/2014	Serf Serfontein		QL-1
Q Liner flow measurements	MC2	262509	774565	Q Liner flow measurements	04/04/2014	Serf Serfontein		QL-2
Q Liner flow measurements	QL-3	261740	774884	Q Liner flow measurements	04/04/2014	Serf Serfontein		QL-3
Q Liner flow measurements	QL-4	267205	777663	Q Liner flow measurements	04/04/2014	Serf Serfontein		QL-4
Jikando Village borehole	JAKBH1	260765	774327	Groundwater monitoring	04/04/2014	Serf Serfontein		JAKBH1
Jawajai Village borehole	JAVBH1	267253	777602	Groundwater monitoring	04/04/2014	Serf Serfontein		JAVBH1
WRD monitoring	MB01	262285	776005	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 29
WRD monitoring	MB02	261903	774885	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 31
WRD monitoring	MB03	261619	775671	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 30
WRD monitoring	MB04	262258	774468	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 28
WRD monitoring	MB05	263247	774274	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 27
TSF monitoring	MB06	263920	773147	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 20
TSF monitoring	MB07	264351	772984	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 19
WRD monitoring	MB08	264706	774614	Groundwater monitoring	04/04/2014	Serf Serfontein		Hyd 15
WRD monitoring	MB09	264444	775628	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 11
WRD monitoring	MB10	264780	775270	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 12
Marvoe Creek Dam Upstream monitoring	MB11	264049	776138	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 16
TSF monitoring	MB12	264378	774133	Groundwater monitoring	04/04/2014	Serf Serfontein	Damaged	HYD 14
TSF monitoring	MB13	265025	774344	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 14
TSF monitoring	MB14	265434	773699	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 18
WRD monitoring	MB15	263765	774345	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 26
TSF monitoring	MB16	263842	771471	Groundwater monitoring	04/04/2014	Serf Serfontein	Damaged	HYD 21
TSF monitoring	MB17	263511	773917	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 22
Marvoe Creek Dam Upstream monitoring	MB18	264811	776180	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 17
Pit dewatering and WRD monitoring	DTW01	262596	775509	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 34

Monitoring target	Planned ID	Easting	Northing	Type	Date	Taken by	Comments	Actual ID
Pit dewatering and WRD monitoring	DTW02	262841	775230	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 35
Pit dewatering and WRD monitoring	DTW03	263244	775318	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 36
Pit dewatering and WRD monitoring	DTW04	263811	775340	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 23
Pit dewatering and WRD monitoring	DTW05	263824	775182	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 37
Pit dewatering and WRD monitoring	DTW06	263952	775083	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 38
Pit dewatering and WRD monitoring	DTW07	264021	775678	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 39
Pit dewatering and WRD monitoring	PW002	263724	775252	Groundwater monitoring	04/04/2014	Serf Serfontein	Number on casing damaged	HYD 07
RAP water quality monitoring	RAP-WH1	266373	775293	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH1
RAP water quality monitoring	RAP-WH2	266368	775195	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH2
RAP water quality monitoring	RAP-WH3	266242	775185	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH3
RAP water quality monitoring	RAP-WH4	266122	775129	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH4
RAP water quality monitoring	RAP-WH5	266126	775004	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH5
RAP water quality monitoring	RAP-WH6	266096	774928	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH6
RAP water quality monitoring	RAP-WH7	265868	774948	Groundwater monitoring		Serf Serfontein	could not locate: taken from GW list	RAP-WH7
RAP water quality monitoring	RAP-WH8	265858	775030	Groundwater monitoring		Serf Serfontein	could not locate: taken from GW list	RAP-WH8
RAP water quality monitoring	RAP-WH9	265880	775035	Groundwater monitoring		Serf Serfontein	could not locate: taken from GW list	RAP-WH9

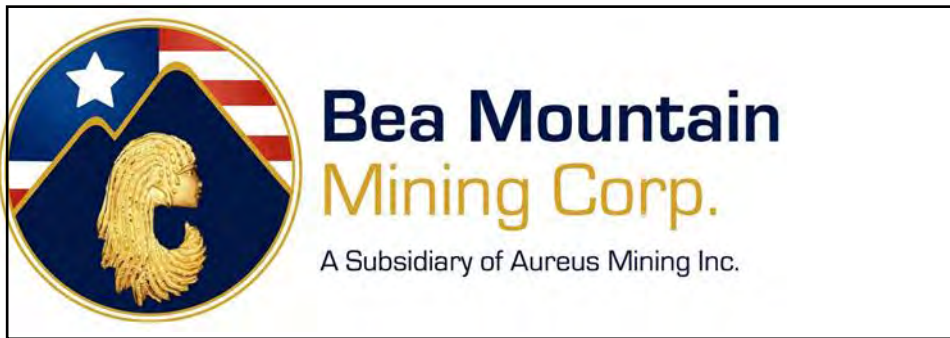
Monitoring target	Planned ID	Easting	Northing	Type	Date	Taken by	Comments	Actual ID
Camp water quality monitoring	CC-WH1	264956	774755	Groundwater monitoring		Serf Serfontein	abandoned- taken from GW list	CC-WH1
Camp water quality monitoring	CC-WH2	264953	774852	Groundwater monitoring		Serf Serfontein	abandoned- taken from GW list	CC-WH2
Camp water quality monitoring	CC-WH3	26220	774889	Groundwater monitoring	04/04/2014	Serf Serfontein		CC-WH3
Camp water quality monitoring	CC-WH4	265235	774740	Groundwater monitoring	04/04/2014	Serf Serfontein		CC-WH4
Camp water quality monitoring	CC-WH5	265129	774730	Groundwater monitoring	04/04/2014	Serf Serfontein		CC-WH5
RAP water quality monitoring	RAP-WH10	265869	775085	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH10
RAP water quality monitoring	RAP-WH11	265759	775332	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH11
RAP water quality monitoring	RAP-WH12	265812	775453	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH12
RAP water quality monitoring	RAP-WH13	265884	775415	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH13
RAP water quality monitoring	RAP-WH14	265968	775219	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH14
RAP water quality monitoring	RAP-WH15	266008	775302	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH15
RAP water quality monitoring	RAP-WH16	266070	775411	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH16
RAP water quality monitoring	RAP-WH17	266187	775341	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH17
RAP water quality monitoring	RAP-WH18	265834	774994	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH18
RAP water quality monitoring	RAP-WH19	265723	775210	Groundwater monitoring	04/04/2014	Serf Serfontein		RAP-WH19
Camp water quality monitoring	CBH-1	263713	775959	Groundwater monitoring	04/04/2014	Serf Serfontein		CBH-1

Monitoring target	Planned ID	Easting	Northing	Type	Date	Taken by	Comments	Actual ID
Camp water quality monitoring	CBH-2	263706	775963	Groundwater monitoring	04/04/2014	Serf Serfontein		CBH-2
Camp water quality monitoring	CBH-3	263650	775663	Groundwater monitoring	04/04/2014	Serf Serfontein	does not exist-taken from GW list	CBH-3
Camp water quality monitoring	CBH-4	263653	775663	Groundwater monitoring	04/04/2014	Serf Serfontein	does not exist-taken from GW list	CBH-4
Boom gate water quality monitoring	BHBG	265445	774348	Groundwater monitoring	04/04/2014	Serf Serfontein		BHBG
Plant site water quality monitoring	PSW-1	263456	774029	Groundwater monitoring	04/04/2014	Serf Serfontein		PSW-1
Plant site water quality monitoring	PSW-2	263854	774045	Groundwater monitoring	04/04/2014	Serf Serfontein		PSW-2
Dust monitoring	DB-1	260702	774317	Dust Monitoring	04/04/2014	Serf Serfontein		DB-1
Dust monitoring	DB-2	261941	774313	Dust Monitoring	04/04/2014	Serf Serfontein		DB-2
Dust monitoring	DB-3	267258	777599	Dust Monitoring	04/04/2014	Serf Serfontein		DB-3
Dust monitoring	DB-4	265197	774794	Dust Monitoring	04/04/2014	Serf Serfontein		DB-4
Dust monitoring	DB-5	265872	774958	Dust Monitoring	04/04/2014	Serf Serfontein		DB-5
Dust monitoring	DB-6	263641	774170	Dust Monitoring	04/04/2014	Serf Serfontein		DB-6
Dust monitoring	DB-7	263606	775782	Dust Monitoring	04/04/2014	Serf Serfontein		DB-7
Dust monitoring	DB-8	262753	775346	Dust Monitoring	04/04/2014	Serf Serfontein		DB-8
Stageboard Bridge	STB-1	263984	775699	Surface monitoring	04/04/2014	Serf Serfontein		STB-1
Pit	PW001	263666	775319	Production well	04/04/2014	Serf Serfontein		HYD 06
Shallow Test Well	STW03	263834	775369	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 08
Shallow Test Well	STW04	263612	774952	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 25
Shallow Test Well	STW05	263961	775713	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 24
Shallow Test Well	STW01	262843	775508	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 32
Shallow Test Well	STW02	262818	775253	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 33
Shallow Test Well	STW06	263947	775079	Groundwater monitoring	04/04/2014	Serf Serfontein		HYD 40
Deep Test Well	DTW08	264079	773203	Groundwater monitoring	04/04/2014	Serf Serfontein	Damaged: co-ordinate taken from GW list	HYD 41
Camp Well 1	CW1	263651	775664	Groundwater monitoring	04/04/2014	Serf Serfontein		CW1
Camp Well 2	CW2	265653	775651	Groundwater monitoring	04/04/2014	Serf Serfontein		CW2

Monitoring target	Planned ID	Easting	Northing	Type	Date	Taken by	Comments	Actual ID
Camp Kitchen	CK	263663	775655	Drinking quality water	04/04/2014	Serf Serfontein		CK
Camp Tank	CT	263464	775696	Drinking quality water	04/04/2014	Serf Serfontein		CT

6.2 NLGM Monitoring program

AUREUS WATER MONITORING PROGRAM - NEW MONITORING PROGRAM 2013-2014						
Measurement frequency	Surface Water Flows Every Week - Monday	Camp Potable water Daily 09:00am	Groundwater Monitoring - Levels Every 1st Thursday & Friday of the Month	Groundwater Monitoring - Quality Every 1st Tuesday & Wednesday of the Quarter	Weather Station 1st of Each Month	Dust Sampling 1st week of every month - Thursdays
Daily		✓				
Weekly	✓		✓			
Bi- Weekly						
Monthly			✓			
Quarterly	✓	✓ (SGS)-4	✓	✓ (SGS) - 20	✓	✓
Annually	✓	✓ (SGS)-4	✓	✓ - 20	✓	✓
POTABLE WATER						
Camp Potable Water Daily 09:00am	CK1 - Camp Kitchen CT - Camp Water tank CW1 - Camp well CW2 - Camp Well	SGS Parameters Potable water pH, Conductivity Electrometric (EC), Total Dissolved Solids (TDS), Alkalinity, Chemical Oxygen Demand (COD), Phenols; and Nutrients: Free and saline ammonia, Nitrate (NO3), Nitrite (NO2), Phosphate (PO4), Ecoli, Arsenic(As)	Daily Qualities - site parameter: (pH, EC, COD,TDS, TEMP, DO,)			
GROUND WATER - BOREHOLES						
SURFACE MONITORING	Sample name	Parameters	Weekly - levels	Quarterly Qualities	pH, EC, TDS, Free CN, SO4, WAD, As, Fe, Al, Turbidity, Alkalinity,As, Al, Sb, Se, Cu, Pb, Ni, Na, K, Ca, F, SO4, Mn, Fe, Mg, Cr, Cd, Hg, Zn, NO3, NO2, NH4, NH3	
Level logger	Marvoe creek upstream	SWM1				
Portable flow gages	Marvoe creek upstream	SWM2				
Portable flow gages	Marvoe creek downstream (Pit dewatering)	SWM3				
Portable flow gages	Marvoe creek upstream	SWM4				
Lever logger	Marvoe creek - bridge camp	SWM5				
Sampling	TSF discharge monitoring	TSFDS1	Quarterly Qualities		(Effluent: pH, EC, TDS, Free CN, SO4, WAD, As, Fe, Al, Turbidity, Alkalinity) (Mcreek: pH, EC, TDS, TSS, Total Hardness, Turbidity, Carbonate Alkalinity, Bicarbonate Alkalinity, Total Alkalinity, Total CN, Free CN) As, Al, Sb, Se, Cu, Pb, Ni, Na, K, Ca, F, SO4, Mn, Fe, Mg, Cr, Cd, Hg, Zn, NO3, NO2, NH4, NH3	
	TSF discharge monitoring (Wetland)	TSFDS2				
	Mine effluent dilution monitoring (Marvoe Creek)	EDMP1				
	Marvoe Creek Diversion Channel (Dam discharge)	MCDC1				
	Marvoe Creek Diversion Channel	MCDC2				
	Jikando surface water use monitoring	JAKSW1				
	Mine effluent dilution monitoring (Marvoe Creek)	EDMP2 (SWM3)				
New relocation village surface water use monitoring	NVSW1					
Ground water	Jikando Village borehole	JAKBH1	Quarterly Qualities		Total Hardness, Turbidity, Carbonate Alkalinity, Bicarbonate Alkalinity, Total, As, Al, Sb, Se, Cu, Pb, Ni, Na, K, Ca, F, SO4, Mn, Fe, pH, EC, TDS, Mg, Cr, Cd, Hg, Zn, NO3, NO2, NH4, NH3 Total CN, Free CN	
	Jarvajai Village borehole	JAVBH1				
	WRD monitoring	MB01				
	WRD monitoring	MB02				
	WRD monitoring	MB03				
	WRD monitoring	MB04				
	WRD monitoring	MB05				
	TSF monitoring	MB06				
	TSF monitoring	MB07				
	WRD monitoring	MB08				
	WRD monitoring	MB09				
	WRD monitoring	MB10				
	Marvoe Creek Dam Upstream	MB11				
	TSF monitoring	MB12				
	TSF monitoring	MB13				
	TSF monitoring	MB14				
	WRD monitoring	MB15				
	TSF monitoring	MB16				
	TSF monitoring	MB17				
	Marvoe Creek Dam Upstream monitoring	MB18				
	Test Holes	DTW01				
		DTW02				
		DTW03				
		DTW04				
		DTW05				
		DTW06				
DTW07						
Pit dewatering and WRD monitoring	PW001					
Ground water	Level Loggers	STW05	Hourly - Once a Monthly			
	Level Loggers	DTW06				
	Level Loggers	DTW07				
Dust Sampling						
Dust Sampling 1st week of every month - Thursdays	Co-ordinates		Parameters	Monthly		
NLIB_DB1 Jikando	260704.6688	774263.9649	Dust fallout	✓		
NLIB_DB2 Jikando Bridge	261939.3163	774329.144		✓		
NLIB_DB3 Javajai	267259.1493	777576.4708		✓		
NLIB_DB4 New Mine Camp	265104.1918	774855.8344		✓		
NLIB_DB5 New Kinjor	266095.931	775077.5631		✓		
NLIB_DB6 Plant Area	263603.319	774150.5247		✓		
NLIB_DB7 Existing Camp	263672.7296	775730.7786		✓		
NLIB_DB8 Existing Larjor Villag	262767.4624	775338.8598		✓		



EMERGENCY RESPONSE PLAN

A/BMMC-ENV-MP-004

AUREUS MINING INC.

March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date

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Mining Corp.**
A Subsidiary of Aureus Mining Inc.

**BEA MOUNTAIN MINING CORP.
New Liberty Gold Mine
EMERGENCY RESPONSE PLAN**

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REVISION INFORMATION

Rev #	Old Section Ref	New Section Ref	Description of Changes
Draft			Edited from "template"

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1. INTRODUCTION

A project of this nature can lead to a number of emergency situations for which an appropriate response is required. As part of the Management Plans, an Emergency Response Plan has been developed which includes more detail on how emergencies will be dealt with. The Emergency Response Plan will apply to all phases of the Project, and is designed to minimize the potential for accidents and emergency situations involving the exploration and construction activities, and the mine's physical structures or operational practices.

The Emergency Response Plan has been developed in conjunction with the other Management Plans developed for specific major construction, operation, decommissioning/ closure, and post-closure phase activities, and will be reviewed and updated, as appropriate, on at least an annual basis. The Emergency Response Plan will identify key emergency-related roles and responsibilities, and will provide direction on required responses to operational or environmental emergencies.

In addition to the emergency notification requirements addressed in the Plan, the circumstances and response actions associated with any significant spills, releases, accidents, near-misses, or other emergency situations for which Aureus has direct responsibility will be documented and investigated, and appropriate corrective and preventive actions will be taken in conformance with the Non-compliance/ Corrective Action Management Plan. Preventive actions in such cases will require a mandatory review of the adequacy and effectiveness of the Emergency Response Plan and its supporting procedures, and subsequent updates as warranted by the results of the review.

The emergency response plan is in place to cover:

- Accidental spills of hazardous materials;
- A major spill or dam/TSF failure;
- Human conflict or violence;
- Other accidents involving personnel on the work sites; and
- Major failures, such as landslides, disease, mine failures, fires, flooding, structural collapse, etc.

2. APPLICATION AND SCOPE

The Emergency Response Plan has been developed and is directed at both the construction and operational phases of the project and is applicable to all personnel either directly employed or contracted by Aureus and has been developed for the entire site.

2.1 Objectives

The overall Emergency Response Plan provides Aureus with the framework and guidance to respond effectively to emergencies or serious incidents, reducing their impact on the project, its people, property and operations. The plan should enable the Aureus to respond effectively to a wide range of adverse events, thus reducing any subsequent impact on the company, its staff and the surrounding environment. As well as environmental emergencies,

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2.2 IFC Guidelines

The IFC General Environmental Health & Safety Guidelines set out the following recommendations with regard to spills and emergency response¹⁴: All projects should have an Emergency Preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements:

- Administration (policy, purpose, distribution, definitions, etc);
- Organization of emergency areas (command centers, medical stations, etc);
- Roles and responsibilities;
- Communication systems;
- Emergency response procedures;
- Emergency resources;
- Training and updating;
- Checklists (role and action list and equipment checklist);
- Business Continuity and Contingency.

IFC Performance Standard 3, Pollution Prevention and Abatement is also relevant to emergency preparedness and response.

3. MANAGEMENT OF EMERGENCY SITUATIONS

All incidents and hazards that relate to the Project 'Duty of Care' will be reported and analysed. Details of how each are to be assessed is briefly documented below with regards to investigating and reporting incidents and hazards. It is the responsibility of the contract sponsor to ensure that employees/contractors working on the project undertake the following when reporting an emergency:

- Type of emergency that has occurred;
- Date and time of the emergency;
- Corrective action that was implemented; and
- Reporting of the incident.

In addition to the above the following must be taken into consideration when reporting of emergencies:

- a requirement that serious incidents which involve a fatality, significant environmental impact, lost time or high potential incident must be reported to Senior Management as soon as possible. The SHEQ Department of the project must be informed as soon as practicable;
- provision for the SHEQ Department to assign a unique incident number to be referenced in the Incident Report and all associated documentation;
- a requirement that the investigation Line Manager be responsible for completing an initial Incident Notification Report to the SHEQ Department no later than 24 hours after the event, and that the;
- Line Manager will be responsible for the investigation and internal reporting of an incident;



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- Provision for the SHEQ Department to resource the investigation using appropriate personnel from the site management team;
- a requirement that all recommendations in the Investigation Report have clear responsibilities allocated and time periods set for implementation; and
- all incidents requiring external reporting will be via the Contractor or Mine Managers.

3.1 Investigation

For all emergencies that occur an investigation is required, it will include the following basic elements:

- identification the root cause and, extent of the incident;
- identification and implementation of the necessary corrective action;
- identification of the personnel responsible for carrying out the corrective action;
- recording of any changes in written procedures required;
- advising the relevant authority (if applicable); and
- implementation or modification of controls necessary to avoid repetition.

3.2 Type and frequency of reports

The table below summarises the reporting channels and associated timeframes associated with reporting of emergencies.

Responsibility			Emergency Level		
	Name	Phone Numbers/emails	Actual Level 3	Potential Level 4 of 5	Actual Level 5
General Manager	Thinus Strydom	0888884029 thinus.strydom@aureus-mining.com	Within 12 hours by phone or email		
Construction Manager (Aureus)	Ian Le Roux	0888779518 ian.leroux@aureus-mining.com			
Site/Client Paramedic (FSL)	Open	Radio Line: FSL SIMPLEX Clinic cell: 0888779527			
Contractor Manager (DRA)	Gawie van der Westhuizen	0888779521 gawievdw@drasa.co.za			
Site SHEQ Manager (Aureus)	Erickson T. Brown	0886228518 / 0886266401 erickson.brown@aureus-mining.com			
Site EHS&S Manager (DRA)	Gerve Warren	0888779519 GerveW@drasa.co.za			
Site HR Manager	Jame Klah Wilson	0886518196 james,wilson@aureus-mining.com	NA	Within 24 hours by email	Immediate by phone
CEO of Company	David Reading	david.reading@aureus-mining.com	NA	NA	Immediate by email

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3.3 Leak Detection and Minimization

The plant and equipment will be designed to reduce the risk of a leak of hazardous or dangerous material. This may, where required, include contingency barriers, fault-monitored sensors to detect leaks, alarms, pressure valves and portable monitors. Particular attention will be given to areas storing or using hazardous material or waste, high-pressure vessels, underground tanks, and utilities that store and transport pressurized natural gas.

3.4 Emergency Shutdown Systems

Process and plant equipment will be designed for Emergency Shutdown Systems contingency where there is potential for a significant incident. These systems can be activated manually by workers at strategic points within the mill, or linked to sensors and alarms that are automatically activated when a calibrated threshold is reached.

In the event that normal power supply is lost (that is, from both turbines and grid), the system will be designed to have an automatic emergency power backup. This will be by fully independent generator/s that switches on following the loss of mains power. The generator will power emergency equipment such as lighting, fire fighting pumps, and boiler feed pumps and a temporary refuge area. An emergency backup powered by battery will provide a third contingency in the event of a disaster occurring.

3.5 Fire / Explosions Prevention

The potential for explosions and fires exists because of the use of volatile materials and pressure vessels on site.

Process event tree analysis will be conducted for major accident events that could lead to explosions, with a focus on the potential for explosions that could escalate into a crisis. This detailed analysis of the potential for explosions will be completed prior to commencement of operations. The analysis will lead to determination of the 'safe distance' between dangerous equipment and the concentration of personnel, and may be completed using modeling of events to determine 'risk contours'.

Fire prevention will focus on an analysis of the following types of fires:

- Flash fire – ignition of flammable vapour cloud e.g. natural gas cloud (explosion can occur if within a pressurized vessel);
- Jet fire – flammable release with momentum effects e.g. vapor jet from fractured pipe;
- Pool fire – flammable or combustible volatile liquid is ignited following a spill. The pool of liquid burns to produce thermal radiation levels that relate to it's properties and size of the flammable source; and
- Material fire – ignition of flammable material e.g. oily rags within a waste skip.

3.6 Fire Protection

If a fire occurs within the mine site, there will be adequate fire fighting resources available either to extinguish the fire or to slow its progress to allow personnel to escape danger. Activation of a fire alarm will be by call points placed in easily accessible locations throughout the facilities. An ascending audible alarm system will be designed to warn of potential emergency or fire and to give an evacuation notice.

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Firefighting equipment will, under international best practice, be designed to include contingency for damage or loss in a disaster situation e.g. firewater pumps with backup water and pump capacity. A study of fire fighting needs will be conducted during detailed design in order to best design an appropriate system for the site.

3.7 Toxic Releases

Event tree analysis during detailed design will be used to determine the potential for toxic releases. These could occur from:

- Cyanide spill/leak in the plant
- toxic gas release from ruptured vessel;
- volatile liquid evaporation producing vapor;
- flashing liquid producing vapor and aerosol;
- fire producing toxic gases; and
- toxic dusts or fumes.

3.8 Oil / Fuel Spill

The HAZID workshop during the design phase will assess potential scenarios for oil and/or fuel spills, particularly from the wharf facility or from external sources. The results of this workshop and further modeling will determine specific engineering design measures or management to reduce this risk to ALARP.

3.9 Disease outbreak

Due to its location, there is a potential for communicable and contagious diseases to occur, such as Ebola virus, in which case an emergency response is required. At present there is no detailed emergency response plan for disease outbreak, however following a review of the facilities and transport options available, Aureus will compile a procedure to deal with disease. The procedure is likely to link into the medical aid cover provided to the site and will need to follow any protocols such a facility requires.

3.10 Emergency Response Codes/Levels

The following section specifies the likely emergency plan/procedures that will be required. The system aspects are structured into five levels, the highest level being a broad description (Code Blue), with increasing detail to procedures (Code Red). A description of these levels is included below.

3.10.1 Code Blue

Where an emergency occurs on site and can be managed initially without external assistance, the

Person in Charge (PIC) will initiate an increase in status if:

- no information is forthcoming from the site of incident;
- the situation is escalating or control has not been established immediately;
- in the PICs, opinion the incident requires additional resources; and
- there is a possible impact to Aureus' reputation.

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3.10.2 Code Yellow

Where an emergency may require external assistance initially and can be controlled by resources on site over time, the PIC may contact the Construction and Mine Managers. The PIC will initiate an increase in status if:

- resources committed are insufficient;
- the situation is escalating or control has not been established immediately; and
- there is possible impact on Aureus' reputation, assets, customers, or continuity of supply.

3.10.3 Code Orange

Where, in an emergency, the site's asset resources have been fully committed; or where the time to bring the incident under control is excessive; or where significant resources are required to control the incident, the appropriate emergency centre and either the Construction and Mine Managers. Other characteristics of this emergency include:

- a significant risk to facility and/or to asset and/or to surrounding area;
- a significant risk to life, to property, and to the environment; and
- likely impact on Aureus' reputation, assets, customers or continuity of supply.

3.10.4 Code Red

Where, in an emergency, all available resources have been committed and the incident is still not under control and the emergency presents a risk to on-going operations, commerce or reputation the Crisis Management Team - CMT Manager will mobilise the CMT and communicate with any established Contractors. The Country Manager will join the CMT.

3.11 Other Components of Emergency Response System

The following components of a typical emergency response system may also require development:

- Emergency centres and personnel responsibilities;
- Simplified emergency flow chart (to be placed on site wall for quick reference);
- Detailed list of contact names and numbers;
- Specific facility and site Emergency Response Plans;
- External affairs team procedures/protocol;
- Crisis Management Team procedures;
- Training and exercise procedures and schedule; and
- Auditing procedure and schedule.

3.12 Immediate Response Guidelines for an Environmental Disaster

These set out the recommended guidelines for the IRT's response to the more common emergency incidents. They are designed to assist Aureus staff to consider appropriate responses and make the best possible decisions during emergency situations. It is important to note that detailed prescriptive



planning for every scenario is both impractical and unwise, as there is a danger that flexibility could be lost. However, these guidelines serve as a useful prompt at each stage of incident resolution. The tables below show the guidelines for environmental disaster response. The Incident Response Team Leader (IRTL) would typically be the Company Security Manager.

3.12.1 PHASE 1: Notification & Escalation – Immediate Actions

No.	Action	Responsible
1	Immediately advise the IRTL, using the Incident Notification Form as a guide for what information needs to be passed.	Observer
2	Establish the nature of the disaster (e.g. solid or liquid material spill) and the nature of the environment affected (e.g. water course, urban area, empty bush land).	IRTL
3	Establish the need for immediate evacuation of casualties or people in danger.	IRTL
4	Notify the site General Manager immediately if there is any likelihood that the disaster may have an impact on Aureus's facilities.	IRTL
5	Notify the Environmental Protection Agency immediately if there is any likelihood that the disaster may have an impact on any land or water resource outside of Aureus's facilities.	HSE Manager
6	Record all events, actions and decisions in an Incident Management Log.	IRTL

3.12.2 PHASE 2: Event Containment – Follow Up Actions

No.	Action	Responsible
7	Determine the events surrounding the environmental disaster: - What type of disaster is it? - Has the immediate risk passed, or does it still exist? - In the case of an impending disaster, what is the expected scale and what areas are likely to be affected? - Is the problem basically soil- or water- or urban-based, or a combination of these? - If water-based, what is the scale of downstream catchment affected?	IRTL
8	Determine the exact nature of the environmental fall-out, both immediate, impending and long term.	HSE Manager
9	Determine whether the Company or its Contractors have the capacity to deal with the incident, or whether specialist support is required.	HSE Manager supported by IRTL
10	Determine what people or assets are threatened in proximity to the event.	IRTL
11	Notify the Environmental Protection Agency if this has not already been done in Phase 1.	HSE Manager
12	Outline the action that needs to be taken to contain and rectify the problem: - What resources are needed? - Who should be assigned to what tasks? - What is the sequence of actions? - What authority is needed to implement the response?	IRTL supported by HSE Manager
13	Verify what action has been taken to date through the observers.	IRTL
14	Verify the actions and resources needed for containment or rectification, obtain necessary authority and commence implementation.	IRTL

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15	Contact all principle staff members and advise them of the situation.	HR
16	Notify the Environmental Protection Agency of the actions being taken and resources mobilised.	HSE Manager
17	Issue an information bulletin via public radio.	IRTL
18	Monitor the containment or rectification process and modify as necessary.	HSE Manager

3.12.3 PHASE 3: Event Recovery – Not Time Critical

No.	Action	Responsible
19	Ensure that the containment process is completed fully and effectively.	HSE Manager
20	Ensure that the rectification process is completed fully and effectively.	HSE Manager
21	Verify the impact on people, assets and the environment. Identify any further actions that may be necessary.	IRTL supported by HSE Manager
22	Issue information bulletin updates as appropriate via public radio or leaflets.	IRTL
23	Monitor local media and be prepared to issue media releases to stop congestion of rumours, should they develop.	IRTL
24	Request Environmental Protection Agency to review action taken and ascertain further needs.	HSE Manager
25	Conduct a post-incident review of incident management procedures.	IRTL
26	Conduct a post-incident impact assessment.	IRTL
27	Ensure lessons learnt are ploughed back into Company and Contractor procedures to avoid a repeat.	GM
28	If the incident had security-related implications, consider the need for an increased physical security presence and preventative security measures.	IRTL
29	Consider the requirement to conduct an additional environmental audit.	HSE Manager

4. IMPLEMENTATION

4.1 Responsibilities

In the event of an emergency of any kind, a Company Emergency Response Team (ERT) is detailed to assemble at an Emergency Control Centre in the NLGM concession area. This takes overall responsibility for all emergency incidents affecting all or significant elements of the Company's operations.

Once the nature of the emergency is understood, the ERT determines the appropriate composition of an Incident Response Team (IRT) to deal with the problem. The IRT would be based at the appropriate concession location and would typically be led by the Company's Security Manager, who is required to be trained in a wide range of emergency response procedures.

Any environmental disaster would automatically have the HSE Manager co-opted into the IRT as a key adviser. The IRT would then operate under the overall direction of the ERT, which would typically be led by either the General Manager (GM) or the appropriate Manager to ensure that adequate resources and authority for actions are immediately available. The ERT would provide management guidance for the IRT in addressing the emergency.

The Construction and Mine Managers are responsible for Emergency Management Planning with overall responsibility for the Emergency Response System. In the event of a crisis occurring the Construction and Mine Manager would assume overall responsibility.

The project SHEQ Department will act as advisers to maintain consistency of the plans and assist with regular emergency response exercises.

4.2 Incident Response Team: HSE Manager's responsibilities

The Health, Safety and Environment Manager is a member of the Incident Response Team. His or her responsibilities can be summarised as:

- Identify HSE impact of the situation;
- Ensure sufficient resources available for consequential management;
- Initiate Flash Report; and
- Co-ordinate incident investigation.

The detailed roles and responsibilities for the HSE Manager are as given below.

IRT Responsibilities – HSE Manager	
1	Join the Incident Response Team as soon as informed by the Emergency Response Team or the IRTL. Until further notice the incidence response takes precedence over all other work or leave. It may require immediate travel to and residence at a different site.
2	Develop as full an understanding as possible of the nature of the incident and the possible immediate and long term impacts on all aspects of the environment.
3	Advise the IRTL on immediate actions that are required to counteract the initial impacts on the environment.
4	Determine what other resources are required to provide detailed specialist technical support, and request the IRTL to arrange these.
5	Decide whether to notify the Environmental Protection Agency in either Phase 1 or Phase 2 of the incident response (see Incident Response Guidelines). Once the EPA has been notified, establish a liaison point within the Agency and arrange to keep them updated as events develop.
6	Work closely with the field teams mobilised by the Company to deal with the incident.
7	Advise the IRTL on the longer term actions and resources that are required to contain and rectify the incident. Emphasis must be given first to minimising and then to rectifying impacts on the environment
8	Monitor the incident response and ascertain whether it is proving effective. Advise the IRTL of any modifications or additions that are necessary to the response.
9	Once the response is substantially complete, check all of the work done and ascertain that it has been fully undertaken to a satisfactory and effective degree.
10	Work with the Environmental Protection Agency to review the actions taken, the lessons learnt and any further work that is required.
11	Produce a formal environmental audit report covering the entire incident and response, on behalf of the Company

4.3 Training

All employees and contractors of Aureus shall be provided with basic training in spill and emergency response.

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All employees, contractors and visitors will be introduced and instructed on the policies and procedures established with this plan. Area specific inductions will be given to individuals working in high risk activity areas such as the mill, the open pit, or the open areas surrounding the mine.

The training for spill response will be part of the worker orientation at the site. All personnel will be made aware of the products present on site through the orientation program and the availability of Material Safety Data Sheets (MSDS) in prominent locations. Supervisors who will fill the role of Spill Response Coordinator, the Spill response Supervisor and the Clean up Crew will receive a more detailed training allowing them to respond quickly and safely to any spill on the site. Specified disaster response teams will receive additional training as well.

4.4 Schedule and Updates

The Environment Manager, in consultation with the General Manager or designate will review the plan on a regular basis. Review of the emergency response procedures will include the periodic verification of any telephone number contacts for the various organizations that may be needed. Such verification will be undertaken at a minimum of once per year.



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5. EMERGENCY HEALTH & SAFETY RESPONSE PROCEDURE

5.1 Procedure



**Bea Mountain
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Emergency Health & Safety Response Procedure

FIRST PERSON ON SCENE

- Keep calm, stop all activities, briefly assess the scene and Call for help Immediately
 - Notify the Clinic and your supervisor immediately on either radio or phone
 - ✓ **Radio Line: FSL SIMPLEX**
 - ✓ **Clinic Cell #: 0888779527**
 - When Reporting and an Emergency situation on radio, Do the following
 - ❖ Identify Yourself
 - ❖ Specify the Location
 - ❖ Approximate Time of Incident
 - ❖ Type of incident
 - ❖ Number of people injured or trapped (**Do not Mention Names**)
 - ❖ What you have done (if any) and Support needed
 - If safe, access the area and make it safe (Either remove casualty from danger or danger from casualty if possible) Continue other emergency action if trained, but do not endanger yourself
 - Call your immediate Supervisor/Foreman/Manager/Safety Team
- If spill try to stop flow into nearby environment, Contain, Lean up and Dispose off**

SUPERVISOR

1. Travel to scene immediately
2. Assess incident and identify emergency response
3. Call for internal emergency response
 - ✓ **Emergency Response Team - Site Clinic or Security Control**
 - ✓ **Project Leader**
4. Contact **SHEQ Manager** immediately: by phone or radio

✓ **Cell #: 0886228490 - Radio Line: Aureus**

SHEQ MANAGER/SUPERVISOR

1. Travel to scene immediately
2. Immediately contact Construction Manager
3. Ensure responders have right PPE
4. Act as emergency response coordinator



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5.2 Aureus/Contractor EMP Contact List

EMP Contact	Name	Phone Numbers/emails
General Manager	Thinus Strydom	0888884029 thinus.strydom@aureus-mining.com
Construction Manager (Aureus)	Ian Le Roux	0888779518 ian.leroux@aureus-mining.com
Site/Client Paramedic (FSL)	Open	Radio Line: FSL SIMPLEX Clinic cell: 0888779527
Contractor Manager (DRA)	Gawie van der Westhuizen	0888779521 gawievdw@drasa.co.za
Site SHEQ Manager (Aureus)	Erickson T. Brown	0886228518 / 0886266401 erickson.brown@aureus-mining.com
Site EHS&S Manager (DRA)	Gerve Warren	0888779519 GerveW@drasa.co.za
Site HR Manager	Jame Klah Wilson	0886518196 james,wilson@aureus-mining.com
CEO of Company	David Reading	david.reading@aureus-mining.com

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Contact at www.aureus-mining.com



CODE OF PRACTICE

TRANSPORTATION MANAGEMENT PLAN

A/BMMC-SHEQ-COP-MP-006

NEW LIBERTY GOLD MINE LIBERIA

AUREUS MINING INC.

MARCH 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date
		SHEQ Manager and Technical Manager		

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Code of Practice

An approved code of practice is a practical guide to achieving the standards of the environment, health, safety and welfare. A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the environment, health and safety duties at BMMC, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The environmental, health and safety duties require license holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the relevant Act and Regulations. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

Compliance with the relevant Act and Regulations may be achieved by following another method, such as a technical or the mining industry standard, if it provides an equivalent or higher standard of work environment, health and safety than the code.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice.

This Code of Practice has been developed as a model code of practice under the MDA *for Regulatory and Operational Reform in Occupational Environment, Health and Safety* for adoption by the BMMC, license holder.

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1. SCOPE AND APPLICATION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of an open pit, a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drafted to integrate the management measures applicable to the project. This Transportation Management Plan (TMP) forms part of the ESHS system and incorporates the mitigation and monitoring measures that have been identified to minimise the environmental impacts relating to the movement of transport both on the mining site and externally.

This Code provides practical guidance for persons conducting a business or undertaking on how to manage the risks associated with transportation within their workplace. It applies to all businesses, departments or undertakings where there is a risk of injury due to the movement of people, vehicles and plant in the workplace, such as warehouses, haul roads, construction sites, exploration areas, access roads and logistics depots, and container or other maintenance or operational yards and or areas.

The guidance may also be useful for persons conducting a business or undertaking who design workplaces and the plant area.

Persons conducting a business or undertaking who carry out construction or maintenance work on or adjacent to public roads should refer to Liberia's national road authority for the relevant transportation management requirements and guidelines.

1.1 How to use this code.

The words 'must', 'requires' or 'mandatory' indicate that a legal requirement exists and must be complied with.

2. INTRODUCTION

There is a risk of death and injury in workplaces where vehicles, plant and pedestrians share the same work areas or traffic routes.

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Transport management involves the safe movement of vehicles (such as cars, trucks and buses), mobile powered plant (such as forklifts) and pedestrians within, through and around sites where work is carried out.

2.1 Who has responsibility for managing transport hazards?

A person conducting a business or undertaking has the primary duty under to ensure, so far as is reasonably practicable, that workers and other persons at the workplace are not exposed to environmental damage, health and safety risks arising from the business or undertaking. This duty includes implementing measures to control the risks of persons being injured due to the movement of vehicles or other moving transport at the workplace.

A person conducting a business or undertaking who has management or control of a workplace must ensure so far as is reasonably practicable, that the workplace, the means of entering and exiting the workplace and anything arising from the workplace is without environmental damage, health and safety risks to any person.

A principal contractor for the construction project has duties that include managing the environment, health and safety risks associated with transport in the vicinity of the workplace that may be affected by construction work carried out in connection with the construction project.

Designers, manufacturers, suppliers and importers of plant or structures must ensure, so far as is reasonably practicable, that the plant or structure is without risks to the environment, health and safety. This includes, for example designing workplaces so that vehicle and pedestrian routes are separated with optimum operator visibility, speed limiters and warning devices.

Officers such as **company directors** have a duty to exercise due diligence to ensure that the business or undertaking complies with the relevant Act and Regulations and this code of conduct. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to manage risks associated with transport in the workplace.

Workers, including those who drive vehicles and operate other transport, must take reasonable care for their own health and safety and must not adversely affect the environment, health and safety of other persons. Workers must also comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to the environment, health and safety at the workplace.

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2.2 What is involved in managing transport?

Effectively controlling the risks associated with transport hazards involves following a systematic process known as risk management consisting of the following steps set out in this Code:

- Identify traffic hazards
- If necessary, assess the risks
- Implement and maintain risk control measures, and
- Review the effectiveness of control measures.

3. RISK MANAGEMENT

Transport management should commence with an identification of the hazards and an assessment of the risks so that effective control measures can be implemented.

Elements to take into account in transport management include:

- pedestrian routes - ensure all pedestrian movements are provided for
- traffic demand - determine the capacity required to accommodate traffic demand. Also decide on the amount of space which must remain open, and where applicable, the times of day when traffic volumes are higher, for example when deliveries are made
- vehicle routes - select the appropriate means of routing traffic at the site, i.e. through, around or past the site or a combination of these and ensuring that all required traffic movements are provided for traffic control and the type of control required – for example using portable or permanent traffic signals or using trained persons to direct traffic
- requirements for special vehicles such as over-dimensional vehicles emergency services access
- parking requirements
- safe access to facilities for visitors, suppliers or customers
- the type of information, instruction, training and supervision required.

3.1 Identifying transport hazards

- Transport hazards occur at the workplace when there is an interaction or potential interaction between pedestrians and vehicles.
- Transport hazards involving vehicles and other transporting vehicles may occur during:
 - o vehicles or plant reversing and manoeuvring
 - o delivery and pick up from operational areas and process lines

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- o picking goods from warehouse operations
- o arrivals or departures
- o loading or unloading on and around vehicles
- o hitching or unhitching of trailers
- o mounting or dismounting from vehicles
- o securing of loads
- o maintenance and other operational work.

Traffic hazards involving pedestrians may occur due to:

- a lack of physical barriers to separate pedestrian walkways and pedestrian crossings
blocked pedestrian routes – for example routes that are obstructed by parked vehicles or equipment can cause pedestrians to divert onto unsafe routes

Pedestrians and vehicles using the same route

- unsuitable and dangerous pedestrian routes – for example if routes are poorly maintained, blind corners or inadequate lighting
- pedestrian routes that have poor drainage and are prone to flooding
- narrow roads where there is not enough room for pedestrians and vehicles
- drivers not being able to see pedestrians, for example when reversing
- poorly designed routes causing pedestrians to take short cuts
- locked emergency doors and gates preventing pedestrians escaping in the event of an emergency
- a lack of disabled access to and within a workplace – for example if a person in a wheelchair is required to use the same ramp used by forklifts
- drivers accessing truck/trailer trays during loading and unloading.

The following methods can help identify hazards associated with the movement of vehicles and pedestrians:

- obtain a floor plan and or a site layout sketch
- examine the way forklifts, vehicles, delivery drivers and pedestrians move or need to move around, and work out the frequency of interaction
- identify the places where there is the potential for a collision to occur – look at floor surfaces, exits, driveways, overhead structures, doorways and housekeeping standards and evaluate the adequacy of any existing risk control measures
- look for blind spots caused by stationary equipment and vehicles, as well as other areas of poor visibility or low lighting levels

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- ask your workers about any problems they have noticed
- talk to pedestrians and incoming drivers about any traffic management problems they encounter at the workplace
- review incident and injury records (including 'near misses')
- review security and other information to identify areas where pedestrians and vehicles interact at various times.

3.2 Assessing the risk

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you determine:

- how severe a risk is
- whether existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

A risk assessment is unnecessary if you already know the risk and how to control it effectively.

Pedestrian movement and vehicles reversing, loading and unloading are the activities most frequently linked with workplace vehicle incidents.

People who work with, or near, vehicles and other transport vehicles such as cars, forklifts, trucks, cranes, semi-trailers, trailers, tractors and earthmoving equipment, are most at risk.

People also at risk may include customers and visitors at workplaces.

Factors that should be considered when assessing the risks arising from traffic hazards include:

- the design and layout of work areas, including:
 - o the physical environment, such as lighting levels and road surfaces
 - o the number and movement of people at the workplace
 - o traffic destination, flow, volume and priorities
 - o the speed of traffic
 - o adequate space for the minimum turning radius of vehicle types accessing the work areas
- the need for load shifting equipment (cranes) and if the equipment is suitable for the task
- the time of day when traffic volumes are higher
- housekeeping for the work area (e.g. cleaning following spills)
- the effectiveness of any existing risk control measures – for example travel paths, physical separation, crossings or speed limits.

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3.3 Controlling the risk

The methods for controlling risk is to rank them from the highest level of protection and reliability to the lowest. This ranking is known as the hierarchy of risk control.

You must always aim to eliminate a hazard, which is the most effective control. If this is not reasonably practicable, you should minimise the risk by working through the other alternatives in the hierarchy.

The hierarchy of control	Examples
Eliminate the hazard	Eliminate the interaction between vehicles and pedestrians. Eliminating hazards is often cheaper and easier to achieve when designing the layout of the workplace.
Substitute with something safer	Use more people-friendly load shifting equipment such as a walker stacker or an automated conveyor system.
Isolate the hazard from people	Physically separate vehicles and other transportation from people by distance, using sturdy barricades or by isolating a delivery area from other pedestrian or work activities.
Use engineering controls	Install speed limiters to relevant areas
Use administrative controls	Create 'no-go zones' that are clearly marked. Use signs and devices such as 2way - mirrors to alert drivers and pedestrians
Use personal protective equipment	Provide high visibility or reflective clothing.

Administrative control measures and personal protective equipment do not control the hazard at the source. **They rely on human behaviour and supervision** and ***used on their own tend to be the least effective control measures*** to minimise risks.

3.4 Reviewing control measures

The controls that you put in place to protect the environment, health and safety of people should be monitored and reviewed regularly to make sure they work as planned. Do not wait until something goes wrong.

You can use the same methods as in the initial hazard identification step to check controls. Consult your workers and their environmental, health and safety representatives and consider the following questions:

- Are the control measures working effectively in both their design and operation?
- Have the control measures introduced new problems?
- How effective is the risk management process? Are all traffic hazards being identified?
- Are traffic safety procedures being followed?
- Has instruction and training provided to workers been successful?
- Are the frequency and severity of the environmental, health and safety incidents reducing over time?

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- If new legislation or new information becomes available, does it indicate current controls may no longer be the most effective?

If problems are found, further decisions are needed regarding control measures.

A checklist to assist in reviewing control measures is at Appendix A.

4 TRANSPORT CONTROL MEASURES

The most important step in managing risks involves eliminating them so far as is reasonably practicable, or if that is not possible, minimising the risks so far as is reasonably practicable.

4.1 Pedestrian routes

The safest way to protect pedestrians is to eliminate the hazard, which means removing the use of all vehicles and other transport in the workplace. Where this is not reasonably practicable the risks must be minimised. For example provide:

- separate traffic routes so that vehicles cannot physically enter pedestrian space
- pedestrian barriers at building entrances and exits to prevent pedestrians walking in front of vehicles
- traffic control barricades.

If this is not reasonably practicable consider:

- gates that are interlocked, hinged so they open towards the pedestrian - these methods create a stop or pause in the pedestrian's movement before entering a traffic area to increase their awareness of any traffic movement
- railings or bollards to protect 'blind' or convex corners of buildings
- vision panels in pedestrian doors entering vehicle areas
- 2 way mirrors for both pedestrians and vehicle use
- pedestrian routes that represent paths people would naturally follow which will encourage pedestrians to stay on designated safe routes and avoid taking potentially hazardous shortcuts
- separate, clearly marked footpaths or walkways, for example using lines painted on the ground or different coloured surfacing (see Figure 1) along with sturdy or light weight barriers and signage.



Figure 1: Walkway marked with lines or bollards

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4.2 Vehicle Routes

Where possible, traffic routes should be separate for both vehicles and pedestrians at the workplace. Traffic routes should be:

- one-way if possible with adequate passing space around stationary vehicles
- wide enough for the largest vehicle using them including the load
- designed with separate entry and exit points for large vehicles
- surfaced with suitable material that is well drained
- clearly sign-posted to indicate restricted parking, visitor parking, speed limits, vehicle movement and other route hazards
- able to take into account routine activities such as meal breaks
- well maintained and free from obstructions, grease, slippery substances or surface damage and pot holes
- without excessive gradients – steep gradients that cannot be avoided should be clearly signposted. Forklift trucks and similar transport / equipment should operate on gradients only if they are designed to do so.

4.2 Safe crossings

If pedestrians have to cross vehicle routes at your workplace, you should consider:

- overhead walkways
- physical barriers with inward opening gates
- interlocked gates or gates with warning devices
- traffic light systems

These control measures should be supplemented with:

- clearly visible ground markings, lights and signs
- clear pedestrian and vehicle visibility.

4.3 Safe Parking

If onsite parking is provided, there should be separation between mobile mining vehicles and equipment and private vehicles. Private vehicles should only be parked in designated areas and away from busy work areas where practicable.

Walkways leading to and from parking areas should be separated from vehicle routes, clearly marked, adequately lit, unobstructed and sign-posted.

4.4 Safe loading and unloading

Loading bays should be situated in locations where vehicles can be manoeuvred easily and safely. They should be clearly sign-posted, protected from adverse weather conditions and be on level ground or platform.

Truck driver safety zones should be provided and clearly marked, and where necessary, protected by physical barriers (see Figure 2). Distance walkway, away from building is determined by speed of operating forklifts and subsequent safe stopping distance.

Figure 2: Example of traffic control for truck loading and unloading



Designated pedestrian walkway, clearly delineated, with physical barriers to ensure isolation of pedestrians.



A pedestrian exclusion zone has been established for a distance equal to the height of the load from the ground plus an additional allowance for the nature of the load.



The driver must be in full view to a forklift operator. All loading or unloading must stop if the driver cannot be seen or needs to enter exclusion zone to inspect load. Alternatively, if it is safe to do so, the system of work can provide for the driver to stay in the cabin during loading and unloading.

4.5 Safe reversing

Where possible, the need for reversing

loading and unloading systems or using

cables

Where this is not possible you should

reorganising loading and unloading pro

Examples of other control measures

Staggered barriers, to

designing reversing areas large enough

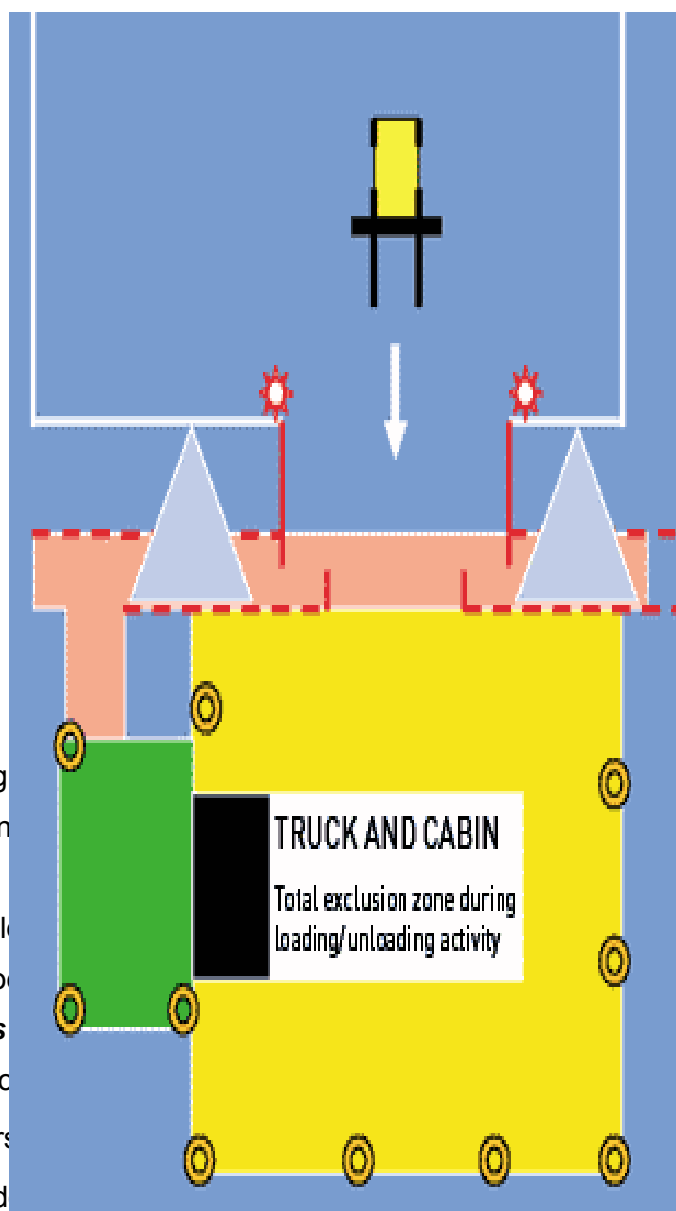
placing fixed mirrors at blind corners

fitting refractive lenses on rear wind

using warning devices such as rotating lights and audible reversing alarms

using radios and other communication systems

providing designated and clearly marked reversing areas



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- excluding non-essential personnel from the area
- ensuring drivers have another person to direct them before reversing if they cannot see clearly behind. The driver should maintain visual contact with the person signalling them and signallers should wear high-visibility clothing
- ensuring visiting drivers are familiar with workplace routes and reversing areas
- ensuring rear vision mirrors, fixed safety mirrors and windscreens are kept clean and in good working order.

Dust suppression

The watering of haul roads to suppress dust has the potential for traffic accidents; either by the water bowser turning over or by the haul roads becoming very slippery because of wet bends and ramps and any other sections of haul road where brakes may be applied. Drivers of water bowsters should take extra care, especially when full, to avoid driving across gradients due to the potential increase in instability of trucks carrying fluids. Water bowser operators should at all times 'patch' spray haul roads and avoid blanket spray or excessive amounts of water being deposited on the roads (especially in braking areas, gradients and junctions of haul roads).

External visitors and deliveries

External Vehicles and Contractors

All delivery vehicles should report to a designated control point to sign in, to receive site rules and site induction as necessary and to receive instructions regarding points of delivery and who to report to.

The site rules should include traffic routes to be taken, parking arrangements, pedestrian control and the need to observe signs and instructions in relation to transport control and segregation, where applicable. At the point of delivery the receipt of the goods will be controlled by a designated person who will ensure that parking and unloading rules are observed. Site specific rules should be prepared to cover the delivery of gas oil, explosives and other hazardous materials. After unloading the delivery vehicle should return to the designated control point to sign out. Plant delivered to site should be escorted to the designated off loading or build area away from other plant movements. The areas should be suitable for all relevant works such as cranes etc.

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4.6 Signs

Potential dangers need to be indicated by suitable warning signs. Drivers and pedestrians should be able to expect that the layout, signs, road furniture and markings on site will be similar to those on public roads.

Signs and lighting should be kept clean and well maintained so that they are always visible.

Signs that should be considered for use along surface mine haul roads include:

- To identify separate traffic routes and inform who can travel them
- To identify safe waiting (holding) areas for working and operational areas
- To identify hazards such as heavy plant crossing points, overhead obstructions, blind corners, steep gradients etc.
- To identify traffic controls such as speed limits, exclusion zones etc.
- To identify pedestrian routes and crossing points.
- Entry to workshop, maintenance, processing etc areas

4.7 Lighting

All routes, manoeuvring areas and yards should be:

- adequately lit, with particular attention to junctions, buildings, plant, walkways and vehicles routes
- designed to avoid extreme light variation, for example drivers moving from bright into dull light or vice versa.

Persons with management or control of powered mobile vehicles or equipment must ensure that the risk colliding with pedestrians or other infrastructure is controlled so far as is reasonably practicable. If there is a possibility of collision, the latter must have a warning device that will warn persons who may be at risk from the movement of the vehicle and or equipment and measures must be taken to eliminate or minimise the risk.

4.8 Forklifts and other powered mobile vehicles or equipment

Control measures to manage the risks include:

- using overhead walkways, high impact physical safety barriers or boom gates
- providing separate entries and exits for pedestrians and moving equipment/vehicles
- staging areas to facilitate alternative load shifting equipment
- isolating pallet racking aisles at warehouse
- using speed-limiting devices and implementing speed limits

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- using proximity devices/notification that trigger signals, boom gates and warning signs
- using a combination of audio (alarms and horns) and visual (flashing lights) warning devices and ensuring these are working when operating
- creating 'no go' zones for pedestrians (e.g. forklift-only areas in loading bays)
- creating 'no go' zones for pedestrian-only areas around mess, amenities and entrances
- removing blind corners and ensuring intersections are well lit
- locating signs to give advance warning to pedestrians and operators and indicate who must give way – implement and enforce procedures that cover when and how pedestrians and moving equipment or vehicles must give way to each other
- implementing systems of work that prevent forward carrying of loads if they prevent clear vision

Speed and stopping distances

- The risk management process should determine the speed limits appropriate for the workplace. Reducing speed is particularly important where administrative controls are the only reasonably practicable control measure.
- Many forklifts do not have speed gauges therefore consider buying or hiring forklifts with speed limiting devices or where this is not possible retro-fit them to existing forklifts.
- Once speed limits are determined, signs should be located so that operators can easily see them and systems should be implemented to ensure speed limits are complied with.
- Table 1 shows the typical distance it takes for a 2.5 tonne forklift to stop once the worker has applied the brakes. This is in optimal conditions: travelling on a dry, even surface with good traction, driven by an alert worker who is not distracted by other activities or fatigued.
- A fully laden forklift cannot use its maximum braking capacity because the load will slide or fall from the tines or the forklift will tip forwards. Stopping distances are often significantly under-estimated.
- Note that the distance at which a forklift can stop is affected by:
 - o the speed at which it is travelling
 - o the weight of its load
 - o its mechanical and tyre condition
 - o the road surface
 - o the size of the forklift and

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- o how it affects visibility.

TABLE 1: Reaction distance and approximate total stopping distance for a 2.5 tonne forklift

Reaction distance and approximate total stopping distance (typical reaction time: 1.5 seconds)							
Speed (Kilometres/hour)	6	12	14	16	18	20	22
Speed (metres/seconds)	1.7	3.3	3.9	4.4	5	5.6	6.1
Distance travelled while driver reacts and begins to apply the brakes in an emergency (metres)	2.5	5	5.8	6.7	7.5	8.3	9.2
Total emergency stopping distance (metres)	2.9-3.2	7-8	8-10	9.5-12	11.14	13-16.5	14.5-19

4.9 Information, instruction, training and supervision

A person conducting a business or undertaking work must ensure, so far as is reasonably practicable, the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their environmental, health and safety arising from work carried out as part of the conduct of the business or undertaking work.

You should ensure that everyone who has access to the workplace including workers, customers and visitors, are aware of the transport management procedures and have information and instructions on designated safe routes, parking areas, no-go zones and speed limits. This should be addressed through the induction process at the area of responsibility.

Visitors should report to the reception or site office, if appropriate, and be given information on Environmental, Health and Safety procedures before they are allowed into areas where moving equipment and vehicles will be used. Provide appropriate supervision to ensure that Environmental, Health and Safety procedures are being followed, particularly if you are relying on administrative control measures to minimise the risk of injury in your area of responsibility.

High risk work licences

Certain types of vehicles/equipment, such as forklifts, trucks and some types of cranes require the operator to have a high risk work licence before they can operate the plant. The licence should be visible on the equipment/vehicle for inspection. If a worker is undertaking training for the high risk work licence, they must be directly supervised by a licenced operator.

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4.10 Transport management plans

A transport management plan may be developed to assist in managing risks and communicating information regarding control measures. It may include details of:

- the desired flow of pedestrian and vehicle movements
- the expected frequency of interaction, vehicles and pedestrians
- traffic controls for each expected interaction, including illustrations of the layout of barriers, walkways, signs and general arrangements to warn and guide traffic around, past, or through a work site or temporary hazard
- roles and responsibilities of persons in the workplace for traffic management
- instructions or procedures associated with the control of traffic, including in an emergency.

4.11 Specific requirements for construction work

Where high risk construction work is carried out a safe work method statement (SWMS) must be prepared before work commences. High risk construction work includes construction work that is carried out:

- in an area of a workplace in which there is any movement of mobile equipment
- on, in or adjacent to a road, or other traffic corridor that is in use by traffic other than pedestrians.

The SWMS must identify the high risk construction work, specify associated hazards, describe measures to control risks and how these will be implemented.

Information and instruction for workers involved in construction work must include the contents of SWMS and workers must have easy access to the relevant SWMS at the workplace.

If the work undertaken is classified as a construction project, the principal contractor must prepare a WHS management plan. The WHS management plan sets out the arrangements to manage the risks associated with more complex construction projects, and in particular this relates to the interaction and co-ordination of a number of contractors and subcontractors.

Transport management planning and SWMS should be incorporated in the WHS management plan. Further information on the preparation of SWMS and EHS management plans is available in the *Contractors pack*.

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APPENDIX A: TRAFFIC CONTROL CHECKLIST

Have the following been considered?	Yes	No	Comments/Action
Separation			
Are separate entries and exits provided for vehicles and pedestrians (including visitors)?			
Do the entries and exits protect pedestrians from being struck by vehicles			
Does the layout of the workplace effectively separate pedestrians, vehicle and other mobiles?			
Are systems in place to keep pedestrians and moving vehicles or mobile equipment apart, e.g. physical barriers, no-go zones?			
Vehicle Routes			
Are the roads and pathways within the workplace suitable for the types of volumes of vehicular traffic?			
Are loading zones clearly marked?			
Are there adequate numbers of suitable parking places for all vehicles and are they used?			
Are traffic directions clearly marked and visible?			
Is there a properly designed and signed one-way system used on vehicle routes within the workplace?			
Are vehicle routes wide enough?			
Do vehicle routes have firm and even surfaces?			
Are vehicle routes kept clear from obstructions and other hazards?			
Are vehicle routes well maintained?			
Do vehicle routes avoid sharp or blind corners?			
Pedestrian routes			
Are pedestrian walkways separated from vehicles?			
Where necessary, are there safe pedestrian crossings on vehicle routes?			
Is there a safe pedestrian route that allows visitors to access the site office and facilities?			
Are pedestrian walkways well maintained?			
Are pedestrian walkways separated from vehicles?			
Vehicle movement			
Have drive-through, one-way systems been used wherever possible to reduce the need for reversing?			
Are vehicles slowed to safe speeds, for example speed limiters traffic routes?			
Do drivers use the correct routes, drive within the speed limit and follow site rules?			
Signs			
Are there appropriate speed limit signs?			
Are there clear warnings of hazards?			
Is there clear signage of pedestrian and exclusion zones?			
Is lighting adequate to ensure that signs are visible, particularly at night?			

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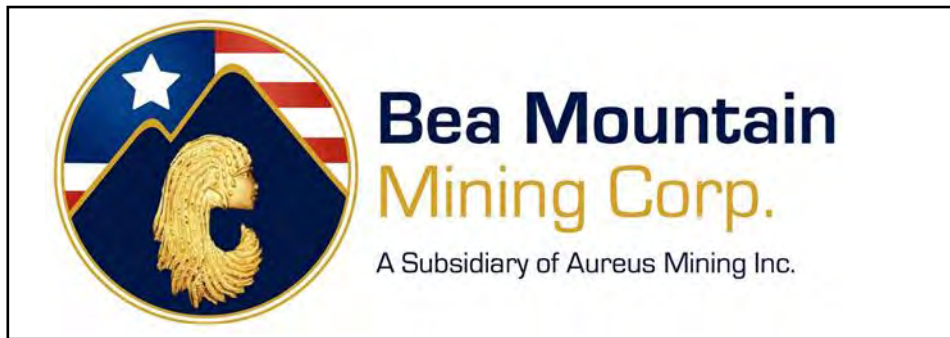
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New Liberty Gold Mine
TRANSPORT MANAGEMENT PLAN**

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Have the following been considered?	Yes	No	Comments/Action
Warning devices			
Are flashing lights, rotating lights, and reversing alarms installed on mobile equipment and vehicles?			

Have the following been considered?	Yes	No	Comments/Action
Information, training and supervision			
Do mobile operators have relevant high risk work licences and are trained in operating the particular model being used?			
Have workers received site specific training and information on particular hazards, speed limits, appropriate parking and loading areas?			
Is information and instruction about safe movement around the workplace provided to visitors and external delivery drivers?			
Is the level of supervision sufficient to check traffic movement and ensure safety of pedestrians and drivers?			
Personal Protective Equipment			
Is PPE such as high visibility clothing provided and used where necessary?			
Vehicle safety			
Have suitable vehicles and mobiles been selected for the tasks to be undertaken?			
Do vehicles have good direct visibility or devices for improving vision e.g. external and side mirrors?			
Are vehicles fitted with effective service and parking brakes?			
Do vehicles and mobiles have seatbelts where necessary?			
Are there guards to prevent access to dangerous parts of the vehicles, e.g. power take-offs, chain drives, exposed exhaust pipes?			
Is there a regular maintenance program for vehicles and mobile equipment e.g. cranes?			
Is there a system for reporting faults on vehicles and mobile?			
Do drivers carry out daily basic safety checks before using vehicles?			

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SECURITY MANAGEMENT PLAN

A/BMCC-SHEQ-MP-008

AUREUS MINING INC.

March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date

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SECURITY MANAGEMENT PLAN**

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1 INTRODUCTION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of an open pit, a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvoe Creek, accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drawn up to integrate the management measures applicable to the project. This Security Management Plan forms part of the ESHS system and incorporates the mitigation and monitoring measures that have been identified to manage security in and around the operations.

2 APPLICATION AND SCOPE

The security management plan will apply throughout the life of the operation and should be in place prior to construction when security risks are normally higher.

2.1 Objectives

The objectives of the Security Management plan include:

- Ensure security measures on site are implemented to reduce risks;
- Maintain the safety and security of the mines assets, personnel and property;
- Be prepared and ready to assist with emergency situations.

3 SECURITY MANAGEMENT

The first step in managing site security issues is to identify and assess all risk factors applicable to the individual site. Once the identification process is complete, a specific site-security plan can be developed as a resource document to illustrate the objectives, strategies and responsibilities required to meet the site's safety, health and security goals. This plan forms a framework, following from which site specific security plans can be implemented around the NLGM, where applicable.

The following aspects will be taken into account for this plan:

3.1 Access and Security

- Aureus, NLGM Protection Services is responsible for the security and control of the movement of persons in the workplace/premises.
- It is expected that the contractor's responsible person and all contractor's employees will give their full co-operation to the Protection Services Officers in the execution of their duties.
- No firearms shall be taken into the workplace/premises.
- No liquor shall be taken into the workplace/premises.
- Drugs are prohibited on the premises/ workplace, unless authorised by a Medical Practitioner who is fully aware of the duties to be performed by the contractor's employees.

- The contractor and the contractor's employees shall not take photographic equipment functions into the workplace/premises without prior approval from AUREUS, NEW LIBERTY GOLD MINE.
- No photos shall be taken. Taking photos without necessary authorisation will lead to a breach of contract.

3.2 General Security Rules on Site

Disobedience

Any person who fails to obey any instruction given to him in accordance with or for the proper observance of the requirements of the legislation and AUREUS, NEW LIBERTY GOLD MINE's, ESH programme, shall have disciplinary action taken against him, which could lead to removal from premises/ workplace.

Horseplay

No person shall engage in any form of horseplay on premises/ workplace. Such persons shall be removed from site.

Sleeping

No person shall sleep on premises/ workplace.

Assaults

- All assaults shall be reported immediately to the Aureus NLGM Protection/ Security Services and to the Liberian Police Services.
- All parties involved in the assault shall be suspended from premises/ workplace pending the outcome of the investigation.

Intoxication or Incapability

An employer or a user of machinery, as the case may be, shall not permit any person on premises/ workplace, who is or who appears to be intoxicated or if such a person's presence constitutes a threat to safety, to himself or other persons and shall be removed from premises/ workplace. Aureus New Liberty Gold Mine, reserves the right to do random alcohol and drug testing from time to time.

Recognised/Access routes

- Only official roads, walkways and recognised rights-of-way shall be used in the workplace/premises.
- When inside buildings, contractor's employees shall keep to the demarcated walkways.
- Contractors and their employees are not permitted to take short cuts between buildings and process lines to and from the construction premises/ workplace.
- Speed limits to be adhered to at all times
- Head lights engaged at all times inside the mining concession area
- Where necessary, visitors will be escorted through areas of high security risk

3.3 Security During Emergencies

Due to the mining operations being located in Liberia, there are a number of emergency situations which could arise which would lead to security risks and need to be managed. These emergencies could include:

- Protestor activity, including threats to the operation from a wide variety of people ranging from environmental groups through to potential terrorist threats, as well as managing any number of confrontations that can erupt between internal and external groups on any given day.
- Weather conditions are subject to high temperatures and heavy rainfall. This has meant that security team must be prepared in emergency response procedures in order to assist where possible.
- Loss of electricity and telecommunications due to supplier issues or site management issues.

3.4 Working with Communities

In order to reduce the security risk of unrest and conflict, it is important that Aureus maintains a good relationship with both its staff, and the local communities. This can be achieved by complying with the Stakeholder Engagement Plan and following up any grievances lodged. Where necessary meetings or workshops can be held to discuss issues of concern or contention. Should it appear that violence could escalate, the security systems should be alerted and if required, the emergency response mechanism implemented.

3.5 Security Personnel

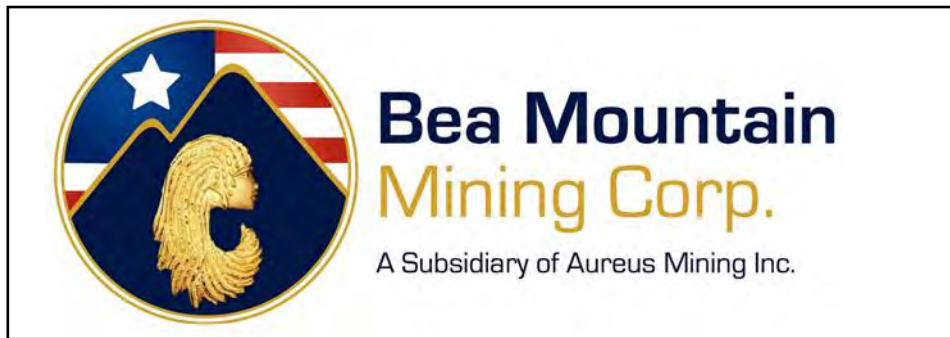
While the provision of security involves carefully designed systems, processes and technology, it is primarily about people. An experienced security team can assist in the maintenance of a safety culture, reduce expenditure due to theft and control access to ensure only authorised personnel can enter a site. These tasks are all vital to achieving the objectives set.

The HR department should ensure appropriately skilled and mentally competent personnel are selected for security jobs. Personnel shall be required to demonstrate that have not been involved in past misconduct and/or human rights abuses, and will use force only when necessary and to an extent proportional to the threat.

4 TRAINING

Any successful security plan for a mining environment must incorporate a comprehensive site-security training program. Staff must also be given appropriate risk management training as well as the tools needed for identifying hazards and taking the appropriate action when such hazards are discovered. This includes knowledge of the Management Plans that deal with hazards, risks and compliance under the ESHS System.

Security staff must also be thoroughly trained in emergency management, procedures and equipment, as well as such tasks such as vehicle and bag searches, key-control management and auditing, regular patrols and visual awareness, incident response, investigation and action, and report writing and communication of all security-related matters.



LABOUR MANAGEMENT PLAN

A/BMMC-SHEQ-MP-009

AUREUS MINING INC.

March 2014

Revision	Prepared by	Approved by (position)	Signature of Approver	Date

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LABOUR MANAGEMENT PLAN

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1. INTRODUCTION

Aureus Mining Inc. (Aureus) intends to develop an open pit gold mine within its 457 km² mining license area in Liberia called the New Liberty Gold Mine (NLGM). The project will consist of the construction of an open pit, a gold processing plant, a Tailings Storage Facility (TSF), a Waste Rock Dump (WRD), a diversion channel for the Marvov Creek, accommodation facilities, administrative offices and haul roads.

An Environmental, Social, Health and Safety (ESHS) Management System has been drawn up to integrate the management measures applicable to the project. This Labour Management Plan forms part of the ESHS system and incorporates the procedures that apply to the labour force throughout the project operations.

2. SCOPE AND OBJECTIVES

The Labour Management Plan refers not only to the employment for the NLGM, but also to the longer term skills development and career progression of the employees. The following are objectives of this plan:

- Promote employment and advanced the social and economic welfare;
- Contribute towards the socio-economic development of the areas in which the company is operating and employs the majority of the workforce is sourced;
- Utilize and expand the existing skills base for the empowerment and to serve the community.

3. EMPLOYMENT AT THE NLGM

Aureus is committed to a fair and consistent approach to recruitment and selection. NLGM employs on the basis of merit as compared to job requirements and does not discriminate on grounds of age, ethnic or social origin, gender, sexual orientation, politics or religion.

Aureus employs an HR Manager who will manage the hiring process based on the following aspects:

- Identification of a recruitment need;
- Development and review of job descriptions;
- Select appropriate methods of recruitment (this might involve using recruitment service providers);
- Advertise the position in an open and fair manner;
- Review and screen applications;
- Identify preferred candidates;
- Offer an appointment.

Employees will be asked to sign employment contracts which will contain policies, procedures and plans to which the candidate is expected to comply with. The contract will also deal with employment aspect such as termination of employment, any benefits or allowances as well as the legal framework within which the company and its employees operate.

Aureus will, as far as possible, focus on employing locally from the community, Liberia and where skills are not available, outside labour. The process of employment and skills assessment will be communicated to the local community to ensure they have an opportunity to apply.

Should any employment contract be terminated, Aureus will develop a procedure for termination of a contract that is in line with Liberian regulations.

3.1 Employment Reporting

Due to the NLGM being a new operation, it is expected that there will be a high levels of hiring in the initial stages of development. Aureus demonstrates its commitment to ensure diversity in management at all decision making positions and the workforce. Aureus will indicate the annual progressive targets as follows.

- Occupational levels: top management, senior management, middle management, junior management;
- Core skills;
- Gender;
- Ethnicity.

Aureus will also report back on any other requirements as set out by the Liberian authority or Lender requirements.

4. HUMAN RESOURCE DEVELOPMENT PROGRAMME

The primary objective of human resource development programme is to ensure development of requisite skills in respect of training, learnership, bursaries (of core and critical skills), artisans, Adult Basic Education and Training (ABET) and other vocational training initiatives that reflect on the demography of mining communities.

Thus, Aureus will demonstrate its compliance with the Liberian skills development legislation.

It will ensure the following:

- Confirmation of having appointed a skills Development facilitator or trainer;
- Provide a workplace skills plan and the target.

4.1 Skills Development Plan

Aureus will draft a skills development plan that outlines how the mine intends to offer employees development of requisite skills. The following should be provided.

- Number and Education levels of the workforce;
- Determine current illiteracy level and the ABET needs;
- Provide the target to be trained and the timeframe;
- Provide how ABET would be implemented in short and long term.

Beside the ABET plan, Aureus will provide the core business training, job skills and other training.

Aureus will set up the targets and timeframes for such training, also provide how the training would be implemented.

Regarding training, Aureus will provide internal job skills training for the benefit of employees as Career Development and the external job skills training- for non-employees as Capacity Building for human capital in the mining community.

4.2 Career Progression Plan

Aureus will put in place a career development matrix of each discipline (inclusive of minimum entry requirement and timeframes). This will include:

- Develop individual professional development plan for employees.

This provision will be a comprehensive plan with targets, timeframes and how the plan would be implemented. It will include the following:

- Current position;
- Training intervention;
- Qualification to be achieved;
- Time frame to complete;
- Number of identified employees (new and those have many years of work).

Aureus will incorporate into its labour policy the opportunity for every employee to be developed in line with the normal progression procedure.

4.3 Mentorship Plan

Aureus will set up a Mentorship Plan for employees. It will involve:

- Identify areas of development that require mentoring, provide a plan highlighting number of mentors and mentees with target and timeframes and how the plan will be implemented.
- Develop appraisal Performance form detailing the Keys Performance Indicators and the Key Performance Areas to track trend.
- Individual development programmes that will address the following.
 - Focus on learners, career progression targets, employment equity targets, interns and bursars;
 - Detailed plan with targets, timeframe and how to achieve.

The mentorship matrix will consist of the following.

- Mentoring programme;
- Career deliverables;
- Duration;
- Target;
- Gender.

The mentorship will be made available for all levels of the workforce.

4.4 Bursary and Internship Plan

The aim of the Bursary and Internship Plan is to provide bursary and experiential learning opportunities to employees and mine communities.

In this regard Aureus has committed to apply a fair selection criteria. The plan must be framed to the skills development plan, and focus to building capacity in various skills and careers for employees and mine communities.

4.4.1 Bursary Plan

Aureus will provide a bursary scheme in terms of training, apprenticeship and learning in line with the needs of the company.

Aureus will draft the plan, provide areas of learning and separate internal and external bursaries. The plan will also specify whether bursaries are continuous or new intakes.

The bursary matrix will contain.

- Bursary field;
- Total number;
- Budget;
- Target and timelines.

4.4.2 Internship Plan

- Aureus will provide targets, timeframes and budget;
- Provide areas of learning in line with the needs of the company in the immediate and long terms;
- Provide how interns would be afforded the opportunity for experiential learning;
- Separate internal and external internship;
- Inclusion of own funded students;
- Aureus will also ensure that the plan reflect the demographics features of the employees, their family and the mine communities.

5. MINE COMMUNITY DEVELOPMENT

Aureus is committed to contribute towards community development, both in terms of size and impact to ensure its social license to operate is maintained.

Aureus will consult and co-operate with the mine communities, local development agencies and other relevant stakeholders (public and non-government) in the promotion of sustainable development in the project area and surrounding communities.

In addition, Aureus will demonstrate its contribution to infrastructure and poverty eradication projects in the area. There are opportunities to provide needs of the area in order of priority. For example.

- General assistance: education, clinic
- Specific assistance: infrastructure
- Type of need: infrastructure, logistics

The Social Development Plan discusses community development programmes in more detail.

Aureus will ensure that all the projects will have a positive impact on the community and in the area.

6. MANAGEMENT OF DOWNSCALING AND RETRENCHMENT

In the event where downscaling and retrenchment is foreseen, Aureus will initiate the forum as frame work of debate to prepare the employee for such events and assist the affected employees with alternative forms of employment or sustainable livelihood opportunities. The forum will be attended by employees, Aureus mine management, communities, government authorities and communities and NGOs.

The discussion will be but not limited to.

- Mechanisms to save jobs, provide alternative solutions and procedures for creating job security where job losses cannot be avoided
- Outline the process to be followed in managing retrenchments with consultation with the stakeholders,
- Mechanism to ameliorate the social and economic impact on individual, regions and economies where retrenchment or closure is certain,

The process will include but not limited to:

- Comprehensive self-employment training programme
- Comprehensive training and re-employment programme
- Comprehensive portable skills development plan
- Outline the project earmarked for absorbing the retrenches

Aureus New Liberty will draft a labour policies that depict the following:

- Create a safe and health workplace of zero harm
- Create employment and good training opportunities
- Give preference to hiring a locally or regionally-based workforce

7. RESPONSIBILITIES

There will be a number of management tasks to be undertaken to ensure that the selection, recruitment and installation of new labour is undertaken in a manner that is efficient, transparent and suits Aureus' needs. The internal structure of key roles and responsibilities for the hiring of the labour force has not yet been defined, however several key role players will be required, and their tasks described below.

Hiring Manager

- a. to identify the recruitment need;
- b. ensuring positions are on the Workforce plan and budget;
- c. updating job descriptions;
- d. ensuring positions have been graded;
- e. preparing a statement in case of direct appointment;

- f. participating in recruitment planning;
- g. shortlisting candidates
- h. participating in the selection process as a member of the selection committee ;
- i. conducting phone screening with the recruiter;
- j. finalizing and approving job offers prior to be presenting to a candidate; and
- k. assisting a recruitment officer to provide unsuccessful applicants with feedback as requested.

Recruitment Officer/Manager

- a. providing advice and support where requested;
- b. planning a recruitment campaign;
- c. designing and placing job advertisements;
- d. recommending on selection tools to be used in a campaign;
- e. assist the hiring manager in shortlisting applicants when needed;
- f. collecting information on previous employment with Aureus where applicable;
- g. conducting phone screening;
- h. designing selection tools;
- i. creating and maintaining records of each recruitment campaign;
- j. conducting or arranging for reference and pre-employment checks;
- k. calculating provisional salaries;
- l. drafting letters of offer,
- m. distributing letters of offer
- n. notifying appropriate personnel of accepted offers; and
- o. arranging for notification of unsuccessful applicants

Selection % Remuneration Committee

- a. Reviewing candidate's performance during selection process;
- b. Identifying a preferred candidate;
- c. Creating eligibility lists.
- d. assigning positions to a salary grade level; and
- e. endorsing salary amounts prior to offer.



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CONTRACTORS MANAGEMENT PLAN

A/BMMC-ENV-MP-013

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NOTICE

It is the Contractor's responsibility to ensure that his activities are at all times within applicable environmental legal and Client requirements which include but are not limited to the Liberian Environmental Legislation, IFC Standards and the Aureus ESIA.

This document is meant to facilitate the Contractor's compliance to applicable requirements and does not replace the applicable legal requirements or the EMPR.

This document may be revised at any time to include applicable legal requirements not currently included that may come to the attention of DRA in future. The Contractor will accordingly be responsible to comply with the revised requirements as might be necessary.

Where methods to ensure legal compliance have been specified in this document, Contractors may submit alternative detailed method statements for consideration and approval by DRA. DRA may, at its sole discretion, reject or accept such alternative methods.



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New Liberty Gold Mine

CONTRACTOR MANAGEMENT PLAN

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Mining Corp.**
A Subsidiary of Aureus Mining Inc.

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1 PURPOSE OF THE MANAGEMENT PLAN

The purpose of this Management Plan is to apply the requirements of all applicable environmental legislation into a contractual environmental management plan for application during the construction phase of project.

This document represents the minimum requirements for environmentally friendly construction activities and does not replace applicable legal requirements.

DRA have been appointed as contractor managers and as such have assisted in the compilation of this documentation and reserves the right to stop work whenever environmental violations are observed.

The safety, health and environmental (ESH) vision of Aureus, New Liberty Gold Mine (NLGM) is to achieve excellence in Environmental, Social, Health and Security performance. Our ESHS strategic goals are to achieve

1. Zero injuries.
2. Zero occupational diseases.
3. Zero Environmental incidents / pollution
4. Zero non-compliances

The cooperation of all personnel on site (contractors, own employees and labour broker employees) is vital to achievement of this vision.

It is the responsibility of contractors as employers under Article 276 of the Regulation 61 of 2006 to ensure the health, safety, and welfare of their employees. Contractors are also expected to comply with all applicable environmental legislations whilst performing work on NLGM premises.

Contractors also have a duty to others, not in their employment, under the Government of Liberia, and their labour and occupational, health safety and environmental policy. They shall, in accordance with the appropriate contract conditions, ensure that:

- All work is carried out in compliance with the relevant Liberian laws
- Acts of Parliament, Orders, Regulations, By-Laws and requirements of local or other authorities, which are applicable to the contract work, are complied with.
- All Regulations, Codes of Practice, Guide Notes and Directives issued from time to time are complied with.
- Other applicable Liberian Safety, Health and Environmental Legislation.
- Comply with all statutory legislation requirements as issued and amended from time to time by the government of Liberia.

2 DEFINITIONS

Wherever these words occur in the Contract documents, they shall have the following meaning:

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- **Reviewed:** Reviewed in writing by the DRA Project Manager, the DRA Site Chief SHE Officer, the DRA Site Manager or the Client's Representative. The level of approval required is specified in the relevant section of this document.
- **Client:** as specified per contractual agreement between DRA and the relevant contracting party.
- **Environmental Emergency:** an environmental incident that may have a potentially environmental impact. It is a condition that requires immediate action, for example, an environmental release or spillage which may lead to external complaints and /or a high risk of liability and / or which may require the involvement of government or local authorities.
- **Environmental Incident:** An unexpected, undesired event that results (or can result) in adverse environmental consequences.
- **He/him/his:** Refers to both the male and female gender.
- **Non-conformance:** Failure to comply with any requirement stated in this document, in the EMPR or in any piece of applicable legislation.

3 ENVIRONMENTAL OBJECTIVES

The main environmental objectives and targets for the project are:

- Compliance to all applicable environmental legal requirements and to the ESIA and EMPs.
- Compliance to all requirements of the Client's environmental management system (EMS).
- Good and transparent relations with the community and other interested parties around the project.

All contractors are required to demonstrate total commitment towards the achievement of these objectives.

4 INDUCTION TRAINING

All contractor and subcontractor employees are required to attend the environmental awareness induction training which will form part of the SHE induction programme which will be arranged by the DRA Site Chief SHE Officer. Employees who have not attended the training are not allowed on site

Records of environmental awareness training shall be kept on site and are to be availed to the DRA Site Chief SHE Officer on request.

All vendors, service providers and visitors to the project who will be on site for a period of one to five days shall attend the short duration induction training arranged by the DRA Site Chief SHE Officer before being allowed onto site. Proof of their attendance shall be maintained on site.

DRA or the client will issue proof of induction training attended in the form of a site access card. All people on site shall carry this card on their person at all times.

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5 APPOINTMENT OF RESPONSIBLE PERSON

5.1 The Contractor shall;

- Designate in writing the Contractor's Responsible Person, responsible for implementing the requirements of this procedure and;
- Send a copy of the letter of appointment of the Contractor's Responsible Person to the DRA Site Chief SHE Officer prior to site establishment.
- Have a hazardous material recovery kit on site to immediately rectify any hazardous material spill and report the incident immediately to the relevant responsible person.

5.2 The Contractor's Responsible Person shall:

- Be familiar with environmental management. Proof of the person's relevant training shall be maintained on site.
- Develop a system to ensure that the requirements of this Environmental
- Procedure are effectively implemented.
- Periodically audit the system and be able to demonstrate to the requirements of this Environmental Procedure are being effectively implemented.
- Ensure that employees of contractors, sub-contractors, suppliers etc. receive appropriate environmental awareness training prior to commencing work on the project.
- Maintain, on site, records of applicable training.
- Ensure that responsible persons for sub-contractors are designated to carry out the requirements of the Environmental Procedure.
- Submit all required method statements to the DRA Site Chief SHE Officer for approval and maintain reviewed method statements on file on site.
- Record any non-compliance to the method statements or to the requirements if this Environmental Procedure that lead to environmental impacts. These non-compliances shall be reported to the Contractor Site Chief SHE Officer as soon as possible thereafter.
- No contractor shall recruit workers on or at Aureus New Liberty Gold Mine premises/ workplace.

The contractor's responsible person shall not be absent from premises/ workplace at any time that any work is being carried out by the contractor until he has appointed a competent person to supervise and be responsible for the contract premises/ workplace during his absence.

If the contractor's responsible person is likely to be absent from premises/ workplace for a period not exceeding three consecutive days, he shall nominate a competent person to deputise for him during his absence and shall inform Aureus New Liberty Gold Mine responsible person of the identity of the nominated person. A copy of his CV (i.e. qualifications, previous experience) shall be submitted to Aureus New Liberty Gold Mine responsible person for approval. Contractor's responsible person shall not be responsible for more than one premises/ workplace.

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5.3 Medical certificates of fitness

The contractor shall, be responsible for the medical examination by an occupational medical practitioner of his employees and shall provide AUREUS, NEW LIBERTY GOLD MINE with written proof that medical examination of his employees to be engaged on premises/ workplace has been done and that they are medically fit for the work they are to perform and that the necessary certificates of fitness have been obtained. These medical examinations shall be conducted before employees will be allowed to commence work on premises/ workplace.

The contractor must arrange appointments for medical examinations at least 2 weeks prior to commencement of work on premises/ workplace.

6 ENVIRONMENTAL RISK ASSESSMENT

- The Contractor shall conduct an environmental risk assessment prior to site establishment
- The methodology used by the contractor to assess environmental risks associated with their activities shall be submitted to Contractor for review by the Contractor Site Chief SHE Officer prior to site establishment. The methodology should take the following into consideration, among others:
 - Normal activities undertaken by the contractor.
 - Abnormal situations (e.g. floods, unanticipated breakdown of equipment etc). Emergency situations (e.g. chemical and fuel tank rupture or valve failure). Legal requirements.
 - Requirements of the EMPR.
 - Potential sources of air (including noise and excessive vibrations), water and ground pollution.
 - Changes in work procedures and methods. Previous experience.
 - Completion of the Environmental checklists
- A risk register that will include the following shall be submitted to the Contractor Site Chief SHE Officer before site establishment.
 - All environmental risks identified during the environmental risk assessment
 - A list of the environmental risks that have been identified as being significant. Reference to the method statements, measures or procedures that will be followed to either eliminate or reduce the significant risks to tolerable levels.
- The Contractor shall, in writing, clearly explain how each environmental risk assessed to be significant will be addressed to eliminate or reduce it to a tolerable level and submit it, via the Contractor Site Chief SHE Officer, for review prior to site establishment. This may be through method statements or written operational control procedures. Associated responsibilities and authorities shall be clearly defined. All method statements shall reflect at least:
 - When the activities relating to the method statement will be conducted (timing).
 - Materials to be used.
 - Equipment and staffing requirements.

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- The proposed construction procedure designed to implement the relevant environmental requirements.
 - The system to be implemented to ensure compliance with the method statement.
 - Any other information deemed to be necessary by the Contractor Site Chief SHE Officer and/or the Contractor's Responsible Person.
- For significant environmental risks identified after site establishment, method statements shall be submitted to the Contractor Site Chief SHE Officer at least 2 working days before the start of the associated activity.
 - All changes to reviewed environmental method statements or procedures shall be notified in writing to the Contractor Site Chief SHE Officer. for review
 - The contractor's Responsible Person shall retain records of any amendments and shall ensure that only the most current reviewed version of any method statement or procedure is used.
 - Every environmental risk that is identified during the risk assessment process shall be conveyed to every employee whose work is associated with the risk. This will be done in the form of a Mini HIRA and reinforced by a Toolbox talk. Each employee shall sign to confirm an understanding of the environmental risks in the tasks.

7 ENVIRONMENTAL NONCONFORMANCE, INCIDENTS, CORRECTIVE ACTION AND PREVENTIVE ACTION

- All environmental nonconformities and/or incidents shall be recorded on the Environmental Non-conformance or Incident Register and reported to the Contractor Site Chief SHE Officer before the end of the respective shift. Associated records shall be kept on site.
- Immediate appropriate action shall be taken to prevent or minimize any adverse impact of the nonconformity or incident on the environment.
- All environmental nonconformities and/or incidents shall be investigated to determine their root causes and to identify the corrective action necessary to prevent their recurrence. Use the Environmental Non Conformance/Incident Investigation Form.
- Effective implementation of corrective and preventive actions shall be verified and signed off by at least the contractor's Responsible Person and the Contractor Site Chief SHE Officer.
- All reportable environmental incidents stipulated in the applicable legislation shall be immediately reported to the Client and to the Contractor Site Chief SHE Officer.
- All non-conformances and incidents that have not been signed off as effectively addressed shall be discussed in the SHE Committee meetings and any associated decisions minuted.

8 ENVIRONMENTAL EMERGENCY PREPAREDNESS AND RESPONSE

- The contractor shall identify and record in a register kept on site all potential environmental emergencies that may arise from his activities: The following, among other issues, shall be taken into consideration:
 - Uncontrolled fires.

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- Abnormal accidental release to atmosphere (e.g. toxic gasses).
- Accidental discharge of hazardous substances to storm water and rivers (e.g. oil, chemicals).
- Accidental discharge of hazardous substances to land (e.g. oil or chemical spills).
- Abnormal operating conditions resulting in public complaints due to, for example noise or vibrations.
- Burst water pipes. Explosions (e.g. gas).
- The contractor shall describe in writing and in detail how each identified potential environmental emergency will be handled to prevent or minimize harm to people or the environment should the emergency actually occur. The description or emergency plan should identify, among other issues:
 - The precautions that will be taken by the contractor to prevent each potential environmental emergency from occurring.
 - The equipment that will be necessary to adequately respond to the emergency.
 - The personnel that will be required to adequately respond to the emergency (including training requirements if applicable).
 - Resources external to the Contractor that will be required to adequately respond to the environmental emergency, including contact details where applicable.
- Copies of the register referred to in 8.1 and the environmental emergency response plan or plans referred to in 8.2 above shall be submitted to the Contractor for review prior to site establishment.
- The reviewed environmental emergency plan shall be followed in the event of such an emergency occurring.
- All environmental emergencies shall be immediately reported to the Contractor's Site Chief

SHE Officer.

All environmental emergencies shall be recorded on the Environmental Non Conformance/Incident Register and investigated. Results of the investigation shall be recorded on the Environmental Non Conformance/Incident Investigation Form and signed off by at least the Contractor's Responsible Person and the Contractor Site Chief SHE Officer.

9 ENVIRONMENTAL MANAGEMENT MEETINGS

Environmental management issues, including nonconformities, incidents and emergencies shall be permanent agenda items for the SHE meetings.

10 ENVIRONMENTAL AUDITS

Environmental Audits will be conducted monthly by the Contractor's SHE Officer who shall submit his findings to the Contractor Site Chief SHE Officer on a monthly basis before the 25th day of each month. The contractor shall ensure that corrective and preventive action necessary to address all audit findings are effectively implemented.

Environmental audits can be combined with Occupational Health and Safety Audits but audit

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reports shall indicate the environmental issues that were audited.

The Contractor will conduct ad-hoc environmental audits and inspections on all Contractors.

11 INTERNAL COMMUNICATION AND TOOLBOX TALKS

- The topics of discussion of toolbox talks shall always include the environmental risks that are associated with the tasks to be performed on that day and the measures that will be followed to eliminate or control those risks. Resources, including manpower and equipment required to ensure that the risk is eliminated or minimized shall be recorded.
- The risk management plan identified above, including the allocation of resources shall be prominently displayed in the work area concerned. It shall be signed by all employees working in that area as confirmation that they understand the associated risks and ways to minimize or prevent negative impacts.
- Records of toolbox talks combining occupational health and safety and environmental issues shall clearly reflect the environmental issues addressed.
- The Contractor shall make available an interpreter in the event of language difficulties.
- The Contractor shall promptly provide Aureus with any information that might adversely affect the environment or the health and safety of any person, and which might justify a review of the project SHE plan.

12 RECRUITMENT OF LABOUR

All unskilled and semiskilled labour shall be employed through the local Department of Labour offices, unless written permission has been granted by either Aureus or the Contractor. Records relating to the applicable recruitment process shall be maintained at the contractor's site offices.

13 ENVIRONMENTAL MANAGEMENT PLAN

Sub-contractors shall submit to the Main Contractor a detailed Environmental Management Plan, aligned with Aureus' EMPR and shall include at least the following:

- The sub-Contractors Environmental Policy.
- Identification of the person or function responsible for environmental management on site.
- Environmental objectives and targets
- Method statements, procedures or other documentation addressing, as applicable:
 - Waste management, including identification of anticipated waste streams and how each stream will be managed.
 - Management of polluted runoff from the contractor's camp e.g. where equipment is cleaned, parked, fuelled and/or serviced.
 - Storage of fuel, oil and other hazardous substances. Dust control.
- Any of the other environmental management issues that are required by this document.

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The above shall be submitted with the Tender documentation and shall be reviewed by DRA.

Aureus and/or the main Contractor may, at their discretion, request further evidence to verify the contents and implementation of the contractor's plan and may request to audit the sub-Contractor's premises and SHE records as part of the tender adjudication process and during the project execution phase.

14 GENERAL ENVIRONMENTAL REQUIREMENTS

14.1 Animals

No member of the construction team will be permitted to:

- Hunt, kill, set devices to trap, tamper with or harass wild animals and livestock or any form of animal shelter.
- Feed native animals.
- Bring own pets to the construction site.

Avoid attracting animal pests by keeping the construction site and camp free of litter and by providing adequate waste receptacles that can be covered to prevent access by animal pests.

Make workers aware of potential animal dangers and provide for their protection against ticks, mosquitoes/malaria (mosquito screens, repellents, coils), stinging insects (bees, tsetse fly) and dangerous/venomous reptiles (snakes).

14.2 Surface Water

- Do not dispose of any liquid or solid waste in any watercourse or water body. Do not stockpile soil or any other materials within or near a watercourse or water body.
- Stockpiles will be constructed in such a way as to ensure stability and thereby preventing the possibility of erosion or wash down.
- Wastewater shall not be allowed to enter watercourses or water bodies.
- Do not use the watercourses or water bodies for domestic purposes including bathing, washing, drinking water, etc.
- Do not impede the flow of any water course or water body.
- All vehicles shall use existing crossings to cross drainage channels on site.

14.3 Visual Aspects

- Where possible, maintain a vegetation barrier around the construction site, construction camp and along roads to reduce the visual impact of construction activities.
- Paint structures with a non-reflective matt paint in colours that blend into the surroundings and which are not considered obtrusive.



- Efforts will be Employed to maintain the construction site in a neat and orderly condition during the construction phase
- Designated areas for material storage, waste sorting and temporary storage, batching and other potentially intrusive activities will be created and screened off to the extent is feasible
- Where feasible, specimen trees must be left in locations adjacent to the mine where they will not be affected by mining activities.

14.4 Light Pollution

- Keep external lighting for the general lighting of the construction camp and site to the minimum necessary.
- Direct the lighting downwards and use lighting equipment that minimizes the spread of light near to or above the horizontal.
- Position and aim lights to ensure minimum light spill.
- Complete as many activities as possible during the daylight hours so there is no need for extensive lighting after dark.

14.5 Dust

- Avoid excavation, handling and transport of materials that can erode under conditions of medium to high wind or when a visible dust plume is evident from sources as high wind speeds will exacerbate erosion.
- Locate soil stockpiles in sheltered areas where they are not exposed to the erosive effects of wind.
- Where possible, maintain a buffer zone of vegetation around the site as the vegetation barrier will act as a barrier to the movement of wind and therefore erosion of the exposed surfaces.
- Use appropriate dust suppression measures when dust generation is unavoidable.
- Maintain maximum vehicle speeds of 40 km/h along dust roads and 20 km/h when traversing unconsolidated and un-vegetated areas.
- Where applicable, maintain surface crusts to decrease the susceptibility to erosion.
- Only strip the minimum amount of vegetation necessary to allow construction to take place (i.e. within the defined construction area).

14.6 Noise

- Where possible, maintain a vegetation buffer around the construction site.
- All equipment shall be regularly and systematically checked, maintained and repaired (especially exhaust systems).
- Ensure that construction workers do not create unnecessary noise such as hooting and shouting.
- Ensure any generators used on site have adequately silencing equipment that will aid in containing or dissipating the noise generated.

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14.7 Waste Management

- Disposal of waste on site is not allowed. Waste shall only be disposed of at an approved site or at appropriate permitted waste disposal facilities. The Contractor shall ensure that waste generated by him is disposed of through controlled incinerating methods or removed from site by an approved contractor.
- Hazardous waste may only be stored on site, in a fenced off area with access control, for up to 90 days. The date of first accumulation of any hazardous waste shall be recorded and the records kept on site.
- All areas shall be cleared of litter and other domestic waste at the end of each working day.
- Adequate waste receptacles shall be provided at the construction camp and site.
- Non-hazardous waste / domestic waste will be collected by the Client at specific collection points as identified by the Contractor's Site Chief SHE Officer and will be removed to the relevant waste disposal site.
- Flammable, toxic or poisonous materials and containers shall not be disposed of with the domestic waste and shall be transferred to an appropriate and permitted disposal site by an authorized refuse removal company. These materials and containers shall be stored in a barricaded area until they can be collected and transferred to a suitable disposal site.
- Used oil shall be collected in suitable containers at designated collection points. The collection points shall be bunded and underlain by impervious materials to ensure that any spills are contained. Notices shall be erected at each waste oil point giving instructions on the procedure for waste oil discharge and collection. Oil will be send back to the supplier after use.
- Soil polluted by a spill of chemicals shall be handled as hazardous waste if remediation in situ is not possible. It shall be classified as waste and shall be disposed of at an appropriate permitted waste disposal facility.
- Ensure that building rubble does not become polluted or mixed with any other waste. Building rubble can be used to backfill excavations.
- The Contractor shall ensure that all hazardous waste generated is classified, handled and disposed of in accordance with the requirements of Liberian legislation, IFC Standards as well as and the Client's procedures.
- Copies of all records relating to the handling, storage and disposal of hazardous waste shall be kept at the contractor's site office and shall be available for inspection by any Contractor SHE Officer.

14.8 Storage of Diesel, Oil and Chemicals

- Storage areas and vehicle maintenance areas shall be surfaced and shall have appropriate runoff containment measures, such as bunds and canals which shall be channelled to sumps.
- All chemical, fuel and lubricant storage areas shall be underlain by impermeable material.
- Drums containing chemicals shall be stored upright in a secure, bunded area with an impermeable surface.
- Vehicles shall be regularly serviced according to a pre-planned maintenance program.
- Pipelines shall be monitored continuously to limit spillage.
- All hazardous waste and storage areas to be denoted by appropriate signage.



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- All incidents shall be handled in accordance with the environmental non conformance, incidents and corrective action procedures or the emergency preparedness and response procedures above as applicable.
- If spills do occur and soils become contaminated, appropriate remedial measures shall be identified in consultation with an appropriately qualified specialist. If necessary, the polluted soils shall be classified as waste and shall be discarded at an appropriate permitted waste site or treated on site according to specifications.
- After removal of the contaminated soils, the affected areas shall be landscaped and rehabilitated.

14.9 Access, Security and Machinery

- Aureus NLGM Protection Services is responsible for the security and control of the movement of persons in the workplace/premises.
- It is expected that the contractor's responsible person and all contractor's employees will give their full co-operation to the Protection Services Officers in the execution of their duties.
- No firearms shall be taken into the workplace/premises.
- No liquor shall be taken into the workplace/premises.
- Drugs are prohibited on the premises/ workplace, unless authorised by a Medical Practitioner who is fully aware of the duties to be performed by the contractor's employees.
- The contractor and the contractor's employees shall take photographic equipment functions into the workplace/premises without prior approval from AUREUS, NEW LIBERTY GOLD MINE.
- No photos shall be taken. Taking photos without necessary authorisation will lead to a breach of contract.
- Entrance to or exit from the premises/ workplace shall only be made through the officially recognised entrance and exits, where an entrance control officer is on duty.
- Before plant/equipment, tools or materials are brought onto the premises/ workplace the contractor responsible person and the contractor employees shall ensure that they are fully conversant with the NLGM services procedures for declaring plant/equipment, tools and materials into or out of the workplace/premises.
- Any person who fails to obey any instruction given to him in accordance with or for the proper observance of the requirements of the legislation and NLGM, ESHS programme, shall have disciplinary action taken against him, which could lead to removal from premises/ workplace
- NOTE: No homemade or makeshift tools shall be brought into the workplace/premises, unless approved by NLGM responsible person.

14.10 Personal Protective Equipment

- The contractor's responsible person is responsible to supply all his employees with suitable approved personal protective equipment and shall ensure that personal protective equipment is readily available and used. Contractor's employees shall not share PPE.
- At various places on premises/ workplace, notices/signs/pictograms are used to indicate areas where head, eye, respiratory, hearing, hand, foot protection, etc is required and shall be worn. The

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contractor's responsible person shall ensure that all contractor employees understand and obey these notices/signs/pictograms.

- Fire retardant overalls shall be worn whilst working in the steel and iron making areas and any other area that is specified by the plant responsible person.
- The contractor shall provide suitable rubber mats, gloves and gauntlets, safety harness and such other protective equipment as may be necessary to prevent accidents.
- The contractor's responsible person shall be responsible to monitor and enforce appropriate PPE usage by all contractor employees on premises/ workplace.
- Aureus New Liberty Gold Mine will enforce the wearing of PPE where stipulated.

14.11 Sites of Archaeological and Cultural Interest

- All grave sites / cemeteries and cultural sites situated within the Contractor's area of responsibility shall be demarcated. Provision shall be made for families to gain access to the graves under controlled supervision.
- Should other human remains be encountered from graves not identified, then all work to cease and NLGM to notify the village chief, to then formulate an action plan to deal with the discovery with the community's agreement.
- Subsurface traces of Iron Age pottery and Pleistocene age material and features may occur. In the event that any major feature is encountered, for example, a burial or a cache of ostrich eggshell flasks, then work shall be halted and a professional archaeologist consulted in order to assess the find and make recommendations for mitigation, if necessary. The DRA Site Chief SHE Officer shall be informed immediately.
- Immediately upon the identification or unearthing of a grave, all work, construction, or excavation within a radius of 3m of the gravesite shall cease, to avoid desecration of the grave or any further damage.
- The person that identifies the grave shall ensure the following:
 - A person is appointed to watch over the grave until a security guard has arrived.
 - The Contractor's Site Manager and the Contractor's Site Manager are informed of the discovery of the grave immediately.
- When informed of the existence of a grave, the Site Manager or his representative shall ensure that:
 - The grave is clearly marked with hazard tape, screening off a radius of 3m around the site of the grave.
 - The security company is instructed to make available a security guard to watch over the grave until attended to by the undertaker.
 - Photographs and co-ordinates are taken of the grave and surroundings and submitted to the Contractor and Aureus in writing for registration purposes.
 - A local undertaker is contacted to attend the grave within a 24 hour period. The local municipal health inspector is informed should the grave be exhumed.
 - The family of the deceased is contacted or an advertisement is placed in a local newspaper.

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15 REQUIREMENTS SPECIFIC TO SITE ESTABLISHMENT

No construction activities will be allowed within the 1:100 year flood line of a river or any of the tributaries and drainage channels. Flood lines are identified in the EMPR.

15.1 Soil

15.1.1 Soil Stripping

- Strip soils from all areas underlying permanent or semi-permanent structures so as to guarantee a source of soil available for site rehabilitation.
- Strip the topsoil layer first and stockpile separately to preserve its biological and chemical characteristics.
- Remove and separately stockpile any other soil excavated as a result of the construction process (e.g. during the excavation of foundations) so that it can be used for site backfilling, contouring and rehabilitation.

15.1.2 Soil Handling

- Avoid handling soils when they are wet as this causes compaction.
- Avoid repeated handling of soils as this may result in the loss of soil structure and compaction.
- Do not handle soils during windy conditions, as this will exacerbate the loss of soil through wind erosion.
- To avoid spillage and erosion, do not overload trucks when transporting soil to/from site (soil level shall be below bin height).
- Any spillage on roads shall be cleared up as soon as possible but not later than the same day.

15.1.3 Soil Stockpiling

- Slope angles of topsoil stockpiles shall not exceed 1:3 (18°).
- The construction of all topsoil stockpiles shall be undertaken in a series of 1.5m vertical lifts.
- The maximum height of the topsoil stockpiles shall be 5m. Erosion control measures (i.e. terraces, vegetation etc.) shall be implemented on all topsoil stockpiles exceeding 1.5m in height.
- Slopes of all stockpiles shall be vegetated to ensure that the slopes are stable and in order to reduce any potential of erosion.
- Select a site for the stockpiling of soils that is:
 - Away from the working area - so that the stockpiles will not disrupt construction activities;
 - In a sheltered position - so that the soil will not be exposed to the effects of

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erosion;

- Away from drainage lines - so that there is no risk of wash away;
- Away from areas of valuable vegetation or plant specimens - so that the clearing of valuable plants or communities is not required;
- Away from the base of a bank - so that runoff from the bank does not cause gathering of water along the stockpile.

15.2 Vegetation

- Clear all shrubs and small trees from the areas to be affected by construction and from where soil is to be stripped.
- For aesthetic and ecological reasons and for shade provision, leave large trees and attractive specimens intact.
- Ensure that valuable natural plant communities and continuous belts of natural vegetation remain intact whenever possible.
- Where possible, maintain buffer zones of vegetation between the construction site and adjacent land users as this will help to reduce noise, visual and dust impacts.
- Should species of rare, protected and / or endemic status be identified on site, the surrounding operations shall immediately cease and these species shall be relocated to a suitable habitat.

15.3 Site Camp

The construction site camp is defined as the demarcated area where the contractor will inter alia establish offices, workshops, storage facilities and ablution facilities.

15.3.1 Access Criteria

The access routes shall be clearly demarcated with stakes or rocks if possible. Where possible, make use of existing roads or tracks and avoid creating new access routes. Maintain the access roads in an adequate condition that will minimize dust and erosion.

15.3.2 Accommodation Criteria

No on-site accommodation is permitted. Off-site accommodation structures shall be safe and healthy and constructed in such manner that it is not unsightly. It shall be neatly planned with easy access to amenities. Requirements of the Aureus Guidelines for Off-Site accommodation shall be complied with.

15.3.3 Storage Facility and Working Area Criteria

- Erect a lockable, mobile structure on a bunded surface (concrete slab) for storing materials, equipment, chemicals, etc.

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- Construct a bunded area (e.g. concrete slab) with a drainage system for the maintenance of vehicles and equipment or anywhere where oil/grease/hazardous chemicals will be stored and/or handled.
- Place any generators used on site on a bunded surface.
- All diesel-welding machines shall be placed on a temporary bunded surface.
- Flammable substances shall be in a ventilated, covered constructed storage facility on a concrete slab.
- Refer also to the requirement for an environmental management plan

15.3.4 Services

- Waste receptacles (preferably 210L drums lined with waste collection bags) shall be available at strategic points around the construction camp to gather all domestic refuse and to minimize the occurrence of littering.
- Potable water (with signage to indicate) shall be available at all times at various points on the site. If no tapped sources are available, ensure that there are tanks of fresh water on site.
- Only with the necessary written permission from DRA may Contractors provide adequate cooking and sanitary facilities.
- Gas or electricity should be used for cooking purposes
- Sufficient ablution facilities should be placed at strategic points around the construction area and shall be cleaned at least twice weekly.

16 REQUIREMENTS SPECIFIC TO ACTIVE CONSTRUCTION

16.1 Soil

16.1.1 Soil contamination

- Construction activities and movement of people should be restricted to demarcated areas. All heavy machinery and trucks should be restricted to designated areas and access roads/tracks.
- Use of fuels and lubricants should be confined to bunded areas with an impermeable layer to prevent soil contamination with appropriate oil separators for recycling of hydrocarbons.
- Wash bays will have a sump and oil separator and used oil will be recycled
- Accidental hydrocarbon spillages should be reported and recorded as incidents and cleaned up immediately.
- Soil hydrocarbon contamination should be cleaned up using bio-remediation and clean-up kits.
- Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas.

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16.1.2 Stockpile Management

- Minimise the period of exposure of soil disturbances through a planning schedule.
- Stockpile and waste dump slopes should not exceed 18°. Control colonization by invasive plants by removing these species when they germinate.
- If stockpiling for more than 6 months cannot be avoided, re-vegetate the stockpiles to control erosion, nutrient loss and colonization by invasive species.
- Rehabilitated areas or those identified for rehabilitation should be demarcated to ensure traffic and movement over stabilised areas is restricted and controlled

16.1.3 Erosion Control and Steep Slopes

- Areas that may be prone to erosion or where signs of erosion are evident should be stabilised.
- Use local labour so that techniques can be shown to the local community.
- Do not disturb vegetation on steep slopes unless absolutely necessary.
- Terrace steep slopes and vegetate horizontal areas.
- Waterways shall be constructed on large areas of steep banks.
- Terraces should channel water to these waterways. The waterways shall be vegetated with approved vegetation.
- Rehabilitate disturbed areas as soon as possible.
- Prevent unnecessary compaction of construction areas – this reduces run-off velocity.
- Rip/plough areas, which have become compacted e.g. paths and vehicle tracks.
- The following areas are prone to erosion and should be protected (a combination of vegetation, bio-matting and gabions should be used) and monitored for erosion:
 - Edges of steep slopes
 - Edges of stockpiles, structures etc especially where these
 - structures are located at the base of a steep slope.
 - Areas around taps and other water supply points.
 - Vehicle access roads – angled speed humps should be constructed to channel water to grassed fringes.

16.2 Vegetation

- Clearing of vegetation should be inspected and verified with co-ordinates to ensure that no more than the minimum area of land that is needed is cleared. Once vegetation at the construction camp and site has been cleared during site establishment, do not clear any additional vegetation during construction except invasive plants.
- Any invasive plant species (especially declared weeds) that germinate or become established within the construction camp and site shall be actively removed or destroyed using the most appropriate methods specific to the species.
- Use local labour for invasive plant control so that this knowledge can be transferred to the community for long term maintenance purposes.
- Ensure that the process of removing invasive plants does not encourage the spread of the plants e.g. avoid removing the plant when it is seeding.



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- With the exception of invasive plants, any de-bushed plant material should be mulched so that it can be used as a supply of organic material for site rehabilitation.
- Firewood is to be stockpiled for controlled release to the local inhabitants through the DRA Site Manager

16.3 Water.

- Limit construction in sensitive areas to the dry season where possible.
- Construction of infrastructure located close to local streams should take place in the dry season, when possible.
- No clearing to start before applicable permit(s) are signed off by responsible persons. Ensure stockpiles are placed on a free draining location so as to limit erosion loss.
- Develop storm water management plan or schedule to address exposure of degraded areas.
- Physical stabilisation methods to be installed in the MCDC as per design drawings. Berms and trenches should be constructed to divert clean water away from the workings.
- Hydrocarbon management guideline and procedures to be communicated.
- Spill kits must be available at all hydrocarbon, chemical storage and handling areas and at workshop areas.
- All storage areas (for fuels and lubricants) will be compacted and have bunded containers to prevent soil pollution.
- The conveyance and storage of hazardous chemicals and effluents must take place in non-permeable proofed infrastructures.
- Hazardous chemicals need to be stored above ground located within a suitable secondary containment (bunded) area.
- Adhere to Waste Management Guidelines.

16.4 Air quality.

- Clean run-off or recycled water have to be used to dampen roads, tracks and/ or stockpiled material especially under windy conditions.
- Exposed surfaces that are not going to be utilised after construction have to be rehabilitated and maintained.
- Implement traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds.

16.5 Noise.

- All vehicles and equipment have to be monitored and maintained in good working order.
- All sirens to have appropriate directional and volume settings.
- On site generators should be clad in suitable materials or housed in structures that would reduce their noise impacts.

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- Reduce noise at source if possible. This includes ensuring silencers on vehicles, using rubber linings, enclosing sources if possible.
- Switch off equipment when not in use.
- Choose low noise plant alternatives.
- Training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- Conduct occupational monitoring system for Employees working in high noise level areas.

16.6 Ecology.

- Illegal waste dumping should be prohibited.
- Install/commission a proper waste disposal facility with an incinerator.
- Equip area with hazardous waste bunded storage area under a roof and adequate ventilation.
- Domestic waste to be covered to keep animals and scavengers out.
- Implement the IEMS and waste guideline principles.
- Progressive rehabilitation of disturbed areas should take place as soon as possible.
- Report any Red data species found and implement permit to clear procedure.
- Access should be restricted to already impacted areas (drilling roads, test pits and trenches) by ripping the roads and filling in trenches, and letting these areas vegetate.
- Areas where large numbers of plant Species of Special Concern occur should be avoided and demarcated.
- Access should be controlled in areas where the mine has management control to prevent the clearing of vegetation and logging.
- Alien invasive plants should be monitored and controlled at all times.
- Riparian vegetation bordering on drainage lines and rivers should be considered environmentally sensitive and impacts on these habitats should be avoided.
- All roads need to be maintained and any erosion ditches forming along the road filled.
- Storm water must be managed so as to reduce the silt loads in the aquatic system.
- All vehicles and equipment should be regularly maintained to avoid any oil leaks or spills.

16.7 Socio-Economic.

- Ascertain that constructed features do not expose road users to health and safety threats by demarcating areas under construction.
- Provide alternative routes for road users if access is restricted.
- Consider the impact of noise and dust to the roadside population by mitigating e.g. dust suppression.
- Establishment of grievance mechanism to facilitate the resolution of affected community concerns and grievances.
- Heavy motor vehicle (HMV) traffic should be restricted to daylight hours if at all possible. Headlights of HMV should be on at all times, especially in rainy conditions.

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- Ensure that access to assets is uninterrupted by providing alternative access routes and/or temporary access points during bridge construction.
- Provide adequate signage to inform road users of areas where road works are in progress.
- The measures suggested above to minimise road deterioration will also serve to minimise access restrictions.
- Where access has to be temporarily denied for safety and construction reasons, this must be communicated to residents before the event.

17 REQUIREMENTS FOR FINAL REHABILITATION

The construction site and construction camps will need to be rehabilitated on completion of the contract. The extent of rehabilitation required will depend on the nature of construction.

17.1 Structures

- Disassemble all temporary building and housing structures and remove from the site.
- Demolish any building structures no longer required.
- Break up all concrete structures (e.g. concrete bunding slabs). Drain/evaporate all pollution sumps and transfer the waste solids to a permitted waste disposal site.
- Handle any waste in accordance with the waste management requirements above.
- Ensure that all unused building materials, equipment and implements are packed up and removed from the site.
- If not to be used on a permanent basis, disconnect and disassemble any power, water, sanitation infrastructure on site and remove the components from the site.
- Clear and backfill any voids associated with ablution facilities.

17.2 Backfilling and Contouring

Contour and landscape the site to make it blend in with the surrounding topography or micro-topography.

17.3 Substrate Preparation

Prepare the soil physically for re-vegetation. This will involve ripping severely compacted areas (e.g. roads that will no longer be required) and tilling the entire site to a depth of 10 to 15cm to loosen clods and prepare a planting/seeding surface.

Prepare the soil chemically for re-vegetation. This will involve applying compost, mulch and fertilizer (organic or chemical) at the appropriate rates. The contractor will need to be advised by an appropriately qualified person on the appropriate materials, processes, rates of application, etc, for physical and chemical preparation of the soil.

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17.4 Re-vegetating

- Contractors shall avoid areas under rehabilitation and limit traffic to a minimum to allow vegetation to establish.
- Contractors shall familiarise themselves with the Environmental Management Programme Report (EMPR) for the project.
- All requirements shall be complied with at all times.

18 QUERIES

Should there be any queries regarding the contents of this document, Contractors are invited to contact Aureus Mining Site Chief SHE Officer.



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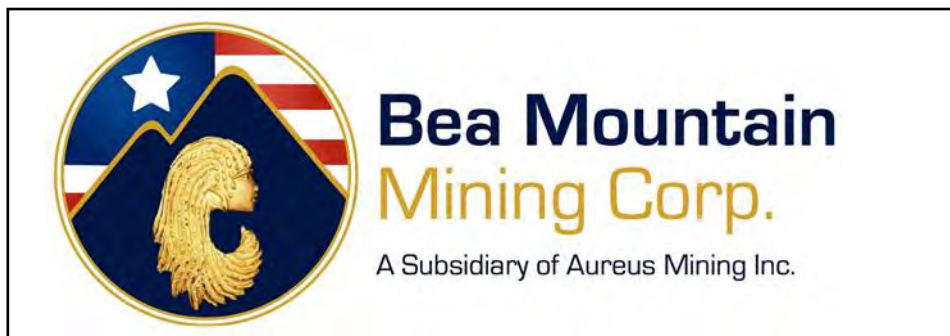
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19.3 Non-conformance investigation form (continued)

Indicators of effectiveness of Corrective Action		Achieved		Verified by (Initial and Surname)
		Yes	No	
1				
2				
3				
4				
Comments				
FINAL SIGN-OFF OF NC BY RESPONSIBLE PERSON				
DATE				
FINAL SIGN-OFF OF NON-CONFORMANCE BY DELEGATED DRA SHE OFFICER				
DATE				



19.4 External complaints form

Date complaint received:		Time:	
Name of complainant:			
Organization:			
Address:			
Tel:		Fax:	
		e-mail:	
Complaint received by:			
Receivers organization:			
Details of complaint:			
Date form received by DRA Site Chief SHE Officer			
Complaint investigated by:		(DRA SHE Officer)	
Findings of the investigation:			
Complaint discussed at:		Date:	
Date complainant responded to:			
Time for response: Under 48 hours		☐	☐ Over 48 hours

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Contact at www.aureus-mining.com



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19.5 External Complaints form (Continued)

Decision relating to complaint:
Actions taken or to be implemented
Evaluation of effectiveness of corrective action:
Final Sign off of Complaint:
(The DRA Site Chief SHE Officer/DRA Site Manager/Client Representative

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EVALUATION ROTATION

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Contact at www.aureus-mining.com

APPENDIX OF ENVIRONMENTAL CERTIFICATES AND PERMITS

1.CDP Certificate

2.RAP Permit

3.-8.Environmental Permit for Gold Exploration

9.-13. Aureus Mining License





REPUBLIC OF LIBERIA
ENVIRONMENTAL PROTECTION AGENCY (EPA)



4TH STREET, SINKOR
P.O. BOX 4024
MONROVIA, LIBERIA

Certificate No. EPA/EA/RAP/001-03-13

CERTIFICATE OF APPROVAL

This is to certify that

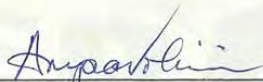
AUREUS MINNING INC. NEW LIBERTY GOLD MINE

Is authorized to undertake the implementation of the New Liberty Gold Mine Resettlement Action Plan (RAP) as detailed in the submitted RAP report approved by the Board of Directors of Aureus Mining Inc. on November 4th 2012.

Issued this 25TH day of March A.D. 2013 in the City of Monrovia, Montserrado County, Republic of Liberia

Validity: 25th March 2013 to 3rd September 2015

The approval is issued subject to conditions attached as Schedule



Anyaa Vohiri
EXECUTIVE DIRECTOR



SCHEDULE TO THE ENVIRONMENTAL PERMIT UPDATE

1.0 **CONTACT** : Debar Allen
GENERAL MANAGER
TEL: + 231 886-533-039
Email: debar.allen@aureus-mining.com

2.0 **COMPANY** : Bea Mountain Mining Corporation
(New Liberty Gold Mine Project)
P.O. Box 1875, Allison Street
Congo Town, Monrovia, LIBERIA

3.0 **LOCATION** : Darblo Clan, Gola Konneh District
Grand Cape Mount County

4.0 **TYPE OF WORK** : **GOLD EXPLOITATION**

In pursuance of the Environment Protection & Management Law of Liberia, 2003 Part III Sections 8 (1), 11 (1) 13 and on the basis of the submitted “ Updated Environmental and Social Impact Assessment (ESIA), an Environmental permit is issued authorizing **Bea Mountain Mining Corporation (BMMC) New Liberty Gold Mine Project** in Darblo Clan, Gola Konneh District, Grand Cape Mount County.

5.0 **CONDITIONS OF PERMIT**

- 5.1 Comply with all specifications in the updated ESIA; the project involves industrial gold mine operation
- 5.2 Permit does not cover Forest Reserves, Wildlife Reserves or Natural heritage area;
- 5.3 Company shall be responsible to conduct concurrent reclamation on all areas cleared as a result of her operations as soon as work is completed on such areas.
- 5.4 Company shall submit an Annual Environmental Report after commencement of operation.
- 5.5 Company shall comply with the New Mining Law
- 5.6 Company shall comply with the New Forestry Reform Law
- 5.7 Company shall Comply with Mine closure detail as specified in ESIA/EMP document

6.0 **WATER QUALITY**

Implement key mitigation measures to avoid, minimize and reduce Negative impacts on water quality which includes but not limited to:

- All drinking water on site and downstream should be monitored and adhere to WHO and Liberian water Quality standards as stipulated in ESIA/EMP
- Monitoring water quality on a monthly basis at identified sampling sites around the mine to determine possible contamination due to cyanide or arsenic. These water quality results should be compared against baseline data.
- Control contamination of the groundwater from the TSF by ensuring that contamination will not spread from the TSF area such that it influences surrounding water users by installing seepage containment trenches (5 m key below the wall and a 5 m deep trench drain type system below the TSF wall, which will lead to a sump and a pump below the TSF wall and treating the tailings in the plant prior to discharge channels and cut of trenches should be placed around tailings facilities, waste rock dumps and soil stockpiles so as to divert rain water away from possible sources of contamination.

7.0 BIODIVERSITY

Design, and operate a Biodiversity offset program based on the no net loss principle that demonstrates compensation for environmental damage equivalent to or better than the loss of habitat ecosystems services and structure given in ESIA

- Sensitive habitat (i.e. river and drainage lines, semi natural Secondary forest) should be left undisturbed as much as practicable
- The Company should protect small patches of natural occurring regenerated habitat such as clump of trees, ponds or wetlands.

8.0 SAFETY AND HEALTH

Implement a comprehensive Health and Safety Policy to cover employees, contractors, sub-contractors and suppliers at the company's operational areas and facilities:

- Ensure the provision of Personnel Protective Equipment (PPE) for entire workforce;
- All measures should be taken to avoid air pollution in the Mining work area emanating from vehicular emission and movement that would impact workers health;

9.0 EROSION AND SEDIMENTATION CONTROL MITIGATION AND MONITORING

- a. The company shall endeavor to carry out land clearance in the dry season and schedule construction progressively so that no land is cleared of vegetation more than three month in advance of when it is not required. This shall not apply to the mine footprint.

- b. For all three phases of the project (i.e. construction, operation and decommissioning), monitoring of erosion by visual inspection should be carried out in all areas prone to erosion (i.e. steep slopes of dumps, stockpiles, river, stream diversions, Dam or water control structures) and appropriate mitigation measures applied as detailed in ESIA/EMP.
- c. For all three phases of the project (i.e. construction, operations, and decommissioning), monitoring for sedimentation should be done by visual inspection of all sedimentation traps and facilities installed during the life time of mining operations. Monitoring should also be done where water control structures discharge near human activities.

10.0 AIR QUALITY

- a) Mitigation measures for PM₁₀ that can be implemented includes maintenance of roads, deployment of dust suppression techniques, enclosure of crushers or manage emission from crusher, reduction of drop heights for material and reducing the speed of transport equipment
- b) To mitigate against the expected impacts associated with the generation of NO_x the power generation plant regular maintenance, and tuning of the combustion equipment, reduced engine idling/start-up times and minimal operational time for power generation plant will be required;

11.0 CYANIDE MANAGEMENT

- (a) Submit integrated cyanide management plan to the Agency for **ENVIRONMENTAL CLEARANCE** prior to importation and subsequent usage.
- (b) Comply with all international standards and requirements for shipment of cyanide
- (c) Subscription to the principles of Cyanide Management Code
- (d) BMMC operations will follow the Cyanide Code principles and standards applicable to several aspects of cyanide use including its purchase (sourcing), transport, handling/storage, use, facility's decommissioning, worker safety, emergency response, training, and public consultation and disclosure throughout the life of the Mine
- (e) Cyanide levels in the TSF to be kept within line with ICMM and International Cyanide code standards

12.0 WASTE MANAGEMENT AND DISPOSAL

- All hazardous or potentially hazardous waste shall be disposed in consultation with the EPA;

- Identify and commission Landfill site for disposal of general waste with the approval of the EPA
- A detailed waste manifest must be held on site at all time, and made available for inspection at the EPA's request;
- Provide solid and liquid waste management systems as specified in EMP;
- Install and maintain adequate sanitation facilities in camp, offices and workshop areas to avoid contamination due to poor hygiene;

13.0 **BLASTING**

- (a) The company shall establish existing environmental conditions including, but not limited to , physical conditions of existing buildings, infrastructures of cultural significance, sacred sites etc. within the potentially affected communities to serve as baseline information
- (b) The Company shall ensure that its blasting operation does not cause any significant changes in existing geotechnical and hydrological environmental condition of surrounding grounds

14.0 **COMPENSATION**

Company shall pay compensation for all damages afflicted on nearby land users and structures as a result of its operations in accordance with agreed rates between the Company and affected parties.

15.0 **RESETTLEMENT/RELOCATION**

- (a) The Company shall resettle **Kinjor and Larjor** towns as identified by the Resettlement Action Plan at a safe site with better accommodation and livelihood restoration packages at the cost of the company
- (b) The company shall not undertake to settle any other town(s), hamlet for which the impact from the operation is **not** certified by the Agency
- (c) In view of the short duration of the project the company shall ensure that the resettlement exercise takes place within the shortest possible time.

16.0 **ROCK DISPOSAL**

- (a) The Company shall where practicable, dispose of waste rocks by backfilling existing excavations

- (b) For waste rock disposal on the surface, the company shall dispose of any chemically reactive waste rock so that the potential of acid generation and contaminant leaching is minimized and the final surface is suitable for reclamation

17.0 HAULAGE

The Company shall ensure maximum safety signs at all intersections of haul route with public roads and observe all traffic regulations on public roads.

18.0 CHEMICAL HANDLING AND STORAGE FACILITIES

- a. Where hazardous materials such as oils, grease, solvents and other chemicals are stored, the company shall segregate potentially reactive materials and institute and maintain precautions to minimize the risk of spillage and ground water contamination.
- b. The company shall only reuse containers when no environmental and/or safety hazard would occur from their reuse. All other containers shall be disposed of in a safe and environmentally sound manner, according to international best practice or in consultation with the EPA. Employ appropriate standards for the packaging, storage, handling of chemicals, explosives and disposal of waste chemicals and containers;
- c. Store hazardous/toxic chemical substances in bunded areas which make provision for capturing and containment in case of spillage;
- d. Comply with all International Standards and Requirements for chemicals handling and usage;
- e. Comply with all health and safety measures as pertained chemicals and explosives usage;
- f. Any chemical spillage should be cleaned up immediately, with contaminated soil treated as hazardous waste and disposed of after appropriately treatment. The EPA should be immediately notify;

19.0 DUST SUPPRESSION

The Company shall provide adequate dust suppression measures on all dirt roads within its mine footprint and surrounding roads used during mining activities in order to protect workers health and prevent unreasonable nuisance to nearby communities

20.0 WORKSHOP

The company shall manage its workshops to maximize the collection of waste solvent oil. Non-reusable waste solvents and waste oil shall be disposed of in a safe and environmentally responsible manner. The company shall manage water

drainage and workshop area runoff to minimize risk of spillage, prevent soil contamination and safeguard surface and ground water quality.

21.0 FUEL STORAGE AND FILLING STATIONS

The company shall construct containment bonds around all fuel storage tanks to safeguard against spillage and the company shall make available spill kits at fuel farms or filling Stations to control tier one Spillage;

22.0 MONITORING

The company shall monitor its operations and make monthly reports to the Agency to:

- Confirm the validity of impact predictions
- Demonstrate compliance
- Identify any unforeseen effects
- Determine whether remedial action is required or not

23.0 NOTIFICATION

- Notify the EPA as soon as mining operation commences
- Notify EPA of any major changes in the planned development contrary to the information provided in the ESIA.

24.0 NOTWITHSTANDING THIS PERMIT, the mining activity is further subject to other relevant, regulations and permits pertaining to the mining sector and must be observed.

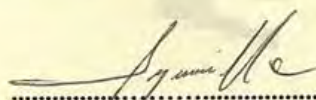
25.0 Company shall obtain decommissioning/closure certificate before abandoning any of its operation sites

26.0 TRANSFERABILITY: *THIS PERMIT IS NOT TRANSFERABLE, EXCEPT AUTHORIZED AND APPROVED BY THE EPAL.*

27.0 VALIDITY PERIOD

This permit is valid for the period 4th October 2013 to 3rd October 2015 renewable under new terms and conditions.

Providing false information or failure to comply with or observe all the permit conditions above will lead to the suspension, cancellation or revocation of this permit or to prosecution.



 STEPHEN Y. NEUFVILLE
 ACTING EXECUTIVE DIRECTOR

11/12/13

 DATE





REPUBLIC OF LIBERIA
MINISTRY OF LANDS, MINES AND ENERGY
P.O. BOX 10-9024
1000 MONROVIA 10
LIBERIA, WEST AFRICA
TEL: (231) 227490, FAX: (231) 226281



CLASS A MINING LICENSE

This CLASS A MINING LICENSE, (This "Mining License") is dated 29th of July A.D 2009 and made by and between the MINISTER OF LANDS, MINES AND ENERGY OF THE REPUBLIC OF LIBERIA (hereinafter referred to as the ("MINISTER"), and BEA MOUNTAIN MINING CORPORATION, a corporation organized under the laws of LIBERIA (hereinafter referred to as the ("CONCESSIONAIRE")).

Capitalized terms used but defined herein shall have the meaning ascribed to them in the Mineral Development Agreement, dated November 28, 2001, among the Government of the Republic of Liberia BEA MOUNTAIN MINING CORPORATION. And (the "MDA") or, if not defined therein, in the New Minerals and Mining Law of the Republic of Liberia, Part1, Title 23, Liberian Code of Laws Revised, as approved on April 3, 2000 and published by the Ministry of Foreign Affairs on September 20,2000 (the "Minerals and Mining Law") or the Regulations.

WITNESSETH:

WHEREAS, the Government and the CONCESSIONAIRE have concluded, and the CONCESSIONAIRE is materially in compliance with, the MDA, which has become effective, permitting Mining in the Proposed Production Area pursuant to its terms and conditions;

WHEREAS, the CONCESSIONAIRE has satisfied the requirement set forth in Section 6.5(b) of the Minerals and Mining Law by completing an exploration program and submitting to the MINISTER a detailed map and descriptive statement, attached hereto as Annex 1, setting forth the boundaries of the Proposed Production Area and the size of the Deposit from which the Minerals are to be mined;

WHEREAS, the CONCESSIONAIRE has submitted a notice to the MINISTER requesting a Class A Mining License for the Proposed Production Area in accordance with the Minerals and Mining Law;

WHEREAS, the CONCESSIONAIRE's application for a Mining License conforms in all material respects to the requirements of the Mineral and Mining Law and the Regulations including:

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- (I) Name, address, nationality and legal status of the applicant;
- (II) The Minerals expected to be mined;
- (III) The boundary of the area subject to the Mining License;
- (IV) The metes and bounds (angles and distances) of the area; and
- (V) An accurate survey of not less than 1-10,000 accompanied by a map showing the geographic position of the claim with reference to adjacent natural landmarks.

WHEREAS, the CONCESSIONAIRE is an Eligible Applicant for a Class A Mining License pursuant to the provision of section 4.2 of the Minerals Law, and has demonstrated the technical and financial capability required in respect of a Class A Mining License;

WHEREAS, the MINISTER is satisfied that the CONCESSIONAIRE possesses the technical skills and experience, and the financial resources to permit it to carry out mining operations in keeping with the requirements of a Class A Mining License and of the Minerals and Mining Law;

WHEREAS, the Proposed Production Area is not subject to a valid Mineral Right granted to another person;

WHEREAS the Republic of Liberia is the owner of all Gold Deposits within the territory of Liberia, and all the rights related to the Development of all such Gold Deposits [including but not limited to the Gold Deposits within Concession Area
]; and

WHEREAS, in accordance with the Minerals and Mining Law, the MINISTER has the power to grant the CONCESSIONAIRE a Class A Mining License as contemplated in the MDA, and to permit the CONCESSIONAIRE to conduct the operations as contemplated by the MDA;

NOW, THEREFORE, for and in consideration of the premise, the mutual promises made by and between the Government and the CONCESSIONAIRE (hereinafter referred to as "the Parties;"), and the terms and conditions herein contained it is hereby irrevocably provided as follows:

GRANT OF CLASS A LICENSE

1. The MINISTER hereby grants to the CONCESSIONAIRE a Class A Mining License for the Proposed Production Area, together with related and privileges to allow the CONCESSIONAIRE to conduct the Operations contemplated by the MDA. This grant is subject to the provisions of the MDA;

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TERMS OF LICENSE

2. The initial term of the Mining License shall commence on the date first above written and shall be for twenty-five (25) years unless earlier terminated pursuant to any of Sections 5.1(g), 5.1(h) or 24 of the MDA. The CONCESSIONAIRE shall have the right to extend the Mining License as set forth in Section 5.1(f) of the MDA upon demonstration that proven reserves exist and upon submission of a revised and updated Feasibility Study, for consecutive additional terms not to exceed twenty-five (25) years each.

DISCOVERY OF OTHER MINERALS

3. Pursuant to section 6.7(c) of the Mineral Law, should the CONCESSIONAIRE, in the course of Development or Mining discover that the Mine or Deposits contain another Mineral not the subject of the Mining License, the CONCESSIONAIRE shall have the right to mine such additional Mineral after an application has been submitted to, and approved by, the MINISTER. A separate application shall be filed in respect of each mineral which has been discovered and is to be Mined, for permission to have its Mining License amended to cover the new Mineral. The approval of the MINISTER shall be granted if the above conditions are met.

DEFINITION OF THE BEA MOUNTAIN PRODUCTION AREA

4. The co-ordinates for the corner points are given below in UTM WGS84 co-ordinate system:

UTM CO-ORDINATES FOR THE BEA MOUNTAIN PRODUCTION AREA

Point	Easting	Northing
0	250035	773000
1	250035	778000
2	265035	778000
3	265003	785013
4	284981	785013
5	284981	793033
6	300035	793000
7	300035	800000
8	307035	800000
9	307035	790000
10	300035	790000
11	300035	786000
12	290035	786000

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13	290035	780000
14	280035	780000
15	280035	777000
16	273035	777000
17	273035	773000
18	250035	773000

ADDITIONAL EXPLORATION WITHIN THE PRODUCTION AREA

5. If the CONCESSIONAIRE wishes to carry out additional Exploration within the proposed production Area, it may do so provided that the work is covered by an exploration work program that has been approved under the terms of the Exploration Regulations. No budget or annual expenditure requirement apply to such work, but all other provisions of the Exploration Regulation as to the manner of carrying out such work and as to reporting the results of such work remain applicable

SURFACE RIGHTS

6. Without prejudice to the generality of the rights provided in the MDA, the grant of the Mining License shall, pursuant to the provisions of Section 6.7(d) of the Minerals and Mining Law, carry the following surface rights:
 - (i) Erection of habitations, office buildings, mill buildings, engine houses, storehouses;
 - (ii) Building of dumps, ditches for drainage, roads within the surface boundaries of the proposed Production Areal;
 - (iii) Making trenches and open cuts, constructed for and necessary Mining Operation;
 - (iv) Cutting of timber only as it is necessary to clear for buildings and such works as are mentioned in (i) to (ii) above and to use in construction of the mining site; and
 - (v) Use of water and other resources necessary for the execution of the work.

RIGHTS TO DISPOSE OF MINERALS

7. The CONCESSIONAIRE shall have the right to freely dispose of within Liberia all Minerals extracted under the terms of this Class A Mining License, and may export all such Minerals in their original or changed form subject to the specific provisions of the MDA;

*Att.
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REPORTS BY THE CONCESSIONAIRE

8. The CONCESSIONAIRE shall submit to the MINISTER not later than September 30 of each year a report giving statistical and descriptive information concerning the operation of the Mining License. The CONCESSIONAIRE shall demonstrate, upon request, to the reasonable satisfaction of the MINISTER that the provisions of this Law and the Regulation are being complied with. Such reports, if requested, shall be submitted not later than December 15, of each year;

INSPECTION OF MINING PREMISES AND BOOKS

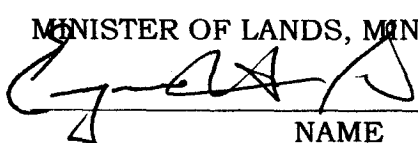
9. The MINISTER shall have the right to order an inspection at any time of the Proposed Production Area and, upon reasonable notice of the books and records maintained at the principal officer of the CONCESSIONAIRE in Liberia;

REQUIREMENTS FOR MAPS

10. The MINISTER may order topographical maps and underground maps to be filed by the CONCESSIONAIRE at any time, but not more often than once every six months. All such maps must be sworn by a competent surveyor, who in his affidavit shall set forth a statement of his training and ability.

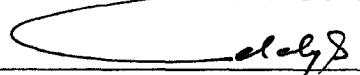
Made in Monrovia, this 29th day of July, 2009.

MINISTER OF LANDS, MINES AND ENERGY


NAME



ACKNOWLEDGE AND AGREED:
BEA MOUNTAIN MINING CORPORATION


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