Appendix 7 B
Management Plans (ENVIRON)

Appendix 7B: Management Plans

Exploration Management Plan
Construction Management Plan – Early Works
Erosion Prevention and Control Plan
Occupational Health and Safety/Accident Prevention Plan
Emergency Preparedness and Response Plan
Hazardous Materials Management Plan
Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)
Buckhall Spill Contingency Plan
Transportation Management Plan
Waste Management Plan
Mine Reclamation and Closure Plan
Community Relations Management Plan
Influx Management Plan
ESHS Monitoring Plan



Exploration Management Plan

Aurora Gold Project

Prepared for

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Georgetown, Guyana
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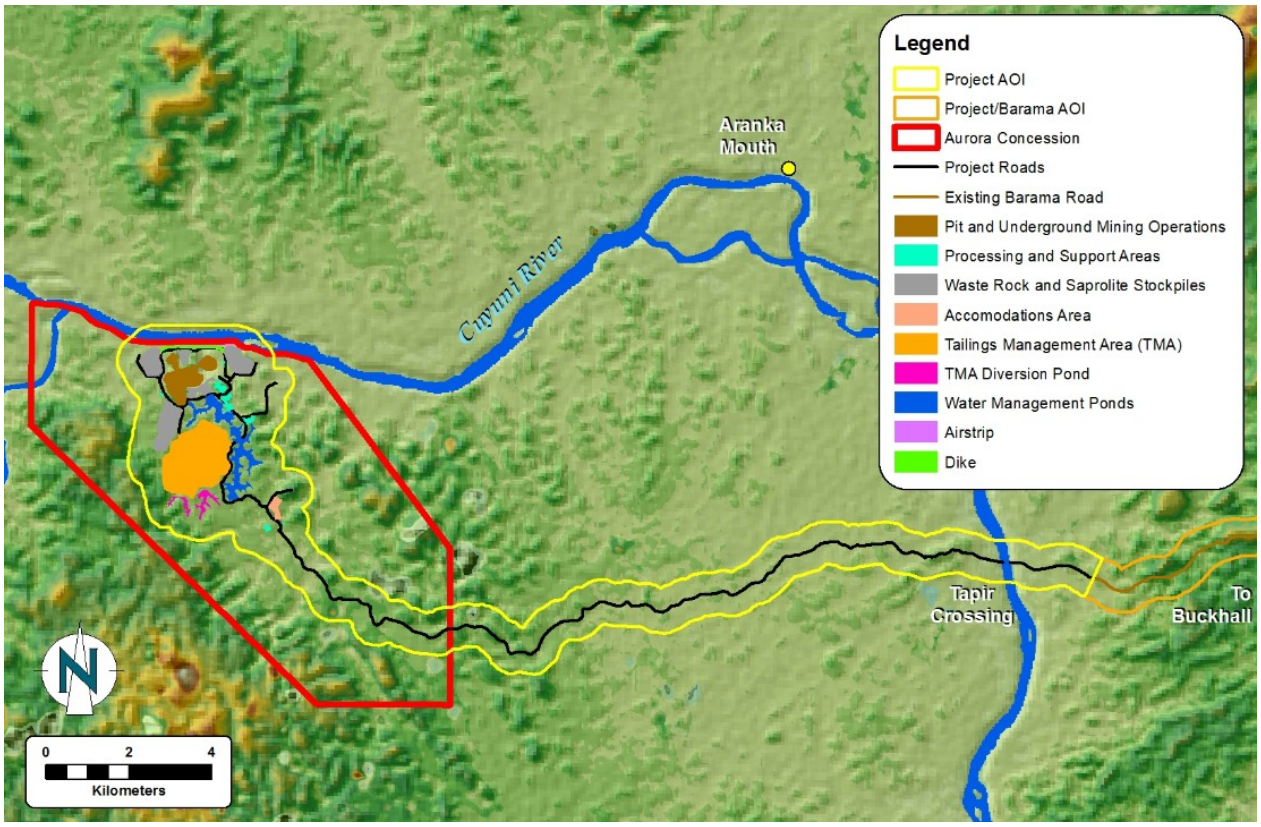
ASM	Artisanal and Small Scale Mining
ATV	All-Terrain Vehicle
E/EWC	Exploration/Early Works Construction
EHS	Environment, Health & Safety
EIA	Environmental Impact Assessment
EPA	(Guyana) Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management Plan
GFC	Guyana Forestry Commission
GGI	Guyana Goldfields, Inc.
GIIP	Good International Industrial Practice
IFC	International Finance Corporation
PS	Performance Standards
SOP	Standard Operating Procedure

1 Introduction

1.1 Purpose and Scope

This *Exploration Management Plan* is designed to manage and, to the extent possible, prevent or mitigate the potential environmental, social, and health and safety (ESHS) impacts associated with prospecting and advanced exploration activities to be conducted at the Guyana Goldfields, Inc. (GGI) Aurora Gold Project (referred to hereafter as the Project). This plan applies specifically and exclusively to those exploration activities conducted to further delineate and characterize the mineral resources contained with GGI's A1 Mining License, i.e., the Project concession boundary, as shown in **Figure 1.1-1**.

Figure 1.1-1: Aurora Gold Project Mine Site Layout, and Concession Boundary



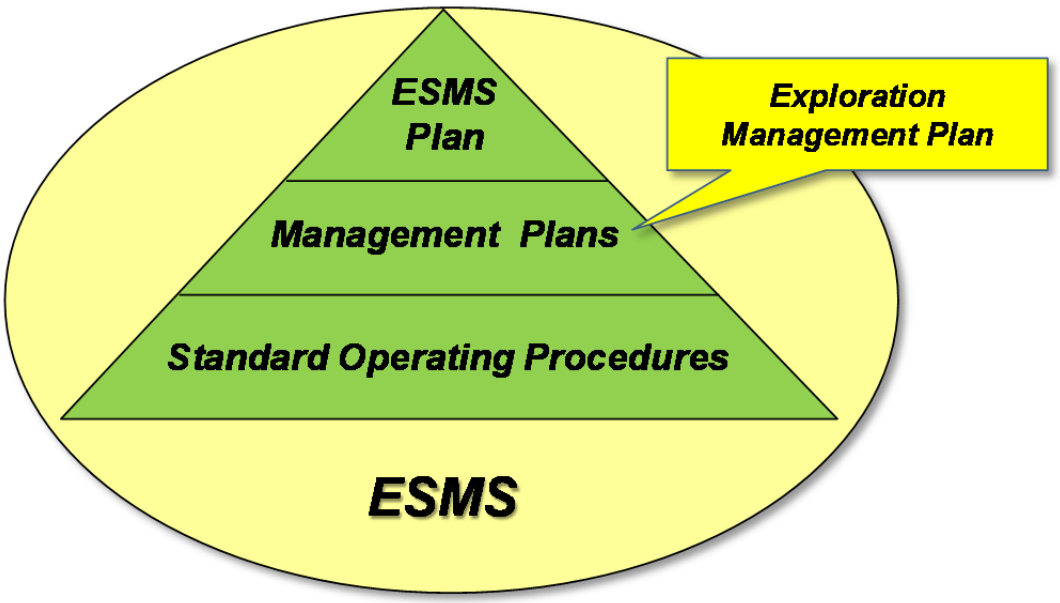
This *Exploration Management Plan* is designed to prevent exploration-related impacts to the extent technically and financially feasible. Where impacts cannot be avoided or prevented, the *Exploration Management Plan* identifies appropriate mitigation or management measures. The *Exploration Management Plan* will apply to all parties involved in prospecting and exploration activities, including Project staff and contractors. Adherence to the *Exploration Management Plan* will be invoked as a condition of all prospecting/exploration contracts and subcontracts; see Section 4.3.3 of the Project *Environmental and Social Management System Plan (ESMS Plan).*

1.2 Relationship to Environmental and Social Management System (ESMS) and Environmental and Social Impact Assessment (ESIA)

GGI has established an Environmental and Social Management System (ESMS) for the Project, which is embodied in a Project-specific *ESMS Plan*. The *ESMS Plan* is based on the requirements of International Finance Corporate (IFC) Performance Standard 1 (PS 1), "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012) and other recognized GIIPs for environmental and health and safety (EHS) and social program management.

This *Exploration Management 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 EHS or social impacts, and will support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project. **Figure 1.2-1** depicts the relationship of the *Waste Management Plan* to the overall structure of the Project ESMS (see Section 1.2 of the ESMS Plan for additional details).

Figure 1.2-1: Relationship of *Exploration Management Plan* to ESMS



1.3 Change Management

Changes to the *Exploration Management Plan* and/or the standard operating procedures (SOPs) cited herein may be required as the Project progresses from phase to phase or as new conditions are encountered. Such changes will be managed in accordance with Section 1.3 of the *ESMS Plan.*

2 General Description of Exploration Activities

2.1 Background

Exploration work within the Project concession will generally be conducted in two distinct phases:

- ***Prospecting,*** which involves short-term, low-impact field reconnaissance and limited surface sampling; and
- ***Advanced Exploration,*** which is longer term and may involve construction of narrow, temporary access roads to transport heavy equipment for trenching; if a site exhibits significant resource potential, access roadways may be widened and improved to permit access by drilling rigs for characterization of the subsurface geology and the location and nature of mineral resource.

As the relative environmental risks and impacts of prospecting and exploration tend to increase as the investigation becomes more detailed and intrusive, GGI will conduct initial investigations of a prospective site in accordance with SOPs GG-08, “Environmental and Social Footprint Surveys” just prior to “ground-truthing” those sites for which initial prospecting efforts have determined that sufficient potential mineral reserves exist to justify more intrusive advanced exploration methods (e.g., trenching, core drilling). If the latter is required, GG-44, “Management of Land Clearances” will also apply to the prepration of drilling pads or temporary laydown or support areas. This *Exploration Management Plan* also identifies other appropriate management and mitigation measures that will be applied to assess, prevent, minimize, or mitigate anticipated social and environmental risks.

If advanced exploration activities and a formal Feasibility Study (FS) confirm that a significant resources are present that warrant significant changes to the Project‘s mining plan or existing infrastructure, updates to the Project’s ESIA and Environmental Permit (Guyana EPA, 2010) may be required.

2.1.1 Prospecting Activities

The prospecting phase of Project exploration operations may include four generally sequential activities:

1) aerial (aircraft-based) surveys of geologic structures using electromagnetic and radio metric survey techniques;
2) interpretation and correlation analysis to map potential areas of interest on the basis of the aerial surveys, current knowledge of the regional geology in the concession areas, and the coordinates of the Project’s concession boundary;
3) site prioritization to determine which concession locations will be "groundtruthed" or prospected; and

4) groundtruthing, which requires a field team to be deployed to prospect the area via visual observation, sampling and geochemical analysis of stream sediments, outcrops, and surficial soils (e.g., hand auger samples).

Activities 1 – 3 are carried out via remote sensing methods and are non-intrusive. Only the fourth activity involves a physical visit to the target site by a team to carry out prospecting, which consists of walking streams to examine sediments for mineralogy that might evidence presence of ore bodies and (where mineralogy is of interest) acquiring surface/near-surface soil samples in the upland areas between streams, using hand auguring methods.

Access to prospecting areas is typically via foot travel or lightweight all-terrain vehicles (ATVs), operation of which is subject to the controls established by GG-26, "Safe Use of All-Terrain Vehicles." Prior to ATV access, the potential alignment of the ATV trail must be evaluated in accordance with GG-08. "Environmental and Social Equipment Surveys" and applicable elements of the Project *Erosion Prevention and Control Plan*. For ATV access, a small track just wide enough for ATV passage is created. ATV tracks should be kept to high ground wherever possible to avoid streams and wetlands, to facilitate passage to the area of interest, and to and to the extent possible avoid the need for constructing any temporary bridges or crossings.

Since exploration activities will be conducted within the Project concession and distances from the Aurora man-camp and Project support areas is small, the need for establishing temporary "fly camps" at the investigation site will be minimal. However, use of fly camps may be warranted in some parts of the concession, and may reduce the net impact on the environment that may be caused by daily traffic to and from the investigation site. If fly camps are established, previously cleared or impacted areas will be used to the extent possible, in order to minimize potential impacts and reduce the amount of work required to establish and decommission a camp. Any required clearances will be managed in accordance with GG-44, "Management of Land Clearances."

The typical prospecting fly camp (see **Annex A**) contains the following:

- tarpaulin rainflies or tents supported by saplings;
- hammocks for the field team (typically a cook, 1-2 geologists, and several helpers);
- several ATVs, with fuel;
- cooking equipment, food storage containers, and cooking fuel;
- medical supplies and safety equipment; and
- lanterns and lantern fuel.

2.1.2 Advanced Exploration Activities

Exploration activities will include trenching using track mounted excavators, followed by the placement of drill rigs, the excavation of temporary drilling mud ponds, and the commencement of drilling and core sampling operations. Previously cleared or impacted sites shall be selected, to the extent possible, and all required clearances must be evaluated and managed in accordance with GG-08, "Environmental and Social Footprint Surveys" and GG-44, "Management of Land Clearances." prior to conducting any clearance activities. Boundaries

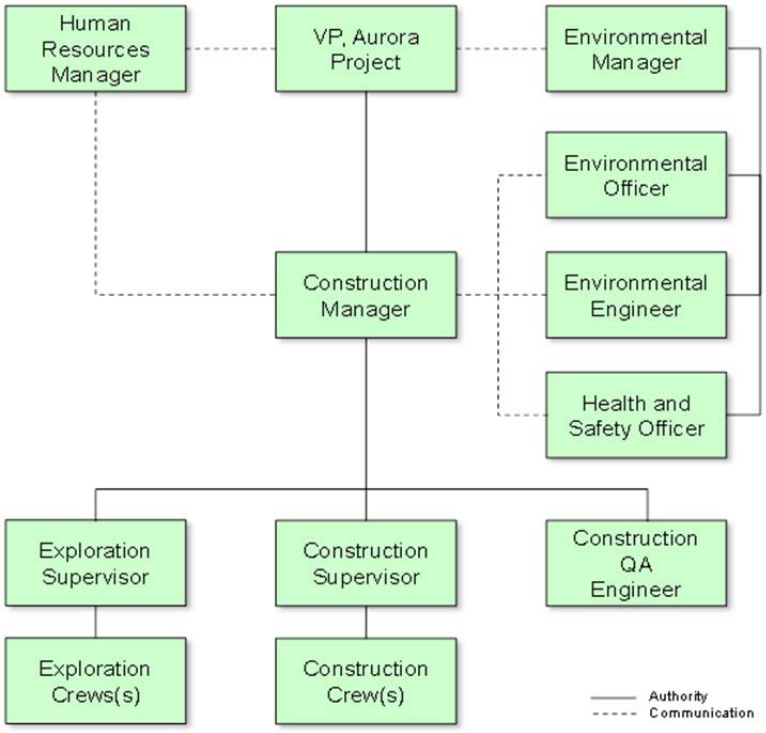
and work areas will be adjusted to accommodate any setbacks or necessary environmental precautions or protective measures identified in the footprint survey.

Due to the need for transporting excavators, drilling rigs, and other heavy equipment to the site, exploration sites also require the establishment of a more substantial earthen access road. Such roads shall be designed for minimal environmental impact in accordance with the requirements of the Guyana Forestry Commission (GFC) *Code of Practice for Timber Harvesting* 2nd ed. (GFC, 2002) and the Project *Erosion Prevention and Control Plan.* All roads should be at least 3 meters wide with stream and wetland crossing structures such as culverts and bridges, appropriately designed to control drainage and to minimize impacts on natural water flows and associated habitats. Because advanced exploration activities will be conducted within the Project concession, and because such roads establish reliable access to the site, there should be no need to maintain a fly camp or establish a semi-permanent exploration camp; drill crews and geologists will be based at the Aurora man-camp

2.2 Management Organization

GGI's management organization is described in detail in Section 5.1 of the Project *ESMS Plan*. A copy of the organizational chart provided therein is reproduced for convenience in **Figure 2.2-1**. Organizational changes that may occur during major construction or mining operations will be reflected in appropriate updates to the *ESMS Plan* and this *Exploration Management Plan*, implemented under the change control requirements discussed in Section 1.3.

Figure 2.2-1: Organizational Chart, Aurora Gold Project



3 Legal Framework for Exploration Activities

3.1 Applicable Laws and Standards

3.1.1 National Requirements

Prospecting and advanced exploration activities are guided by the Guyanese Environmental Protection Act of 1996, which established the Guyana Environmental Protection Agency (EPA) and provides for the management, conservation, protection, and improvement of the environment through the prevention or control of pollution, the assessment of the impact of economic development on the environment, and the sustainable use of natural resources.

The Act mandates the performance of Environmental Impact Assessments for projects with significant impacts on the environment. However, the impacts from early-stage exploration work (e.g., on a new concession area or new acquisition) are not significant enough to necessitate an ESIA or other type of assessment. Preparation of a full EIA (or ESIA, if IFC is engaged as an equity partner) would not be warranted until FSs and pother preliminary studies indicate a viable mining project. EIA/ESIA approval will be required prior to the start of major construction. It may also be noted that Section 3.1 of the *ESMS Plan* requires the development of documented regulatory compliance management processes prior to major construction, in order to ensure that all applicable laws and standards are properly reflected in the Project design.

3.1.2 International Standards

Prospecting and advanced exploration activities will also be guided by appropriate international standards/good international industrial practices (GIIPs), including:

- International Finance Corporation (IFC) *Environmental, Health, and Safety Guidelines for Mining* (IFC, 2007a);
- IFC *Environmental, Health, and Safety General Guidelines* (IFC, 2007b); and
- Prospectors & Developers Association of Canada (PDAC). 2009. “e3-Plus Excellence in Environmental Stewardship e-toolkit (EES)”, Version-01.

GGI will consider applicable elements of these standards and other appropriate GIIPs in the selection of impact management and mitigation measures, as noted in Section 5.

4 Potential Risks and Impacts

4.1 Environmental Impacts from Prospecting and Advanced Exploration Activities

The environmental impacts from prospecting and exploration activities are relatively limited, and may be expected to include:

- temporary erosion and sedimentation from ATV trails, exploration roadways, and cleared “fly-camp” and work areas;

- air emissions and noise from the operation of ATVs, trenching and roadway construction equipment, and drill rigs;
- temporary habitat loss due to clearing of vegetation for trails, roadways, fly- camps, and work areas;
- use of hazardous materials (e.g., fuel for lanterns, cooking, and vehicles, generators, drill rigs, and other portable motorized equipment items); and
- generation and accumulation of non-hazardous and hazardous wastes from fly-camp and field activities.

Measures that will be applied to the prevention, minimization, and/or mitigation of such impacts are described in Section 5.

5 Environmental Management and Mitigation Measures for Prospecting and Exploration Activities

The following tables present standard practices and references to specific Project management plans and SOPs which are designed to prevent, minimize, and/or mitigate potential environmental impacts associated with the prospecting and advance exploration activities described in Sections 2 and 4. These practices and SOPs will be followed over the entire life of the prospecting or exploration activity, from the siting and development of prospecting trails and camps, through use, maintenance, and decommissioning. Each table presents:

- ***Issue/Impact***: General description of the issue or impact.
- ***Mitigation Measure/Action***: Describes the mitigation measure or action, and provides a cross-reference to applicable practices or appropriate GGI SOPs. Note that one or more specific mitigation measures/actions may be included for a given issue.
- ***Source Reference***: This states the source of the mitigation measure/action and any associated planning or SOP controls established by the Project ESMS.

5.1 Management and Mitigation Measures for Prospecting Trails and Advanced Exploration Roadways

The following table details the mitigation measures and actions that should be completed during the construction, use, and decommissioning of prospecting trails and exploration roadways. The potential risks and impacts are listed with the accompanying management actions / mitigation measures, and references for the noted actions.

Table 5-1: Impact Management and Mitigation Measures for Prospecting Trails and Advanced Exploration Roadways

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Trail Construction		
Trail Width	ATV trails will be single tracks (i.e., no two-way trails); the trail width should be the minimum required for safe passage of an ATV (1.5 - 2 meters).	GIIPs and GG-26, "Safe Use of All-Terrain Vehicles"
Exploratory roadway width	Roadway design shall consider the applicable requirements the Guyana Forestry Commission (GFC) *Code of Practice for Timber Harvesting* 2nd ed.; rights of way should be minimized to the extent possible, although adjustments shall be made to ensure the safety of the roadway and camp areas from potential treefall hazards	GFC *Code of Practice for Timber Harvesting* and Project *Erosion Prevention and Control Plan* (GFC, 2002)
Trail and exploratory roadway alignments	When possible, the trail or exploratory roadway shall be located on uplands in order to avoid stream crossings and wetlands. Trails and roadways shall also be located to avoid any known sensitive habitat areas; all alignments will be evaluated in accordance with GG-08, "Environmental Footprint Surveys" prior to creation of any ATV trail or exploratory roadway.	GG-08, "Environmental Footprint Surveys"
	Discoveries of any human remains or artifacts with potential archaeological or historical value will be left in place, protected, and evaluated in accordance with GG-25, "Chance Archaeological Finds."	GG-25, "Chance Archaeological Finds"

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Trail and exploratory roadway Installations	During prospecting activities, trail installations shall be temporary in nature (e.g., wooden boards for traction, temporary stream crossings). Roadway design shall consider the applicable requirements the GFC *Code of Practice for Timber Harvesting* (GFC, 2002); rights of way (ROW) shall be minimized to the extent possible, although adjustments shall be made to ensure the safety of the roadway and camp areas from potential treefall hazards. ROWs shall be stabilized and revegetated where necessary per the Project *Erosion Prevention and Control Plan.*	GIIPs, GFC *Code of Practice for Timber Harvesting,* and the Project *Erosion Prevention and Control Plan*
Records and Documentation	GGI will keep records of the locations of all prospecting trails (via GPS or other) per GG-08, "Environmental Footprint Surveys" and GG-05, "Records Management" requirements in order to more effectively utilize previously established trail routes when constructing trails to new prospecting camps (where possible), and to assist in the revegetation and monitoring of trail recovery after abandonment, per the Project *Erosion Prevention and Control Plan.*	GG-08, "Environmental Footprint Surveys"; GG-05, "Records Management"; and the Project *Erosion Prevention and Control Plan*
Trail Use and Maintenance		
ATV use	ATV riders shall comply with the requirements of GG-26, "Safe Use of All-Terrain Vehicles."	GG-26, "Safe Use of All-Terrain Vehicles"
ATV maintenance	Only emergency maintenance is allowed along the prospecting trails; regular vehicle maintenance is prohibited. ATVs in need of repair will be towed to the nearest base camp that has a dedicated site for vehicle maintenance.	GIIPs and GG-26, "Safe Use of All-Terrain Vehicles"
Noise	Vehicles shall be maintained in proper working order in accordance with the requirements of GG-26, "Safe Use of All-Terrain Vehicles"; noise reduction devices (i.e., silencers or mufflers) shall not be removed . Noise reduction devices are included on the equipment maintenance program and inspection protocols described in GG-26. Given the remoteness and lack of formal settlements in the Project concession, other noise issues are not anticipated.	GIIPs and GG-26, "Safe Use of All-Terrain Vehicles"

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Air Emissions and Ambient Air Quality	Vehicles will be inspected prior to use in accordance with GG-26, "Safe Use of All-Terrain Vehicles" to ensure the equipment is in good condition and that air emissions and chance of spills and releases are minimized.	GG-26, "Safe Use of All-Terrain Vehicles"
	Minimize vehicle emissions, dust, and stationary source pollution by properly maintaining vehicles, and by not removing emission control devices; see GG-26, "Safe Use of All-Terrain Vehicles"	GG-26, "Safe Use of All-Terrain Vehicles"
Biodiversity and Natural Resource Management	Hunting and fishing are strictly prohibited.	GGI "Labour Grievance Procedure" (*ESMS Plan* Appendix A)
	Workers shall avoid all contact with wildlife: • wild animals shall not be fed; and • animals shall not be approached or harassed in any way.	GIIPs and GGI "Labour Grievance Procedure" (*ESMS Plan* Appendix A)
Solid Waste Management	No littering is permitted anywhere within the Project concession, in particular along prospecting trails or exploratory roadways. All non-hazardous and hazardous waste shall be transported to the nearest camp and disposed of in accordance with the Project *Waste Management Plan*; a "carry in/carry out" policy shall be applied to all prospecting activities.	GIIPs; GGI "Labour Grievance Procedure" (*ESMS Plan* Appendix A); and the Project *Waste Management Plan*
	Any trash encountered along the trail will be picked up and carried to the nearest semi-permanent camp for proper disposal or controlled accumulation in accordance with the Project *Waste Management Plan.*	GIIPs and the Project *Waste Management Plan*

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Hazardous Materials Management	It is anticipated that the primary types of hazardous materials transported along the prospecting trails will be fuels, including gasoline and cooking gas, and potentially limited quantities of malaria suppression chemicals; temporary secondary containment will be provided per GG-14, "Handling and Storage of Hazardous Materials"; remote fuelling will be accomplished using drip trays as noted in GG-17, "Vehicle Fuelling and Spill Prevention."	GIIP; *Waste Management Plan*; GG-14, "Handling and Storage of Hazardous Materials"; GG-17, "Vehicle Fuelling and Spill Prevention"; and GG-26, "Safe Use of All-Terrain Vehicles.
	The use of hazardous materials will be avoided or minimized to the extent practicable, per the Project *Waste Management Plan.*	
	Fuel containers shall be securely strapped to the vehicle carrying them, and staff operating vehicles carrying fuel shall exercise extra caution (i.e., travel at a lower rate of speed). All ATV riders will be qualified in accordance with GG-26, "Safe Use of All-Terrain Vehicles."	
Soil Contamination	All field fuelling activities will comply with GG-17, "Vehicle Fuelling and Spill Prevention"; any spills shall be reported immediately to the Environmental Officer at the Aurora base camp for investigation and cleanup per the *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas).*	GG-17, "Vehicle Fuelling and Spill Prevention"; *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas)*; and *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas)*
	If necessary, contaminated soil shall be removed from the trail and disposed of properly at the Aurora base camp per the Project *Waste Management Plan*.	

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Training and Workforce Conduct	All prospecting and advance exploration workers will receive initial training on acceptable environmental and social behavior and field practices (i.e., the GGI "Labour Grievance Procedure") prior to their first prospecting or advance exploration expedition, in accordance with GG-06, "ESMS Training Program." Workers will also receive periodic refresher training in accordance with GG-06. All workers will be trained in the requirements of GG-11, "Personal Protective Equipment"; GG-12, "First Aid and Emergency Medical Response"; GG-24, "Recognition and Reporting of Safety Hazards", GG-22, "Fire Prevention Program"; and GG-23, "Operational Safety Meetings."	GG-06, "ESMS Training Program"; GG-11, "Personal Protective Equipment"; GG-12, "First Aid and Emergency Medical Response"; GG-24, "Recognition and Reporting of Safety Hazards", GG-22, "Fire Prevention Program"; and GG-23, "Operational Safety Meetings"
Chainsaw accidents	Chainsaw operators will be trained and qualified in accordance with GG-27, "Chainsaw Safety" and GG-17, "Vehicle Fuelling and Spill Prevention."	GIIP; GG-27, "Chainsaw Safety"; and GG-17, "Vehicle Fuelling and Spill Prevention"
Vehicular Accidents	ATV riders and heavy equipment operators will be trained and qualified in accordance with GG-17, "Vehicle Fuelling and Spill Prevention"; GG-16, "Safe Operation of Heavy Equipment"; and/or GG-26, "Safe Use of All-Terrain Vehicles."	GIIP; GG-17, "Vehicle Fuelling and Spill Prevention"; GG-16, "Safe Operation of Heavy Equipment"; and/or GG-26, "Safe Use of All-Terrain Vehicles"
Records, Documentation, and Reporting	The Camp Manager and/or Environmental Officer will document any significant environmental issues that occur during the prospecting activities in accordance with GGI SOPs cited above and GG-05, "Records Management."	GG-05, "Records Management"

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Trail/Exploration Roadway Decommissioning and Abandonment		
Decommissioning	All equipment and structures (e.g., boards for assisting in ATV traction or stream crossings) will be removed prior to abandoning the trail (or exploration roadways that will not be developed further)l; any wastes or trash along the trail will be removed and disposed of properly in accordance with the Project *Waste Management Plan*. Disturbed areas will be stabilized and revegetated in accordance with the *Erosion Prevention and Control Plan.*	GIIPs; *Waste Management Plan*; and *Erosion Prevention and Control Plan*
Trail or Exploration Roadway Abandonment	Before abandoning a trail or exploration roadway, GGI staff will inspect to ensure that it has been properly decommissioned (i.e., re-contoured and re-seeded as required) per the Project Erosion Prevention and Control Plan.	GIIPs; *Erosion Prevention and Control Plan*
Reclamation	Disturbed areas will be revegetated using appropriate methods selected the Project *Erosion Prevention and Control Plan.*	GIIPs and the Project *Erosion Prevention and Control Plan*

5.2 Management and Mitigation Measures for Prospecting Fly Camps and Advance Exploration Areas

Table 5-2 details the mitigation measures and actions that should be completed during the construction, use, and decommissioning of prospecting and advance exploration areas. The potential risks and impacts are listed with the accompanying management actions / mitigation measures, and references for the noted actions.

Table 5.2-1: Impact Management and Mitigation Measures for Prospecting Fly Camps and Advance Exploration Worksites

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Prospecting fly camp, exploration trench, or drill pad and laydown area location	Whenever possible, existing clearings will be used to minimize impacts on forested areas; proposed locations will be subject to evaluation in accordance with GG-08, "Environmental and Social Footprint Surveys." Any new clearances will be subject to the requirements of GG-44, "Management of Land Clearances" and the Project *Erosion Prevention and Control Plan.*	GIIPs[1]; GG-08, "Environmental and Social Footprint Surveys."; GG-25, "Chance Archaeological Finds"; GG-44, "Management of Land Clearances"; and the Project *Erosion Prevention and Control Plan.*
	All fly camp areas or drilling pad or laydown areas will be located at least 75 m from surface water features	
	Excavation and disturbance of the soil shall be minimized; discoveries of any human remains or artifacts with potential archaeological or historical value will be left in place, protected, and evaluated in accordance with GG-25, "Chance Archaeological Finds."	
	Chainsaw operators involved in clearance activities shall be trained in GG-27, "Chainsaw Safety" requirements.	GG-27, "Chainsaw Safety" .

[1] For Example: http://www.lnt.org/programs/principles.php and http://www.treadlightly.org/page.php/responsible-camping/Recreation-Tips.html

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Vegetation	Work areas shall be designed to minimize the number of trees (especially large trees) and other vegetation that needs to be removed (with the exception of potential treefall that could represent a safety hazard top the workforce).	GIIPs and GG-44, "Management of Land Clearances"
Records and Documentation	GGI will keep records of the locations of all exploratory trenches and drill pad locations in accordance with GG-08, "Environmental and Social Footprint Surveys"; GG-44, "Management of Land Clearances"; and GG-05, "Records Management."	GG-08, "Environmental and Social Footprint Surveys"; GG-44, "Management of Land Clearances"; and GG-05, "Records Management."
Campfires	Open campfires are prohibited in exploration work areas per GG-22, "Fire Prevention Program"; campfires are	GIIPs and GG-22, "Fire Prevention Program"
Soil Contamination	All field fuelling activities will comply with GG-17, "Vehicle Fuelling and Spill Prevention"; any spills shall be reported immediately to the Environmental Officer for investigation and cleanup per the *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)*	GIIPs; with GG-17, "Vehicle Fuelling and Spill Prevention"; and *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)*
Human Waste	At exploration sites, temporary latrines shall be dug downgradient of the drill pad or worksite. If human waste levels reach within 1m of the ground surface, latrines shall be buried, and the site re-contoured and re-seeded with native species to re-establish a vegetative cover per the Project *Erosion Prevention and Control Plan*	GIIPs[2] and the *Erosion Prevention and Control Plan*

[2] For example: http://www.lnt.org/programs/principles_3.php

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
	At fly camps, solid human waste shall be disposed of in a shallow hole six to eight inches deep at least 75m from water sources, campsites, or trails. The waste hole shall be covered and disguised with natural materials (e.g., leaves and sticks). Toilet paper shall be buried with the waste. Liquid waste can be disposed of on the ground, since urine (in small quantities) has minimal effect on vegetation or soil.	
Air Emissions, Ambient Air Quality, and Dust	Vehicles and machinery, in particular internal combustion engine-powered equipment, will be inspected prior to use in to ensure the equipment is in good condition and that excessive air emissions and chance of spills and releases are minimized.	GIIPs
	Minimize vehicle emissions, dust, and stationary source pollution by properly maintaining vehicles, and by not removing emission control devices; see GG-13, “Transportation Safety – Light Vehicles”; GG-16, “Safe Operation of Heavy Equipment”; and GG-26, “Safe Use of All-Terrain Vehicles.”	GIIPs; GG-13, “Transportation Safety – Light Vehicles”; GG-16, “Safe Operation of Heavy Equipment”; and GG-26, “Safe Use of All-Terrain Vehicles”
Hazardous Materials Management	The use of hazardous materials will avoided or minimized to the extent practicable. However, it is anticipated that the primary types of hazardous materials used at fly camp or semi-permanent exploration camp sites will be fuels, including gasoline, diesel fuel, chainsaw fuel, and cooking gas, and potentially limited quantities of malaria suppression chemicals, pesticides, or rodenticides. Temporary secondary containments for fuel and waste oil storage and any accumulated hazardous wastes will be provided per GG-14, “Handling and Storage of Hazardous Materials”; remote fuelling will be accomplished using drip trays as noted in GG-17, “Vehicle Fuelling and Spill Prevention.”	GIIPs; GG-14, “Handling and Storage of Hazardous Materials”; and GG-17, “Vehicle Fuelling and Spill Prevention”
	Fuel drums, waste oil, and accumulated empty fuel barrels will be stored away from living areas within temporary roofed, bermed, and HDPE-lined containments; fuel may be stored within dedicated metal skids or trays that also provide containment as noted in GG-14, “Handling and Storage of Hazardous Materials.”	GG-14, “Handling and Storage of Hazardous Materials”

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Solid Waste Management	At fly camps and exploration worksites, all non-hazardous wastes generated by the project shall be contained, transported back to the Aurora site, and disposed of as required by the Project *Waste Management Plan.*	GIIPS and the Project *Waste Management Plan*
Noise	Given the remoteness and lack of formal settlements in the Aurora concessions, noise issues with the public are not anticipated. However, vehicles and noise reduction devices shall nevertheless be maintained in proper working order in accordance with the requirements of GG-26, "Safe Use of All-Terrain Vehicles"; GG-16, "Safe Operation of Heavy Equipment"; and/or GG-13, "Transportation Safety" requirements. Engine silencers or mufflers shall not be removed.	GG-26, "Safe Use of All-Terrain Vehicles"; GG-16, "Safe Operation of Heavy Equipment"; and/or GG-13, "Transportation Safety"
Soil Erosion and Sediment Control	Camps and exploration work areas will be designed to minimize the area of bare ground exposed; sediment control measures shall be installed as required by the Project *Erosion Prevention and Control Plan*	GIIPs and the Project *Erosion Prevention and Control Plan*
Chainsaw accidents	Chainsaw operators will be trained and qualified in accordance with GG-27, "Chainsaw Safety" and GG-17, "Vehicle Fuelling and Spill Prevention."	GG-27, "Chainsaw Safety" and GG-17, "Vehicle Fuelling and Spill Prevention"
Training and Workforce Conduct	All prospecting and advance exploration workers will receive initial training on acceptable environmental and social behavior and field practices (i.e., the GGI "Labour Grievance Procedure") prior to their first prospecting or advance exploration expedition, in accordance with GG-06, "ESMS Training Program." Workers will also receive periodic refresher training in accordance with GG-06. All workers will be trained in the requirements of GG-11, "Personal Protective Equipment"; GG-12, "First Aid and Emergency Medical Response"; GG-24, "Recognition and Reporting of Safety Hazards", GG-22, "Fire Prevention Program"; and GG-23, "Operational Safety Meetings."	*ESMS Plan* Appendix A ("Labour Grievance Procedure") ; GG-06, "ESMS Training Program"; GG-11, "Personal Protective Equipment"; GG-12, "First Aid and Emergency Medical Response"; GG-24, "Recognition and Reporting of Safety Hazards", GG-22, "Fire Prevention Program"; and GG-23, "Operational Safety Meetings"

Potential Issue/Impact	Mitigation Measure / Action	Applicable References
Vehicular Accidents	All vehicle operators will be trained and qualified in accordance with GG-17, "Vehicle Fuelling and Spill Prevention"; GG-12, "Transportation Safety"; GG-16, "Safe Operation of Heavy Equipment"; and/or GG-26, "Safe Use of All-Terrain Vehicles", as appropriate for their work assignments.	GIIPs and GG-17, "Vehicle Fuelling and Spill Prevention"; GG-12, "Transportation Safety"; GG-16, "Safe Operation of Heavy Equipment"; and/or GG-26, "Safe Use of All-Terrain Vehicles"
Records, Documentation, and Reporting	The Environmental Officer will document and seek resolution of any significant environmental issues that occur during the prospecting activities in accordance with GGI SOPs cited above and GG-03, "Field Inspections"; GG-04, "Control of Non-conformances and Corrective/Preventive Action"; and GG-05, "Records Management."	GG-03, "Field Inspections"; GG-04, "Control of Non-conformances and Corrective/Preventive Action"; and GG-05, "Records Management"
Decommissioning	All equipment and structures (e.g., drilling mud reservoirs) will be removed and regraded prior to abandoning the site; disturbed areas will be regarded as required, stabilized, and revegetated in accordance with the *Erosion Prevention and Control Plan*. Any wastes or trash will be removed and disposed of properly in accordance with the Project *Waste Management Plan.*	GIIPs; *Erosion Prevention and Control Plan*; and *Waste Management Plan*
Soil Contamination	All field fuelling activities will comply with GG-17, "Vehicle Fuelling and Spill Prevention"; any spills shall be reported immediately to the Environmental Officer any spills shall be reported immediately to the Environmental Officer for investigation and cleanup per the *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas).*	GIIPs; GG-17, "Vehicle Fuelling and Spill Prevention"; and *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)*
Waste Management	All nonhazardous waste shall be removed from the site and disposed of as required by the Project *Waste Management Plan*. Hazardous wastes shall be segregated and stored in a controlled area pending location of a permitted disposal site, as also specified by the Project *Waste Management Plan.*	*Waste Management Plan*

6 Field Inspections

Compliance with the requirements of this Exploration Management Plan and the supporting Action Plans and SOPs cited herein shall be monitored via periodic inspections conducted at the direction of the Environmental Manager, in compliance with GG-03, “Field Inspections.” Any nonconformance noted in such inspections shall be collaboratively evaluated and resolved in accordance with GG-04, “Identification of Non-conformances and Corrective /Preventive Action.”

References

Internal References

- *ESMS Plan*
- *Construction Management Plan – Early Works*
- *Erosion Prevention and Control Plan*
- *Occupational Health and Safety/Accident Prevention Plan*
- GG-01, “Solid Waste Management – Exploration/Early Works Construction Phase Activities”
- GG-03, “Field Inspections”
- GG-04, “Identification of Non-conformances and Corrective /Preventive Action”
- GG-05, “Records Management”
- GG-06, “ESMS Training Program”
- GG-08, “Environmental Footprint Surveys”
- GG-09, “Identification of Project-Related Safety Hazards and Assessment of Risks”
- GG-11, “Personal Protective Equipment”
- GG-12, “First Aid and Emergency Medical Response”
- GG-13, “Transportation Safety – Light Vehicles”
- GG-14, “Handling and Storage of Hazardous Materials”
- GG-16, “Safe Operation of Heavy Equipment”
- GG-17, “Vehicle Fuelling and Spill Prevention”
- GG-22, “Fire Prevention Program”
- GG-24, “Recognition and Reporting of Safety Hazards”
- GG-26, “Safe Use of All-Terrain Vehicles”
- GG-27, “Chainsaw Safety”
- GG-44, “Management of Land Clearances”

External References

Guyana Forestry Commission. 2002. *Code of Practice for Timber Harvesting* 2nd ed.

International Finance Corporation (IFC). 2007a. *Environmental, Health, and Safety Guidelines for Mining*.

International Finance Corporation (IFC). 2007b. *Environmental, Health, and Safety General Guidelines*.

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Leave No Trace Center for Outdoor Ethics. 2008. "Principles". http://www.lnt.org/programs/principles.php. Accessed on April 12, 2011.

Leave No Trace Center for Outdoor Ethics. 2008. "Dispose of Waste Properly". http://www.lnt.org/programs/principles_3.php. Accessed on April 12, 2011.

Tread Lightly. 2009. "Top 10 Ways to Minimize Impact When Camping in The Outdoors". http://www.treadlightly.org/page.php/responsible-camping/Recreation-Tips.html. Accessed on April 12, 2011.

Attachment A: Typical Prospecting Access Trail and “Fly-camp”





Attachment B: Typical Advanced Exploration Trench and Drill Pad Arrangement







Construction Management Plan – Early Works

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
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Washington, DC
Seattle, WA

Date:
June 2013
Project Number:
01-25901A1

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Page	Section	Description of Change
All	All	First issue of *Construction Management Plan - Early Works*

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List of Acronyms

API	American Petroleum Institute
ASM	Artisanal/Small-scale Miner
ATV	All-Terrain Vehicle
CPAR	Corrective/Preventive Action Request
CQA	Construction Quality Assurance
ESHS	Environment, Social, and Health and Safety
EPA	(Guyana) Environmental Protection Agency
EPC	Engineering'/Procurement/Construction
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
EW	Early Works
EWC	Early Works Construction
GGI	Guyana Goldfields, Inc.
GIIP	Good International Industrial Practices
HDPE	High-Density Polyethylene
HSE	Health, Safety, and Environmental
IFC	International Finance Corporation
MSDS	Material Safety Data Sheet
PS	Performance Standards
ROW	Right of Way
SOP	Standard Operating Procedure
TOG	Total Oil and Grease
TPH	Total Petroleum Hydrocarbons

1 Introduction

1.1 Purpose and Scope of the Construction Management Plan - Early Works

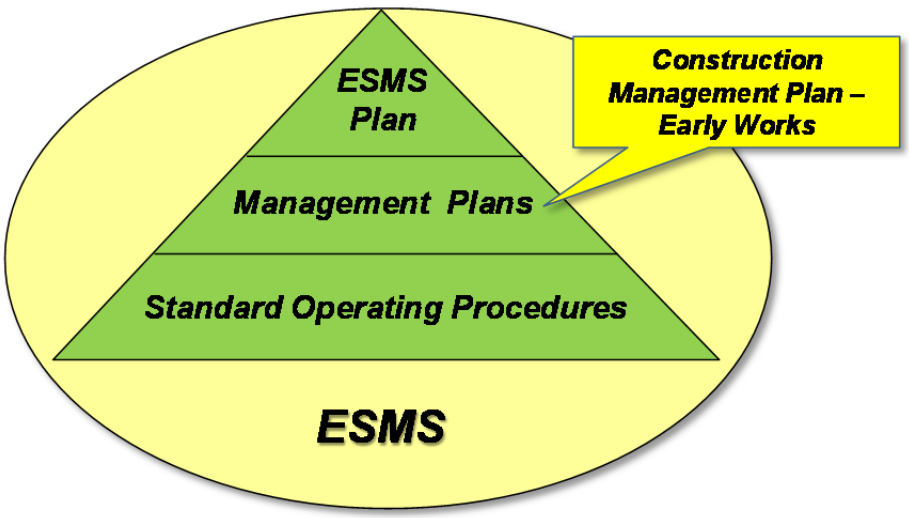
This *Construction Management Plan - Early Works* is designed to manage and, to the extent possible, prevent or mitigate the environmental, social, and health and safety (ESHS) impacts anticipated for a limited range of early works construction (EWC) activities to be conducted at the Guyana Goldfields, Inc. (GGI) Aurora Gold Project (Project). This plan applies specifically and exclusively to EWC activities conducted at GGI's Buckhall logistics support facility and within the boundaries of GGI's A1 Mining License, i.e., the Project concession boundary. EWC activities will be conducted prior to the commencement of major mine construction activities.

1.2 Relationship to Environmental and Social Management System (ESMS) and Environmental and Social Impact Assessment (ESIA)

GGI has established an Environmental and Social Management System (ESMS) for the Project, which is embodied in a Project-specific *ESMS Plan.* The *ESMS Plan* is based on International Finance Corporate (IFC) Performance Standard 1, "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012) and other recognized good international industrial practices (GIIPs) for environmental and health and safety program management. The *ESMS Plan* will be periodically updated at specific points or phases in the mine life cycle in response to changing Project conditions and environmental, health and safety, and social management needs.

The *Construction Management Plan - Early Works* is conceived as an initial, preliminary iteration of a more comprehensive plan (*Construction Management Plans – Major Construction*) that will be developed after the major construction phase of the Project is authorized. The *Construction Management Plan - Early Works* is one of a series of management plans that will be activated at various phases of the mine life cycle (see Section 1.2 of the *ESMS Plan* for further discussion), and will support the final Environmental and Social Impact Assessment (ESIA) for the Project. **Figure 1.2-1** describes the relationship of the *Construction Management Plan - Early Works* to the overall structure of the Project ESMS.

Figure 1.2-1: Relationship of *Construction Management Plan - Early Works* to ESMS



1.3 Change Management

This *Construction Management Plan - Early Works* will be withdrawn from service with the issue of the *Construction Management Plan – Major Construction,* to be developed by GGI's engineering'/procurement/construction (EPC) contractor prior to the pre-stripping of mining areas and the construction of the mill, process plant, Tailings Management Area, various water management features, and other major Project infrastructure. Any changes to the *Construction Management Plan - Early Works* required in the interim will be managed in accordance with Section 1.3 of the *ESMS Plan.*

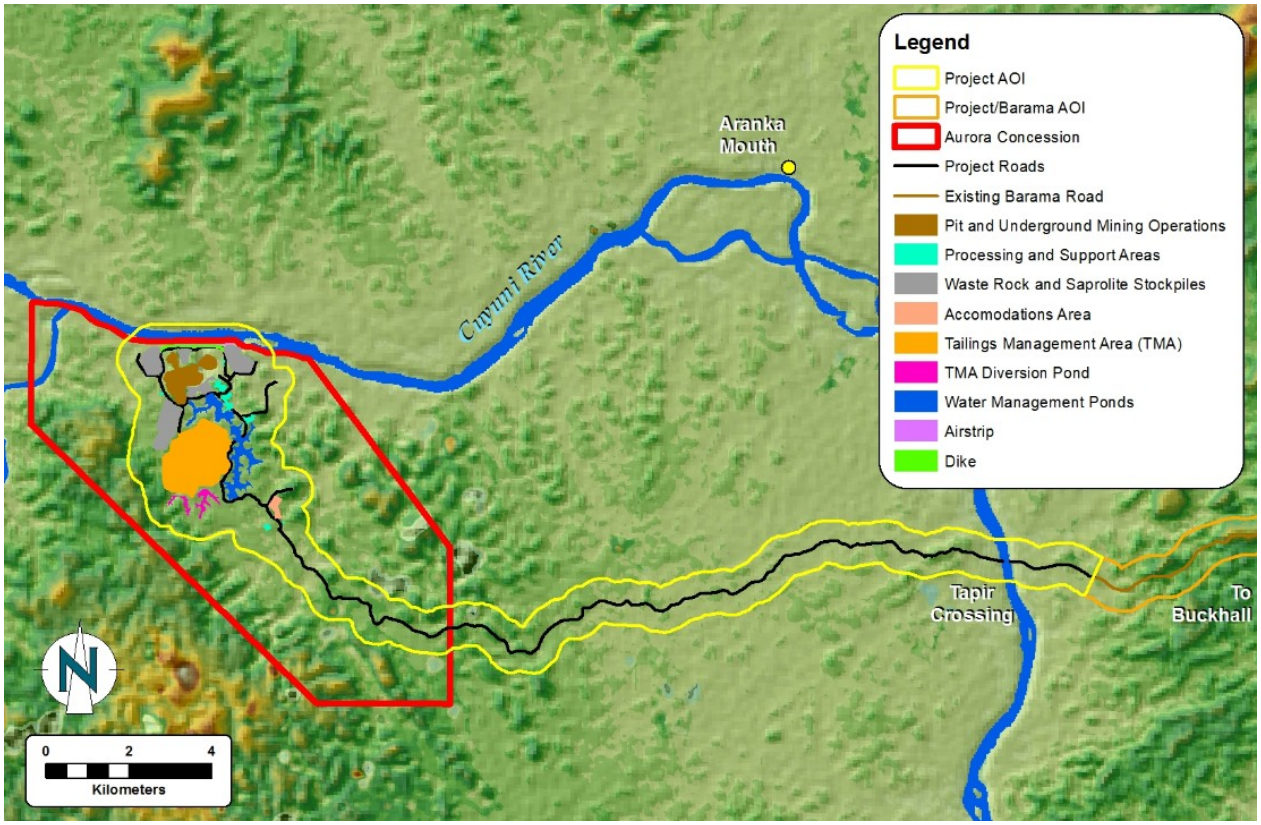
2 Description of Early Works Construction Activities

2.1 Early Works Construction Project Description

EWC activities may include:

- Completion of building upgrades, wharf areas, laydown and convoy marshaling yards, and other infrastructure at the Buckhall logistics support facility;
- Completion and maintenance of the extension of the Barama (M3) road to the Aurora site (see the general project layout and access road locations in **Figure 2.1-1**), including stabilization and revegetation of roadside rights of way (ROWs) in accordance with the Project *Erosion Prevention and Control Plan;*
- Surveys of potentially sensitive environmental issues at all EWC sites within the Project's concession boundary as noted in **Figure 2.1-1**, in accordance with GG-08, "Environmental Footprint Surveys", and collaborative development of appropriate environmental footprint clearance instructions in accordance with GG-44, "Management of Land Clearances", based on summaries of potential impacts and mitigation measures provided in Section 4;
- Surveys of designated clearance areas for usable timber, followed by selective logging, reservation of usable logs for future construction purposes, and stockpiling of organic material for future site reclamation use;
- Surveys of potential sources of aggregate for roadway construction and maintenance;
- Clearing, grubbing, and grading of the footprint required for the installation of a new, 400-man modular man-camp, and construction of modular housing and supporting infrastructure;
- Clearance, grubbing, and grading of areas required for limited construction support infrastructure; these may include:
  - an initial general purpose laydown yard for building materials, and as needed to support logging, clearance, and roadway construction activities;
  - portable rock crushing equipment and aggregate stockpile;

Figure 2.1-1: Aurora Gold Project Site Layout



  - a small portable concrete batch plant for preparation of concrete for building foundations and other purposes; and
  - a portable sawmill for milling site-harvested timber to dimensions suitable for onsite building construction;

- Clearance, grubbing, and grading of designated areas for stockpiling of organic waste material, sawdust, and topsoil (to be reserved for site reclamation/restoration purposes);
- Construction of a covered and bunded concrete or high-density polyethylene- (HDPE-) lined storage facility for containerized accumulation of limited quantities of hazardous wastes (e.g., used insecticide/rodenticide/fungicide containers, oily rags, mercury ballasts, crushed fluorescent light tubes, torch batteries);
- Construction of one or more waste water treatment plants and septic systems; potable water collection, storage, treatment, and delivery systems; indoor/outdoor recreational spaces; fuel storage/fuelling facilities; warehouse/storage facilities; and other infrastructure; and
- Decommissioning and closure of the temporary man-camp at Tapir Crossing (which will be staffed from the Aurora site upon man-camp completion.

2.2 Design and Construction Quality Assurance Considerations

Specific forest or land areas to be disturbed in the creation of roadways and exploration/ construction sites will be evaluated for sensitive environmental issues in accordance with GG-08, “Environmental Footprint Surveys.” Survey results will be evaluated by the Environmental Manager and Construction Manager and appropriate mitigation measures selected from the tables of potential impacts and mitigation and monitoring options described in Section 5. These measures will be documented in area-specific environmental clearance instructions and discussed in training sections with affected construction supervisors and operators; see Section 13 and GG-44, “Management of Land Clearances.”

The overall design of roadways and prepared work areas will be generally consistent with the requirements of the *Code of Practice for Timber Harvesting 2nd ed*. [Guyana Forestry Commission (GFC), 2002], with setbacks or roadway width adjustments made as necessary to ensure driver visibility and safe passage of tractor-trailer rigs and heavy equipment, as well as safe access to drill pads, construction sites, and other specific project areas, giving due consideration to the potential for treefall accidents, potential erosional conditions, and the need to maintain appropriate drainage in all seasonal conditions. Section 4 of (GFC, 2002) addresses the planning and construction of roadways, maintenance, drainage, and culvert installation; other GIIP references are provided in the Project’s *Erosion Prevention and Control Plan.* General conformity with these standards and options will be considered in the review and approval of design drawings by a licensed geotechnical engineer, and will be confirmed in actual construction through contractually required Construction Quality Assurance (CQA) review functions; see the contractor management considerations in the *ESMS Plan*, Section 4.3.3.

2.3 Construction Schedule

EWC activities commenced in late 2011 with completion (i.e., start of major construction) anticipated in late 2013 or early 2014.

2.4 Workforce Considerations

The overall work schedule for the EWC activities will be 6 weeks on with a 2 week break; daily working hours shall be as stipulated by the Ministry of Labour. Workers will be either flown into the site or transported overland in enclosed, custom-designed buses. Based on current Feasibility Study (TetraTech, 2013) estimates, EWC staffing in 2013 will consist of 198 Guyanese nationals, 5 third-country nationals, and 1 “expatriate” (i.e., Canadian, Australian, or US national).

2.5 Construction Equipment

A preliminary inventory of construction equipment that is expected to be onsite during EWC activities is presented in **Table 2.5-1.**

Table 2.5-1: EWC Project Equipment Inventory

Number of Items	Equipment Item Description
2	D9 bulldozers
2	D8 bulldozers
5	D6 bulldozers
4	320 excavators
1	324 excavator
1	336 excavator
4	730 articulated trucks
1	980 wheel loader
1	14M road grader
2	120H road graders
2	Compactors
[TBD]	Pickup trucks
[TBD]	All-terrain vehicles (ATVs)
1	Portable sawmill
1	Portable concrete batch plant
1	Portable aggregate crusher (as required)
[TBD]	Portable diesel generator(s)
[TBD]	Various electric-powered carpentry/construction saws
1	Hydroseeding truck (tanks, pumps, spray equipment)
[TBD]	Crew buses

2.6 Fuel Transport, Storage, and Fuelling Considerations

Fuel to support EWC activities will be delivered by barge to a fuel trestle at GGI's Buckhall logistics support facility, on the west bank of the Essequibo River. Offloaded fuel will be stored in two 20,000 gallon steel tanks located within covered, concrete-bunded storage pending periodic transfers to tanker trucks and transport to the Aurora site over the Barama/Aurora (M3) access road. Transported fuel will then be offloaded to three 12,000 gallon steel tanks temporarily located at the existing Aurora man-camp; these tanks are placed within covered high-density polyethylene (HDPE) lined and bunded secondary containment as note in **Figure 2.6-1**.

All fuel storage tanks at the Buckhall facility and the Aurora Project site are designed to American Petroleum Institute (API) or equivalent standards. Secondary containment capacity at will be provided that is in excess of the greater of 110% of the largest contained tank volume or 25%+ of the combined tank volumes, as recommended by Section 1.5 of the IFC *Environmental, Health, and Safety General Guidelines* (IFC, 2007b). Containments at the Buckhall storage facility are designed at 110% of the combined tank volumes, well in excess of the minimum IFC requirement; see the *Buckhall Spill Contingency Plan* for additional details.

Figure 2.6-1: EWC Phase Fuel Storage Facility, Aurora Site



All vehicle fuelling will be managed in accordance with GG-17, "Vehicle Fuelling and Spill Prevention." Lubricants, specialty fuel, and the paints, sealants, solvents used for building construction will be stored in the maintenance warehouse at the mine site and transported to the roadway, airfield, and camp work areas when necessary using metal or HDPE lined tractor- or skid-mounted containment boxes. Fuelling and lubrication operations of major construction equipment will typically be conducted remotely using transfer tanks and drip trays, as noted in GG-17.

3 Legal Framework for EWC Activities

3.1 National Requirements

Prospecting and advanced exploration activities are guided by the Guyanese Environmental Protection Act of 1996, which established the Guyana Environmental Protection Agency (EPA) and provides for the management, conservation, protection, and improvement of the environment through the prevention or control of pollution, the assessment of the impact of economic development on the environment, and the sustainable use of natural resources. Guyana EPA granted the Environmental Permit for the Aurora Gold Project in 2010 (Guyana EPA, 2010).

3.2 International Standards

EWC will also be guided by appropriate international standards and GIIPs, including:

- International Finance Corporation (IFC) *Environmental, Health, and Safety Guidelines for Mining* (IFC, 2007a);

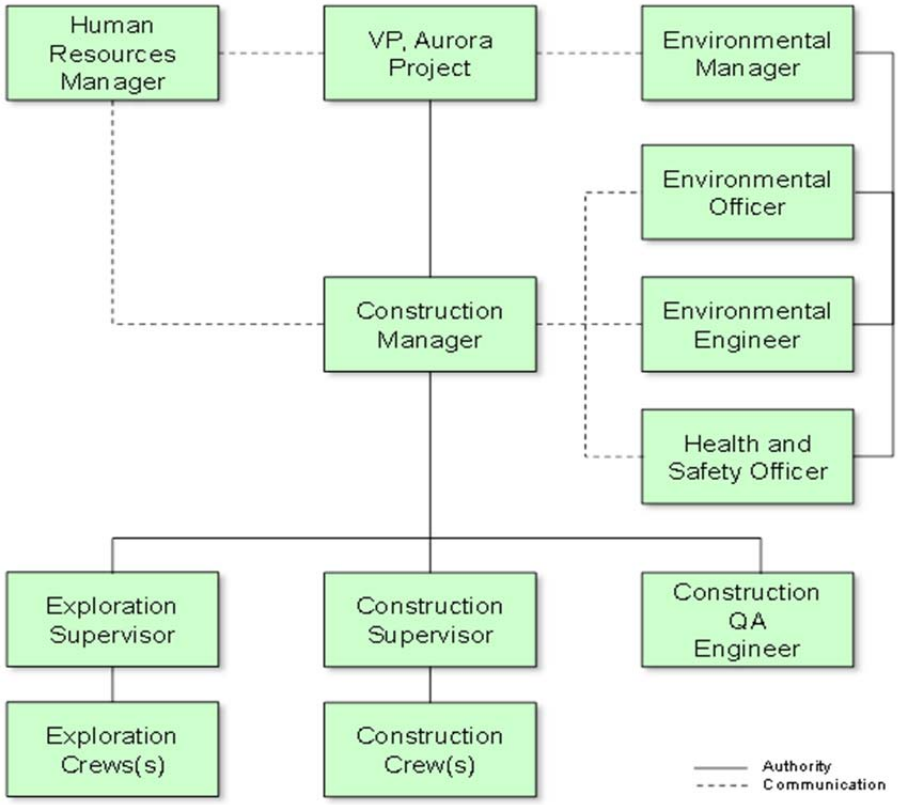
- IFC *Environmental, Health, and Safety General Guidelines* (IFC, 2007b); and
- Prospectors & Developers Association of Canada (PDAC). 2009. "e3-Plus Excellence in Environmental Stewardship e-toolkit (EES)", Version-01.

GGI will consider applicable elements of these standards and other appropriate GIIPs in the selection of impact management and mitigation measures, as noted in Sections 5, 6, 7, and 8.

4 Management Organization and Responsibilities

GGI's management organization for E/EWC phase activities and the responsibilities of key GGI's management organization is described in detail in Section 5.1 of the Project *ESMS Plan*. A copy of the organizational chart provided therein is reproduced for convenience in **Figure 4.2-1**. Organizational changes that may occur later during major construction and mining operations will be reflected in the *Construction Management Plan – Major Construction* and appropriate updates to the *ESMS Plan* in keeping with the change control requirements discussed in Section 1.3.

Figure 4.2-1: Organizational Chart, Aurora Gold Project[1]



[1] The community relations function will be formally held by the VP, Aurora Gold Project and designated management staff in GGI's Georgetown office; formal assignment of a Project Community Relations Manager is expected to be made at the start of major construction.

5 Environmental Considerations

The potential environmental impacts of the EWC phase of the Project will be managed in general compliance with Section 1.1 of the IFC *EHS Guidelines for Mining* (IFC, 2007). **Table 5.0-1** lists a range of potential environmental impacts that may be encountered in the EWC phase, sorted by the categories of interest identified in (IFC, 2007). A menu of appropriate mitigation and monitoring options are provided; this summary of potential impacts, mitigation measures, and monitoring options will be specifically considered in the development of appropriate site-specific clearance instructions, as discussed in Sections 2.1 and 2.2; GG-08, "Environmental Footprint Surveys"; and GG-44, "Management of Land Clearances."

Table 5.0-1: Potential Environmental Impacts, Prevention/Mitigation Actions, and Monitoring Methods for Consideration in Developing Site-specific Environmental Clearance Instructions

IFC Impact Category (Section 1.1)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Water use and quality	Erosion/surface water quality impacts to the Cuyuni River and its tributaries	• Implementation of appropriate surface water management/erosion control considerations in design of roadways, cleared construction areas, biowaste/topsoil stockpiles, man-camp, landfills, other infrastructure areas • Installation of drainage/surface water diversion structures or sediment traps per Guyana Forestry Commission *Code of Practice for Timber Harvesting* and/or the Project *Erosion Prevention and Control Plan* • Revegetation of ROWs and other disturbed areas per the Project *Erosion Prevention and Control Plan* • Implementation of surface water quality monitoring program focused on early identification of any potential impacts, using reliable field screening methods for biological oxygen demand and visual inspection for petroleum hydrocarbons	• Design control and CQA programs (see *Construction Management Plan - Early Works* Section 2.2) • Monitoring for erosion and revegetation progress per *Erosion Prevention and Control Plan* • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"

IFC Impact Category (Section 1.1)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Water use and quality (continued)	Erosion/surface water quality impacts to the Cuyuni River and its tributaries	• Reservation, stockpiling, and erosional stabilization of topsoil/biowaste/sawdust for future use in site reclamation /closure • Installation of toe drains around perimeters of all stockpile areas • Hydroseeding of stockpile surfaces as necessary for erosion control and/or installation of silt fence around non-working faces of stockpile; see the Project *Erosion Prevention and Control Plan* • Management of sanitary wastewater in septic systems pending installation of wastewater treatment plants at both Aurora and Buckhall • Management of greywater from canteen operations using appropriately designed dry wells pending installation of wastewater treatment plants at both Aurora and Buckhall	• Conduct biweekly inspections of erosional stability of stockpile, initiate immediate corrections to resolve erosion issues per GG-37, "Control of Erosion and Sedimentation" and the Project *Erosion Prevention and Control Plan* • Focused inspections of water and wastewater management features at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Hazardous and non-hazardous wastes	Surface water quality impacts to the Cuyuni River and its tributaries	• See Section 8 and **Table 8.0-1** of the Construction Management Plan - Early Works • Construct lined (compacted clay or geomembrane) sanitary landfill to Province of Ontario or equivalent standards, at appropriate sites at above flood level (aurora and Buckhall sites; include seepage collection systems and seepage discharge controls	• Conduct CQA reviews of landfill design documents prior to authorizing construction • Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Hazardous materials	Contamination of ground surface, soil, and surface/groundwater at the Aurora Project site from spillage of diesel fuel, specialty fuel for chainsaws; lubricants;	• Conduct hazard management review in accordance with GG-09, "Identification of Project-Related Safety Hazards and Assessment of Risks" • Containment for potential fuel tank leaks provided by bunded concrete pad, sized to contain at least the greater of 110% of the	• Construction Supervisor, Environmental Officer and HSE Officers to monitor as part of primary job functions • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections" • Environmental Manager to submit register to

IFC Impact Category (Section 1.1)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
	paints, sealants, and solvents used in building construction	largest contained tank, or 25% of all tanks • Fuel storage tanks and specialty fuel/ lubricant storage area located in warehouse • Spill containment and cleanup kits provided for warehouse and field fuelling trucks • Spill trays provided for field fuelling in accordance with GG-17, "Vehicle Fuelling and Spill Prevention	Guyana Environmental Protection Agency (EPA) listing hazardous materials stored on site; will be limited to diesel fuel, specialty fuel for chainsaws; lubricants; and paints, sealants, and solvents used in building construction
Hazardous materials (continued)	Contamination of ground surface and surface water/ groundwater from spillage of diesel fuel	• Training of all EWC personnel in field fuelling/spill prevention procedures; see CMP Section 9 • Collection and storage of waste oil and grease pending offsite recycling • Conduct hazard management review • Train all Buckhall fuel handling personnel and tanker truck drivers in the requirements of the *Buckhall Spill Contingency Plan* • Provision of radio/cell phone communications devices to truck drivers for requesting assistance from Buckhall port facility personnel in the event of a spill in transit to the Aurora Project site (per the Project *Transportation Management* Plan) • Provision of portable spill kits for all tanker trucks per the Project *Transportation Management Plan*	• Environmental and Health and Safety Officers to monitor as part of primary job functions • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"

IFC Impact Category (Section 1.1)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Land use and biodiversity	• Habitat loss and other potential biodiversity impacts related to logging and destruction of plants in previously undisturbed forested areas	• Design of roadways, airstrip, landfill, and construction pads to minimize disturbed footprint, to the extent safely possible • Hydroseeding or re-seeding of disturbed areas along access road alignments; see the Project *Erosion Prevention and Control Plan* • Wildlife assessment of cleared roadway areas will be conducted to identify the disturbance of any wildlife corridors; caution signage will be installed as appropriate	• Construction Supervisor and Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Land use and biodiversity (continued)	Wildlife poaching, capture, or trade in animals/animal parts	Collection of native plans, hunting and trapping of animals, or the keeping of pets at the EWC site is strictly prohibited; see the code of conduct embodied in the GGI "Labour Grievance Procedure" (Appendix A of *ESMS Plan*)	• Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Air quality	Minor biodiversity impacts related to exhaust fumes from	Mobile and stationary heavy equipment will be maintained in good working order to minimize excessive particulates in engine exhaust	• Ongoing visual observation by Construction Supervisor and maintenance actions as directed
Air quality	Minor biodiversity impacts from roadway dust in dry seasonal conditions	Use of road watering trucks/inert surfactants to reduce dust from roadways in dry season conditions	• Ongoing visual observation by Construction Supervisor and maintenance actions as directed • Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"

IFC Impact Category (Section 1.1)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Noise and vibration	Minor biodiversity impacts from locally Significant but transient noise events from logging and heavy equipment operation	Chainsaws, and mobile and stationary mechanical equipment will be fitted with silencers or mufflers and kept in good working order	• Ongoing visual observation by Construction Supervisor and maintenance actions as directed • Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Energy use	Minor impacts related to consumption of fossil fuels	Chainsaws and mobile and stationary equipment will be maintained in good working order to maximize fuel economy	• Ongoing visual observation by Construction Supervisor, maintenance actions as directed • Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Visual impacts	Minor potential impacts to transient artisanal/small scale miners (ASMs) or the Buckhall community related to the logging and development of previously undisturbed forested areas, potentially uncontrolled litter or garbage, vehicle noise	• Landfill, laydown areas, and man-camp will be located off of primary access road • Footprints of all areas to be disturbed will be reduced to a safe minimum • Trash will be collected and removed on an ongoing basis • Disturbed areas on roadway alignments will be graded and reseeded or hydroseeded; see the Project *Erosion Prevention and Control Plan* • Dust suppression using water or inert surfactants will be applied to Buckhall-area roadways in dry seasonal conditions	• Construction Supervisor and Environmental Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections" • Response to any external inquires or complaints per the Project *Community Relations Management Plan*

6 Occupational Health and Safety

The potential occupational health and safety (OHS) impacts of the EWC Project will be managed in compliance with applicable sections and subsections of Section 1.2 of the IFC *EHS Guidelines for Mining* (IFC, 2007) and the Project *Occupational Health and Safety/Accident Prevention Plan*. **Table 6.0-1** lists the potential OHS impacts of the project, sorted by the specified categories of interest identified in the IFC Guidelines, as applicable to EWC activities, and identifies a range of potential mitigation options that may be employed, as well as other general methods or options available to monitor performance. **Table 6.0-1** will be used as a general reference in the development of an EWC area-specific OHS risk register in accordance with the requirements of GG-09, "Identification of Project-Related Safety Hazards and Assessment of Risks." The risk register so developed will select appropriate options from the menu provided by this table, and will form the basis for project-specific OHS training activities (see Section 14).

Table 6.0-1: Potential OHS Impacts, Prevention/Mitigation Actions, and Monitoring Methods for Consideration in Risk Register Development

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
General workplace health and safety	• Accidents or injuries to workforce or visitors to EWC sites • Damage or destruction of buildings, vehicles, or property • Wildfires	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Train workforce in use of *Emergency Preparedness and Response Plan* • Installation of warning/ unauthorized entry signage on perimeter fences at landfill and fuel storage areas • Provision of fire extinguishers for each vehicle and in man-camp • Installation of spark arrestors on all vehicles • Fire suppression equipment provided at fuel storage tank area and warehouse • Field work limited to daylight hours • Communications devices (cell phone or radio) provided to field teams and site management staff	• Environmental Manager and Health and Safety Officer to monitor as part of their primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Hazardous substances	Accidents or injuries to workforce or visitors to EWC site	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Building ventilation and fire extinguishers installed in specialty fuel/lubricant storage area • Backup containment for potential fuel tank leaks provided by bunded pad • Material Safety Data Sheets (MSDSs) made available for diesel fuel, specialty fuels, lubricants, and paints/sealants used in construction	• Construction Supervisor and Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections
	Accidents or injuries to workforce or visitors to Buckhall fuel storage facility or to fuel tanker truck drivers en route to EWC site	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Train workforce in use of GG-28, "Emergency Response Process – Exploration/Early Works Construction Phase Activities" • Train all Buckhall port facility fuel handling personnel and tanker truck drivers in the requirements of the *Buckhall Spill Contingency Plan* • Provision of radio/cell phone communications devices to truck drivers for requesting assistance from Buckhall in the event of an accident in transit to the site per *Transportation Management Plan* • Buckhall fuel storage tanks located within access-controlled security fencing • Fire suppression equipment provided at fuel storage tank area • Fire extinguishers provided for all trucks	• Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Use of explosives	• Accidents or injuries from misuse or premature detonation • Nuisance noise impacts to local wildlife, domestic animals, and residents	• Anticipated conditions are not likely to require the use of explosives during EWC; however, if conditions require: – blasting permits will be applied for; – a *Blasting Management Plan* will be developed and issued as an Action Plan, and managed within the context of the *ESMS Plan*; – a licensed blasting engineer will be assigned to the project; – blasting personnel will be trained by the licensed blasting engineer , with the assistance of the Health and Safety Officer; – a secure storage magazine will be constructed; – blasting designs will be devised to minimize fly rock and; and – blasting activities will be confined to daytime	• Site security personnel, the site blasting engineer, and the Health and Safety Officer will monitor closely as part of their primary job functions
Heavy equipment operation	• Accidents or injuries associated with operation of heavy equipment	• Conduct hazard management review per GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks” • Review training of all equipment operators prior to mobilization to project site per GG-16, “Safe Operation of Heavy Equipment” • Procurement of equipment with permanently installed backup alarms • Use of safety wands/flags on all pickups • Mandatory chocking of all rubber-tired equipment when parked • Conduct daily tailgate safety meetings	• Construction Supervisor and Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager’s discretion in accordance with GG-03, “Field Inspections”

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Electrical Safety and Isolation	Electrocution or severe electrical shock to workers involved in building construction	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Train workforce in requirements of GG-20, "Electrical Safety" • Conduct tailgate meetings with this specific safety component • Required use of ground fault interrupters on all extension cords per GG-20	• Construction Supervisor and Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Physical hazards	Accidents related to logging, use of chainsaws, operation of sawmill, and general operation of heavy equipment	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Train operators in requirements of: – GG-11, "Personal Protective Equipment" – GG-12, "First Aid and Emergency Medical Response" – GG-13, "Transportation Safety" – GG-14, "Handling and Storage of Hazardous Materials" – GG-15, "Forklift Safety" – GG-16, "Safe Operation of Heavy Equipment" – GG-17, "Vehicle Fuelling and Spill Prevention" – GG-18, "Machine Guards and Safety Barriers" – GG-19, "Welding and Cutting Safety" – GG-22, "Fire Prevention Program" – GG-24, "Recognition and Reporting of Safety Hazards" – GG-26, "Safe Use of All-Terrain Vehicles" – GG-27, "Chainsaw Safety" – GG-28, "Heat Stress" – GG-36, Lockout/Tag-out Requirements" – GG-37, "Control of Erosion and Sedimentation"	• Construction Supervisor and Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
		– GG-38, “Working from Heights” – GG-40, “Site Security” – GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes” • Procurement of mobile equipment with permanently installed backup alarms • Use of safety wands/flags on all pickup trucks and ATVs • Mandatory chocking of all rubber-tired equipment when parked • Conduct daily tailgate meetings with specific safety component • Issue Personal Protective Equipment to all EWC staff (steel toed boots, hard hats, ear protection, eye protection, masks for nuisance dust, eye shields and protective chaps for chainsaw and sawmill operators) • Prohibition of removal of manufacturer-installed protective shields on saws or other power tools per GG-18, “Machine Guards and Safety Barriers”	
Physical hazards (cont.)	Falling hazards in building construction	• Conduct hazard management review per GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks” • Conduct periodic tailgate safety meetings • Provided safety ladders and harnesses/ lanyards to carpenters/ roofers per GG-38, “Working from Heights”	• Construction Supervisor and Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager’s discretion in accordance with GG-03, “Field Inspections”

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Fitness for work	Endangerment of the workforce or visitors from behavior related to alcohol or drug use	• Prohibition of alcohol or illegal drug use by EWC workforce as a matter of policy, enforced by potential termination of employment (see GGI "Labour Grievance Procedures")	• Construction Supervisor and Aurora Health and Safety Officer to monitor as part of primary job function
Fitness for work (continued)	Introduction or exchange of communicable diseases within workforce	• Medical screening of workforce when first hired and upon arrival at Project site • Review of employee health status prior to each onsite rotation, provision of medical assistance as necessary	• Construction Supervisor and Aurora Health and Safety Officer to monitor as part of primary job function
Travel and remote site health	Health impacts from potential lack of appropriate disease vector control	• See entries under "Vector Control Strategies" in Table 6-1.	• See entries under "Vector Control Strategies" in Table 6-1.
	Health impacts from lack of appropriate sanitary facilities	• Installation of restrooms, showers, septic system, and wastewater treatment plant at man-camp • Construction of controlled, lined sanitary landfill away from man-camp, with regular cover of tip face	• Health and Safety Officer to monitor as part of primary job function • Focused inspections at the Environmental Manager's discretion in accordance with GG-03, "Field Inspections"
Thermal stress	Heat stroke or other heat-induced medical condition	• Provision of sunshades where no shade may be available and revision of supplies of potable water at all field sites, per GG-28, "Heat Stress"	• Health and Safety Officer to monitor as part of primary job function

IFC Impact Category (Section 1.2)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Noise and vibration	Hearing loss/repetitive stress injuries by workers using heavy equipment, chainsaws, power tools, or operating the sawmill	• Hearing protectors (muffs) provided to all heavy equipment operators and logging/sawmill crews per GG-11, "Personal Protective Equipment" • Installation and maintenance of silencers or mufflers on all heavy equipment, pickups, chainsaws, and portable generators	• Construction Supervisor and Aurora Health and Safety Officer to monitor as part of routine job function.

7 Community Health and Safety

The potential Community Health and Safety impacts of the EWC Project are expected to be minimal due to the remoteness of the site and sparse population, but will be managed in compliance with relevant elements of Section 1.3 of the IFC *EHS Guidelines for Mining* (IFC, 2007). **Table 7.0-1** lists the potential impacts of the project, sorted by the specified categories of interest identified in the IFC Guidelines, as packable to EWC activities, and identifies the mitigation procedures that will be employed, as well as the general methods that GGI will use to monitor performance. Prior to initiating the start of the major construction phase of the project, the mitigation procedures and monitoring methods outline here will be considered in the development of the Project *Community Relations Management Plan* and *Influx Management Plan;* see Section 1.2 of the GGI *ESMS Plan.*

Table 7.0-1: Potential Community Health and Safety Impacts, Prevention/Mitigation Actions, and Monitoring Methods

IFC Impact Category (Section 1.3)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Communicable diseases	Introduction or exchange of communicable diseases to or with local community/indigenous population	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Conduct documented HIV/AIDs, mosquito-borne disease, and other education/ prevention training program per GG-06, "ESMS Training Program" • Prohibition of workforce contact with local communities (see *ESMS Plan* Appendix A, GGI "Labour Grievance Procedure") • Prohibition of human access to man-camp and landfill areas	• Monitor as part of Health and Safety Officer and security personnel's daily routine • Monitor and respond to any potential community grievances per GGI "Community and Environmental Grievance Procedure" (*ESMS Plan* Appendix B), *Community Relations Management Plan* and *Influx Management Plan*

IFC Impact Category (Section 1.3)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Communicable diseases (cont.)	Foodborne illness to workforce or visitors	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Provision of refrigerated storage for canteen foodstuffs • Provision of bottled water until onsite potable water systems are operational	• Monitor as part of Health and Safety Officer and security personnel's daily routine • Monitor and respond to any potential community grievances per GGI "Community and Environmental Grievance Procedure" (*ESMS Plan* Appendix B), *Community Relations Management Plan* and *Influx Management Plan*
Specific Vector Control and Prevention Strategies	Inadvertent creation/enhancement of mosquito habitat	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Regular malaria suppression fogging • Covered storage for used tires pending transport for offsite recycling • Management or temporary covers for other equipment items in laydown yard to prevent accumulation of ponded rainwater • Regular cover of landfill tip faces	• Monitor as part of Health and Safety Officer and security personnel's daily routine • Monitor and respond to any potential community grievances per GGI "Community and Environmental Grievance Procedure" (*ESMS Plan* Appendix B), *Community Relations Management Plan* and *Influx Management Plan*
	Attraction of vector species to food waste from canteen operations or field operations	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Regular cover of the tip face of the landfills • Prohibition of lunch waste disposal in field locations • Use of rodenticides in dry (non-refrigerated) food storage areas	• Monitor as part of Health and Safety Officer and security personnel's daily routine • Monitor and respond to any potential community grievances per GGI "Community and Environmental Grievance Procedure" (*ESMS Plan* Appendix B), *Community Relations Management Plan* and *Influx Management Plan*

IFC Impact Category (Section 1.3)	Potential Impact(s)	Prevention/ Mitigation Procedures	Monitoring Methods
Specific Vector Control and Prevention Strategies	Potential (domestic or wild) vectors associated with domestic or wild animals	• Conduct hazard management review per GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks" • Prohibition of capture or removal of wildlife or the keeping of any domestic animals on site	• Monitor as part of Health and Safety Officer and security personnel's daily routine • Monitor and respond to any potential community grievances per GGI "Community and Environmental Grievance Procedure" (*ESMS Plan* Appendix B), *Community Relations Management Plan* and *Influx Management Plan*

8 Waste Management

Waste materials anticipated from early EWC activities and associated waste minimization and management procedures are summarized in **Table 8.0-1** and will be managed in accordance with GG-01, "Solid Waste Management (Pre-construction Phase)." GG-01 will be replaced by a more comprehensive *Waste Management Plan* after the construction of sanitary landfills at the Buckhall and Aurora Sites prior to the start of major construction.

Table 8.0-1: Waste Minimization/Management Procedures

Anticipated Waste Type	Waste Minimization/Management Procedures
Biowaste/topsoil from clearing and grubbing activities	Manage solid waste in accordance with GG-01, "Solid Waste Management (Pre-Construction Phase)" • Chip or mulch organic material and reserve in controlled stockpile as growth medium for future site restoration needs • Timber >75 cm diameter to be reserved in organized piles for future construction of site buildings
Waste oil and grease, drained and crushed oil filters from vehicle maintenance, and any fuel/oil spill cleanup residue	Manage solid waste in accordance with GG-01, "Solid Waste Management (Pre-Construction Phase)" • Contain in used plastic fuel drums, transport to Georgetown for recycling or permitted offsite disposal, if available, or store within secure containment pending identification of acceptable disposal facilities • Any potential external disposal sites will be audited to ensure the appropriateness of waste management practices that involve EWC wastes
Used tires and used plastic fuel drums	Manage solid waste in accordance with GG-01, "Solid Waste Management (Pre-Construction Phase)" • Transport to Georgetown for recycling or permitted offsite disposal, if available, or store within secure containment pending identification of acceptable disposal facilities External disposal sites will be audited to ensure the appropriateness of waste management practices that involve EWC wastes
Sanitary waste from EWC man-camp	• Wastewater treatment plant and septic system will be installed at man-camp • Potable water will be monitored for metals and BOD per Section 8 • Administrative policies will prohibit use of toilet facilities for disposal of hazardous waste
Miscible waste and general garbage from man-camp	Manage solid waste in accordance with GG-01, "Solid Waste Management (Pre-Construction Phase)" • A lined (compacted clay, saprolite, or geomembrane) landfill will be constructed downwind and downgradient from the man-camp • Security fencing will be installed to prevent incursions from wildlife or unauthorized human access

Anticipated Waste Type	Waste Minimization/Management Procedures
	• Landfill face will be regularly covered with earth, and covered, graded, and revegetated on completion of EWC activities
Wastewater from man-camp	• Septic tanks, drain fields, greywater treatment systems, and effluent/wastewater treatment plants will be installed at Buckhall and the Aurora site prior to the start of major construction

9 Environmental Monitoring

9.1 Monitoring for Potential Soil/Surface Water/Potable Water Contamination

Then Environmental Officer or his designee will conduct a quarterly inspection and sampling program for soil/surface water near the EWC areas, focusing on upgradient/downgradient waterways, active refueling and fuel storage areas, and the man-camp. Any standing water downgradient from fuel storage/refueling areas or the workers' camp locations will also be examined. If surface sheen is observed, water samples will be collected and shipped to a qualified analytical laboratory for total oil and grease (TOG) analysis; analytical methods proposed by the laboratory shall be based on recognized international standards, and will be reviewed and approved by the Environmental Manager prior to use. Acceptance limits for TOG are 50 mg/L as defined by Table 1 of (IFC, 2007a).

Results will be reported to the Environmental Manager and Construction Manager; observations of nonconformance will require documentation and initiation of appropriate corrective and preventive action in accordance with GG-04, "Identification of Non-conformances and Corrective/Preventive Action."

Monitoring will also be required for all potable water streams (post-ultraviolet light/filtration treatment) in accordance with GG-39, "Monitoring and Maintenance of Potable Water Quality."

9.2 Monitoring of Biota

During periodic inspection of the EWC site, the Environmental Officer will monitor the implementation of the environmental footprint clearance instructions generated under GG-08, "Environmental Footprint Surveys." Observations of non-conformances will require documentation and initiation of appropriate corrective and preventive action in accordance with GG-04, "Identification of Non-conformances and Corrective/Preventive Action." The Environmental Officer will also look for unusually stressed or dying trees or other plants (not immediately adjacent to clearing or construction works) as well as for visibly stressed or deceased wildlife. If an animal is observed to be distressed (e.g., sick, lethargic, or injured) or deceased, an attempt should be made to identify the species and document the location. All such observations shall be noted on the construction progress report, and the Environmental Manager notified for further investigation as deemed appropriate.

10 Spill Prevention

Spill prevention measures for the Buckhall fuel storage facility (which will provide diesel fuel to the EWC site) include:

- hazard management reviews of the completed fuel transfer and storage facilities, an accordance with GG-09, “Identification of Project-Related Safety Hazards and Assessment of Risks”

- training of all Buckhall port facility fuel handling personnel in the requirements of the *Buckhall Spill Contingency Plan* (see the *ESMS Plan*, Appendix C), in accordance with GG-06, “ESMS Training Program”

- implementation of GG-14,”Handlign and Storage and Hazardous Materials” and GG-17, “Vehicle Fuelling and Spill Prevention”, including training of all affected staff per GG-06;

- use of dripless couplings in the transfer of diesel fuel from delivery barges to the Buckhall fuel trestle;

- storage of fuel in two 20,000 gallon coated steel tanks, within impermeable concrete containments sized at 110% of the combined tank volumes (see Section 2.6);

- verification (via dipstick measurements or electronic tank level indicators) of available volumes in tanks or tanker trucks prior to transferring specific volumes of fuel, in order to prevent any overflow;

- installation of fuel transfer nozzles with automatic shutoff capabilities; and

- periodic inspection of accumulated precipitation within the storage containment prior to discharge; any observations of sheen or fuel odor in accumulated water will prompt an immediate investigation of the leak source and sampling and analysis to determine TPA/TOG concentrations and, as necessary, transfer to a retention facility/oily water separator and treatment prior to release.

Spill prevention measures at the Aurora site and Tapir Crossing during EWC are focused primarily on fuel transfer, onsite fuel storage/transfer, and field fuelling operations, and will include the following:

- As noted in GG-14,”Handling and Storage and Hazardous Materials”, all tanker trucks will be provided wheel chocks, spill response kits, and communications devices for requesting assistance from other drivers and/or the Buckhall facility in the event of an emergency. Deliveries will be made as part of multiple-truck convoys to better ensure safe delivery. All drivers will be trained in the specific spill response requirements of the *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas),* and GG-14.

- All fuel will be offloaded at the Aurora site and temporarily[2] stored in three 12,000 gallon aboveground steel tanks as shown in **Figure 2.6-1**; these tanks are installed on a covered, impervious bunded HDPE pad, sized to contain the greater of 110% of the largest contained volume or 25% of the combined tank volumes.
- As noted in GG-14,"Handling and Storage and Hazardous Materials", all required lubricants and fuel/lubricant mixtures for chainsaws will be stored inside appropriate secondary containments at the mine site and transported to the airfield and camp work areas when necessary, using metal or HDPE-lined containment trays or skids.
- Fuelling and lubrication operations will be conducted in accordance with GG-17, "Vehicle Fuelling and Spill Prevention." Fuel truck drivers or maintenance personnel responsible for remote fuelling operations shall dispense fuel in accordance with the guidelines provided in GG-17.

11 Site Security

The security risks of the EWC project site shall be periodically evaluated. At a minimum, all fuel shall be stored in a bunded area inside security fencing. Vehicles shall be locked and (if rubber-tired) chocked when not in use, and chainsaws and other portable tools secured in locked storage when not in the immediate possession of the user.

EWC personnel will be expected to immediately advise their supervisor with respect to any unauthorized human access to the project site or adjacent areas, interference with project work, or other emergency involving non-GGI employees, in accordance with GG-40, "Site Security." If active interference is encountered, work shall be suspended and the matter referred immediately to the Security Manager and Camp Manager for appropriate action.

12 Communications

Requests for information or specific complaints about EWC activities or the Project in general received from an external stakeholder shall be referred to the Environmental Manager and Vice President, Aurora Gold Project for evaluation, further discussion with Guyana Goldfields management, as required, and a response or other action developed as appropriate to the situation, as required by the GGI "Community and Environmental Grievance Procedure" (*ESMS Plan* Appendix A). Records of all such contacts shall be retained as noted in Section 14.

13 HSE Inspections

At the discretion of the Environmental Manager or Construction Manager, the Environmental and/or Health and Safety Officers may be requested to conduct focused inspections of specific HSE -related aspects of the EWC Project, in accordance with GG-03, "Field Inspections."
If any non-conformances are observed, a CPAR will be generated in accordance with GG-04, "Identification of Non-conformance and Corrective/Preventive Action" and referred to the

[2] These tanks will be replaced by a new fuel farm in the major construction phase.

Environmental Manager and Construction Manager for joint evaluation and resolution. Inspection and CPAR records shall be retained as required by Section 14.

14 Training

The EWC workforce will be provided appropriate types and levels of ESMS training in accordance with the minimum requirements of Section 5.2 of the ESMS Plan. In addition, the EWC workforce will be provided a general introduction to the requirements of this CWP-EWC, and more detailed training on the specific environmental clearance instructions developed as a result of the construction area-specific surveys conducted in accordance with GG-08, "Environmental Footprint Surveys" and GG-44, "Management of Land Clearances." All training sessions will be documented as note in GG-06, "ESMS Training Program."

Specific training requirements applicable to suppliers or contractors will be defined within the context of their individual contracts or purchase orders. All EWC site visitors will be escorted, and will be required to complete an ESMS briefing upon arrival to the Aurora or Buckhall sites.

15 Reporting

After release of this *Construction Management Plan, Aurora Project Early Works* for implementation, a quarterly ESMS status report will be prepared by or at the direction of the Environmental Manager that, at a minimum, summarizes the following:

- overall compliance with the *ESMS Plan* and the other management plans and SOPs cited herein;
- status of any CPARs issued in accordance with GG-04, "Identification of Non-conformances and Corrective/Preventive Action";
- any fuel spills;
- any lost-time injuries; and
- any stakeholder interactions and the status of any associated complaints.

16 Records Management

Records of all environmental footprint surveys and clearance instructions shall be retained in accordance with GG-05, "Records Management." Records of environmental monitoring activities (e.g., construction reports, weekly HSE monitoring reports) shall also be retained, as well as any completed CPAR forms documenting the detection and resolution of nonconforming situations (ref: GG-04, "Identification of Non-conformance and Corrective/Preventive Action."
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References

Internal References

- *ESMS Plan*
- *Erosion Prevention and Control Plan*
- *Buckhall Spill Contingency Plan*
- *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)*
- *Waste Management Plan*
- *Transportation Management Plan*
- GG-01, “Solid Waste Management (Pre-Construction Phase)”
- GG-03, “Field Inspections”
- GG-04, “Identification of Non-conformances and Corrective/Preventive Action”
- GG-06, “ESMS Training Program”
- GG-08, “Environmental Footprint Surveys”
- GG-09, “Identification of Project-Related Safety Hazards and Assessment of Risks”
- GG-11, “Personal Protective Equipment”
- GG-12, “First Aid and Emergency Medical Response”
- GG-13, “Transportation Safety – Light Vehicles”
- GG-14, “Handling and Storage of Hazardous Materials”
- GG-15, “Forklift Safety”
- GG-16, “Safe Operation of Heavy Equipment”
- GG-17, “Vehicle Fuelling and Spill Prevention”
- GG-18, “Machine Guards and Safety Barriers”
- GG-19, “Welding and Cutting Safety”
- GG-20, “Electrical Safety”
- GG-21, “Confined Space Work Safety”
- GG-22, “Fire Prevention Program”
- GG-23, “Operational Safety Meetings”
- GG-24, “Recognition and Reporting of Safety Hazards”
- GG-26, “Safe Use of All-Terrain Vehicles”
- GG-27, “Chainsaw Safety”
- GG-28, “Heat Stress”
- GG-36, Lockout/Tag-out Requirements”
- GG-37, “Control of Erosion and Sedimentation”
- GG-38, “Working from Heights”
- GG-40, “Site Security”
- GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”

External References

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Erosion Prevention and Control Plan

Aurora Gold Project

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Acronyms

EHS	Environmental and Health and Safety
EPA	(Guyana) Environmental Protection Agency
ESHS	Environmental, Social, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
FWP	Fresh Water Pond
GGI	Guyana Goldfields, Inc.
GIIP	Good International Industrial Practice
HSE	Health, Safety, and Environmental
IFC	International Finance Corporation
MWP	Mine Water Pond
NTU	Nephelometric Turbidity Units
OHS	Occupational Health and Safety
PS	(IFC) Performance Standard
ROW	Right of Way
SOP	Standard Operating Procedure
TSS	Total Suspended Solids

1 Introduction

1.1 Purpose and Scope

This *Erosion Prevention and Control Plan* applies to all Guyana Goldfields, Inc. (GGI) Aurora Gold Project (Project) activities that may contribute to soil erosion and/or downslope or downstream sedimentation through the disturbance of the ground or soil surface. The Project is located in an environmental setting with very high seasonal precipitation conditions, in an area that has been historically impacted by the erosional damage associated with many decades of uncontrolled artisanal and small scale mining (ASM). GGI is committed to the management and mitigation of erosional conditions associated with the Aurora Project over the life of the mining operation. The primary objective of this *Plan*, to the extent possible, is to control site runoff during precipitation events, and thereby prevent, minimize, or mitigate the potential environmental impacts associated with soil erosion and sedimentation.

Erosion is caused by the exposure of soil surfaces to precipitation; such exposure can result from any activity that disturbs the ground surface or covering vegetation. At the Aurora Project, such activities could potentially include: road or trail building; dam, dike, or containment berm construction; open-pit mining; logging or forest clearance for construction purposes; stockpiling of overburden and waste rock; or, illegal ASM or logging operations within the boundaries of the Project concession. The mobilization, 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. Synergistic environmental 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 [e.g., road embankments and roadways, culvert placements, the Tailings Management Area (TMA), Mine Water Pond (MWP), and Fresh Water Pond (FWP) embankments, the Cuyuni River dikes, and other water diversion and control structures].

This *Plan* outlines the steps to be taken by GGI and contractor personnel to ensure that erosion and sedimentation is adequately controlled on the Project site. These steps include:

- Early identification of areas and activities that that have the potential to cause erosion (every activity involving vegetation clearance and earthworks should have an erosion control plan in place prior to the start of any and all clearance activities);
- Selection of appropriate preventative or control measures, commensurate with the type and severity of the impacts so identified;
- Proper maintenance of earthworks, structures, installations, and revegetated areas;
- Continuous and systematic monitoring of the effectiveness of the preventive measures taken;

- Identification of new potential sources of erosion, and implementation of specific control measures for any new sources so identified; and

- To the extent practicable, progressive decommissioning and reclamation of disturbed areas no longer required by the Project, in accordance with the Project *Mine Reclamation and Closure Plan*.

This Plan is organized as follows:

- **Section 2** describes the regulatory requirements that will apply to the management of erosion on the Aurora Project.

- **Section 3** summarizes primary responsibilities for *Plan* implementation.

- **Section 4** discusses the range of preventive measures that may be applied to earthworks, forest clearances, and roadway construction activities, and is supported by a series of flowcharts or decision trees (**Appendix A**) to help guide the design and installation of appropriate preventive measures for specific situations. Section 4 is also supported by examples of water diversion structures and settling ponds (**Appendix B**) and various erosion control methods (**Appendix C**).

- **Section 5** addresses the processes that will be followed for monitoring construction activities, as well as the monitoring of the completed access road from Buckhall to the Project site[1], and the constructed earthworks and other erosionally sensitive areas of the Aurora, Buckhall, and Tapir Crossing sites. Section 5 is also supported by a second series of decision tree flowcharts (**Appendix D**) to guide the actions to be taken in response to specific observed issues. Section 6 describes applicable training program requirements.

- **Section 6** addresses general Project training program requirements.

- **Section 7** cross-references the Project's occupational health and safety (OHS) program.

- **Section 8** addresses waste management issues associated with erosion prevention and control actions.

- **Section 9** summarizes spill prevention and response actions associated with the use of heavy equipment.

- **Section 10** provides a cross-reference to the Project's records management requirements.

[1] GGI will provide advisories to the Barama timber operation if any erosion issues are noted on the Barama-managed portion of the road.

- **Section 11** lists the internal (GGI) and external sources or references cited in Sections 1 through 10.

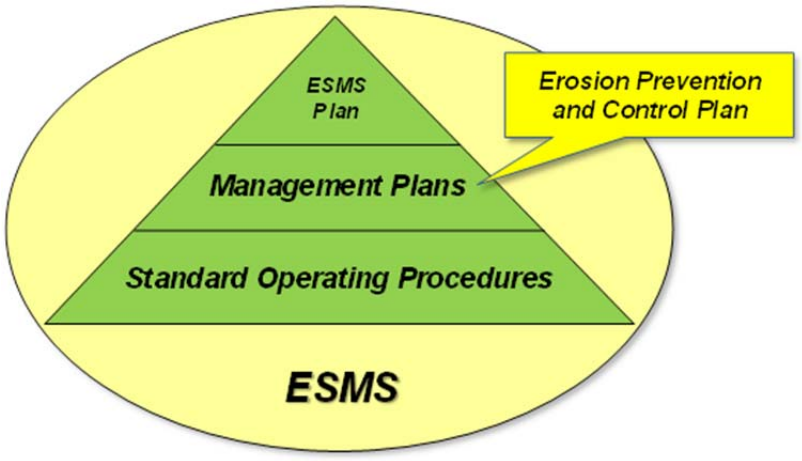
Procedural instructions for the installation of specific erosion control measures (within the context provided by this *Plan*) are provided in Standard Operating Procedure (SOP) GG-37, **"**Control of Erosion and Sedimentation", which is also incorporated by reference.

1.2 Relationship to Environmental and Social Management System (ESMS) and Environmental and Social Impact Assessment (ESIA)

GGI has established an Environmental and Social Management System (ESMS) for the Aurora Project, which is embodied in a Project-specific *ESMS Plan.* The *ESMS Plan* is based on the requirements of World Bank Group/International Finance Corporation (IFC) Performance Standard 1, "Assessment and Management of Environmental and Social Risks and Impacts" (PS-1)[2] and other internationally recognized best management practices (GIIPs) for environmental and health and safety (EHS) and social program management.

This *Erosion Prevention and Control 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 (EHS), and social impacts, and will support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project in accordance with IFC requirements. **Figure 1-1** depicts the relationship of the *Erosion Prevention and Control Plan* to the overall structure of the Project ESMS; see Section 1.2 of the *ESMS Plan* for additional details.

Figure 1-1: Location of *Erosion Prevention and Control Plan* in ESMS Document Hierarchy



[2] See http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/pol_PerformanceStandards2006_full/$FILE/IFC+Performance+Standards.pdf

1.3 Change Management

The *Erosion Prevention and Control Plan* will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing EHS and social management needs, in accordance with Section 1.3 of the *ESMS Plan.* The overall effectiveness of the *Erosion Prevention and Control Plan* will be assessed in the internal ESMS audit and management review processes described, respectively, in Sections 7.4 and 7.5 of the *ESMS Plan.*

2 Regulatory Considerations

In the Guyana *Mining Act* (No 20 of 1989), Part XXV, General Requirements. Section 240 (3) (a) notes that "…operators shall ensure that a discharge from a tailings pond … into any river or creek shall not exceed 100 mg/l of total suspended solids (TSS) or 50 Nephelometric Turbidity Units (NTU)." There are no limits specified for TSS in direct runoff from a mine site; however, residence time in settling ponds is required to be such that discharge from the ponds does not exceed the stated limits above. It is also noted that the IFC *Environmental, Health, and Safety Guidelines for Mining* (IFC, 2007) specifies a lower TSS standard (50 mg/L) for site runoff and treated effluents.

As GGI is committed to meeting all applicable Guyanese regulations as well as (IFC, 2007) effluent guidelines, GGI will attempt to ensure that in addition to any potential discharge of tailings, no site runoff or treated effluents will be released with TSS $\underline{\geq}$ 50 mg/L. It should also be noted that where settling ponds are used as part of the mine drainage system, Guyanese regulations also require that channels discharging into the river have culverts and slopes that are protected from erosion where necessary. Approved devices, chemical procedures, or settling ponds are required to be used to remove suspended solids from tailings discharges. Settling ponds are required to have a minimum water residence time equivalent to the aggregate volume of slurry processed or water in any continuous two hour period, with discharge in accordance with the noted effluent limits.

To the extent practicable, roadways and prepared work areas will also be constructed in general conformance with the requirements of the *Code of Practice for Timber Harvesting 2nd ed*. (Guyana Forestry Commission, 2002), with setbacks or roadway width adjustments made as necessary to ensure driver visibility and safe passage of tractor-trailer rigs and heavy equipment, as well as safe access to drill pads, construction sites, and other specific project areas, giving due consideration to the potential for treefall accidents and the need to maintain appropriate drainage in all seasonal conditions. Section 4 of the *Code of Practice for Timber Harvesting* addresses the planning and construction of roadways, maintenance, drainage, and culvert installation, and will be considered as a Good International Industrial Practice (GIIP) in Project design, construction, and operation.

3 Responsibilities

Responsibilities of GGI staff members with key roles in the implementation of this *Erosion Prevention and Control Plan* are summarized as follows:

- **Construction Manager**: The Construction Manager is responsible for overseeing day-to-day clearance and/or earthworks construction activities and the proper maintenance of roadways and associated erosion prevention and control measures as specified by this *Erosion Prevention and Control Plan*. These duties include working with the Environmental Manager to develop preparation of an Erosion Prevention/Reclamation Memo for each site or construction area that defines the boundaries of the proposed disturbance working with the Environmental Manager or Environmental Officer to determine the minimum area of impact needed for completion of the required activities and for the installation and maintenance of sedimentation and erosion control measures. These duties also include review of construction reports to monitor progress and issues encountered, and in assisting the Environmental and Health and Safety Officers in the timely resolution of any observed OHS issues.

- **Environmental Manager**: The Environmental Manager is responsible for reviewing all Erosion Prevention/Reclamation Memos, for maintaining oversight over all erosion control monitoring activities, and for assisting in the planning of any required erosion control actions that may be indicated by the monitoring program. The Environmental Manger shall also contact the Barama timber company if erosion issues are noted on the Barama-managed part of the Buckhall to Aurora access road, and for assisting in annual erosion prevention and control survey and management review processes. The Environmental manager will also participate in the review, approval, and as necessary, update or modification of this *Plan* and supporting SOPs in response to changing project conditions.

- **Environmental Officer**: The Environmental Officer at Aurora Base will be responsible to the Environmental Manager for the regular monitoring of project activities to ensure continuing compliance with this *Plan.* The Environmental Officer will also oversee the operation of the reclamation nursery, as discussed in GG-37, “Control of Erosion and Sedimentation” as well as oversight of the specific erosion control actions prompted by the monitoring program discussed in Section 5 of this Plan.

- **Construction/Operations Supervisors**: Construction/Operations Supervisors at Aurora Base will coordinate with the Environmental Officer to ensure that all mine haul roads and key infrastructure components (i.e., stockpiles, waste rock/overburden stockpiles, haul roads) are monitored daily to ensure continuing compliance with this *Plan.*

- **Camp Managers, Aurora and Buckhall**: The Camp Managers at the Aurora Site and Buckhall will coordinate with the Environmental Officer to ensure that earthworks associated with key transportation infrastructure components (i.e., the Tapir Crossing

ferry landing, the wharf area and fuelling trestle at Buckhall) are monitored daily to ensure continuing compliance with this *Plan.*

- **All GGI/Contractor Staff:** All GGI and contractor staff are responsible for the timely reporting of suspected erosion or sedimentation problems to their supervisors, e.g., the Environmental Officer, the Construction Manager, the Camp Managers at Aurora, Tapir Crossing, and Buckhall, or the Environmental Manager, for their appropriate action.

4 Preventive Measures for Control of Erosion and Sedimentation

This section addresses the selection and implementation of GIIPs to manage topsoil or overburden stockpiles, to identify and mitigate other potential areas of soil erosion, manage storm water runoff, and control erosion and sedimentation associated with: ATV trails, roadways and roadway rights of way (ROWs); TMA, FWP, and MWP embankments; the Cuyuni River dikes; clearances associated with the new airstrip, mi/l, and man-camp areas; and other areas requiring vegetation clearance or other disturbance of the soil surface associated with exploration, construction, operation, decommissioning, or closure. Detailed decision tree flowcharts are provided in **Appendix A** to guide the selection of appropriate erosion prevention and control measures. Examples of water diversion structures and settling ponds and various erosion control methods are presented in **Appendix B** and **Appendix C**, respectively. Approaches for monitoring the effectiveness of erosion prevention measures in specific project locations (and initiating appropriate corrective actions) are summarized in **Section 5.**

4.1 Environmental and Social Clearance Process

All ground surface areas that will be disturbed by Project activities must be evaluated for the existence of sensitive environmental features, species, or habitats as well as for any evidence of current or historical human use, in accordance with SOP GG-08, “Environmental and Social Footprint Surveys.” These may include prospecting/exploration trails; surface sampling areas; drill pad areas; surface trenches; roadway alignments; forested areas; and/or other undeveloped areas to be cleared for construction of facilities or supporting infrastructure for the Aurora Project. Surveys will be performed by qualified field ecologists or biologists, who will identify potentially sensitive issues or features, and provide guidance on appropriate realignments or setbacks.

4.2 Preparation of Erosion Prevention/Reclamation Memo

After completion of the environmental and social clearance process described in **Section 4.1** and prior to the initiation of any works, the Construction Manager or his designee will prepare a brief Erosion Prevention/Reclamation Memo (see Figure 4-1) that describes the scope of the planned activity, provides a sketch or descriptive photographs indicating the physical boundaries that will be established for the disturbance, and identifies the specific erosion prevention and control measures that will be implemented to prevent or minimize impacts to

waterways. The latter measures will be prepared giving due consideration to the guidance provided in Sections 4.3 through 4.11, as applicable to the nature of the planned ground disturbance.

4.3 Controlling Boundaries of Disturbance and Avoidance of Waterways

Disturbance boundaries shall be established fenced for the planned activity that permit the safe and effective completion of the required activity while minimizing the extent of the disturbance to the extent possible. A nominal 20 m riparian buffer zone is required for all water courses that are not diverted away from the Project. If the designated riparian buffer along a water course cannot be avoided, plans to divert unimpacted water around the disturbance area must be included in the project design. Diversions may be made through plastic or steel pipelines, or along a ditch lined with riprap and geotextile fabric or other material to minimize the potential for channel erosion. If the diversion must be made permanent, pipelines or a concrete- lined channel should be installed. Diverted water will be routed around the area of disturbance and back into the original channel downstream of the disturbance area, or diverted to the Cuyuni River or one of its tributaries to those rivers. Outfalls of all pipes or concrete ditches shall incorporate riprap pads (velocity dissipaters) to prevent erosion in the bed of the receiving water body.

Once the minimum disturbance area is defined, the area will be flagged, fenced, or otherwise visually marked to alert work crews to the boundary location. Operation of equipment outside of the designated disturbance area will not be allowed without permission of the Environmental Manager.

4.4 General Clearance Considerations

New areas should be cleared and developed only when absolutely necessary. Site clearing operations should be planned to progress in a gradual and phased manner in order to better ensure there are no large increases or concentrated “bursts” of sediment discharge. All available forest cover outside of the area cleared for the mine site operation should be preserved to help control run-off, limit erosion, minimize sediment and increased nutrient loads in waterways, maximize infiltration, and maintain pre-project rates of evapotranspiration and infiltration as much as possible.

When a site is first cleared, an appropriate combination of contouring, terracing, slope reduction/minimization, and appropriate drainage installations should be implemented immediately to reduce erosion in both active and inactive areas. As feasible, any stabilization measures that can be implemented via vegetation planting and/or using jute or coconut fiber erosion control mats should be effected immediately.

All topsoil and organic matter will be removed from the area planned for disturbance and placed in a designated topsoil stockpile that is protected from runoff, rainfall, contaminants, and sunlight. Topsoil and organic matter are to be separated from overburden and should not to be intermixed, as the topsoil and organic material will be used to restore environmental conditions

Figure 4-1: Erosion Prevention/Reclamation Memo

Aurora Project **Erosion Prevention/Reclamation Memo**	
Description of Project/Planned Disturbance:	
Location of/Distance to Nearest Waterway:	
Proposed Disturbance Boundaries (attach sketch/photographs as required):	
Proposed Erosion Prevention/Control Measures (list/briefly describe):	
Proposed Erosion Control Monitoring Requirements (list/briefly describe):	
Prepared by (Construction Manager or designee):	**Approved by (Environmental Manager or Designee):**
Date prepared:	**Date approved:**

once construction/operations are complete. Stockpiled topsoil and organic should be reused in progressive restoration works as soon as practicable to avoid losses of organic matter through oxidation.

4.5 General Stormwater Management Considerations

The primary factor affecting erosion is water runoff. Stormwater management is therefore critical to the control of erosion and sedimentation.

Water running onto the site that is to be disturbed from undisturbed, upgradient sites should be diverted around the area to be disturbed. Water may be diverted through a steel or plastic pipe or along a ditch lined with geotextile fabric or other material to minimize the potential for erosion. If the water diversion is to be permanent, pipe or a concrete lined ditch should be used. Diverted water should be routed around the area of disturbance and into a channel located downstream of the disturbance area or into to a settling basin. If disturbance of the area is temporary, the diversion should be removed once the site is fully restored and vegetation has become well established.

Water falling directly on the area to be disturbed will be collected and routed to a temporary or permanent setting pond. Temporary drainage installations should be designed, constructed, and maintained for recurrence periods of at least a 25-year/24-hour event, while permanent drainage installations need to be designed for a 100-year/24-hour recurrence period.

Stormwater drains, ditches, and stream channels are to be protected against erosion through a combination of adequate design and construction methods, including the use of rip-rap and geotextile lining to minimize erosion.

Design requirements for temporary drainage structures should be developed using a risk-based approach that considers the intended life of diversion structures, as well as the assumed storm recurrence interval in the design of any structures that drain into them.

See **Appendix B** for examples of appropriately designed water diversion structures and settling ponds.

4.6 General Considerations in Selection of Appropriate Erosion Control Measures

The sedimentation and erosion control measures described in **Appendix C** will be reviewed to determine the best options for the specific situation. At minimum, silt fences will be installed along designated riparian buffers adjacent to all planned disturbed ground. Measures will be selected to 1) avoid generation of sediment, 2) minimize sediment generation, and 3) reduce generated sediment to meet the 50 mg/L TSS discharge water quality requirement note in **Section 3**.

Once the appropriate erosion control measures have been identified, all measures that can reasonably be installed prior to ground disturbance should be installed prior to construction or

clearance actions. This may include installation of silt fences, hill slope stabilization, construction of sediment settling ponds or water diversions, and other appropriate features. Installation of measures that cannot be installed prior to construction will be scheduled for installation at the earliest possible time following initial ground disturbance. Disturbed areas should be surrounded with silt fences, rock berms, or other features that will contain and filter sediment, and exposed soil areas should be revegetated promptly; see GG-37, "Control of Erosion and Sedimentation." If weather conditions prohibit seeding or re-panting for an extended period of time, the disturbed areas not actively involved in construction should be covered with mulch or jute or coconut fiber erosion control mats.

To the extent possible, installation of erosion control systems should be performed under favorable weather conditions and should therefore be scheduled prior to the start of the rainy season. Installation should be halted in protracted rainfall events.

Before placement of erosion control blankets or geotextile fabrics, the subgrade should be graded smooth with no depressions, voids, and obstructions (such as tree roots, projecting stones or other foreign matter). No vehicles should be permitted to drive directly on the blankets.

4.7 Access Roads

Access roads provide temporary or permanent access to Project facilities and infrastructure. Roadway design will provide sufficient access to Project facilities while minimizing the overall area impacted by roads. To the extent practicable, roadways will be constructed in general conformance with the requirements of the *Code of Practice for Timber Harvesting 2nd ed*. (Guyana Forestry Commission, 2002. The discussion below summarizes the requirements based on adaptation of (Guyana Forestry Commission, 2002) requirements to address Project conditions.

4.7.1 Road Location

To the extent possible, road alignments should:

- avoid the need for riparian buffer strips except at designated stream crossings;
- be constructed at least 60m from creeks and 50 meters from gullies, except at designated crossing points;
- be located on well-drained soils and slopes where drainage will naturally flow away from the area of the road
- follow the terrain by conforming to the natural contour of slopes, minimizing the needs for cut and fill operations;
- avoid steep terrain and any areas where drainage is difficult to control;

- avoid unstable slopes, swamps, marshes, floodplains, landslide areas, steep slopes (no side cut roads on slopes greater than 50% or 27°, significant rock outcrops, and highly erodible soil types; and

- minimize the total number of water crossings.

4.7.2 ROW Clearance

Usable timber within the road ROW should be felled and preferably extracted and stockpiled before clearing. While clearing, trees and slash materials should be pushed into the ROW and not into the adjacent forest. Selectively cut or "feather" the edges of the tree boundaries along the road to minimize the potential for blow down. Where side cutting is not necessary, earthworks should generally be limited to the width for the roadbed plus ditches (table drains) on either side. Roads on clay and loam soils should have trees removed alongside the road in order to allow sunlight onto the road to dry the surface quickly after rain.

As a general rule, clearance widths for different road types should be limited to those specified in **Table 4.1** with setbacks or roadway width adjustments made as necessary to ensure driver visibility and safe passage of tractor-trailer rigs and heavy equipment, as well as safe access to drill pads, construction sites, and other specific project areas, giving due consideration to the potential for treefall accidents and the need to maintain appropriate drainage in all seasonal conditions.

Table 4-1: Recommended Road Widths (meters)

Road Class	Limit of Clearing	Limit of Roadway	Limit of Roadbed	Limit of Travel Way
Main Access Road	25	20	9	6
Secondary Access Roads	20	15	8	5
Temporary Roads	15	10	7	4

All topsoil and organic matter within the footprint of the road should be removed from the roadbed and placed in a designated stockpile. Hazardous trees with a significant probability of falling onto the roadway should be felled. Cleared areas of the roadway ROW should be progressively revegetated as soon as roadway grading and surfacing is complete; see GG-37, "Control of Erosion and Sedimentation."

4.7.3 Road Construction

General considerations for road construction include:

- road construction should be scheduled during the dry season only;
- organic debris should not be used as fill, and all fill material must be compacted;
- laterite or gravel surfacing is recommended for all roads, with 15 cm minimum compacted gravel to be added at bridge approaches and water crossings as soon as it becomes available during mining;
- all road drainage works should be completed before gravelling work commences;
- side cut roads shall not be located on slopes greater than 50% (27°), and full bench construction should be used on slopes steeper than 25%;
- cuts and fills should be balanced in gentle terrain so that as much of the excavated material as is practicable can be deposited in the roadbed fill sections;
- the maximum allowable slope of the fill batter (sideslope) is 50% (27°); and
- trees at the top of steep cut batters (side slopes) should be felled where erosion or wind-blow down is likely to occur.

4.7.4 Drainage Control

Wherever practicable, permanent drainage should be installed in advance of road construction to keep works as dry as possible. Temporary drainage should be provided if there is likely to be a significant delay in installing permanent drainage. Drainage methods to be considered in roadway designs include:

- a crowned road surface with a cross-fall of 4%;
- ditches or table drains alongside all roads, constructed to a minimum depth of 30 cm below the level of the crown of the road, and with a longitudinal grade of 1-5%;
- installation of turnout drains (i.e., side drains or outlets) with a grade of 1-3% shall be installed with the maximum drain spacing specified in **Table 4-2**;

Table 4-2: Maximum Drain Spacing†

Gradient (%)‡	Drain spacing (meters)
0-5	**80**
5-10	**40**
10-20	**30**

† Ditches adjacent to roads that have been box cut should be stepped or provided with rock or log bars at half the maximum drain spacing

‡ Roads should not be built with grades exceeding 20% (maximum unloaded truck grade is ~23%)

- installation of turnout drains or culverts at changes of slope, and within 50 m of all watercourse crossings;
- culverts (crossroad drains) should be used where turnout drains are not feasible;
- on slopes greater than 5%, drains should be lined with gravel or stones (riprap), log or rock bars, with stepping and/or frequent outlets to reduce scouring;
- earth fill road sections must have adequate drainage through the fill (via installation of culverts) to prevent water ponding behind the fill;
- side cuts are to be provided with crown drains along the top side to collect surface runoff;
- ditches shall not be permitted to drain directly into watercourses, and turnout drains (outlets) shall be installed at least 50 m before meeting a watercourse to divert water into surrounding vegetation; where turnout drains are not practicable, culverts should be installed;
- drain outlets should be stabilized and protected by vegetation or rock or log barriers, particularly in fill areas; drain outlets shall not be permitted to directly enter watercourses; and
- in steep terrain, silt traps should be constructed at the end of turnout drains; sumps or silt traps shall be constructed in ditches at all four corners of watercourse crossings.

4.7.5 Stream Crossings

All earthworks construction at or near stream crossings shall be carefully planned to prevent soil from entering the watercourse. Ditches shall not be permitted to drain directly into watercourses, and shall be provided with turnout drains at least 50 m before meeting a

watercourse in order to divert water into surrounding vegetation. Where turnout drains are not practicable, culverts should be installed. All drains must have stable outlets, protected by vegetation or rock or log barriers, particularly in fill areas and shall never be permitted to directly discharge into a watercourse. Sumps or silt traps shall be constructed in the roadside ditches or table drains at all four corners of watercourse crossings. Culverts shall be placed at the same grade as the watercourse. Watercourses will be armored with gravel or stones and geotextiles, as necessary to prevent erosion and down cutting of the channel. Provisions shall be made at culvert inlets and outlets to minimize erosion caused by flow entering or discharging; sediment traps of constructed of logs or rocks will be required where high water flows are expected through the crossing

4.8 ATV Trails

Temporary or semi-permanent ATV trails may be required to support exploration activities that are conducted to further define the mineral resources of the Aurora Project; such activities may occur throughout the construction and operational phases of the Project. The (Guyana Forestry Commission, 2002) reference does not specifically address ATV trails but has been interpreted as the basis for appropriate erosion prevention guidance. For the purposes of this *Erosion Prevention and Control Plan*, semi-permanent ATV trails will be designated in any area expected to be traversed by ATVs more than 10 times. Temporary trails used less than 10 times have no special construction requirements but will be monitored; see **Section 5**.

4.8.1 Trail Location

To the extent possible, semi-permanent ATV trails should:

- avoid riparian buffer strips except at designated stream crossings;
- be located at least 30 m from streams and 25 m from gullies, except at designated stream crossing points;
- be located on well-drained soils and ridge tops and slopes where natural drainage is away from the trail;
- avoid unstable slopes, swamps, marshes, floodplains, landslide areas, steep terrain, significant rock outcrops, and highly erodible soils;
- minimize the number of water crossings.
- avoid clearances for temporary ATV trails (used less than 10 times) as the land surface may be expected to recover quickly from light use;
- avoid clearing of trees and brush to accommodate designated semi-permanent ATV trails and locate trails along routes that avoid clearance needs, wherever possible; and

- limit maximum trail widths for semi-permanent trails to no more than 3.5 m; no clearances will be allowed beyond the edge of the designated trail boundary.

4.8.2 Drainage Control and Crossings

Because of they are by definition lightly used, temporary ATV trails will typically not use crossing structures. To the extent possible, semi-permanent ATV trails should include:

- turn out drains or cross-drains installed at 30 meter intervals, for all trails located on slopes greater than 5%, and additional drains must be installed at any location where ponding may be observed on the upslope side of the trail; on slopes > 5%, drains may require special treatment such as lining with gravel or stones; log or rock bars; stepping, and frequent outlets to reduce the potential for scouring;

- drain locations that prevent discharge directly into watercourses; drain discharges should be at least 30 m from the watercourse;

- turnout drains (outlets) at least 50 m before meeting a watercourse to divert water into surrounding vegetation; where turnout drains are not practicable, culverts should be installed at grade with the watercourse;

- stable drain outlets, protected by vegetation or rock or log barriers; outlets must never discharge directly into the watercourse;

- silt traps at the end of turnout drains, when in steeper terrain; and

- sumps or silt traps constructed at all four corners of watercourse crossing culverts.

4.9 Embankments and Dikes

The TMA, FWP, and MWP embankments and the various dikes that will be installed between the Cuyuni River and the mine pit are major engineered earthworks with specific geotechnical requirements for material properties and construction methods, as well as specific requirements for erosion prevention and control during construction, operation, and decommissioning and closure. These requirements will be addressed in the applicable construction drawings and specifications, and will be systematically verified during construction through construction quality assurance (CQA) processes. In general, however, erosion control devices such as silt fences or gabions (see **Appendix B** for examples) will be installed around the perimeter of the construction area and will regularly maintained during construction. Water flowing into the construction area from undisturbed upgradient sites must be diverted around the construction area through a metal or plastic pipeline, or via a ditch lined with geotextile fabric and rock or other material to minimize the potential for erosion. If the water diversion is to be permanent, pipelines or a concrete lined trench will be used. Diverted water will be routed around the area of disturbance and into a channel located downstream of the disturbance area, or may be routed to a settling basin if TSS levels are of potential concern. If disturbance of the area is

temporary, the diversion structures will be removed once the site is fully restored and vegetation has become well established.

Precipitation falling directly onto the construction site will be collected and routed to a temporary or permanent setting pond; drainage installations are to be designed, constructed, and maintained for recurrence periods of at least a 25-year/24-hour event, while permanent drainage installations will be designed for a 100-year/24-hour recurrence period. Stormwater drains, ditches, and stream channels will be protected against erosion through the use of rip-rap or other lining methods to minimize erosion; design requirements for temporary drainage structures will be developed using a risk-based approach considering the intended life of diversion structures, as well as the recurrence interval of any structures that drain into them. See **Appendix A** for examples of water diversion structures and settling ponds.

Measures to stabilize soils surfaces shall be implemented as soon as construction is complete on a given section of the embankment or dike. The disturbed area should be covered with a coconut or jute fiber mat, or could potentially be hydroseeded, using a slurry mixture of selected seeds, fertilizer, cellulose fiber, and water. Hydroseed mixtures applied on slopes > 5 percent will also include a bitumen based fixer or other tackifier to keep the mixture on the slope. Alternatively, hydroseeded areas may be mulched to a depth of 50 mm (see **Appendix B**). On slopes >20%, a coconut fibers or jute mat or other geotextile material will be applied to the hill slope over the hydroseeding to help control erosion, and held in place with soil staples.

In the unlikely event that the Project engineering design requires slopes >45%, alternative methods may be necessary to control surface erosion. These may include the use of rip rap, interlocking concrete blocks, crib walls, reinforced concrete walls, rock walls, or other engineered solutions.

4.10 Stockpiles

A series of engineered waste rock and overburden (saprolite and topsoil) stockpiles will be developed as part of the Project design. These stockpiles are major earthworks with specific geotechnical requirements for material properties and construction methods, as well as specific requirements for erosion prevention and control during construction, operation, and decommissioning and closure. These requirements will be addressed in the applicable construction drawings and specifications. Stockpile areas will be prepared and compacted prior to use, and constructed with perimeter (toe) drains to capture runoff; the adequacy of these preparations will systematically verified through applicable CQA processes. Stockpile slopes will be designed with an angle of repose that permits reseeding and closure with minimal or no re-grading required. In general, however, all stockpiles will have perimeter berms and drains to prevent and/or minimize the runoff of surface water and sediment. Erosion and sediment control structures (i.e., settling ponds) will be established to ensure that any runoff meets IFC effluent discharge limits (50 mg/L TSS). In addition, water running onto the stockpile area from undisturbed upgradient locations will be diverted around the stockpile area through a pipeline or along a ditch lined with geotextile fabric or other material to minimize the potential for erosion. If the water diversion is to be permanent, pipe or trenches with a concrete lining may be used.

Diverted water will be routed around the area of disturbance and into a channel located downstream of the disturbance area or will be routed to a settling basin. If disturbance of the area is temporary, the diversion will be removed once the site is fully restored and vegetation has become well established. Sediment traps or check dams should also be constructed within stockpile diversion ditches. Erosion control GIIPs should also be implemented to protect side slopes of stockpiles from erosion until such time as the stockpile is at its design height, in its final surface configuration for closure, and can therefore be completely revegetated.

4.11 Progressive Restoration

As noted in GG-37, “Control of Erosion and Sedimentation, a restoration nursery will be established at the Aurora site in order to ensure that a sufficient stock of native plants is available at all times to support progressive restoration needs. Nursery plants will include grasses and other fast- and low- growing, thickly rooted herbaceous or woody plants that can quickly bind the soils surface, but will also include a variety of easily propagated native plants that will be used where sites are to be permanently restored. The nursery will be managed by the Environmental Officer, who will also be responsible for ensuring that an adequate stock of seeds needed for hydroseed mixtures is available at all times. The initial collection of nursery stock from natural sources will be limited to the minimum necessary to start the nursery. It is intended that the nursery develop its additional stock through appropriate propagation methods.

Progressive restoration will be diligently pursued, with road ROWs and other disturbed soil areas reseeded and revegetated as soon as possible. Compacted soils shall be mechanically disked, plowed, or ripped where necessary to facilitate revegetation. Reserved topsoil and organic material will be replaced on the disturbed site, which will typically be hydroseeded prior to the introduction of other species. The hydroseed mixture will include a slurry of selected seeds, fertilizer, cellulose fiber, and water; when applied on slopes > 5 %, and will also include a bitumen based fixer or other tackifier to keep the mixture on the slope. Alternatively, the hydroseeded area can be mulched to a depth of 50 mm (see **Appendix B**). On slopes >20%, a fiber mat made of coconut fibers, jute, or other geotextile material will be applied to the hill slope over the hydroseeding to control erosion, held in place with soil staples.

Rainy conditions may temporarily prohibit the planting or hydroseeding of disturbed sites. All sites that are not immediately re-vegetated or hydroseeded will be protected from erosion by placing mulches, coconut or jute fiber mats, jute or other geotextile materials, or other appropriate measures to minimize erosion, and the sites will be planted or hydroseeded as soon as the weather allows.

5 Erosion Control Monitoring and Corrective Action

GGI will monitor all components of the Aurora Project for erosional impacts on an ongoing basis, over the entire life of the mining operation. As note in Figure 5-1, the erosion monitoring program contains several components, which are described as follows:

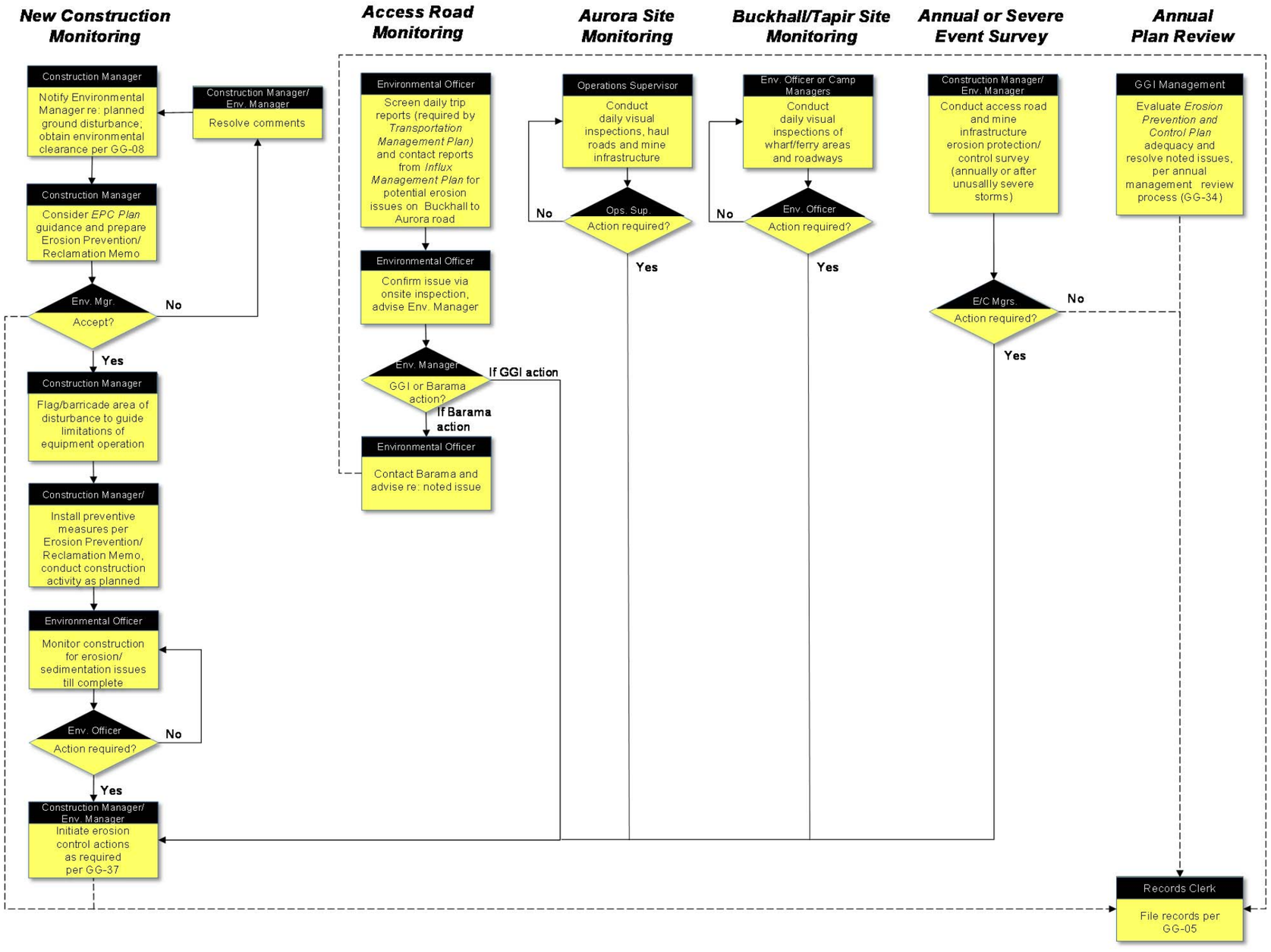
- **New Construction Monitoring:** The effectiveness of the erosion prevention and control measures established for new construction activities at the Aurora site (see Section 4.2 and Figure 4-1) will be monitored by the Environmental Officer or their designee at specified intervals until the completion of the activity; if any additional erosion control actions are required, they will be initiated in compliance with GG-37, "Control of Erosion and Sedimentation."
- **Access Road Monitoring:** as noted in the Project *Transportation Management Plan*, drivers using the Buckhall to Aurora road are required to note any specific erosion issues encountered along the transportation corridor; the *Influx Management Plan* also requires reporting of any ASM encounters as well as any ASM-related erosional issues that may be encountered. These reports will be screened by the Environmental Officer; if confirmed, the issue will be referred to the Environmental Officer. If the issue is associated with the section of the access road managed by the Barama logging operation, appropriate Barama representatives will be contacted. If determined to be a GGI responsibility, then corrective action will be initiated in compliance with GG-37, "Control of Erosion and Sedimentation."

- **Aurora Site Monitoring:** The Operations Supervisor or his designee will conduct a daily visual inspection of the Cuyuni dike installations, haul roads, waste rock and overburden stockpiles; the TMA, FWP, and MWP embankments; and other infrastructure for potential erosional issues. Monitoring will include daily assessment of TSS values in settling pond, FWP, or MWP effluents that may be released to the Cuyuni River or its tributaries, against the 50 mg/L TSS standard established by (IFC, 2007). If any additional erosion control actions are required, they will be initiated in compliance with GG-37, "Control of Erosion and Sedimentation."

- **Buckhall/Tapir Crossing Site Monitoring**: Daily visual inspections will also be conducted by the Camp Mangers (or Environmental Officer or designee, if available) to assess potential erosional issues associated with the Buckhall and Tapir Crossing sites. Any site discharges to the Essequibo or Cuyuni Rivers or their tributaries will likewise be evaluated against the 50 mg/L TSS standard established by (IFC, 2007). If any additional erosion control actions are required, they will be initiated in compliance with GG-37, "Control of Erosion and Sedimentation."

- **Annual or Severe Event Survey:** On at least an annual basis, or, at their discretion after any unusually severe precipitation event, the Environmental Manager and Construction Manager will jointly conduct a visual survey of the Buckhall, access road, Tapir Crossing, and Aurora Site to specifically assess the overall adequacy of the

Figure 5-1: Erosion Control Monitoring Program Structure



Project's *Erosion Prevention and Control Plan*. Action shall be taken as required; the results of this survey, action taken, and any additional suggestions for improvement will be presented for evaluation as part of the annual management review process.

- **Annual Plan Review**: GGI management will evaluate the results of the annual survey as part of the annual review process established by GG-34, "Management Review" and determine whether or not improvements or modifications to the *Erosion Prevention and Control Plan* are warranted.

Monitoring, maintenance, and corrective actions associated with the various physical components of the Project are summarized in the following sections. Detailed decision tree flowcharts corresponding to **Section 5.1** through **Section 5.6** are also provided in **Appendix D** to guide specific monitoring actions.

5.1 Stormwater Control Structures and Diversions

- All stormwater structures, including drains, will be inspected daily.
- Soil, vegetation, or other materials that would impair the function of the stormwater conveyance structure shall be cleared on a regular basis.
- The structural integrity of all stormwater facilities will be inspected. Any indication of erosion will be corrected immediately in accordance with GG-37, "Control of Erosion and Sedimentation."
- Structures will be examined for signs of unintended water leakage; any leakage will be immediately remedied by placing sand bags or other materials adjacent to the structure to stop of the flow of water.
- All disturbed sites will be inspected to determine if there is any stormwater runoff that is not being captured and filtered by existing sedimentation and erosion control structures. If additional stormwater controls are necessary, appropriate measures will be identified and implemented.

5.2 Settling Ponds

- The FWP, MWP, and all other settling structures will be inspected daily.
- Soil, vegetation, or other materials that would impair the function of the pond shall be cleared on a regular basis.
- The structural integrity of all settling ponds will be inspected. Any indication of erosion will be corrected immediately by implementing measures in **Appendix C**, GG-37, "Control of Erosion and Sedimentation", or other appropriate measures as suggested by GGI engineering.

- Structures will be examined for signs of unintended water leakage; any leakage will be immediately remedied by placing sand bags or other materials adjacent to the structure to stop of the flow of water.

- The sediment content of water discharged from the settling ponds into natural water courses will be monitored daily. Any observed surface erosion or violations of the sediment standard of 50 mg/L TSS will be immediately corrected. This will likely require modification of the existing structures to provide greater control of sedimentation prior to discharge into natural water courses.

5.3 Embankments, Dikes, and Berms

- Visual monitoring of the TMA, FWP, and MWP embankments and the Cuyuni dikes will be completed daily to identify any potential cracking, wet spots on the downstream face, and critical areas of settlement. Visual observations should be supplemented by instrumentation to enable an accurate interpretation of the observed condition. Such instrumentation (e.g., piezometers, settlement plates, and inclinometers) should be closely monitored to detect developing trends in the behavior of the embankments. If instability of the structures is indicated, GGI engineering staff, Construction Manager, Environmental Manager, and the Vice President, Aurora Project should be notified immediately and actions taken to remedy the problem.

- The face of the dams, dikes, and berms should be inspected daily for signs of surface erosion. If rills or slumping are present, the exposed surface should be covered with geotextile fabric or other material that will prevent further erosion.

- Erosion and sediment control structures, such as mulching and silt fences, should be inspected daily to ensure the control measures are functioning. All control structures are to be maintained on a regular basis and repaired or replaced if necessary.

5.4 Stockpiles

- The waste rock and overburden stockpiles should be monitored on at least a weekly basis to verify the integrity of the perimeter containment berm and other erosion control measures.

- Runoff from the stockpiles should be monitored to determine if the 50 mg/L TSS standard is being met. If the standard for suspended sediment (and other water quality standards) is met, the runoff can be discharged directly into the diversion channel system. However, if TSS or other water quality characteristics are such that the runoff is considered unsuitable for release, it should be collected in the perimeter ditch system and directed to the FWP, MWP, or another mine settling pond for removal of suspended solids and possible treatment prior to any release to the environment.

5.5 Vegetation

- All seeded areas will be inspected daily immediately after seeding to ensure that surface erosion is under control. If evidence of surface erosion is present, additional erosion control measures are to be implemented to protect the surface until the seeding has matured sufficiently to hold the soils.

- Hydroseeded areas that have not successfully sprouted within 2 weeks of seeding will be reseeded.

- Plant establishment will be monitored monthly for the first year after planting and annually thereafter to determine the success of the plantings. 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 regrowth after clearing, and the conditions apparently contributing that that regrowth.

- Where mortality is excessive, the area should be replanted, possibly with different species.

5.6 Main and Access Roads and ATV Trails

5.6.1 Haul Roads

- Soil, vegetation and other materials that would obstruct water flow shall be cleared from ditches monthly and immediately after major storm events.

- Turnout drains, culverts and erosion control features around bridges shall be kept clear and in a good working condition at all times. These features should be inspected weekly. If erosion control structures are failing, this should be reported and remedied immediately.

- Culverts are to be inspected during major rainfall events to ensure they are adequately sized. 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.

- If evidence of erosion is found within turnout drains, ditches, or downstream of discharge points, measures to correct the erosion will be immediately implemented. This may include modification of the erosion control structure or implementation of additional erosion control measures.

5.6.2 Site Access Roads

- Truck drivers will promptly report any observed failure or erosion on the road surface in accordance with the GGI *Transportation Management Plan*, as well as any erosion that is apparently due to ASM activities. The logs will be reviewed daily by the

Environmental Coordinator and any identified deficiencies will be corrected as quickly as possible. Cross-fall and road shape should be maintained over time to allow effective drainage.

- Soil, vegetation and other materials that would obstruct water flow shall be cleared from ditches monthly and immediately after a major storm event.

- Turnout drains, culverts and erosion control features around bridges shall be kept clear and in a good working condition at all times. These features should be inspected weekly. If structures are failing, this should be reported and remedied immediately.

- If evidence of erosion is found within turnout drains, ditches, or downstream of discharge points, measures to correct the erosion will be immediately implemented. This may include modification of the erosion control structure or implementation of additional erosion control measures.

- Culverts are to be inspected during major rainfall events to ensure they are adequately sized. 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.

- Surfacing of access roads will be completed weekly. Surfacing on access roads will be maintained to minimize or eliminate buildup of mud on the sides of the road and in drains. If rutting of the roads starts to develop, plans to address the situation, such as adding additional surfacing or implementing additional water runoff control measures, will be developed and implemented as quickly as possible.

- Sediment traps will be inspected and cleaned weekly.

- Cut and fill slopes should be inspected weekly. If rills are present, the exposed surface should be covered with erosion control blanket and reseeded. If erosion is persistent at a site, additional erosion protection such as geotextile fabric or riprap should be implemented. If slumping is present, install features to stabilize slope such as rock gabions or build temporary or permanent support wall (see **Appendix C**).

- Any crown drains placed in the slope above the road to manage overland flow reaching the slope will be inspected following inspection requirements for stormwater structures.

- Erosion and sediment control structures, such as mulching and silt fences, should be inspected daily to ensure the control measures are functioning. All control structures are to be maintained on a regular basis and repaired or replaced immediately if necessary.

5.6.3 ATV Trails

- All temporary and semi-permanent ATV trails should be inspected daily.
- If rutting of semi-permanent ATV trails starts to develop, plans to address the situation, such as adding additional surfacing or implementing additional water runoff control measures, will be developed and implemented as quickly as possible.
- If rutting of temporary ATV trails starts to develop, the trail will either be upgraded to meet the standards of a permanent trail or will be closed. If the trail is closed, erosion control materials, such as mulch and/or erosion control blankets, will be placed on the eroding surfaces and the trail will be hydroseeded as soon as possible.

6 Training Requirements

All personnel engaged in erosion prevention and control activities will be trained in the requirements of this *Erosion Prevention and Control Plan* and its supporting SOPs, in compliance with GG-06, "ESMS Training Program." SOP training assignments will be consistent with the needs of individual work assignments; training topics will include any specific OHS hazards or environmental impacts that may be associated with such assignments. Training methods will be selected based on individual job descriptions and the experience and qualifications of the individual employee. Training requirements for contractors will be defined in individual contracts or purchase orders, as noted in Section 4.3.3 of the *ESMS Plan.*

7 OHS Program Considerations

All erosion prevention and control activities will be conducted in compliance with the Project's *Occupational Health and Safety/Accident Prevention Plan.* As noted therein, affected workers and contractors will also be required to comply with several supporting SOPs, as applicable to their work assignments or contracts; these include:

- GG-11, "Personal Protective Equipment";
- GG-12, "First Aid and Emergency Medical Response";
- GG-16, "Safe Operation of Heavy Equipment";
- GG-17, "Vehicle Fueling and Spill Prevention;
- GG-22, "Fire Prevention Program";
- GG-23, "Operational Safety Meetings";
- GG-24, "Recognition and Reporting of Safety Hazards";
- GG-26, "Safe Use of All-Terrain Vehicles";
- GG-27, "Chainsaw Safety"; and
- GG-28, "Heat Stress."

8 Waste Management

Waste materials generated in the implementation of this *Erosion Prevention and Control Plan* may include torn, broken, or worn out silt fence fabric and crushed or broken culverts, as well as leftover fertilizers and hydroseed mixtures, dead plant stock, and waste oil and grease from field servicing of heavy equipment. All wastes shall be collected and segregated, and disposed of in accordance with SOP GG-01, “Solid Waste Management” (during the Exploration/Early Works Construction phase of the project) and the Project *Waste Management Plan.*

9 Spill Prevention and Response

Onsite fuel tanks, vehicle fuelling stations, remote fuelling equipment, and their associated mechanical maintenance programs will be designed to minimize the possibility that employees and the environment will be exposed to pollutants (e.g., petroleum hydrocarbons, heavy metals, and volatile organic compounds)associated with field maintenance and fuelling activities associated with erosion prevention and control activities. All field fuelling activities will be subject to the requirements of GG-17, “Vehicle Fuelling and Spill Prevention”, which is designed to prevent exposures caused by human errors, such as topping off fuel tanks, using fuelling nozzles without functional automatic cut-offs, not being attentive during loading and unloading procedures, not using drip trays, improper cleanup if a spill should occur, and improperly storing or disposing of materials associated with fuel spill cleanup or maintenance activities.

10 Records Management

Records generated in the routine implementation of the *Erosion Prevention and Control Plan* and its supporting plans and SOPs will be filed and maintained by administrative staff under the direction of the Environmental Manager, in accordance with procedure GG-05, “Records Management.” GG-05 defines records organization, retention, and storage and retrieval requirements, as well as access control and other requirements designed to preserve the accessibility and integrity of records.

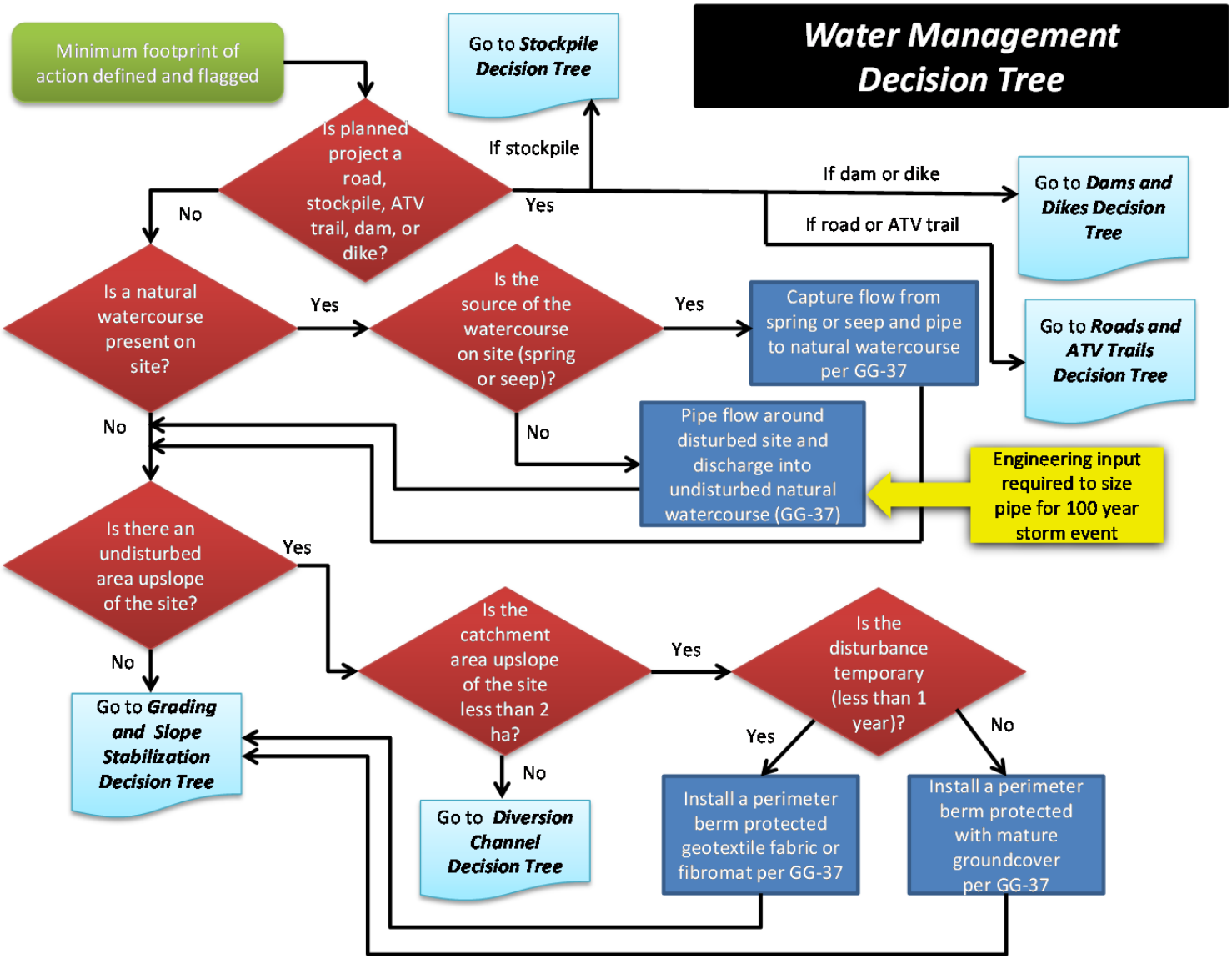
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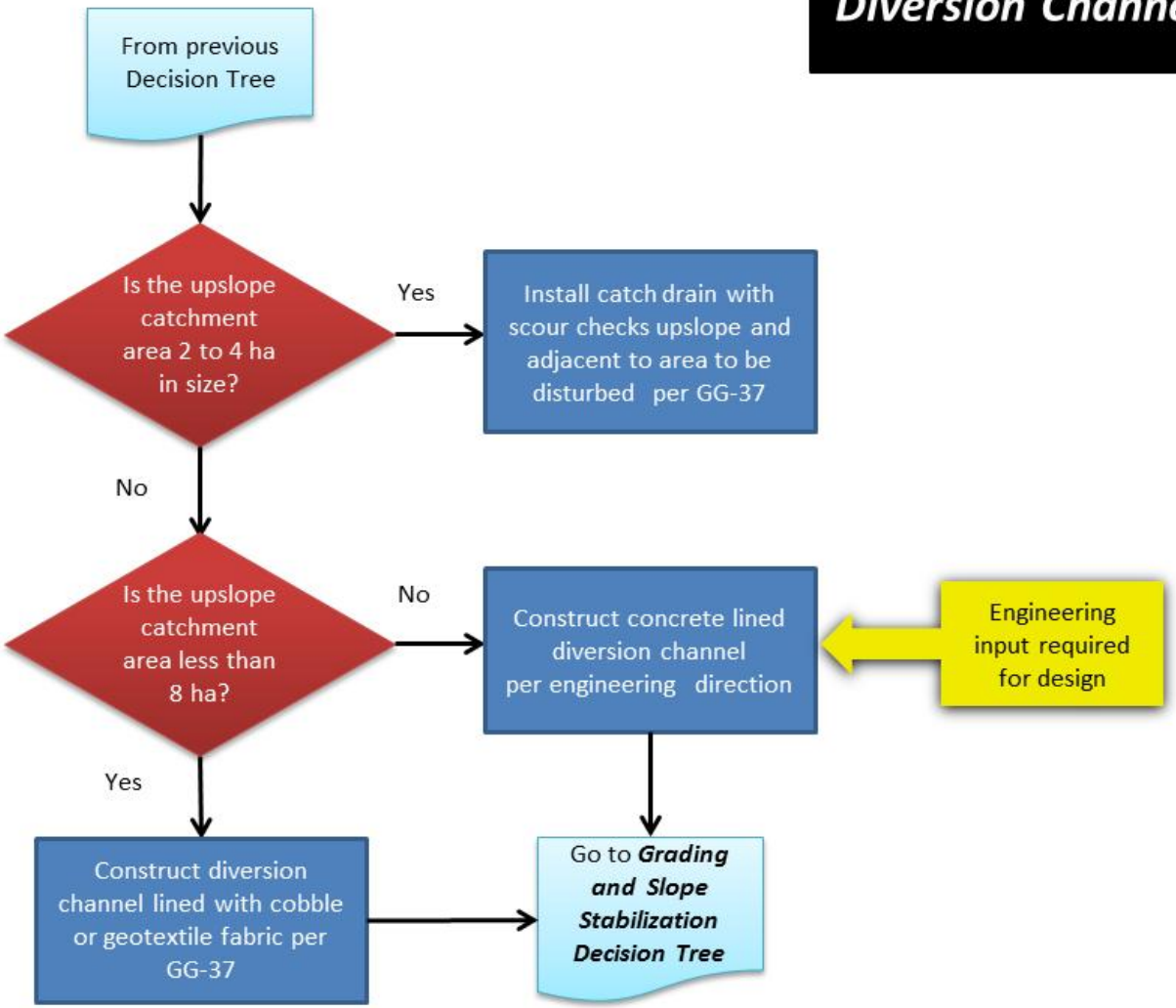
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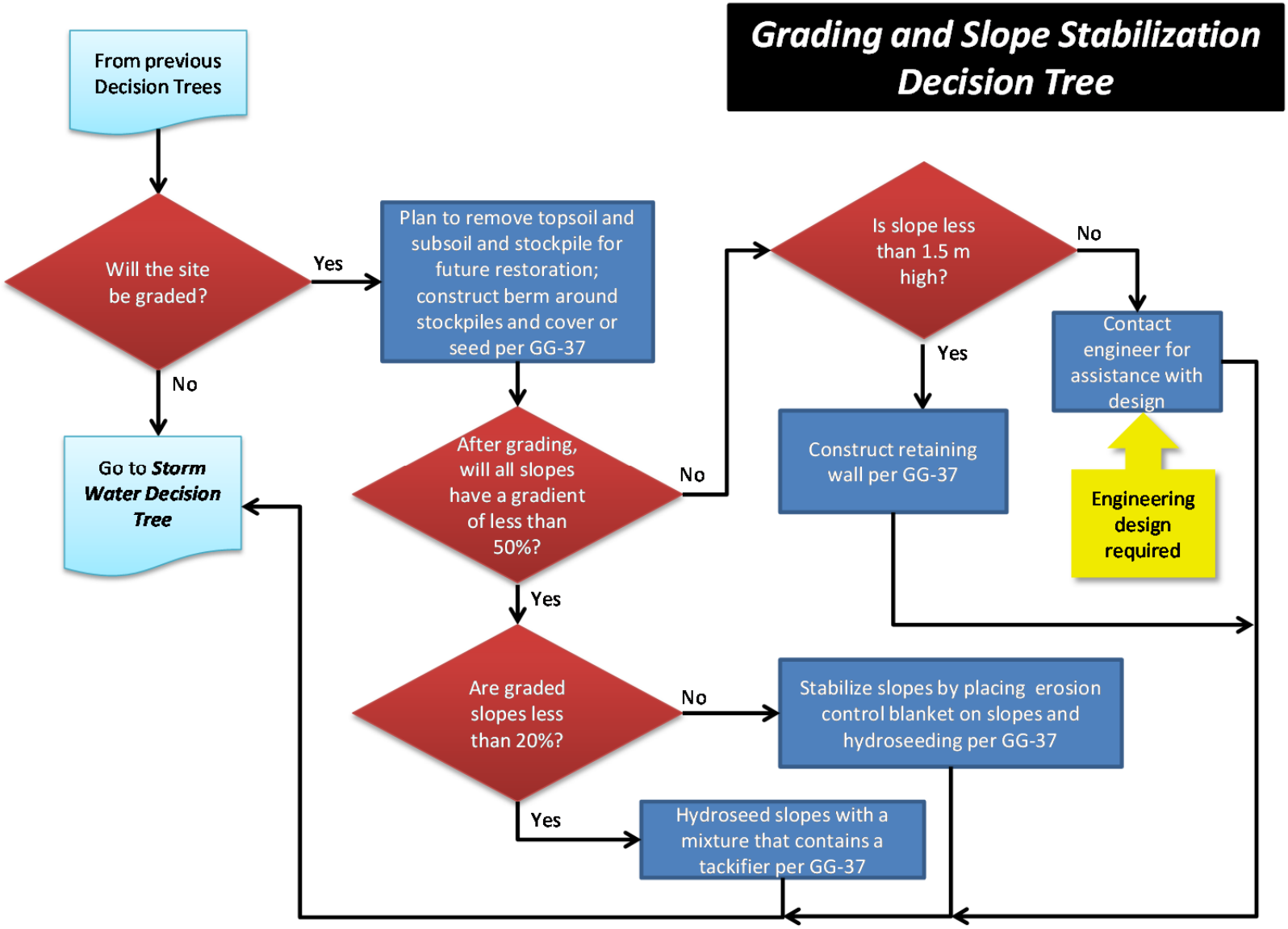
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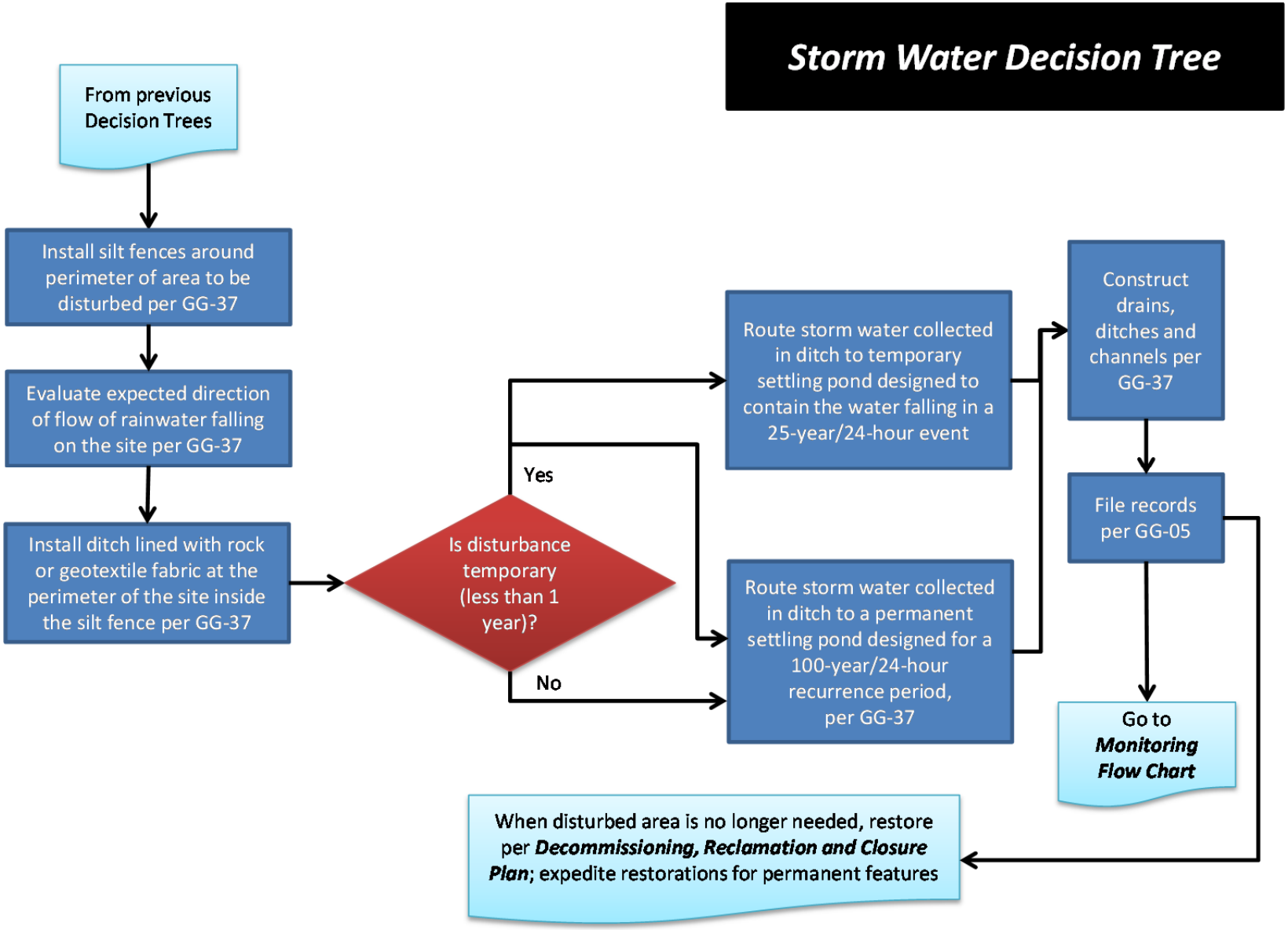
Appendix A
Erosion Prevention Measures – Decision Tree Flowcharts

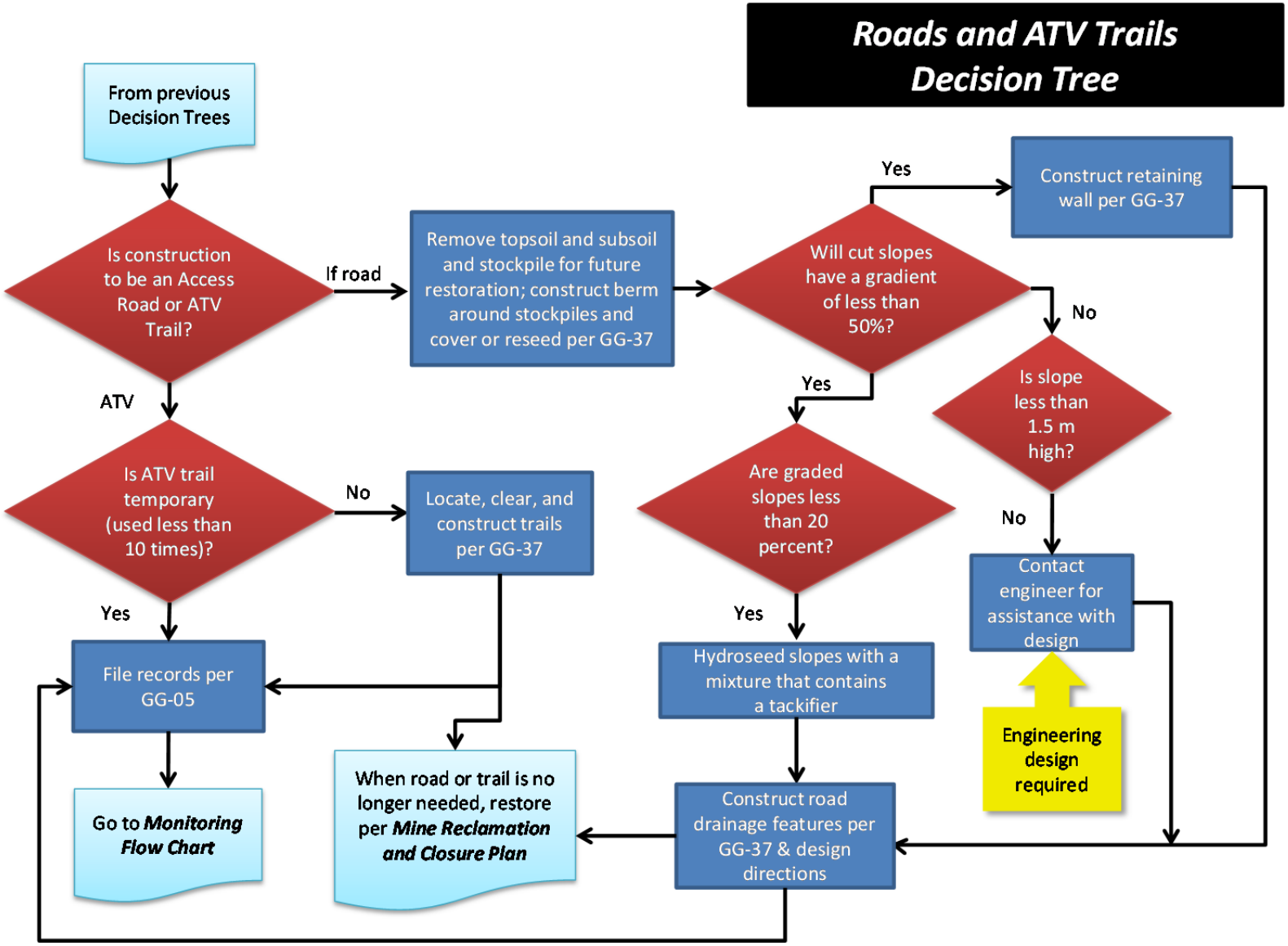

Water Management Decision Tree
Minimum footprint of action defined and flagged
Is planned project a road, stockpile, ATV trail, dam, or dike?
If stockpile
Go to Stockpile Decision Tree
If dam or dike
Go to Dams and Dikes Decision Tree
If road or ATV trail
Go to Roads and ATV Trails Decision Tree
Yes
No
Is a natural watercourse present on site?
Yes
Is the source of the watercourse on site (spring or seep)?
Yes
Capture flow from spring or seep and pipe to natural watercourse per GG-37
No
No
Pipe flow around disturbed site and discharge into undisturbed natural watercourse (GG-37)
Engineering input required to size pipe for 100 year storm event
Is there an undisturbed area upslope of the site?
Yes
No
Go to Grading and Slope Stabilization Decision Tree
Is the catchment area upslope of the site less than 2 ha?
Yes
Is the disturbance temporary (less than 1 year)?
Yes
No
No
Go to Diversion Channel Decision Tree
Install a perimeter berm protected geotextile fabric or fibromat per GG-37
Install a perimeter berm protected with mature groundcover per GG-37

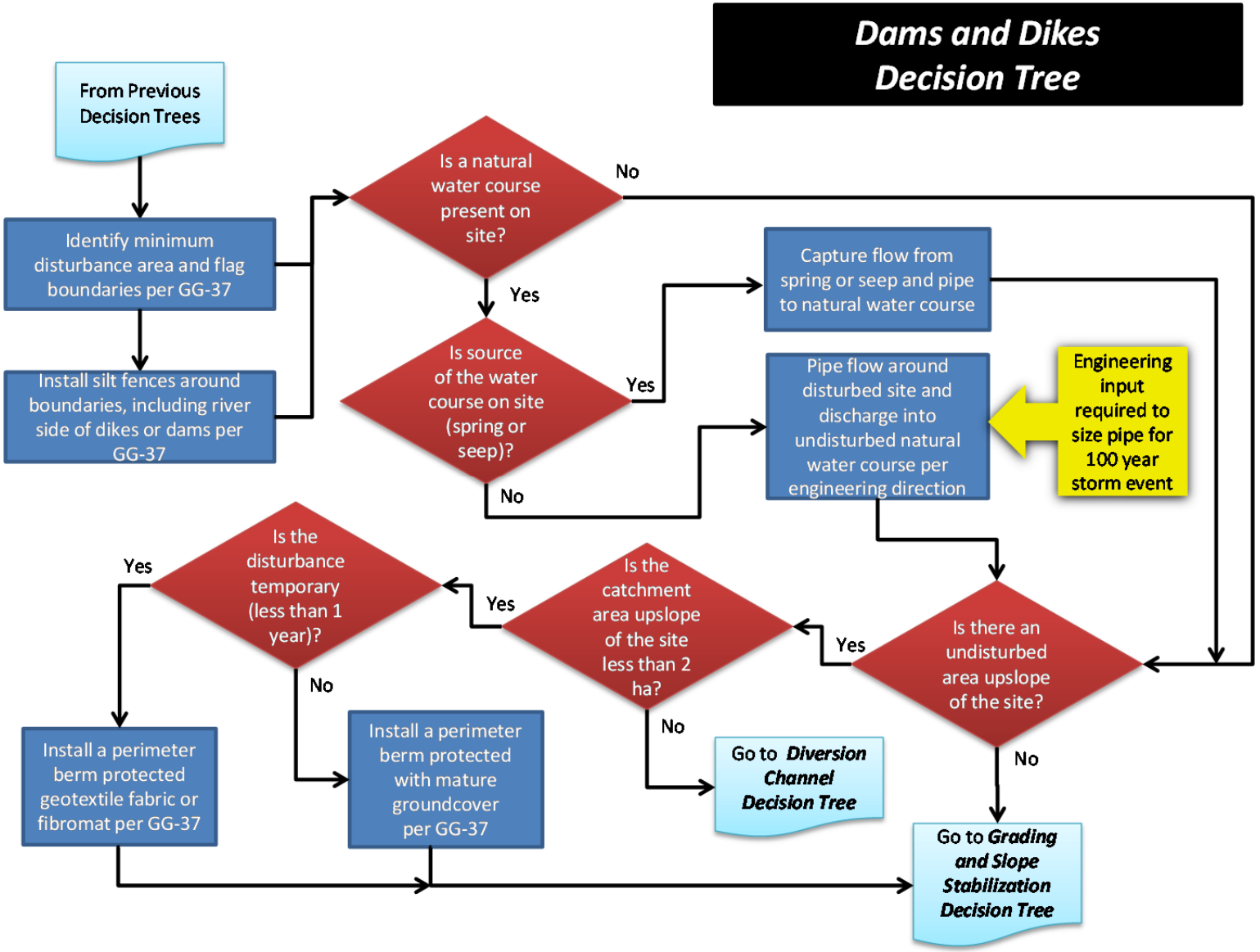
Diversion Channel Decision Tree

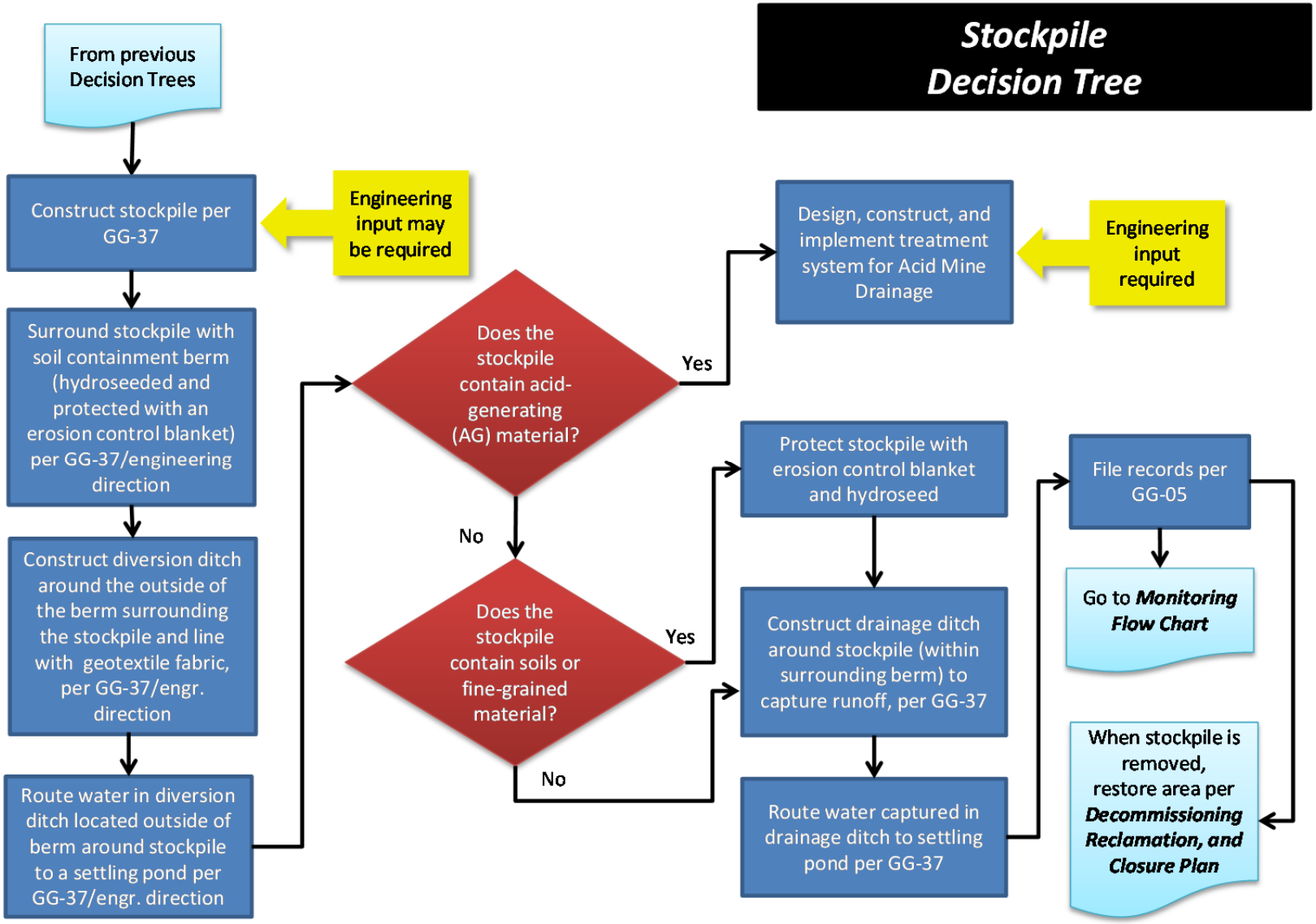



Grading and Slope Stabilization Decision Tree
From previous Decision Trees
Will the site be graded?
Yes
No
Go to Storm Water Decision Tree
Plan to remove topsoil and subsoil and stockpile for future restoration; construct berm around stockpiles and cover or seed per GG-37
After grading, will all slopes have a gradient of less than 50%?
No
Yes
Are graded slopes less than 20%?
No
Yes
Hydroseed slopes with a mixture that contains a tackifier per GG-37
Stabilize slopes by placing erosion control blanket on slopes and hydroseeding per GG-37
Is slope less than 1.5 m high?
No
Yes
Contact engineer for assistance with design
Engineering design required
Construct retaining wall per GG-37


Storm Water Decision Tree
From previous Decision Trees
Install silt fences around perimeter of area to be disturbed per GG-37
Evaluate expected direction of flow of rainwater falling on the site per GG-37
Install ditch lined with rock or geotextile fabric at the perimeter of the site inside the silt fence per GG-37
Is disturbance temporary (less than 1 year)?
Yes
No
Route storm water collected in ditch to temporary settling pond designed to contain the water falling in a 25-year/24-hour event
Route storm water collected in ditch to a permanent settling pond designed for a 100-year/24-hour recurrence period, per GG-37
Construct drains, ditches and channels per GG-37
File records per GG-05
Go to Monitoring Flow Chart
When disturbed area is no longer needed, restore per Decommissioning, Reclamation and Closure Plan; expedite restorations for permanent features


Roads and ATV Trails Decision Tree
From previous Decision Trees
Is construction to be an Access Road or ATV Trail?
If road
ATV
Remove topsoil and subsoil and stockpile for future restoration; construct berm around stockpiles and cover or reseed per GG-37
Will cut slopes have a gradient of less than 50%?
Yes
Construct retaining wall per GG-37
No
Is slope less than 1.5 m high?
No
Contact engineer for assistance with design
Engineering design required
Yes
Are graded slopes less than 20 percent?
Yes
Hydroseed slopes with a mixture that contains a tackifier
Is ATV trail temporary (used less than 10 times)?
No
Locate, clear, and construct trails per GG-37
Yes
File records per GG-05
Go to Monitoring Flow Chart
When road or trail is no longer needed, restore per Mine Reclamation and Closure Plan
Construct road drainage features per GG-37 & design directions


Dams and Dikes Decision Tree
From Previous Decision Trees
Identify minimum disturbance area and flag boundaries per GG-37
Install silt fences around boundaries, including river side of dikes or dams per GG-37
Is a natural water course present on site?
No
Yes
Is source of the water course on site (spring or seep)?
Yes
No
Capture flow from spring or seep and pipe to natural water course
Pipe flow around disturbed site and discharge into undisturbed natural water course per engineering direction
Engineering input required to size pipe for 100 year storm event
Is there an undisturbed area upslope of the site?
Yes
No
Is the catchment area upslope of the site less than 2 ha?
Yes
No
Go to Diversion Channel Decision Tree
Is the disturbance temporary (less than 1 year)?
Yes
No
Install a perimeter berm protected geotextile fabric or fibromat per GG-37
Install a perimeter berm protected with mature groundcover per GG-37
Go to Grading and Slope Stabilization Decision Tree


Stockpile
Decision Tree
From previous Decision Trees
Construct stockpile per GG-37
Engineering input may be required
Surround stockpile with soil containment berm (hydroseeded and protected with an erosion control blanket) per GG-37/engineering direction
Construct diversion ditch around the outside of the berm surrounding the stockpile and line with geotextile fabric, per GG-37/engr. direction
Route water in diversion ditch located outside of berm around stockpile to a settling pond per GG-37/engr. direction
Does the stockpile contain acid-generating (AG) material?
Yes
No
Design, construct, and implement treatment system for Acid Mine Drainage
Engineering input required
Does the stockpile contain soils or fine-grained material?
Yes
No
Protect stockpile with erosion control blanket and hydroseed
Construct drainage ditch around stockpile (within surrounding berm) to capture runoff, per GG-37
Route water captured in drainage ditch to settling pond per GG-37
File records per GG-05
Go to Monitoring Flow Chart
When stockpile is removed, restore area per Decommissioning Reclamation, and Closure Plan

Appendix B
Examples of Water Diversion Structures and Settling Ponds

1 Sediment Traps or Catch Basins[1]

1.1 Purpose and Application

A sediment trap or catch basin is a temporary structure that is typically used to catch and store sediment-laden surface runoff in order to reduce sediment loads to receiving ponds, streams, lakes, or rivers. Such structures are generally used to control sediment from disturbed areas that are less than 2.5 hectares. Smaller structures may be used to collect sediment generated from temporary roads and construction activities.

1.2 Design Criteria

Locations for sediment traps/catch basins should be selected during the initial site planning phase. A sediment trap can be formed by an embankment, an excavation, or by a combination of each. **Figure B-1** depicts a typical sediment trap/catch basin design; **Figure B-2** provides construction examples.

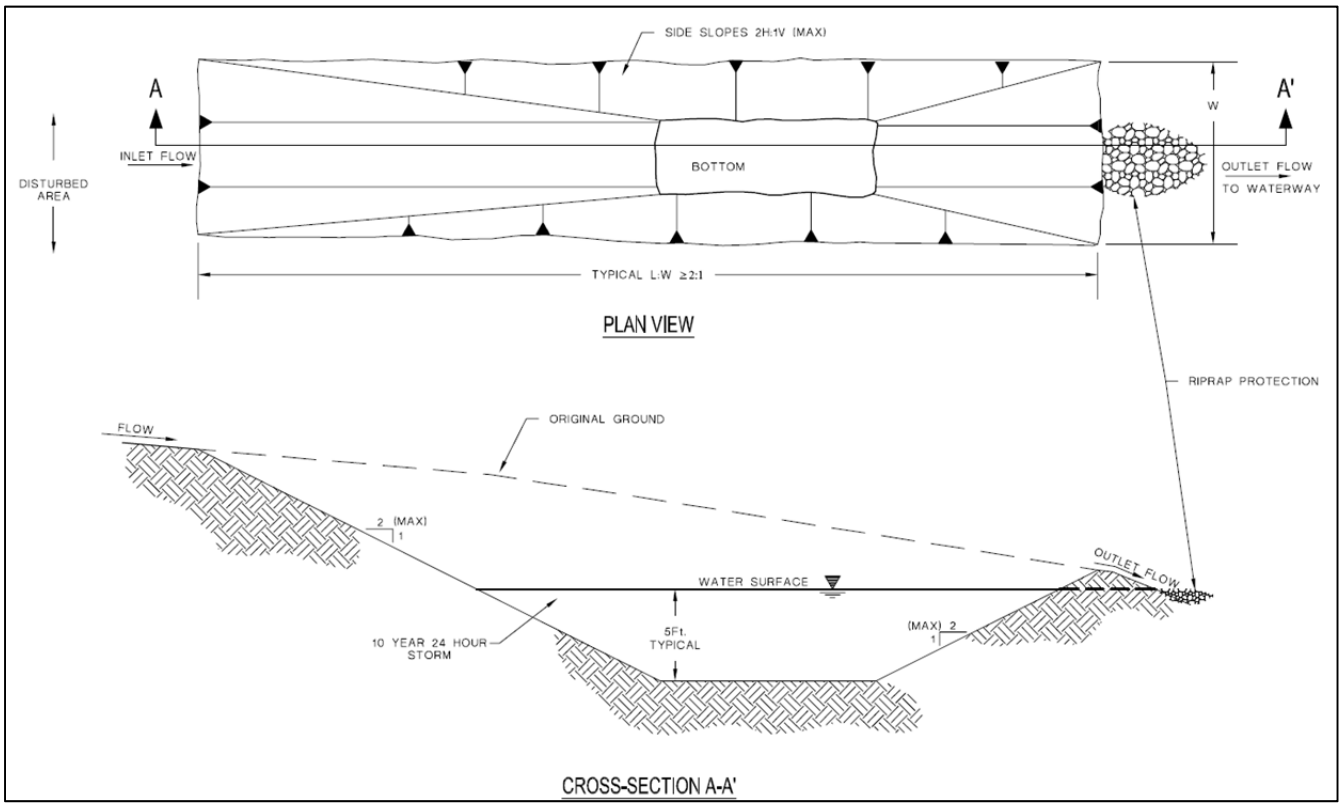
Natural topography should be assessed and used as much as possible. Natural depressions can make an excellent trap, as an excavated structure is simpler to build than an impoundment. Greater efficiencies will be achieved if the trap can be located near the anticipated source of sediment. Ease of access should be considered so that accumulated sediment can be periodically removed, and it may be beneficial to build a number of traps in series.

The sediment trapping efficiency of a trap or catch basin is a function of its surface area and the inflow rate. Since trapping efficiency increases with surface area, surface area should be maximised. Typically, the trap should have enough capacity to collect sediment from a 10-year, 24-hour storm event. Traps with large length to width ratios allow more surface area for settling. Sediment traps serving areas greater than 0.50 hectares should have a length to width ratio of greater than 2:1.

If the trap requires an embankment, then failure protection (i.e., emergency spillway) must be included in the design and construction. The emergency spillway should be designed for the 10-year, 24-hour storm event and should be constructed using riprap or other non-erosive construction materials. Larger structures may require a more permanent spillway so that collected water can be periodically decanted. Gated corrugated metal pipe spillway arrangements are commonly installed for this purpose.

[1] Adapted from the (World Bank) India-Environmental Management Capacity Building Technical Assistance Project, Mining Sub-Component, Activity II A: Task - 1 (iii), BEST MANAGEMENT PRACTICES MANUAL, Volume I (Centre of Mining Environment, Indian School of Mines/ MWH Energy & Infrastructure, Inc./ Mining Group, 2003).

Figure B-1: Typical Sediment Trap/Catch Basin Design



1.3 Construction Guidelines

Since sediment traps are designed to reduce off-site transport of sediment, they must be constructed during the initial stages of a project prior to major earth moving activities.
If site topography and other conditions permit, an excavated trap is preferred over having to construct and embankment. The trap can be excavated using readily available mining equipment such as a bulldozer. If an embankment is needed, clear, grub and strip the area under the embankment of all vegetation and organic matter (topsoil). Place fill in 8-inch lifts and machine compact following standard construction practices. Overfill the embankment by at least 4 inches to allow for settlement. The outlet should be sized according to the design specifications to assure that the design storm event can pass through the outlet without causing structural failure. The riprap or other rock material used to protect the outlet should be a well-graded mixture of hard, angular material, highly weather resistant, and machine placed. Direct the emergency bypass to natural, stable areas so as not to damage the embankment and seed with temporary vegetation as soon using hydroseeding (see **Section 3**) or other efficient seeding methods above the expected elevation of the sediment pool and downstream from the trap immediately after construction.

Figure B-2: Examples of Sediment Trap/Catch Basins with Controlled Stormwater Release Structures





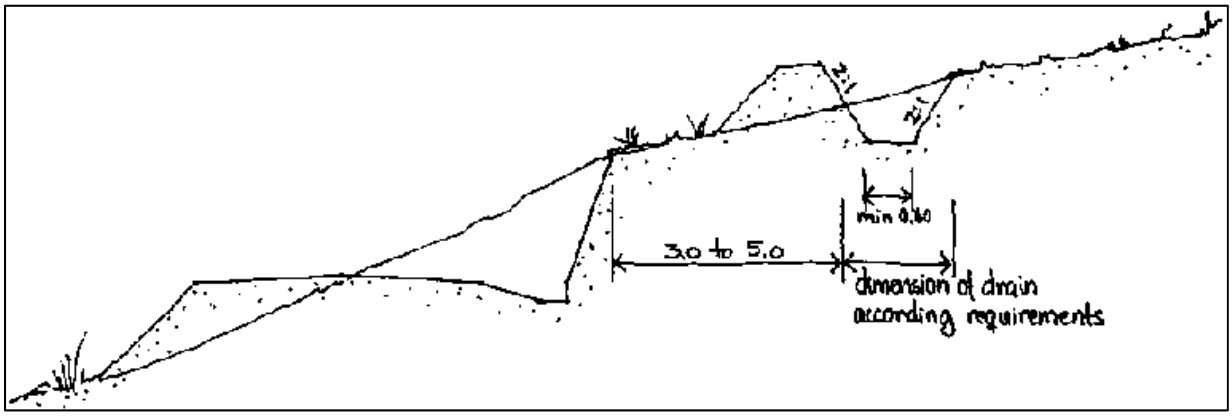
1.4 Maintenance

Sediment tramps/catch basins should be inspected on a regular basis, especially following significant rainfall events. The structure should be inspected for damage from erosion or piping as well as for indications of settlement, and should be cleaned out as needed, usually when the accumulated sediment reaches one-half the design depth. Repairs to inlets and outlets and riprapped surfaces should occur as soon as possible after any damage or erosion is first noted.

2 Catch Drains[2]

Catch drains can be used to divert flow around disturbed areas or used within disturbed areas to direct contaminated flow to a sediment trap or settling basin. They can be either temporary or permanent. They are usually excavated with a grader blade with a depth and width sufficient to carry intercepted water during a high rainfall event. Bank slopes should not exceed 2(H):1(V) (see **Figures B-3 and B-4**). Catch drains usually have a trapezoidal cross-section and the excavated material should always be deposited on the downhill side of the drain.

Figure B-3. Diagram of a catch drain upslope of a cut and fill road[3]



[2] Adapted from Malaysia Department of Environment, Ministry of Natural Resources and Environment. 2008; Guidelines for Prevention and Control of Soil Erosion and Siltation in Malaysia; Department of Environment, Ministry of Natural Resources and Environment. Wisma Sumber Asli, Precinct 4. Federal Government administrative Centre. 62574 PUTRAJAYA, 2008

[3] Source: http://www.greenstone.org/greenstone3/nzdl;jsessionid=EFB78D23C4FE42DA5FF38BAAC751DBA8?a=d&d=HASH01d5af26ab423e691ac8d8d0.4.4.np&c=cdl&sib=1&dt=&ec=&et=&p.a=b&p.s=ClassifierBrowse&p.sa.

Figure B-4. Example of Catch Drain[4]



Where longitudinal gradients are steep the water gains high speed. Therefore, if no protective measures are taken, scouring is likely to occur. The simplest way of dealing with scouring, apart from reducing the volume of water is to reduce the velocity of the water by building scour checks in the ditches. The scour checks hold back the silt carried by the water flow and provide a series of stretches with gentle gradients interrupted by small "waterfalls."

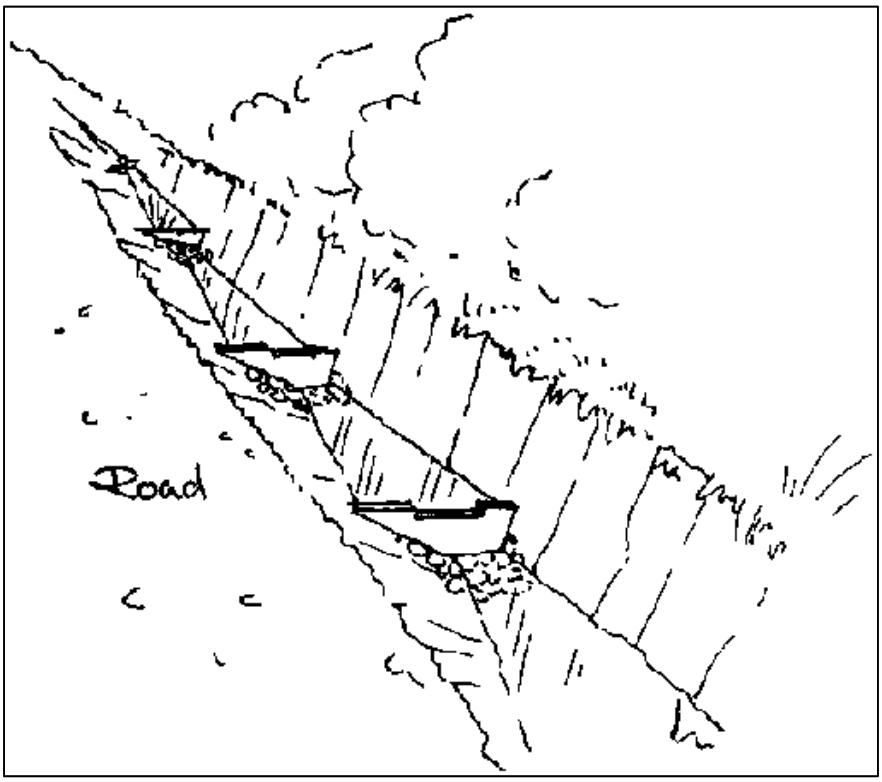
Scour checks are usually constructed in natural stone or with wooden stakes but can also be constructed of masonry or concrete if necessary to control erosion (**Figure B-5**). The spacing of scour checks within the catch drain varies with the gradient of the drain (**Table B-1**).

Table B-1. Recommended Spacing for Scour Checks in a Catch Drain

Gradient of Drain (%)	Scour Check Interval (m)
12	5
10	10
8	15
6	40

[4] Source: http://mw2.google.com/mw-panoramio/photos/medium/27476887.jpg.

Figure B-5: Scour Checks in a Catch Drain[5]



3 Diversion Channels[6]

Diversion channels are typically used where the catchment areas is large, typically 1 to 2 hectares (**Figure B-6**). Where the catchment area exceeds 8 hectares, a concrete lined channel is required. They are normally constructed at the basin of a cut or fill slope and direct sediment-laden flows to sediment traps. The channels may be subject to erosive flow and will likely require lining to reduce erosion. They can be lined with plastic, cobble, geotextile fabric, or concrete (Malaysia Department of Environment 2008). Side slopes should not exceed 2(H):1(V).

[5] Source: http://www.greenstone.org/greenstone3/nzdl;jsessionid=EFB78D23C4FE42DA5FF38BAAC751DBA8?a=d&d=HASH01d5af26ab423e691ac8d8d0.4.4.np&c=cdl&sib=1&dt=&ec=&et=&p.a=b&p.s=ClassifierBrowse&p.sa.

[6] Adapted from Malaysia Department of Environment, Ministry of Natural Resources and Environment. 2008, *op. cit.*

Figure B-6: Examples of Rock lined and Concrete Lined Diversion Channels[7]





[7] Source: Malaysia Department of Environment, Ministry of Natural Resources and Environment. 2008, *op. cit.*

4 Diversion Dikes

Diversion dikes (see **Figure B-7**) are also useful in diverting flow from undisturbed areas onto construction areas. Diversion dikes work best where flows can be diverted around the disturbed area and discharged to a channel without flowing over any disturbed sites. Dikes are constructed of compacted soil, rock, or gabions or sandbags covered with plastic.. They should be protected with plastic, geotextile fabric, rock, or other materials that protect the dike from erosion. The entire surface of the dike should be covered if the dike is temporary. If permanent, the slopes of the dike should be vegetated. Protection of the base of a vegetated dike will likely be necessary.

Figure B-7: Example of Temporary Diversion Dike[8]



[8] **Source:** http://www.fairfaxcounty.gov/nvswcd/newsletter/esc.htm

Appendix C
Examples of Erosion Control Methods

1 General Seeding Guidelines[9]

1.1 Purpose and Application

The purpose of seeding a disturbed area of a mining site is to re-establish an effective, self-sustaining vegetative community, consistent with either pre-mining conditions or the planned post-mining land use, in order to minimize erosion losses and stabilize the soil. The establishment of vegetation is the most efficient and cost effective form of erosion control and soil stabilization. Once established, vegetation absorbs precipitation impacts and prevents the mobilization of soil particles. Vegetation prevents erosion, whereas other treatments only mitigate sediment mobilization processes.

Seeding practices should be selected based upon the specifics of the site and the objectives of the reclamation. Most seeding practices are applicable to any surface disturbance requiring re-vegetation or reclamation. Slopes must be mechanically stabilized prior to seeding, however, as vegetation alone will not fully stabilize a slope. Although not commonly used in Guyana. hydroseeding methods are particularly effective in that grass or other ground cover seeds are mixed with nutrients and growth media and sprayed on a prepared ground surface in a uniform layer, yielding a much more consistent vegetation pattern and higher success rate than traditional broadcast seeding methods.

1.2 Design Criteria

Typically economics, site topography, and/or access are controlling factors in selecting a planting process. Hydroseeding is usually preferred due to the higher seed germination and success rates that it provides; other common seeding practices include broadcast seeding, drill seeding, or aerial seeding.

Existing site-specific conditions must be considered and carefully incorporated into a reclamation seeding design. Choosing plants based on a specific site's ecological profile and growing conditions will increase vegetation survival.

The following considerations should be evaluated as species selection criteria during the development of the reclamation seed mixture:

- elevation;
- mean monthly temperature;
- growing season;

[9] Adapted from the (World Bank) India-Environmental Management Capacity Building Technical Assistance Project, Mining Sub-Component, Activity II A: Task - 1 (iii), BEST MANAGEMENT PRACTICES MANUAL, Volume I (Centre of Mining Environment, Indian School of Mines/ MWH Energy & Infrastructure, Inc./ Mining Group, 2003).

- average annual precipitation;
- slope and aspect;
- soil characteristics;
- plant rooting depth;
- suitability of more long-lived species with rapid establishment rates and higher productivity growth characteristics;
- diversity in species of grasses and forbs;
- use of native species wherever possible;
- species that will reduce invading or noxious weeds;
- separate permanent mixtures for different slope aspects;
- separate mixtures for temporary and permanent reclamation seeding;
- compatibility with the planned post-mining land use; and
- compatible growth media (for hydroseeding options).

Temporary reclamation/stabilization seed mixtures should typically be comprised of quick-germinating grasses and legumes that will rapidly provide temporary soil protection. Including legumes in a seed mix will tend to increase nitrogen levels, and inclusion of grasses will increase the volume of organic matter in the soil and generally improve soil health. As long as annual plant varieties are used, issues associated with invasive species may be avoided, as the plants will survive only for one or two seasons.

Permanent reclamation seed mixtures should be comprised of quick germinating grasses and legumes, which will provide immediate soil cover, as well as perennial species for long-term soil stabilization. Because these plants will remain on the site long-term it is important that native species are considered and properly included in this seed mixture. It is also very important for the plants chosen for both temporary and permanent seed mixtures to also have the effect of reducing the invasion of weedy species.

1.3 Construction Guidelines

Soil survey data, as available, should be consulted for each area to be seeded. If the information is not available, sites should be inspected and/or tested for texture, organic matter content, drainage, slope, and aspect. Testing for contaminants and other trace element constituents, water holding capacity and nutrient levels may also be conducted.
If the pH of the soil is less than 5.5 (i.e., acidic soil conditions), the effectiveness of hydroseeding or other seeding activities may be limited. Lime can be added to increase the soil pH to a more neutral pH of 7. Powdered lime should be applied at a rate determined by soil testing and it should be tilled into the top 1 ft. of soil. Some types of seeds may require pre-treatment prior to planting; requirements should be verified with the seed suppliers. Check with seed suppliers to ascertain the need for and/or acquire treated seed.

1.4 Maintenance

Regular inspection and (as required) maintenance on newly seeded areas will be required, particularly during heavy storms or seasonal rains. General maintenance guidelines include:

- Use of equipment should be limited or prohibited on newly seeded areas; if erosion repairs are required, limit the footprint of the newly disturbed area to the extent possible and re-seed immediately after repairs are concluded;
- Inspect the reclaimed area routinely at least every two weeks during the first growing season, and maintain as dictated by site conditions;
- Re-planting and re-seeding should be conducted during the rainy season to take advantage of moisture conditions; and,
- Depending on site conditions and the species involved, periodic application of fertilizers may be needed for the first one or two years following initial seeding to help plants establish and maintain vigorous growth and develop extensive root systems.

2 Silt Fences

2.1 Purpose and Application

Silt fences are temporarily installed permeable barriers used to minimize offsite sediment transport from sheet flow runoff. Silt fences have a limited (one to two years) operational life and are typically constructed of special geotextile fabric with wood or steel upright backing. The fence filters sediment out of runoff water (sheet flow) before the flow becomes concentrated and gains the energy to do more serious erosional damage. Silt fences should be used for small areas where there is a potential for sediment laden runoff from surface disturbance areas to move offsite. Silt fences can also be used in small ephemeral channels where surface water collects or where sheet flow erosion may be a problem. Silt fences reduce runoff flow velocities, which decreases the erosional energy of the runoff; they require minimal clearing or grubbing, and are relatively inexpensive and easy to install.

2.2 Design Criteria

In general, the contributing drainage area should not be greater than 1,000 yd^2 per 100 linear feet of fence. The geotextile fabric is typically 2 to 4 feet wide. It may be purchased with pre-assembled posts, with or without prefabricated fence post pockets. The outer ends of a silt fence must be higher than the top of the centre, and the filter fabric will require upright supports to manage the hydrostatic and sediment load pressure. Steel posts (see **Figure C-1**) or 2 X 2 inch wooden stakes (**Figure C-2**) are commonly used. Additional bracing for the fencing (e.g.,

Figure C-1: Typical Silt Fence Installation (Steel Posts)

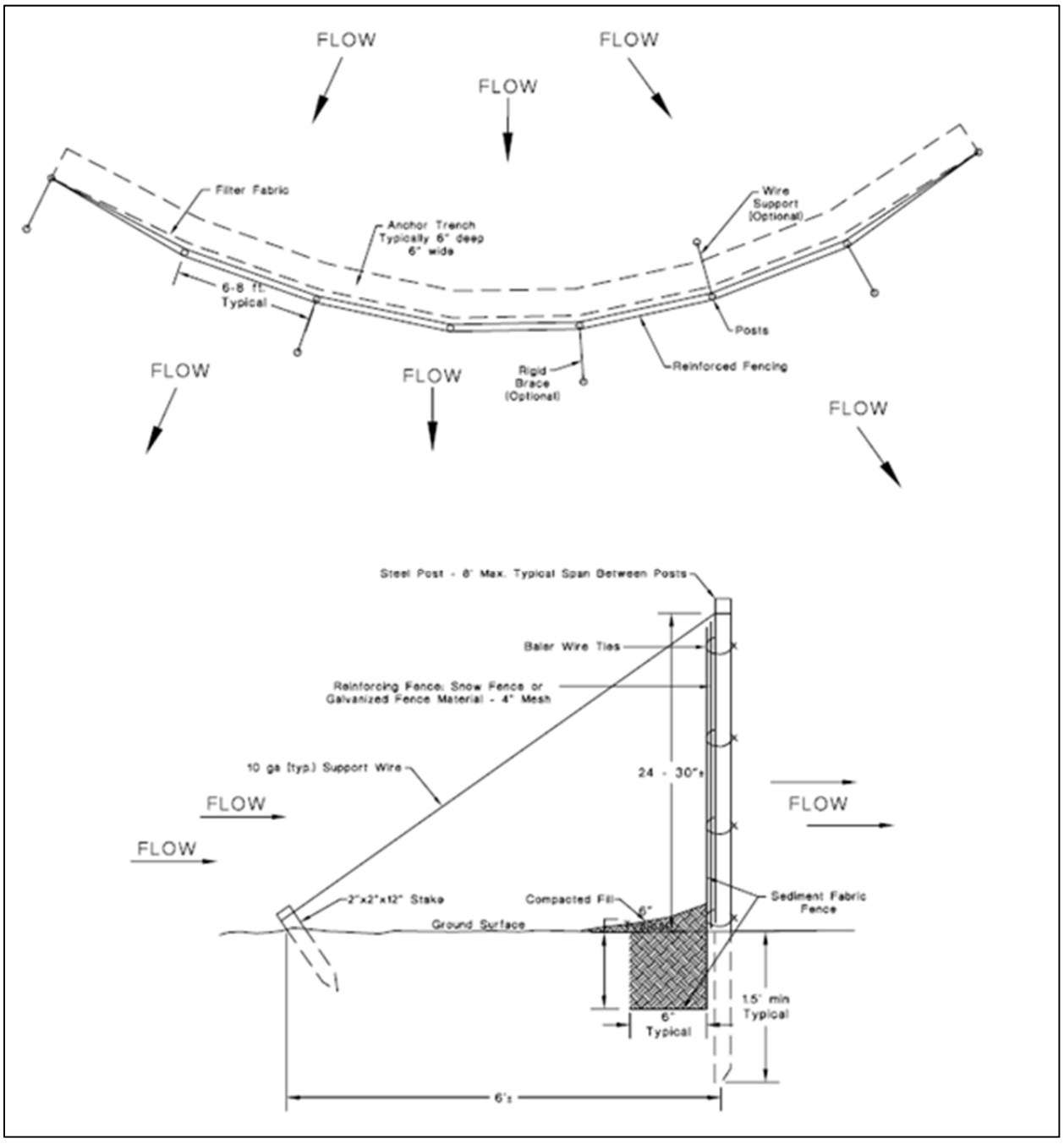
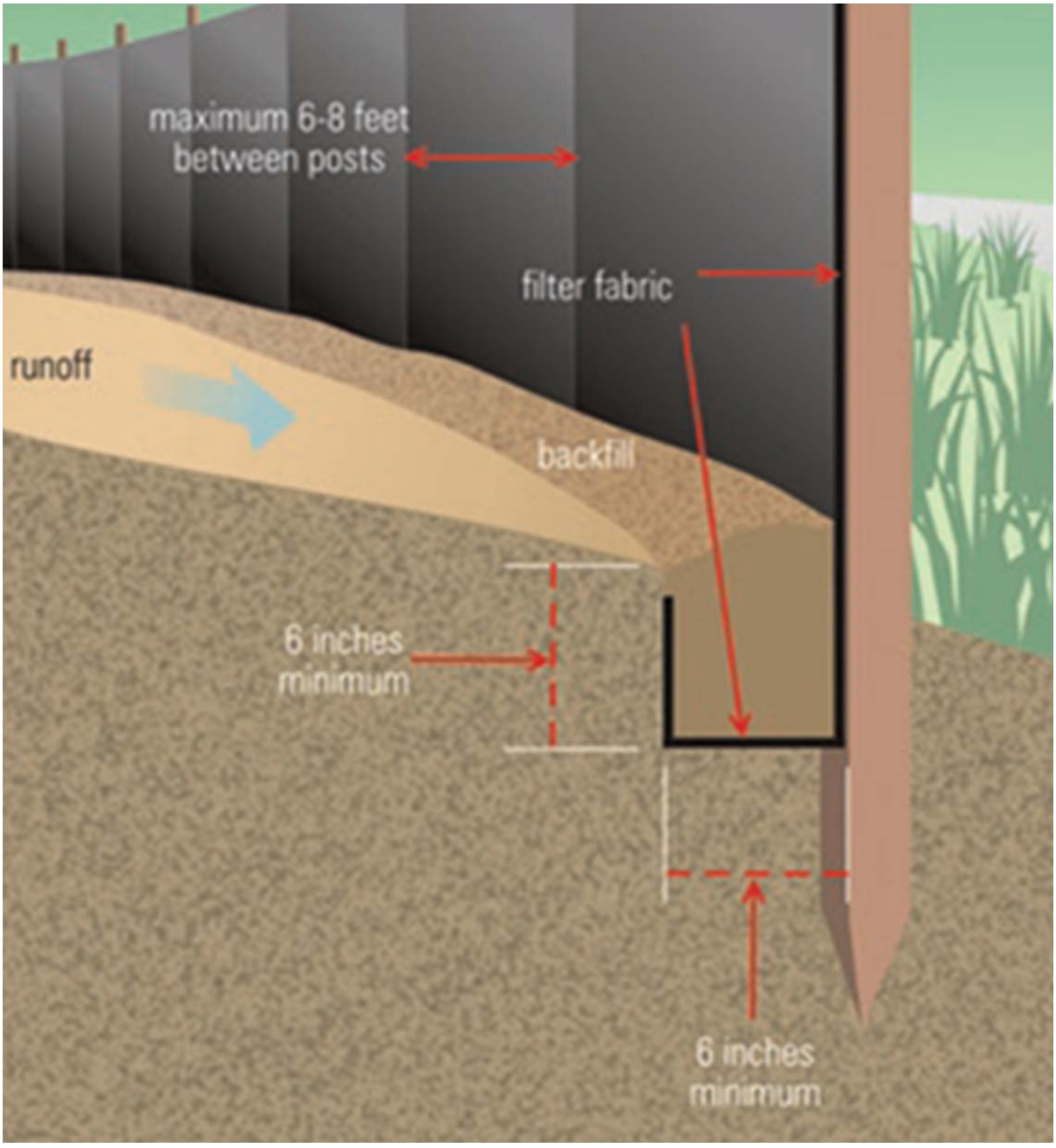


Figure C-2: Typical Silt Fence Installation (Wood Posts)



angled cross bracing on the downslope side, or guy wires and stakes installed on the upslope side on every other upright) will help to ensure that it the fence will withstand flow pressures.

The sediment fabric should be high quality with ultraviolet light inhibitors and stabilizers. The other physical properties that should be determined include filtering efficiency, tensile strength at maximum elongation and flow rate. Selection of a filter fabric is generally made by the fabric vendor based on soil conditions at the site, which affects the nominal equivalent opening size (EOS) and other characteristics of the support fence, but in general, the EOS should be smaller than the sieve size that passes 85 percent of the soil.

2.3 Construction Guidelines

Silt fences must be properly installed to be effective; inadequate or improper installation may allow water to flow around or under the fence, creating more erosion. As shown in **Figures 1-1 and 1-2**, the lower edge of the fences should be prepared with about 18 inches of excess material that can be placed into a 6 inch deep trench on the upgradient or flow source side of the fenceline. The lined trench is backfilled; both sides of the fence should then be compacted to avoid piping. Fence posts should be spaced 6 to 8 feet apart and driven a minimum of 18 inches into the ground. It is essential that the fabric be stretched tight between the posts. If steel posts are used, fabric may be attached with 3 or 4 locking nylon ties per post. Staples may be used for attaching fabric to wood posts, but if this option is selected, staples should be installed through a piece of wooden lath in order to prevent the staples from tearing the fabric.

2.4 Maintenance

The effective life span for a filter fence depends in significant part on the materials of construction and consistent maintenance. The fence requires frequent inspection and prompt maintenance following each rainfall or discharge event in order to maintain their effectiveness. They must be cleaned (i.e., silt removed by shovel) when it reaches a height one-third to one-half the height of the fence. Check for areas where piping or channeling may be developing, or where sediment buildup may be causing the fence to sag or collapse.

3 Gabions

Gabions are rectangular boxes made from steel mesh filled with rocks arranged in an interlocking manner. They can be assembled into many shapes and sizes, but boxes that are 1 meter cubed are the most common (**Figure C-3**). They are used to build walls and stabilize steep slopes (**Figure C-4**). They are also sometimes used to protect stream banks. If lined on one side with a silt barrier, they can also be used to filter water flow.

Figure C-3: Typical Gabion[10]



[10] Source: http://betacurea.tumblr.com/post/3572226535/gabions-from-italian-gabbione-meaning-big-cage.

Figure C-4. Gabion Application Examples[11]



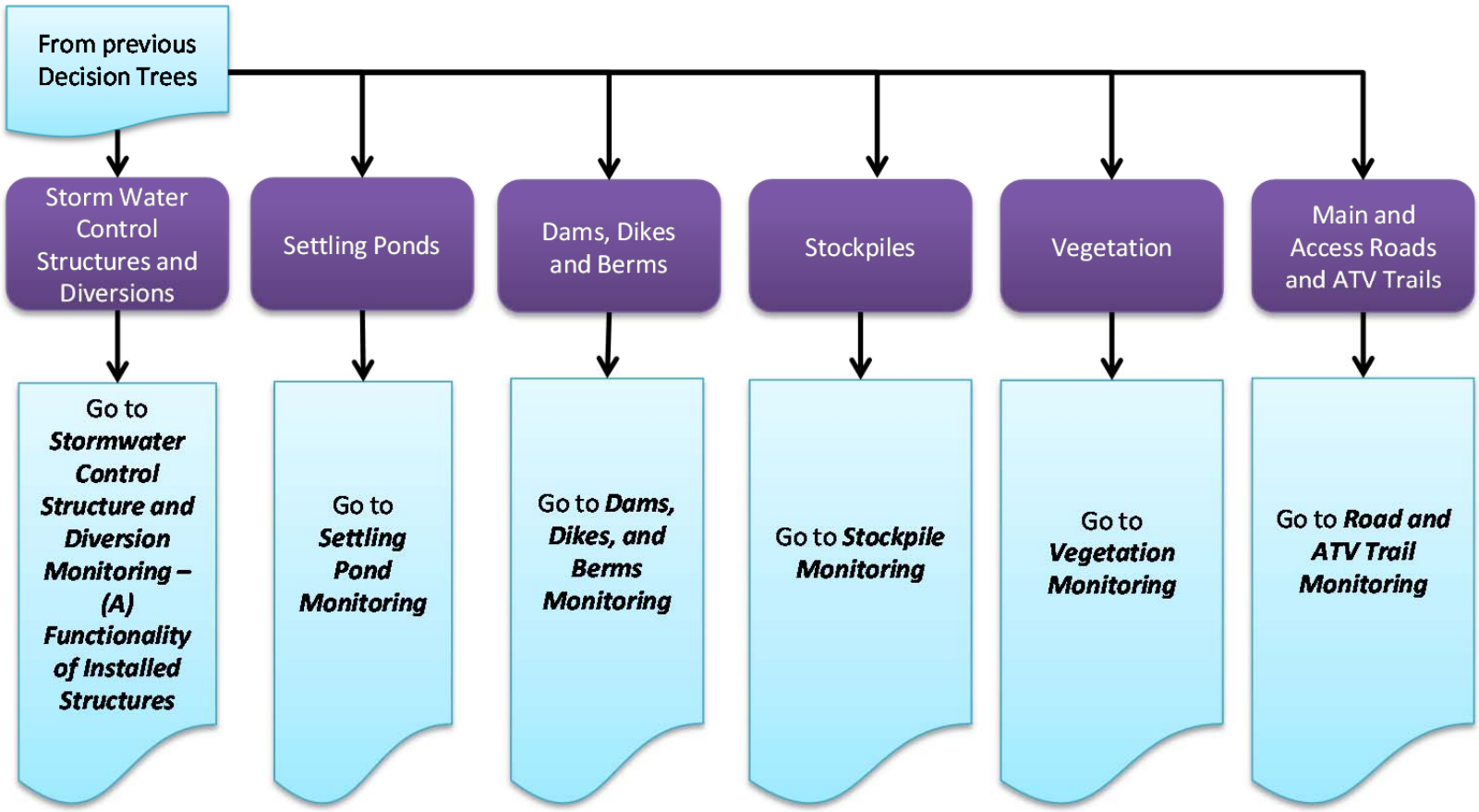


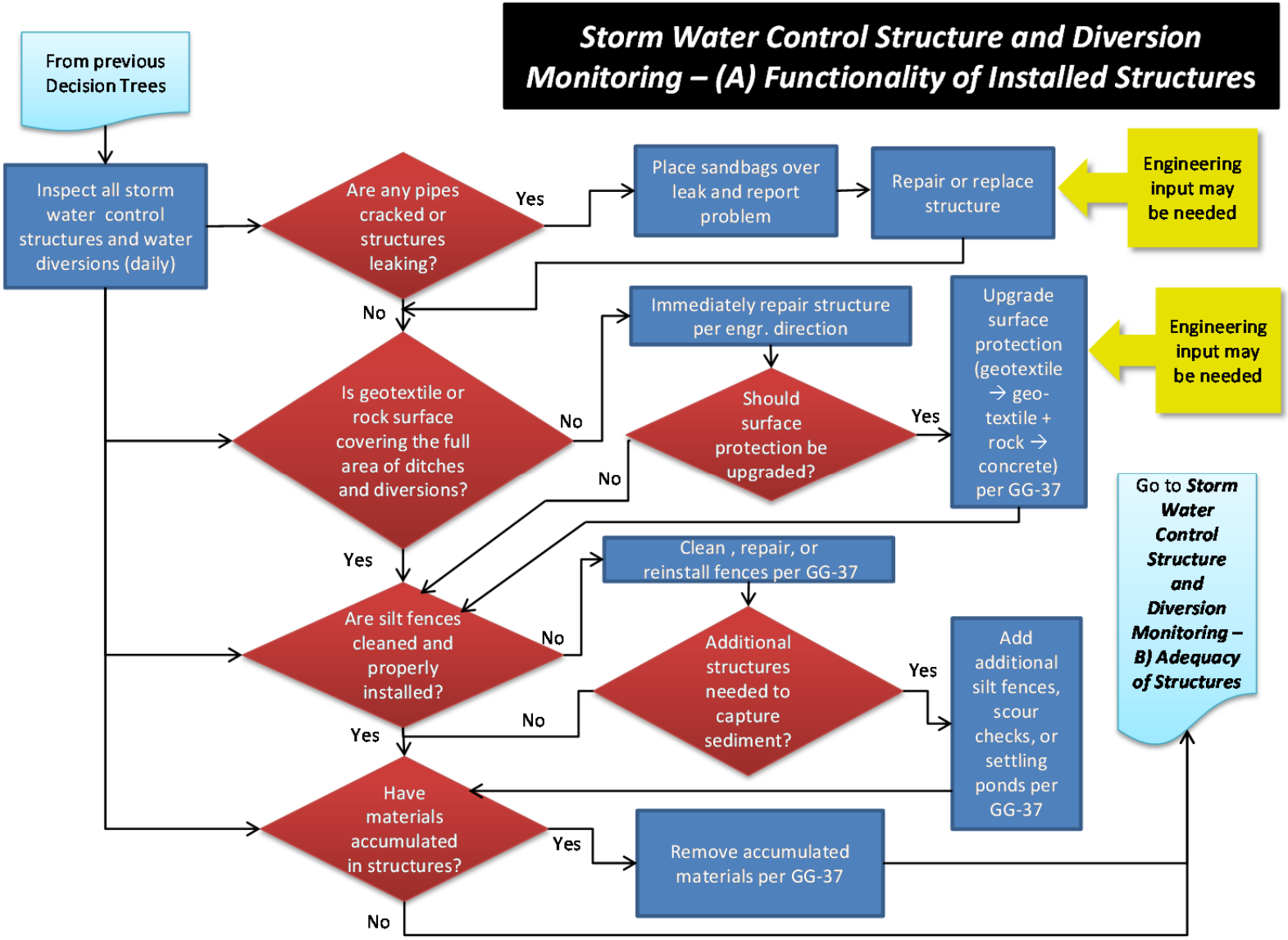


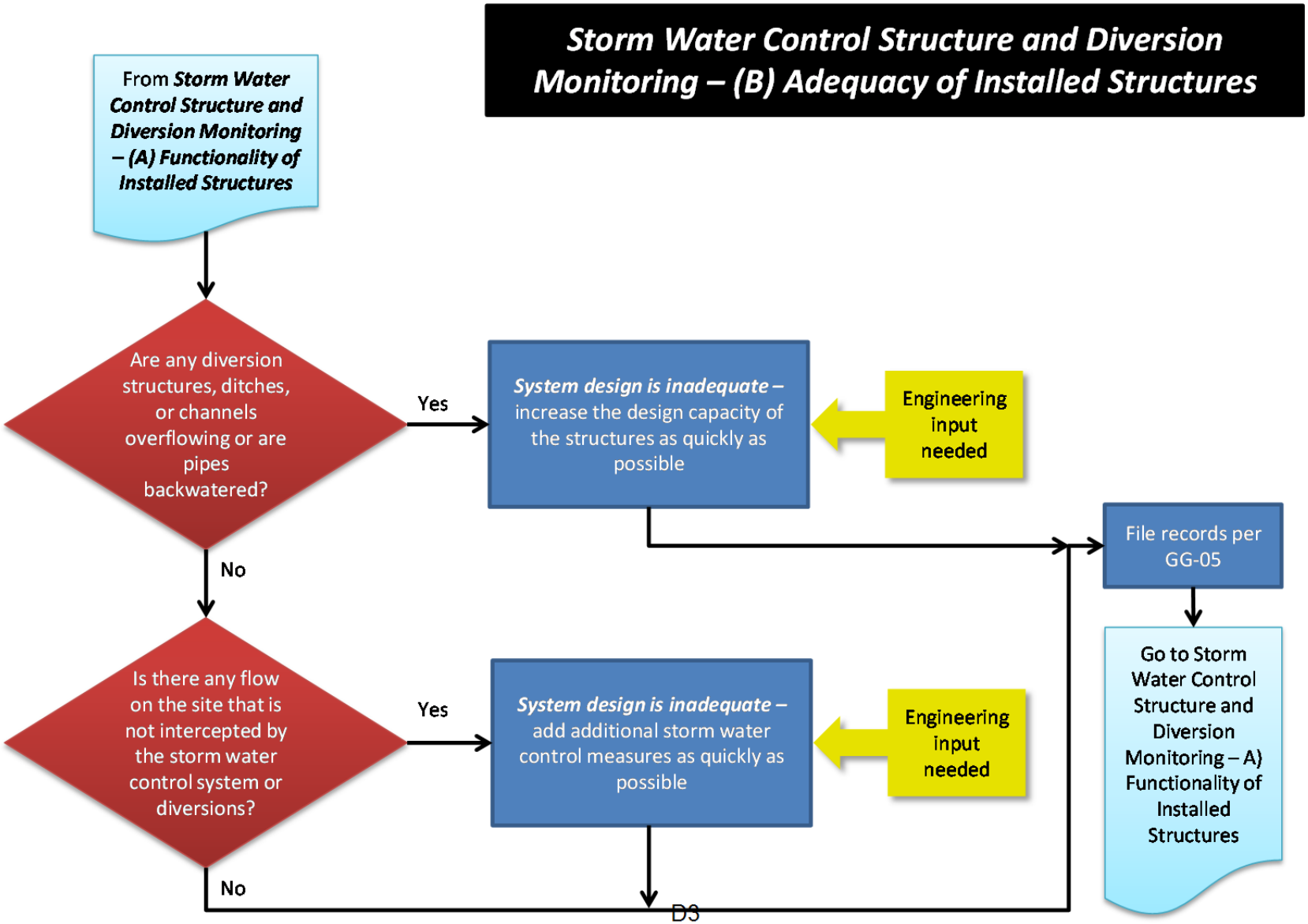
[11] Sources: http://www.wiremesh.mobi/Hexagonal-Box-65.html; http://fbuddiecontracting.com/erosion.html; www.gabion.biz.

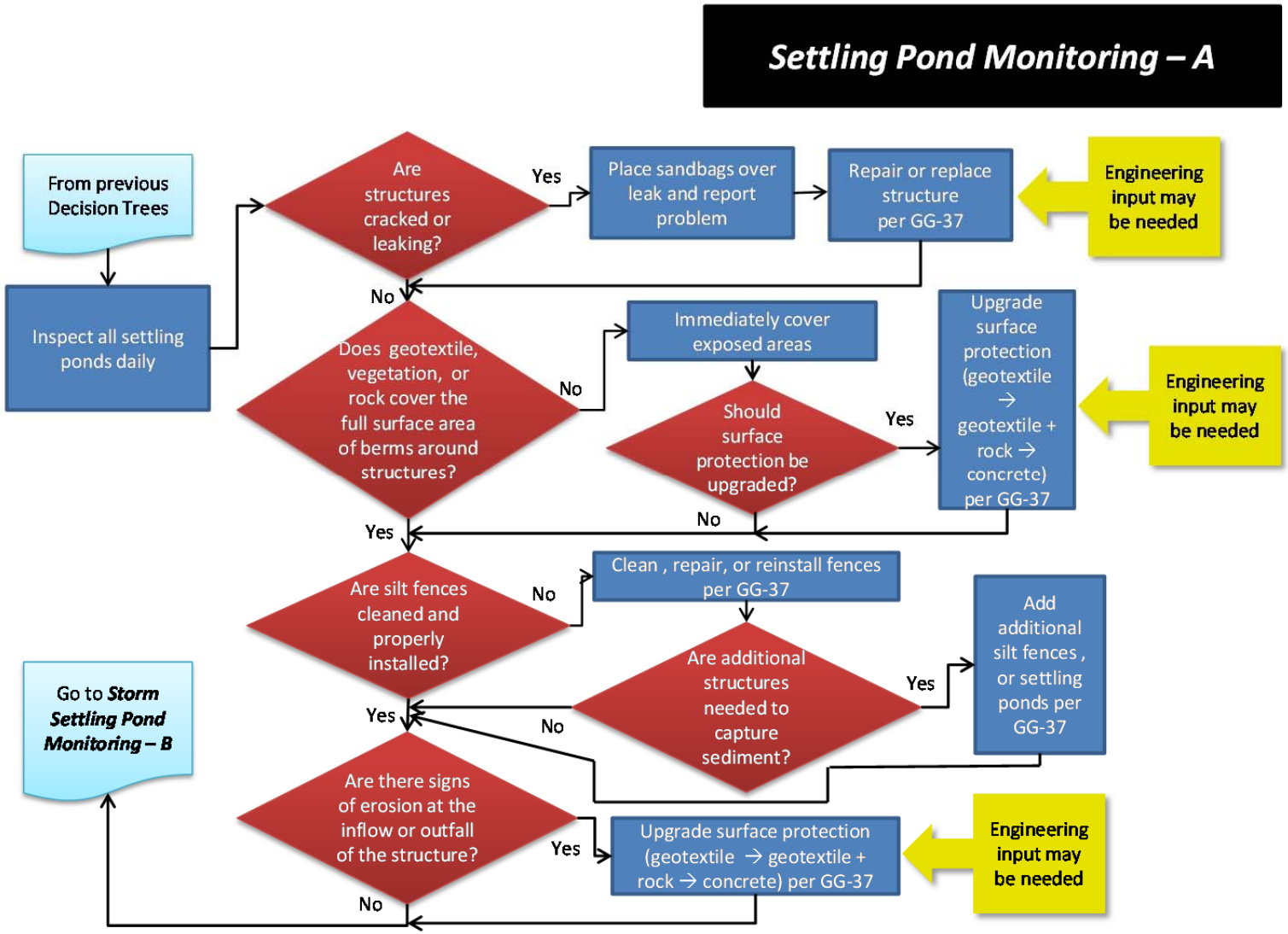
Appendix D
Erosion Control Monitoring Decision Tree Flowcharts

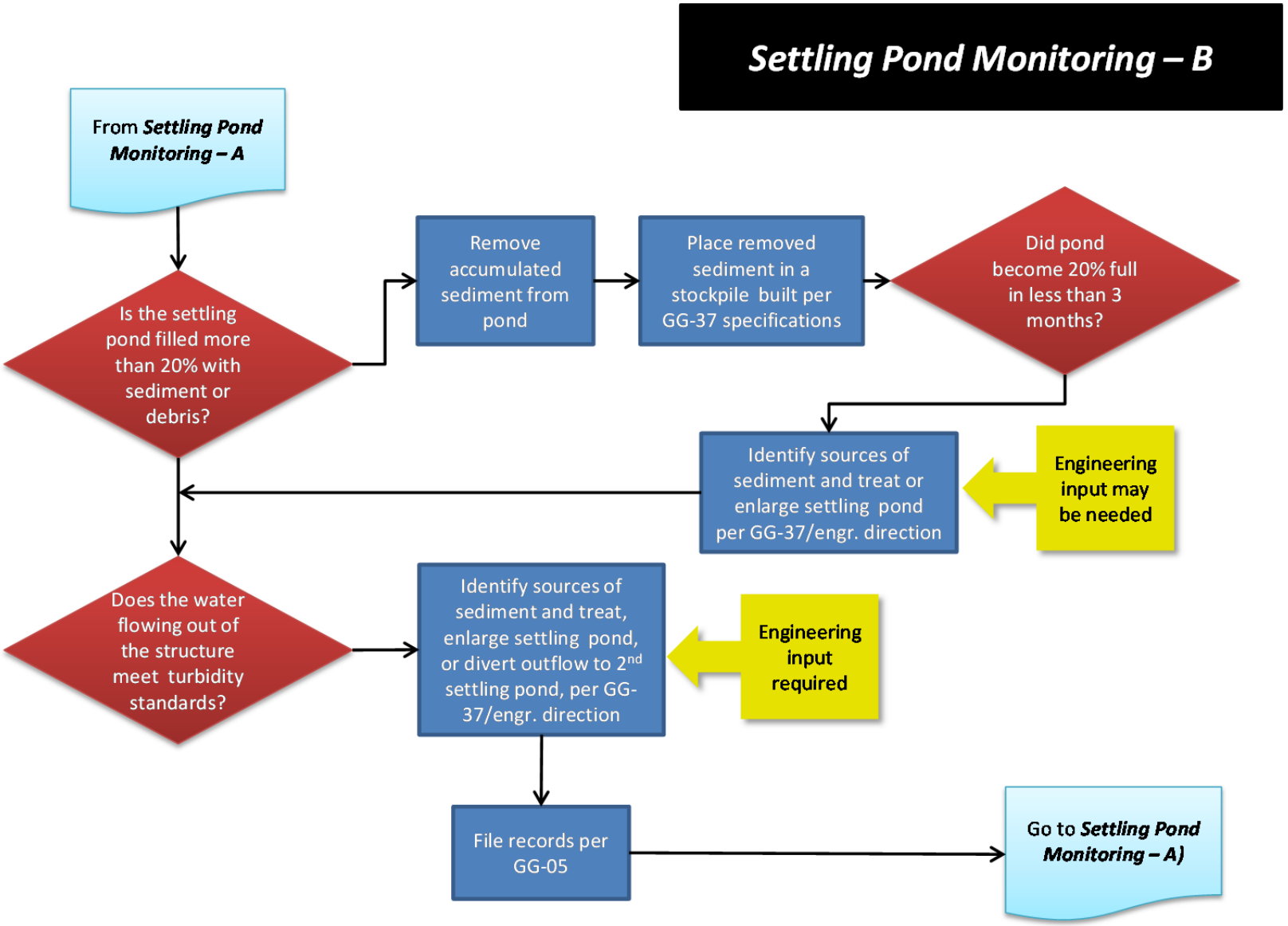
Monitoring Flow Charts

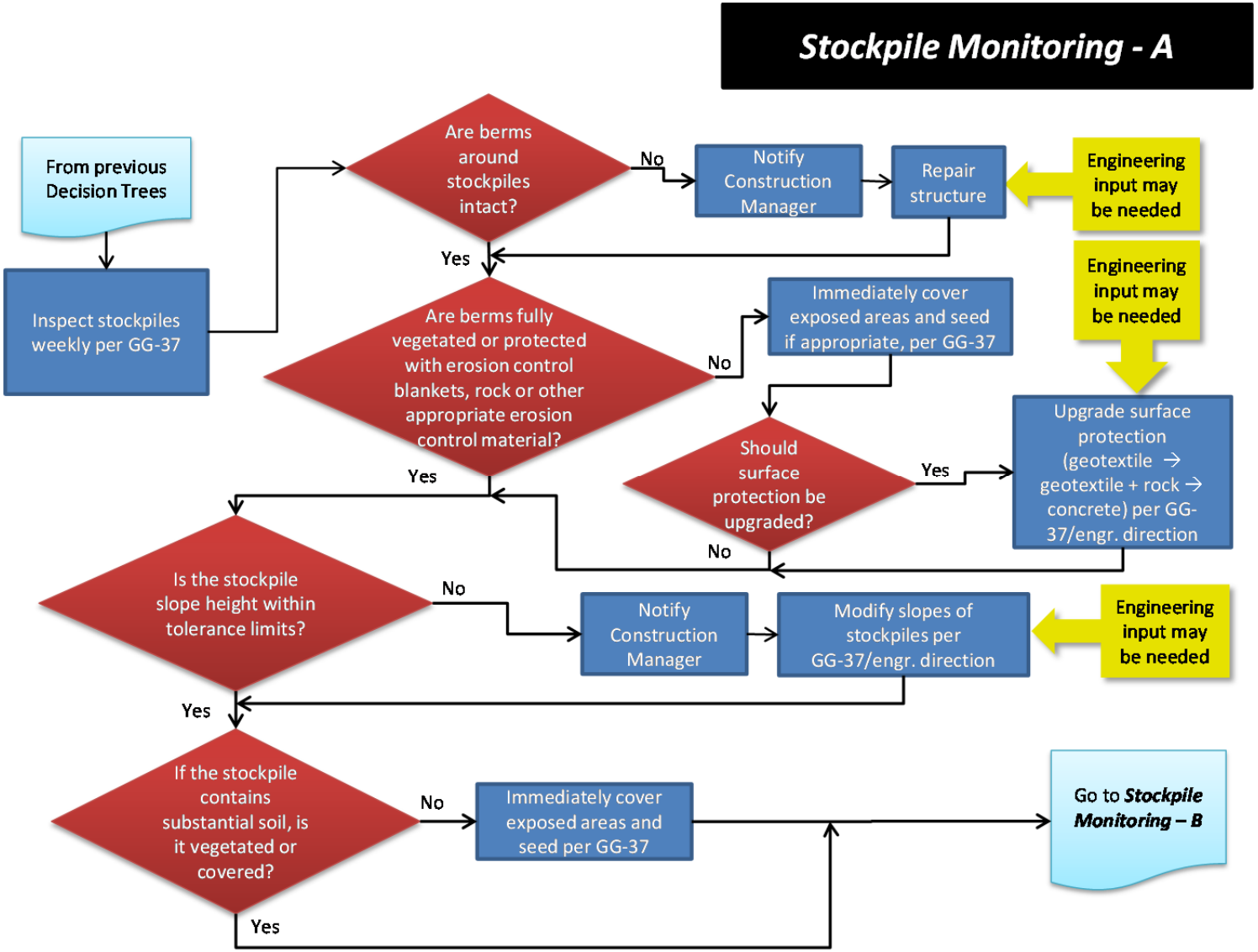


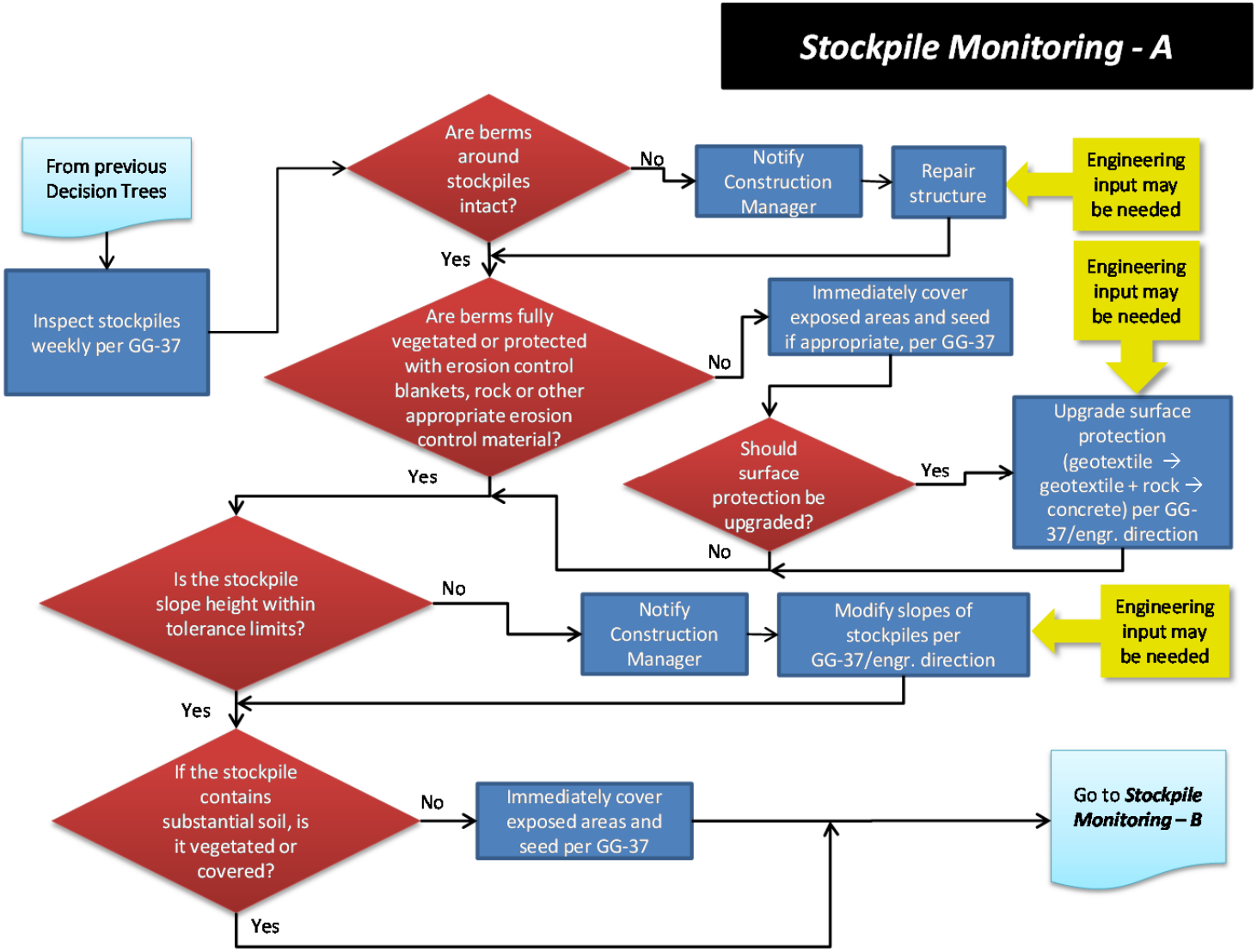

Storm Water Control Structure and Diversion Monitoring – (A) Functionality of Installed Structures
From previous Decision Trees
Inspect all storm water control structures and water diversions (daily)
Are any pipes cracked or structures leaking?
Yes
Place sandbags over leak and report problem
Repair or replace structure
Engineering input may be needed
No
Immediately repair structure per engr. direction
Is geotextile or rock surface covering the full area of ditches and diversions?
No
Should surface protection be upgraded?
Yes
Upgrade surface protection (geotextile → geo-textile + rock → concrete) per GG-37
Engineering input may be needed
No
Yes
Clean , repair, or reinstall fences per GG-37
Are silt fences cleaned and properly installed?
No
Additional structures needed to capture sediment?
Yes
Add additional silt fences, scour checks, or settling ponds per GG-37
No
Yes
Have materials accumulated in structures?
Yes
Remove accumulated materials per GG-37
No
Go to Storm Water Control Structure and Diversion Monitoring – B) Adequacy of Structures

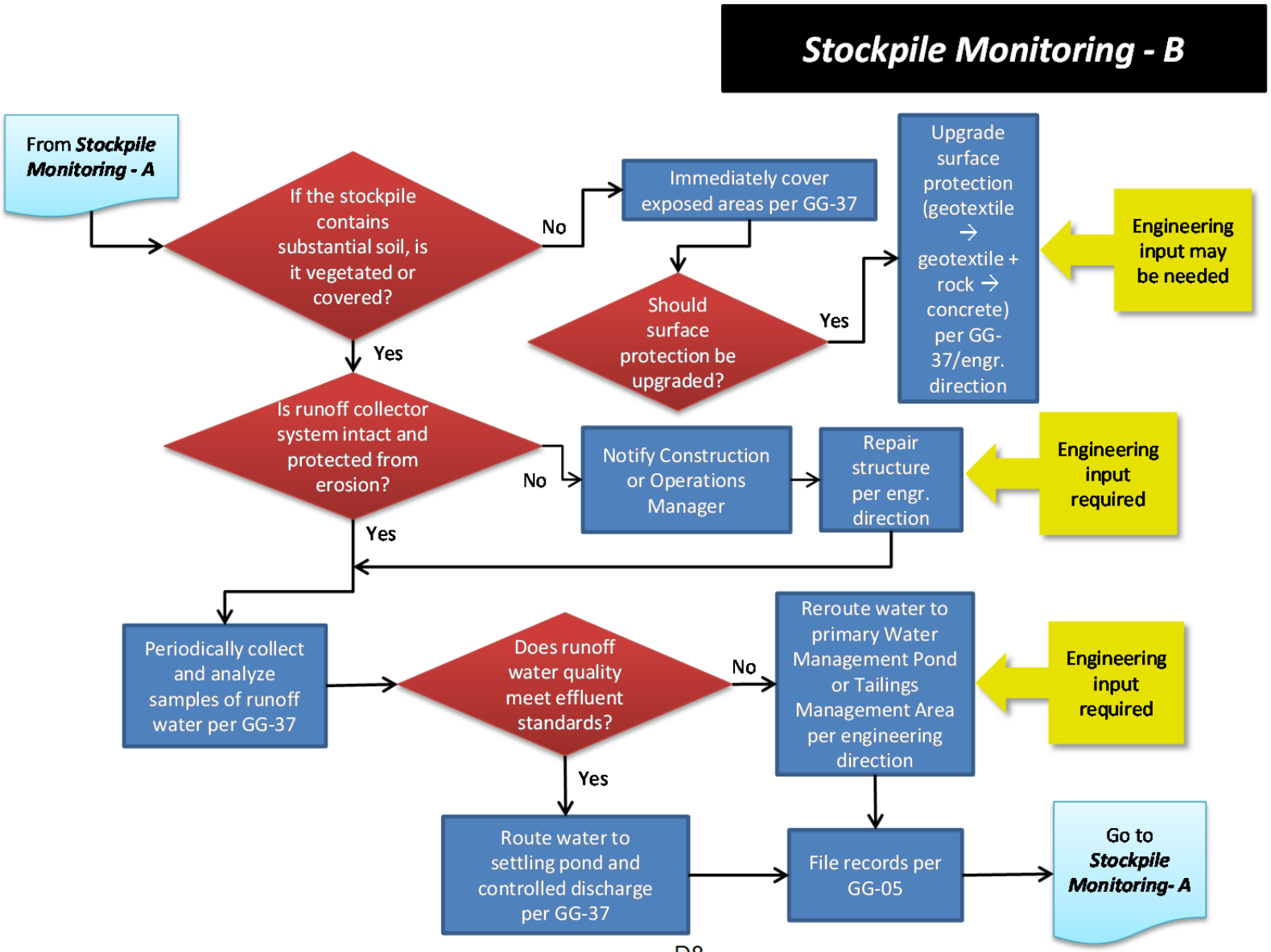

Storm Water Control Structure and Diversion Monitoring – (B) Adequacy of Installed Structures
From Storm Water Control Structure and Diversion Monitoring – (A) Functionality of Installed Structures
Are any diversion structures, ditches, or channels overflowing or are pipes backwatered?
Yes
System design is inadequate – increase the design capacity of the structures as quickly as possible
Engineering input needed
No
Is there any flow on the site that is not intercepted by the storm water control system or diversions?
Yes
System design is inadequate – add additional storm water control measures as quickly as possible
Engineering input needed
No
File records per GG-05
Go to Storm Water Control Structure and Diversion Monitoring – A) Functionality of Installed Structures
D3

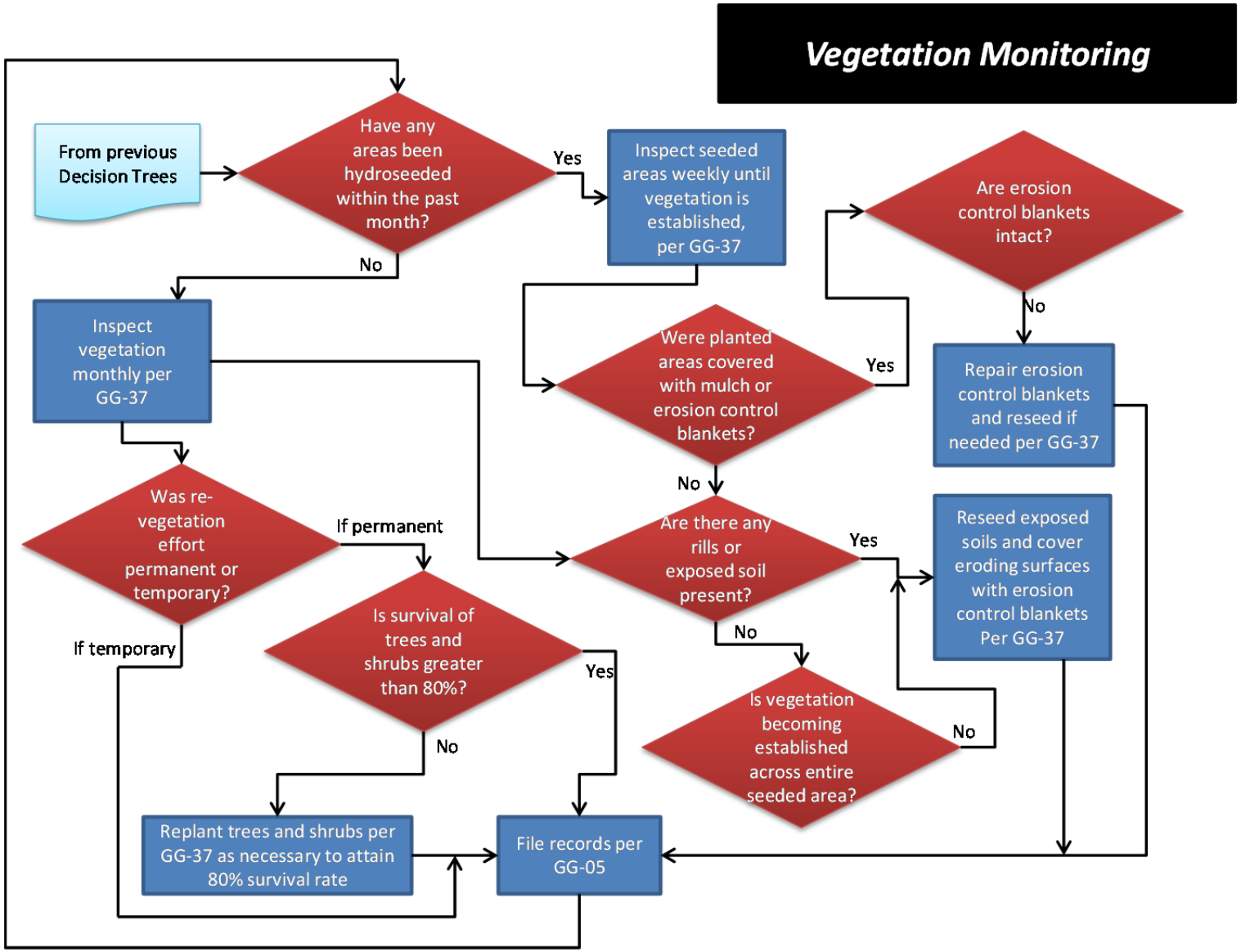

Settling Pond Monitoring – A
From previous Decision Trees
Inspect all settling ponds daily
Are structures cracked or leaking?
Yes
Place sandbags over leak and report problem
Repair or replace structure per GG-37
Engineering input may be needed
No
Does geotextile, vegetation, or rock cover the full surface area of berms around structures?
No
Immediately cover exposed areas
Should surface protection be upgraded?
Yes
Upgrade surface protection (geotextile → geotextile + rock → concrete) per GG-37
Engineering input may be needed
No
Yes
Are silt fences cleaned and properly installed?
No
Clean , repair, or reinstall fences per GG-37
Are additional structures needed to capture sediment?
Yes
Add additional silt fences , or settling ponds per GG-37
No
Yes
Go to Storm Settling Pond Monitoring – B
Are there signs of erosion at the inflow or outfall of the structure?
Yes
Upgrade surface protection (geotextile → geotextile + rock → concrete) per GG-37
Engineering input may be needed
No


Settling Pond Monitoring – B
From Settling Pond Monitoring – A
Is the settling pond filled more than 20% with sediment or debris?
Remove accumulated sediment from pond
Place removed sediment in a stockpile built per GG-37 specifications
Did pond become 20% full in less than 3 months?
Identify sources of sediment and treat or enlarge settling pond per GG-37/engr. direction
Engineering input may be needed
Does the water flowing out of the structure meet turbidity standards?
Identify sources of sediment and treat, enlarge settling pond, or divert outflow to 2nd settling pond, per GG-37/engr. direction
Engineering input required
File records per GG-05
Go to Settling Pond Monitoring – A)

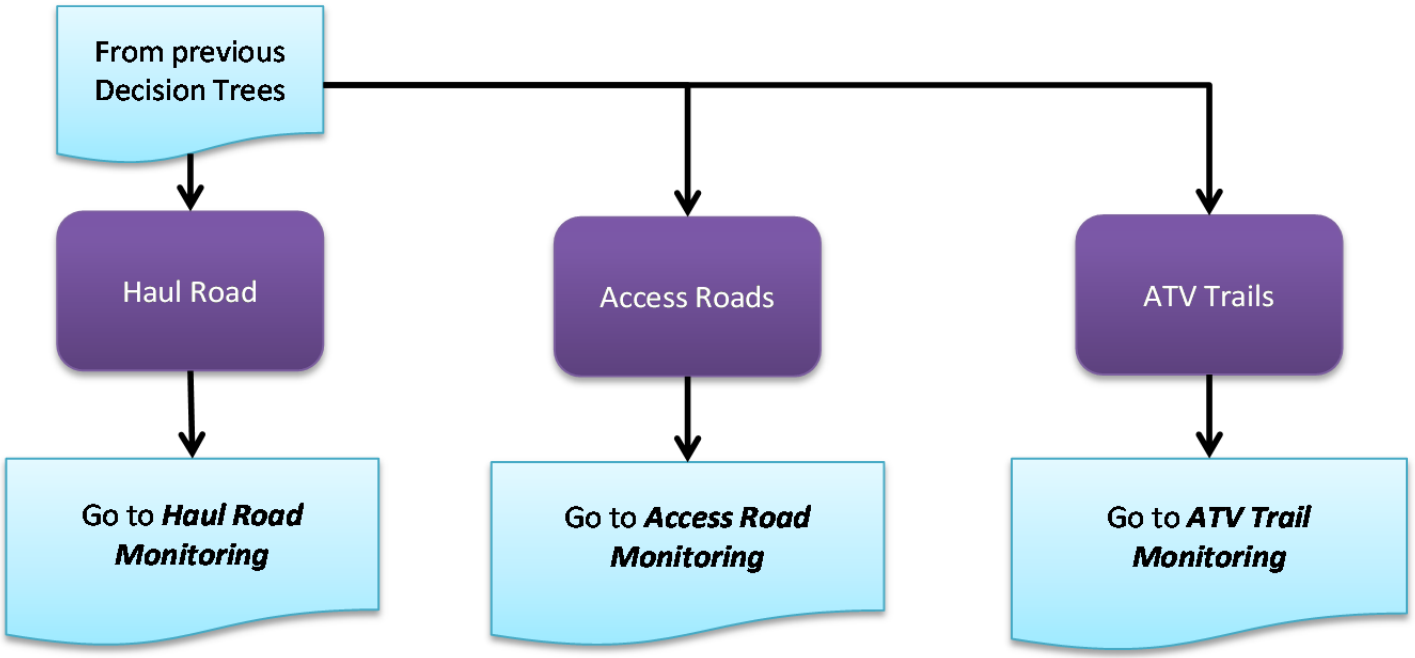

Stockpile Monitoring - A
From previous Decision Trees
Inspect stockpiles weekly per GG-37
Are berms around stockpiles intact?
No
Notify Construction Manager
Repair structure
Engineering input may be needed
Yes
Are berms fully vegetated or protected with erosion control blankets, rock or other appropriate erosion control material?
No
Immediately cover exposed areas and seed if appropriate, per GG-37
Engineering input may be needed
Should surface protection be upgraded?
Yes
Upgrade surface protection (geotextile → geotextile + rock → concrete) per GG-37/engr. direction
Yes
No
Is the stockpile slope height within tolerance limits?
No
Notify Construction Manager
Modify slopes of stockpiles per GG-37/engr. direction
Engineering input may be needed
Yes
If the stockpile contains substantial soil, is it vegetated or covered?
No
Immediately cover exposed areas and seed per GG-37
Go to Stockpile Monitoring – B
Yes

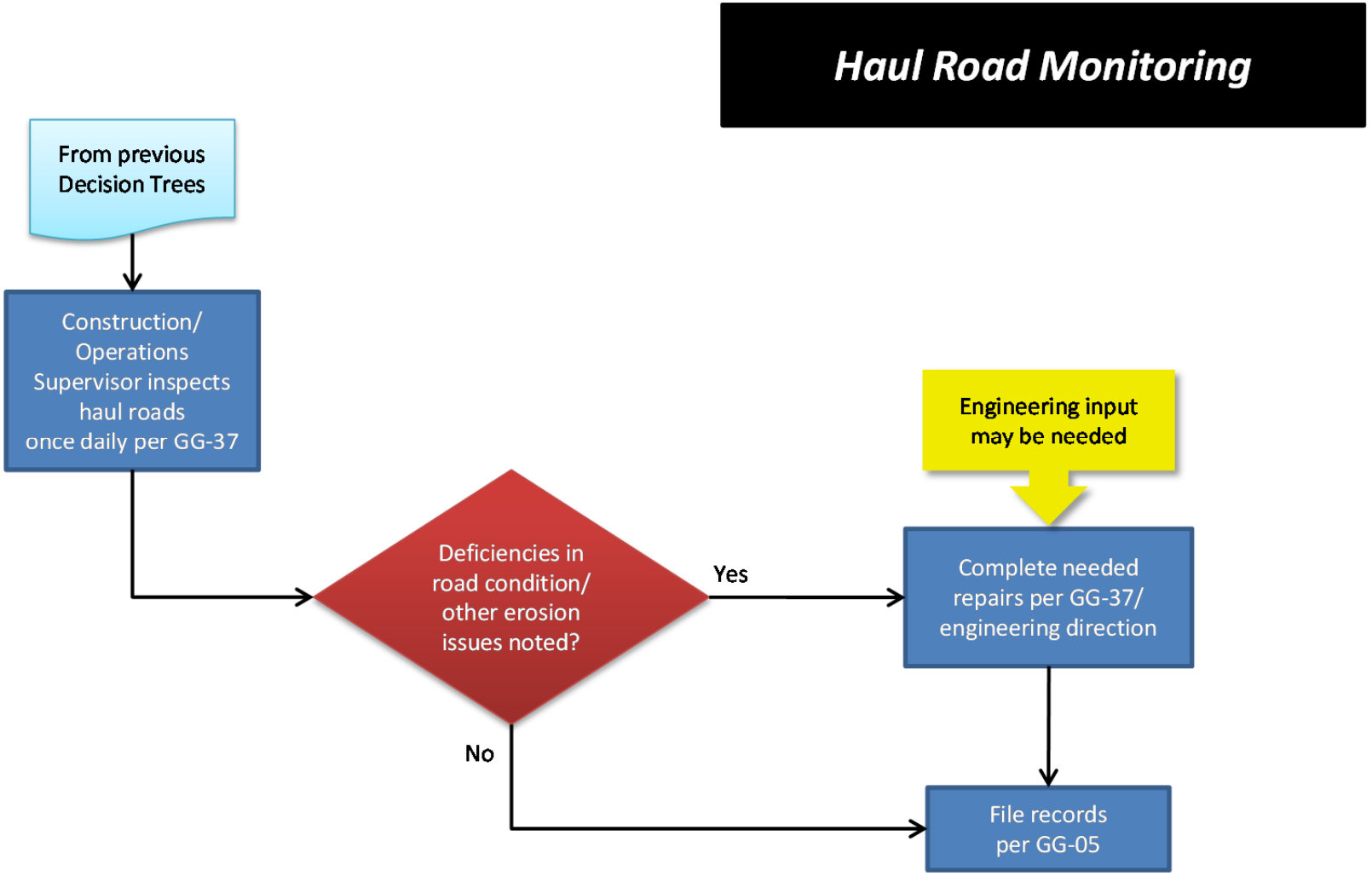

Stockpile Monitoring - A
From previous Decision Trees
Inspect stockpiles weekly per GG-37
Are berms around stockpiles intact?
No
Notify Construction Manager
Repair structure
Engineering input may be needed
Yes
Are berms fully vegetated or protected with erosion control blankets, rock or other appropriate erosion control material?
No
Immediately cover exposed areas and seed if appropriate, per GG-37
Engineering input may be needed
Should surface protection be upgraded?
Yes
Upgrade surface protection (geotextile → geotextile + rock → concrete) per GG-37/engr. direction
Yes
No
Is the stockpile slope height within tolerance limits?
No
Notify Construction Manager
Modify slopes of stockpiles per GG-37/engr. direction
Engineering input may be needed
Yes
If the stockpile contains substantial soil, is it vegetated or covered?
No
Immediately cover exposed areas and seed per GG-37
Go to Stockpile Monitoring – B
Yes

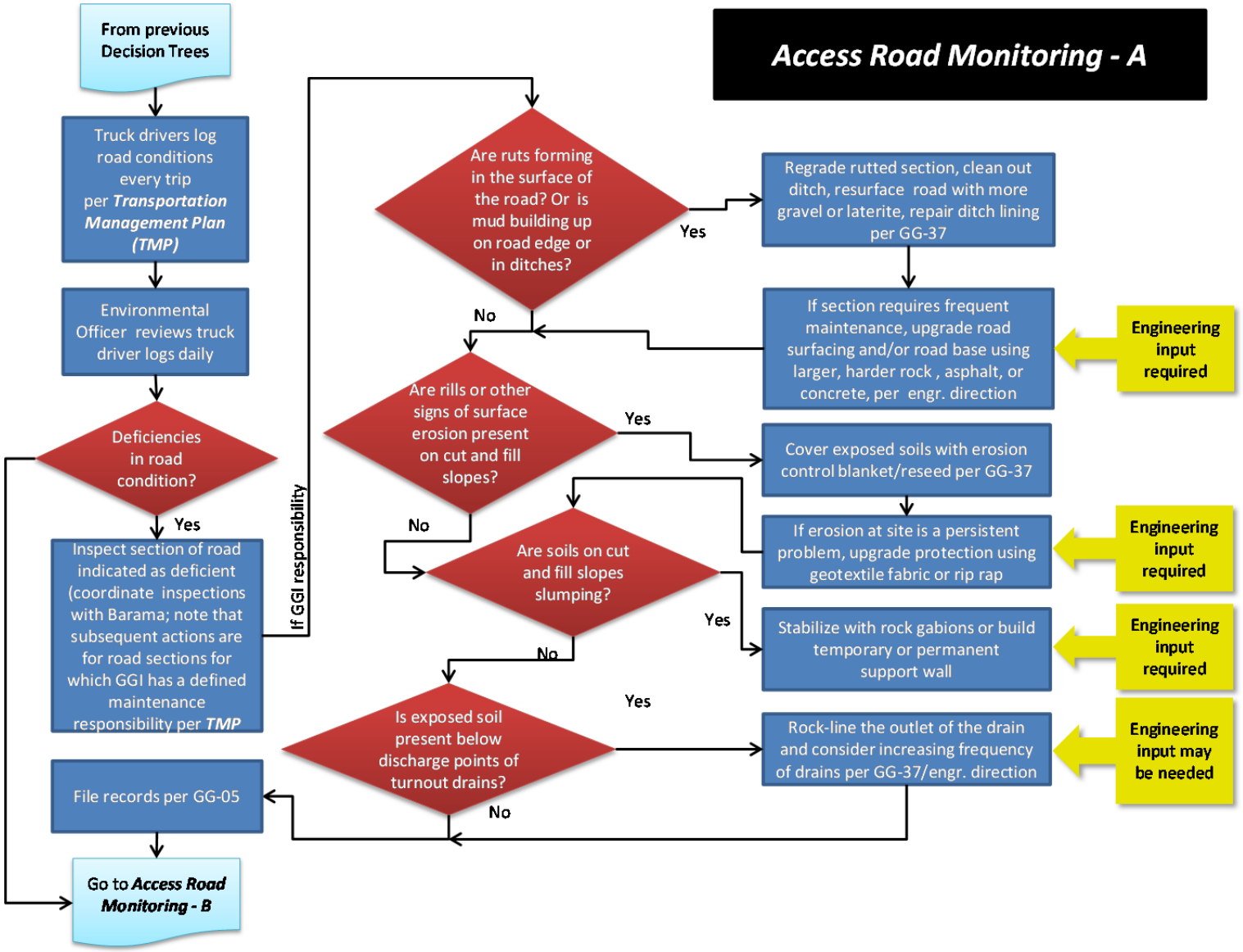

Stockpile Monitoring - B
From Stockpile Monitoring - A
If the stockpile contains substantial soil, is it vegetated or covered?
No
Immediately cover exposed areas per GG-37
Should surface protection be upgraded?
Yes
Upgrade surface protection (geotextile → geotextile + rock → concrete) per GG-37/engr. direction
Engineering input may be needed
Yes
Is runoff collector system intact and protected from erosion?
No
Notify Construction or Operations Manager
Repair structure per engr. direction
Engineering input required
Yes
Periodically collect and analyze samples of runoff water per GG-37
Does runoff water quality meet effluent standards?
No
Reroute water to primary Water Management Pond or Tailings Management Area per engineering direction
Engineering input required
Yes
Route water to settling pond and controlled discharge per GG-37
File records per GG-05
Go to Stockpile Monitoring- A

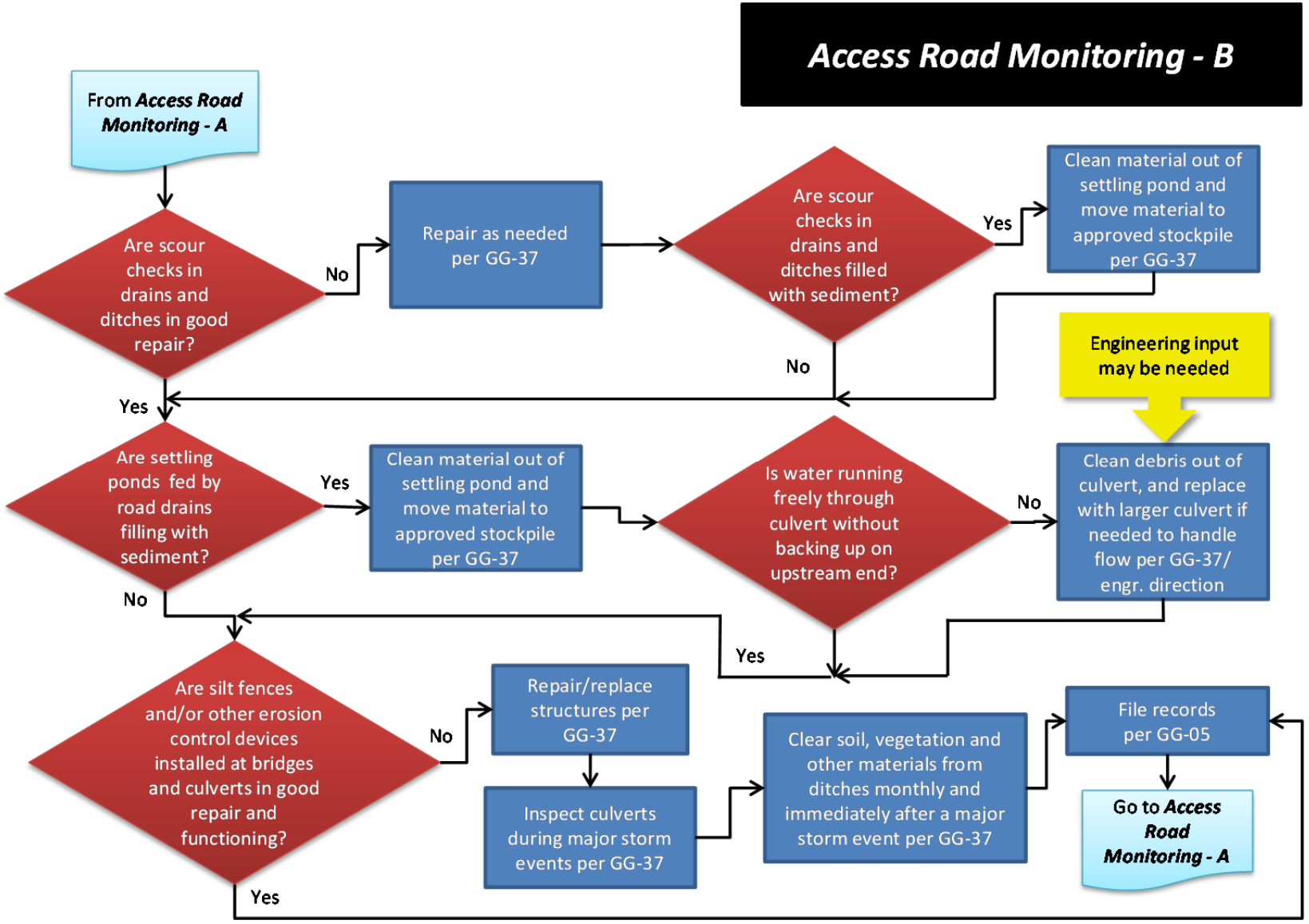

Vegetation Monitoring
From previous Decision Trees
Have any areas been hydroseeded within the past month?
Yes
No
Inspect seeded areas weekly until vegetation is established, per GG-37
Are erosion control blankets intact?
No
Repair erosion control blankets and reseed if needed per GG-37
Were planted areas covered with mulch or erosion control blankets?
Yes
No
Inspect vegetation monthly per GG-37
Was re-vegetation effort permanent or temporary?
If permanent
If temporary
Are there any rills or exposed soil present?
Yes
No
Reseed exposed soils and cover eroding surfaces with erosion control blankets Per GG-37
Is survival of trees and shrubs greater than 80%?
Yes
No
Is vegetation becoming established across entire seeded area?
No
Replant trees and shrubs per GG-37 as necessary to attain 80% survival rate
File records per GG-05

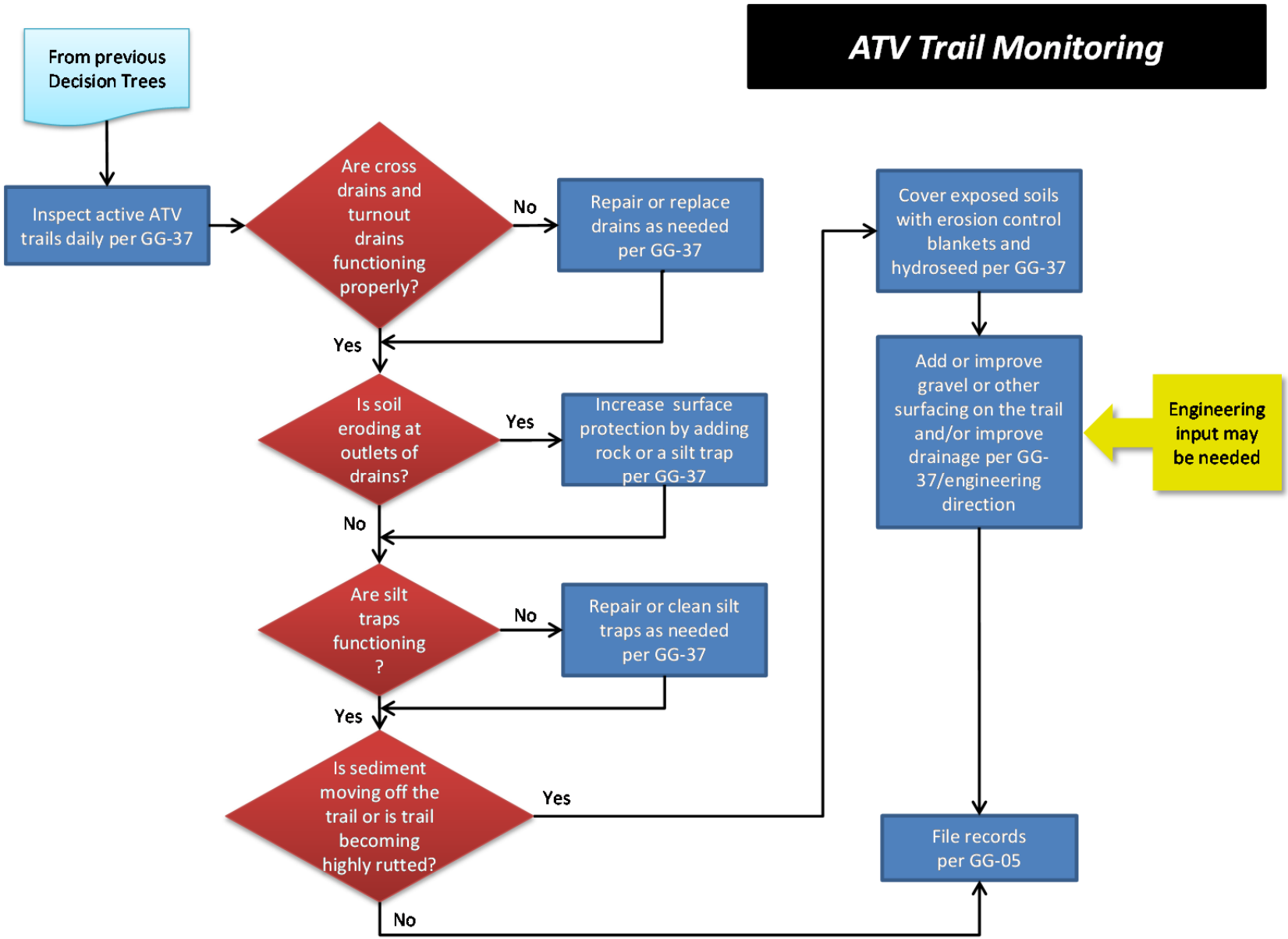
Road and ATV Trail Monitoring




Haul Road Monitoring
From previous Decision Trees
Construction/ Operations Supervisor inspects haul roads once daily per GG-37
Deficiencies in road condition/ other erosion issues noted?
Yes
No
Engineering input may be needed
Complete needed repairs per GG-37/ engineering direction
File records per GG-05


Access Road Monitoring - A
From previous Decision Trees
Truck drivers log road conditions every trip per Transportation Management Plan (TMP)
Environmental Officer reviews truck driver logs daily
Deficiencies in road condition?
Yes
Inspect section of road indicated as deficient (coordinate inspections with Barama; note that subsequent actions are for road sections for which GGI has a defined maintenance responsibility per TMP
If GGI responsibility
File records per GG-05
Go to Access Road Monitoring - B
Are ruts forming in the surface of the road? Or is mud building up on road edge or in ditches?
Yes
Regrade rutted section, clean out ditch, resurface road with more gravel or laterite, repair ditch lining per GG-37
If section requires frequent maintenance, upgrade road surfacing and/or road base using larger, harder rock , asphalt, or concrete, per engr. direction
Engineering input required
No
Are rills or other signs of surface erosion present on cut and fill slopes?
Yes
Cover exposed soils with erosion control blanket/reseed per GG-37
If erosion at site is a persistent problem, upgrade protection using geotextile fabric or rip rap
Engineering input required
No
Are soils on cut and fill slopes slumping?
Yes
Stabilize with rock gabions or build temporary or permanent support wall
Engineering input required
No
Is exposed soil present below discharge points of turnout drains?
Yes
Rock-line the outlet of the drain and consider increasing frequency of drains per GG-37/engr. direction
Engineering input may be needed
No


Access Road Monitoring - B
From Access Road Monitoring - A
Are scour checks in drains and ditches in good repair?
No
Repair as needed per GG-37
Are scour checks in drains and ditches filled with sediment?
Yes
Clean material out of settling pond and move material to approved stockpile per GG-37
No
Engineering input may be needed
Yes
Are settling ponds fed by road drains filling with sediment?
Yes
Clean material out of settling pond and move material to approved stockpile per GG-37
Is water running freely through culvert without backing up on upstream end?
No
Clean debris out of culvert, and replace with larger culvert if needed to handle flow per GG-37/ engr. direction
No
Yes
Are silt fences and/or other erosion control devices installed at bridges and culverts in good repair and functioning?
No
Repair/replace structures per GG-37
Inspect culverts during major storm events per GG-37
Clear soil, vegetation and other materials from ditches monthly and immediately after a major storm event per GG-37
File records per GG-05
Go to Access Road Monitoring - A
Yes


ATV Trail Monitoring
From previous Decision Trees
Inspect active ATV trails daily per GG-37
Are cross drains and turnout drains functioning properly?
No
Repair or replace drains as needed per GG-37
Yes
Is soil eroding at outlets of drains?
Yes
Increase surface protection by adding rock or a silt trap per GG-37
No
Are silt traps functioning ?
No
Repair or clean silt traps as needed per GG-37
Yes
Is sediment moving off the trail or is trail becoming highly rutted?
Yes
Cover exposed soils with erosion control blankets and hydroseed per GG-37
Add or improve gravel or other surfacing on the trail and/or improve drainage per GG-37/engineering direction
Engineering input may be needed
File records per GG-05
No



Occupational Health and Safety/ Accident Prevention Plan

Aurora Gold Project

Prepared for:

Guyana Goldfields Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
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Washington, DC
Seattle, WA

Date:
June 2013

Project Number:
01-29301A1

Record of Revisions

Revision Level -0-

Page	Section	Description of Change
All	All	First issue of *Occupational Health and Safety/Accident Prevention Plan*

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Figure 1.1-3: Aurora Site Layout

Acronyms and Abbreviations

ANFO	ammonium nitrate/fuel oil
ATV	all-terrain vehicle
CPAR	Corrective/Preventive Action Request
GGI	Guyana Goldfields, Inc.
FPP	Fire Prevention Plan
OHS/AP	Occupational Health and Safety/Accident Prevention (Plan)
MSDS	Material Safety Data Sheet
PPE	personal protective equipment
SOP	Standard Operating Procedure

1 Introduction

Guyana Goldfields, Inc. (GGI) is developing the Aurora Gold Project (Project) in northwestern Guyana, as noted in **Figures 1.0-1, and 1.0-2.** The Project is comprised of four major components:

- the ***Aurora mine site***, located on the southern bank of the Cuyuni River approximately 170 km west of Georgetown;
- the ***Buckhall*** river port and logistics support facility, on the west bank of the Essequibo River;
- the ***Barama (M3) road***, which was built in the 1990s to provide access to a large hardwood timber concession north of the Cuyuni River owned by Barama Company Ltd., and for which GGI has negotiated a shared usage arrangement; and
- the ***Aurora M3 road extension***, a new 33-km road constructed by GGI which connects the end of the Barama road with Tapir Crossing (a vehicle barge ferry landing on the Cuyuni River), and extends from Tapir crossing due west to the Aurora mine site.

The Project is in a remote location, and most supplies will be transported by trucks on the noted M3 roadway. Buckhall, the logistics hub for the Project, will include a wharf, a pier, bulk storage for diesel and No. 4 fuel oil, a barge slip, staging/convoy marshalling areas, an administration building, dormitories, a kitchen/dining hall, vehicle maintenance shops, a Republic of Guyana customs office, and site security infrastructure (TetraTech, 2013). Tapir Crossing has a manned security outpost, a vehicle ferry and ferry landing areas, and a number of outboard motor-powered utility workboats; the previous man-camp at Tapir will be decommissioned.

The Aurora mine site proper is depicted in **Figure 1.0-3**, and when full developed will consist of:

- a series of adjacent open pits;
- two dike systems between the pits and the Cuyuni River;
- four waste rock/one saprolite stockpiles;
- three crushers, conveyors, two ball mills, and a processing plant with associated laboratory, storage, and maintenance facilities;
- maintenance buildings for underground and open pit equipment incorporating warehouse, office, change house facilities, a shaft headframe and associated hoist building, a mine air cooling plant, an explosives storage area, a power generating station, fuel storage tanks, a warehouse and laydown area, a 1,200-meter (m) airstrip, new man-camp, potable and waste water treatment plants, licensed solid waste landfill, and associated infrastructure (TetraTech, 2013).

Figure 1.0-1: Aurora Gold Project Location and Buckhall to Aurora Site Transportation Corridor

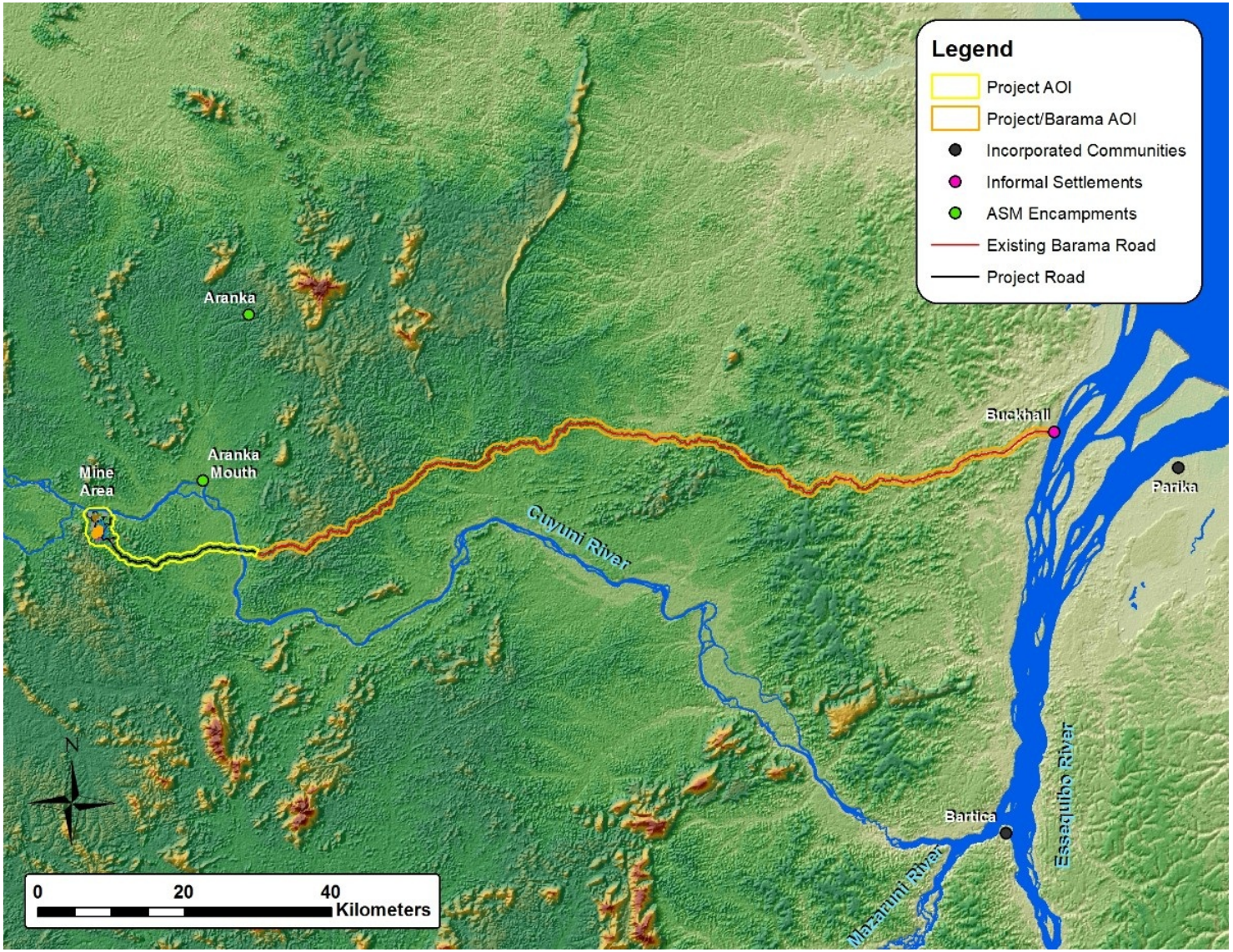


Figure 1.0-2: Aurora Gold Project Mine Site Layout, Concession Boundary, and Environmental AOI

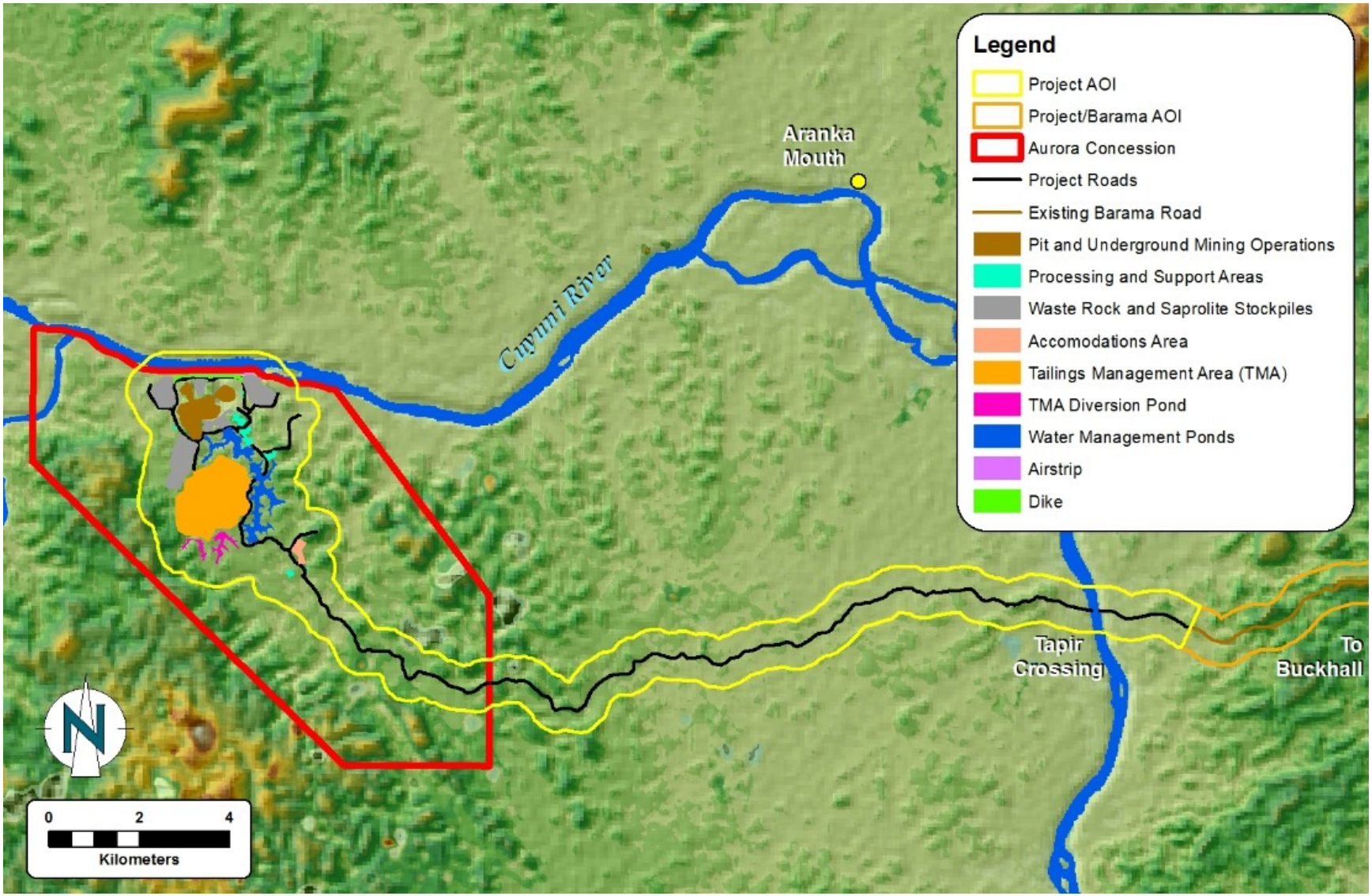
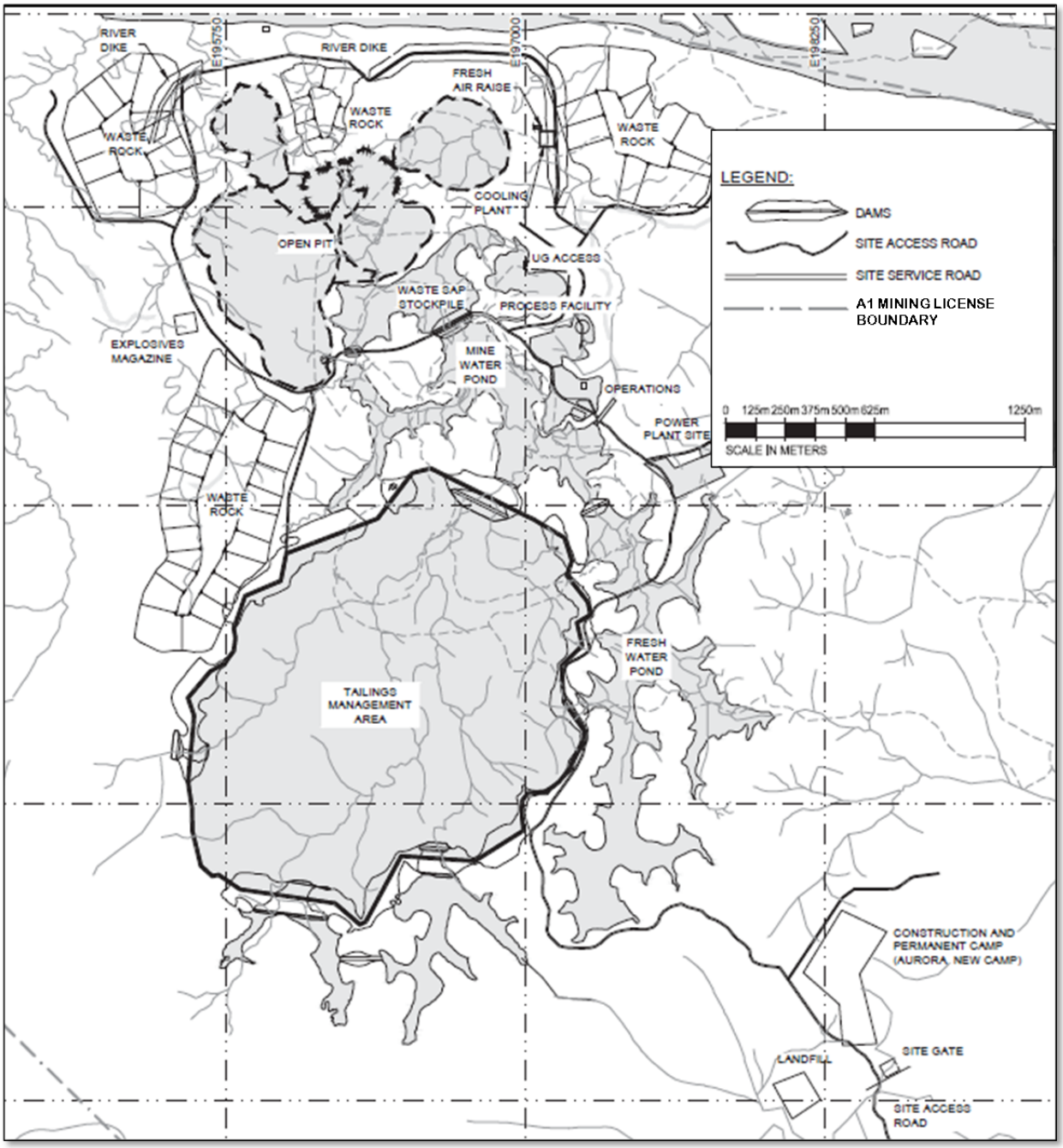


Figure 1.0-3: Aurora Site Layout [Source: (TetraTech, 2013)]



transportation, storage, and used of sodium cyanide reagent, which will be separately addressed by the Project *Cyanide Management Plan*. The latter plan will be developed in accordance with the International Cyanide Management Code (ICMC) (http://www.cyanidecode.org) and issued prior to cyanide being accepted on site in the operational phase of the Project.

This *OHS/AP Plan* provides an overview of health and safety practices for the Project, and introduces the functions of several selected key Standard Operating Procedures (SOPs; see Section 4.0).

2 OHS-Related Plans and SOPs

The *OHS/Accident Prevention Plan* presents and summarizes the occupational health and safety- (OHS-) related SOPs and management plans prepared for the Aurora Project. These documents are developed and distributed under the controls established by the Project *Environmental and Social Management System Plan* (*ESMS Plan*); current OHS SOPs are listed in **Table 2.0-1**.

Table 2.0-1: OHS SOPs

SOP No.	SOP Title (OHS Topics)
GG-01	"Solid Waste Management"
GG-02	"Preparation, Review, Approval, and Update of Standard Operating Procedures"
GG-03	"Field Inspections"
GG-04	"Identification of Non-conformances and Corrective/Preventive Action"
GG-05	"Records Management"
GG-06	"ESMS Training Program"
GG-09	"Identification of Project-related Safety Hazards and Assessment of Risks"
GG-10	"Prevention and Monitoring of Communicable Diseases"
GG-11	"Personal Protective Equipment"
GG-12	"First Aid and Emergency Medical Response"
GG-13	"Transportation Safety – Light Vehicles"
GG-14	"Handling and Storage of Hazardous Materials"
GG-15	"Forklift Safety"
GG-16	"Safe Operation of Heavy Equipment"
GG-17	"Vehicle Fuelling and Spill Prevention"
GG-18	"Machine Guards and Safety Barriers"

SOP No.	SOP Title (OHS Topics)
GG-19	“Welding and Cutting Safety”
GG-20	“Electrical Safety”
GG-21	“Confined Space Work Safety”
GG-22	“Fire Prevention Program”
GG-23	“Operational Safety Meetings”
GG-24	“Recognition and Reporting of Safety Hazards”
GG-26	“Safe Use of All-Terrain Vehicles”
GG-27	“Chainsaw Safety”
GG-28	“Heat Stress”
GG-29	“Determination of Environmental and Social Aspects and Significant Impacts”
GG-30	“Environmental and Social Objectives, Targets, and Performance Improvement Program”
GG-31	“Development and Maintenance of Legal and Regulatory Requirements Register”
GG-32	“Regulatory Compliance Verification Audits”
GG-35	“Community Health and Safety Awareness Meetings”
GG-36	“Lockout/Tag-out Requirements”
GG-38	“Working from Heights”
GG-39	“Monitoring and Maintenance of Potable Water Quality”
GG-40	“Site Security”
GG-41	“Management of Aviation Fuel and Fuelling Operations”
GG-42	“Helicopter Safety”
GG-43	“Safe Operation of Grove Model 530 Hydraulic Cranes”

GGI has also developed a range of other mitigation/management plans that have significant OHS program support elements. These are listed as follows:

- *Construction Management Plan – Early Works;*
- *Emergency Preparedness and Response Plan;*
- *Hazardous Materials Management Plan;*
- *Spill Prevention, Control, and Contingency Plan;*
- *Buckhall Spill Contingency Plan;*
- *Transportation Management Plan;*
- *Waste Management Plan;*
- *Influx Management Plan;* and
- *ESHS Monitoring Plan.*

In addition, GGI expects to develop and issue several additional management plans prior to the operations phase of the Project that also have important OHS functions or considerations. These include:

- *Construction Management Plan – Major Construction;*
- *Blasting Management Plan;*
- *Overburden Management Plan;*
- *Annual Mining Plan;*
- *Mill/Leach Plant Operations Plan;*
- *Tailings Area Management Plan;*
- *Cyanide Management Plan;*
- *Waste Management Plan;*
- *Air Quality Management Plan; and*
- *Noise Vibration Management Plan.*

Brief descriptions of the function of all of these management/mitigation plans are provided in Section 1.1 of the *ESMS Plan*.

GGI staff will be trained in the requirements of these plans and (especially) individual SOPs, at the direction of the Environmental Manager and Health and Safety Officer, to the extent that such requirements are applicable to their individual job assignments. Training shall be conducted and documented in accordance with SOP GG-05, “ESMS Training Program.”

3 Responsibilities of Key Personnel

All Project workers are responsible for their own health and safety as well as the health and safety of their co-workers, and for recognizing and reporting unsafe conditions and acts. In addition, the following personnel play key roles for maintaining healthy and safe working conditions at the Aurora Project site.

3.1 Environmental Manager

The Environmental Manager provides OHS oversight to the entire Project. Responsibilities for the Environmental Manager or his designee include: field inspections, SOP development, training needs assessments, fuel storage tank inspections, supervision of hazardous material handling and storage, potable water testing, and other duties as may be noted in individual SOPs.

3.2 Health and Safety Officer

The Project Health and Safety Officer reports to the Environmental Manager, and is based at the Aurora site. Health and Safety Officer responsibilities include: conducting training needs assessments; ensuring that hazard analyses are performed for all significant processes, operations, jobs, and tasks; ensuring that control measures are selected, developed, and implemented; providing training, information, and instruction to employees on control measures; ensuring that risk assessments are reviewed on at least an annual basis; selecting and purchasing appropriate personal protective equipment (PPE) including respiratory protection for job tasks; inspection of fuel storage tanks; inspection of electrical hazards; evaluating and inspecting machine safeguards; supervising hazardous material handling and storage; performing fire risk assessments and preparing area-specific fire plans; identifying and assessing confined spaces; and other duties as may be noted in individual SOPs.

3.3 Site Medics and First Aid Providers

Site medics are trained, qualified medical professionals assigned to the Aurora and Buckhall sites, and report to the Health and Safety Officer. Site Medics and are responsible for providing communicable disease prevention training to all staff. Site Medics will also monitor the workforce for diseases, investigate any potential disease outbreaks, treat patients, arrange for transport to an offsite clinic or hospital, track the issuing and return of PPE, maintain first aid kits, and fulfil other duties as may be noted in individual SOPs.

First Aid Providers will complete an advanced first aid course including cardio-pulmonary resuscitation (CPR) and will be expected to administer first aid for minor injuries, determine if injuries need more than minor first aid, and administer emergency first aid for serious injuries/illnesses. The Aurora, Tapir Crossing, and Buckhall sites will have multiple *First Aid Provider*s, as noted in SOP GG-12, “First Aid and Emergency Medical Response.”

3.4 Security Officers

Security Officers are located at the Buckhall, Tapir Crossing, and Aurora sites, and are responsible for overseeing security arrangements at each location. Specific duties of the Security Officers are described in SOP GG-40, “Site Security” and other SOPs, and include

coordinating vehicle travel along roads between Buckhall and the Aurora site, reporting all criminal activity or dangerous situations to the proper policy authority, supporting any police actions or investigations, managing security issues in the event of a flood; and other duties as may be noted in individual SOPs.

3.5 Construction Manager

The Construction Manager will oversee all mine construction activities, including mill and processing plant construction, major earthworks, roadbuilding, and construction of other supporting infrastructure. OHS duties for the construction manager include ensuring that all light duty vehicle operators, heavy equipment operators, and all-terrain vehicle (ATV) riders are trained and qualified; ensuring that potential OHS hazards are identified corrected; and other duties as may be noted in individual SOPs.

4 Identification of Hazards and Controls

This section provides an overview of the potential hazards for Aurora Project workers, contractors, and visitors, as well as the controls for those hazards. Also included in this section is a brief overview of key OHS-related procedures and plans, including emergency response, training, reporting, and record keeping.

4.1 Personal Protective Equipment

If the Health and Safety Officer determines that job task hazards warrant the use of PPE in accordance with SOP GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks”, then the guidelines for PPE in SOP GG-11, “Personal Protective Equipment”, should be followed. Most importantly, PPE should only be assigned in instances when engineering, administrative, and/or work-practice controls are not effective at managing all identified hazards. Depending on the site-specific and job-specific hazards, PPE may include, for example, safety glasses, goggles, face shields, hard hats, helmets, gloves, coveralls, steel toe safety shoes, hearing protection, respirators.. The Health and Safety Officer will provide PPE to workers and will ensure that all workers receive at least annual training on the proper use of PPE. Affected employees will be responsible for maintaining and cleaning their PPE, and all PPE will be inspected by the Health and Safety Officer on at least an annual basis. Employees who misuse or do not use PPE will be disciplined. Visitors to the Aurora Project site will receive appropriate PPE and information on how to use it.

The Health and Safety Officer will also conduct an evaluation for individual job tasks to determine if respiratory protection is warranted. Before being required to wear respiratory protection, affected employees will undergo a medical evaluation by the Site Medic or licensed medical professional to determine if there need to be any limitations to respirator use. Fit tests must be performed on all workers assigned to wear respirators, occurring both prior to use and at least annually afterwards. As detailed in Appendix A of GG-11, workers must receive training on fit-testing and proper use and maintenance..

4.2 Emergency Response

The Project *Emergency Preparedness and Response Plan* details the emergency procedures for the Aurora Project. All worksites must have at least one communication device capable of making emergency call, and all workers and contractors must be trained in emergency procedures. As noted below in Section 2.15, all near misses and accidents must be immediately reported. In the event of an injury or major illness to a worker, co-workers must immediately stop work and call for the assistance of a Site Medic. The Site Medics will determine if onsite treatment will be sufficient or if the individual has to be transported by aircraft to an offsite clinic or hospital. If any security issues should arise, workers should immediately notify their supervisors, any uniformed Security Officers, or the Health and Safety Officer, who will work with the Guyana Police Force or other appropriate authorities to address the situation. Because the potential for flooding exists at the Aurora site, flood contingency evacuation plans should be prepared that address provisions for evacuating personnel, temporarily moving assets, and maintaining a skeleton crew.

4.3 Fire Prevention Plan

The Health and Safety Officer will perform a fire risk assessment for all Aurora Project facilities, and with the help of an appointed Fire Warden, will develop a Fire Prevention Plan (FPP) for each facility. All workers will undergo fire prevention training that will include (but not be limited to) the following: smoking restrictions, safe work practices, types of fires and fire suppression systems, and emergency procedures to be taken in the event of fire. Additionally, designated staff will receive additional training in order to be assigned as Fire Wardens or members of a Fire Brigade. Fire Wardens will be assigned to each major facility and will be responsible for ensuring that FPPs are implemented in the event of a fire. The Fire Brigade will fight fires if a need arises. SOP GG-22, "Fire Prevention Program", provides additional information and should be well understood by all personnel.

4.4 Transportation and Vehicle Use

The M3 road between Buckhall and the Aurora site will provide the primary means of access to the site for the delivery of personnel, materials, and equipment, and prevention of transportation accident and incidents will be a major OHS program goal over the life of the Project. Other site roads will include both haul roads suitable for mining trucks and service roads for use by smaller vehicles. Haul and service roads will undergo frequent re-topping during mine operations, and dust suppression will be used as needed in dry seasonal conditions. Additional but more limited access will be provided by airplanes, which will be used transport expensive or time-sensitive materials, medical evacuations, and other limited uses. The current airstrip at the Aurora site will be reconstructed in the same general location after the completion of the Cuyuni River dike systems in the construction phase of the Project. Incoming and outgoing flights will occur during daylight hours except for medical emergencies (for which temporary lighting will be used). Dust suppression will be used as needed on the runway. At Tapir Crossing, a sectional barge ferry will be used to transport vehicles and their cargo; the barge will use a roll on, roll-off design. A number of small outboard motor-powered service boats will be used at Buckhall for transportation of small groups of personnel from Parika, for the placement of the spill control boom at the Buckhall fuelling trestle during fuel offloading operations. Service boats may also be used at Tapir to ferry small groups of workers.

GGI personnel may be required operate light duty vehicles, heavy duty vehicles, or ATVs during the course of work. For all three vehicle types, the following general safety precautions apply:

- only licensed and qualified operators (designated with the vehicle-type-specific operator qualification card) may operate vehicles;
- travel between Buckhall and the Aurora site is permitted only during daylight hours;
- operators are not to offer rides to non-employees;
- posted speed limits must be observed at all times; speeding or reckless driving may be grounds for dismissal because it endangers the safety of personnel as well as risks damage or loss of equipment (see the GGI "Labour Grievance Procedure" appended to the *ESMS Plan*);

- vehicles shall generally not be stopped at any place between the Buckhall site and the mine, unless (a) an emergency situation exists; (b) if specifically requested to stop for weather or road-safety reasons at any of the Barama-operated checkpoints on the Barama portion of the access road; (c) if specifically requested to stop by uniformed police or military authorities; or (d) if conducting activities authorized or directly related to the work or security of the Project;

- all operators and passengers must wear seatbelts (vehicles) or safety helmets (ATVs) at all times; and

- passengers may only ride in designated seats; riding in truck beds, on running boards, or on the back of ATVs designed for only one rider is prohibited.

Additional safety information for each vehicle type is provided in the following paragraphs.

4.4.1 Light Duty Vehicles

Only personnel with a current Guyanese and/or international driver's license who have undergone additional training may operate a light duty vehicle. Workers who meet these requirements and pass a driving test will receive a vehicle operator's qualification card. Before each driving assignment, the light vehicle operator shall perform a safety check on the vehicle that includes (but is not limited to) checking the tires, windshield, windshield wipers, fuel, oil and fluid levels, radio, and brakes. Operators should also ensure that vehicles have a first aid kit, a supply of potable water, a shovel or spade, and a winch or tow chain. Drivers and passengers must review and follow all of the rules provided in GG-13, "Transportation Safety – Light Vehicles." Included in these rules are the following: passengers may only ride in the vehicle (i.e., no one may ride in the truck bed or tray, on the hood, on the bumpers or fenders, or on the roof), the driver and all passengers must wear seat belts at all times, and pedestrians and heavy equipment have the right of way. Operators shall fuel their vehicles following the guidelines provided in SOP GG-17, "Vehicle Fuelling and Spill Prevention."

4.4.2 Heavy Duty Vehicles

All workers employed by GGI must undergo training for heavy equipment operation and pass a driving test before receiving an operator qualification card. All GGI operators will perform a safety check using the Operator's Daily Inspection Report prior to starting work each day. Delivery contractors and truckers are responsible for safely maintaining their vehicles and following the rules outlined by GGI's *Transportation Management Plan*. No driving is permitted at night on the Buckhall to Aurora site (M3) road. Complete rules for operation of heavy equipment are provided in SOP GG-16, "Safe Operation of Heavy Equipment", and operators shall fuel their vehicles following the guidelines provided in SOP GG-17, "Vehicle Fuelling and Spill Prevention."

4.4.3 ATVs

All ATVs for the Aurora Project will conform to international automotive standards and will carry a first aid kit. In order to operate an ATV, an operator must do the following: take a training course, pass a written exam, and demonstrate driving skills to a supervisor or manager. Only then will they receive an operator's card. The mechanical shop will complete a daily safety and

maintenance inspection on all ATVs. All riders must wear appropriate PPE including an approved ATV helmet with face shield, goggles, and leather boots. The number of ATVs riders shall not exceed design specifications, except in emergency conditions. A full set of safe operation instructions are provided in SOP GG-26, “Safe Use of All-Terrain Vehicles.”

4.5 Equipment Use

During the construction and mining phases of the Aurora Project, workers will use a variety of motorized or potentially hazardous equipment. All equipment will have to meet applicable safety standards, and all workers will undergo specific training prior to use.

4.5.1 Forklifts

As outlined in SOP GG-15, “Forklift Safety”, all forklifts used at the Aurora Project site must conform to national or international safety standards. Forklift operators will have to undergo a forklift training session, participate in on-the-job training, and demonstrate their driving skills in order to obtain a forklift operator’s qualification card. Only individuals with this card may operate forklifts, and under no circumstances will passengers be carried. Operators will follow these rules and all of the others provided in the list of safety rules included in GG-15.

4.5.2 Chainsaws

All chainsaws used at the Aurora and Buckhall sites must meet recognized safety standards and be equipped with a kickback-reducing device. All chainsaw operators are required to receive both classroom and on-the-job training that is specific to the model of chainsaw used. PPE for chainsaw operators will include hard hats with ear muff-style noise protection, full-face safety shields, leather gloves, and boots with non-skid soles. Detailed training and PPE requirements and additional safety information are provided in SOP GG-27, “Chainsaw Safety.”

4.5.3 Welding and Cutting

SOP GG-19, “Welding and Cutting Safety”, provides detailed instruction for safe welding and cutting operations, which are briefly summarized here. All workers using welding or cutting equipment shall be properly trained in its use prior to work. Workers shall don appropriate PPE including protective clothing made of fire resistant materials and eye protection with lenses that have a protective shade number appropriate for the operation. Welding must be carried out in locations with adequate ventilation. If welding or cutting is to take place in a confined space, then procedures outlined in SOP GG-21, ”Confined Space Work Safety”, must be followed. Whenever cutting or welding is preformed and there is the potential for fire, a designated fire watcher will be assigned to observe the activity, during the task and for at least one half hour after.

4.5.4 Equipment Safety

SOPs GG-18, “Machine Guards and Safety Barriers”; GG-20, “Electrical Safety”; and GG-36, “Lockout/Tag-out Requirements” all describe important procedures for preventing equipment-related accidents. Key considerations are briefly discussed in the following paragraphs.

4.5.4.1 Machine Guarding

Machine guarding refers to the practice whereby guards, barriers, or other devices are used to protect persons from contacting, being caught by, or falling into rotating or moving machine parts, or to prevent objects from falling into or being ejected from machine parts. Whenever possible, equipment will be purchased or designed with such safeguarding in place. If it is not possible to purchase/engineer equipment with point-of-contact machine guarding, then specific guarding techniques, as outlined in GG-18, "Machine Guards and Safety Barriers"; should be followed. Warning signs must be posted in close proximity to the hazard area, and PPE (hard hats, steel-toed safety shoes, and safety glasses) must be worn at all times. Removing or otherwise hampering a machine guard is not acceptable and may be grounds for termination of employment.

4.5.4.2 Electrical Safety

Along with a licensed electrician, the Health and Safety Officer will complete an initial electrical hazards analysis and risk assessment (see GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks") prior to opening constructed facilities and will conduct periodic inspections of the grounding program and general electrical work practices. All affected employees will undergo electrical safety training that will include the potential sources of electrical hazards, safety rules and work practices, and lockout/tag-out procedures. The Aurora Project will ensure that all equipment and receptacles are properly grounded and that regular ground fault tests are conducted. Details on the grounding program and general inspection process are provided in SOP GG-20, "Electrical Safety." SOP GG-36,"Lockout/Tag-out Requirements" provides additional details on the lockout/tag-out process.

4.6 Communicable Diseases

Because workers will be living and working in close proximity at the Aurora and Buckhall sites, communicable diseases have the potential to move quickly through the workforce. For this reason, a number of controls have been put in place, as outlined in SOP GG-10, "Prevention and Monitoring of Communicable Disease." All workers will be required to undergo a physical and medical examination prior to starting work, and any applicants with a communicable disease will be required to seek treatment prior to completing the application process. Site Medics will provide communicable disease prevention training to all workers. Additionally, workers will be required to refrain from alcohol and drug use, ensure proper waste disposal, minimize contact with the local population, and refrain from bringing animals or plants into man-camp or other Project facility areas. Workers must maintain proper hygiene (especially hand washing), and it will be especially important for cooks and canteen workers to follow proper food handling practices. The Health and Safety Officer will conduct periodic field inspections of hygienic conditions onsite, and Site Medics will monitor the workforce for malaria and several other specific communicable diseases. As noted below in Section 4.7, potable water provided to workers must also be tested regularly.

4.7 Potable Water

Potable water used at all Project locations will be treated with a combination of chlorination, filtration, and ultraviolet light; modular wastewater treatment systems will be installed at the Buckhall and the Aurora site early in the construction phase. Additionally, all potable water shall

be tested quarterly for the essential characteristics classified in the Guyana Specification for Drinking Water (GNBS 2004), i.e., color, odor, taste, turbidity, pH, total hardness, iron, chlorides, and residual free chlorine. Biological contamination will be tested monthly using total coliforms as an indicator. The testing schedule may be altered at the Environmental Manager's discretion based on the results over time. Treatment and testing requirements are defined in SOP GG-40, "Monitoring and Maintenance of Potable Water Quality."

4.8 Hazardous Material Handling and Storage

All handling and storage of hazardous materials on site will be managed under SOP GG-14, "Handling and Storage of Hazardous Materials" which supports the Project *Hazardous Materials Management Plan*. Staging and offloading requirements for containers of cyanide are separately addressed in the Project Cyanide Management Plan.[1] Requirements for safe and secure storage of ammonium nitrate/fuel oil (ANFO) explosives and primer/detonator materials are separately addressed in the Project Blasting Management Plan. Procedures for the identification, segregation, and safe disposal of hazardous wastes are addressed separately in the Project Waste Management Plan.

All hazardous material purchased for the project will come with international Material Safety Data Sheets (MSDSs), which will be compiled by the Health and Safety Officer. All workers involved in the use and handling of these materials will undergo hazardous material training which will cover information contained in MSDSs. All materials will be handled and stored in compliance with their MSDSs. Any leakage or damage to containers must immediately be reported to the supervisor, Camp Manager, or Health and Safety Officer, who will then decide whether evacuation is warranted.

4.9 Confined Spaces

Confined spaces are any workspaces that are large enough to enter but have limited or restricted openings for entry and exit and are not designed for periodic, routine, or continuous occupancy. As described in SOP GG-21, "Confined Space Work Safety, the Health and Safety Officer will identify and prepare an assessment of each identified confined space. All employees and contractors who may have to enter a confined space will undergo training on at least an annual basis. Before any entering any confined space, the Area Supervisor and Health and Safety Officer will evaluate potential alternatives to entering the confined space. If no alternatives are found, the Area Supervisor and Health and Safety Officer will complete a confined space permit, which includes specific mitigation measures to be implemented. A pre-entry safety meeting will be held, and the Area Supervisor or Health and Safety Officer will serve as the confined space entry attendant.

[1] Cyanide will be purchased exclusively as solid briquettes, delivered in fully welded, certified intermodal stainless steel ISO transportation/ mixing containers. ISO containers are sized for intermodal (truck, rail, ship) transport, and are highly protective of the dry cyanide briquettes during transportation and delivery. This material form/delivery system eliminates the need for separate warehousing or onsite bag cutting and mixing facilities and associated hazardous waste streams.

4.10 Working at Heights

SOP GG-38, “Working at Heights” describes the safety procedures for using ladders at the Aurora Project site. Briefly, workers should select the correct ladder for the job, ensure that ladders are in proper working condition before climbing, maintain three points of contact at all times when climbing or descending, and always don proper PPE including fall arrestors and footwear with non-skid soles. When working at heights, there should always be at least one individual on the ground to assist with tools and steady portable ladders.

4.11 Slips, Trips, and Falls

There are many situations that may cause slips, trips, and falls, such as wet spots, grease, loose flooring, uneven walking surfaces, clutter, electrical cords, and damaged ladder steps. The controls needed to prevent these hazards include keeping walkways and stairs clear of scrap and debris; coiling up extension cords, lines, and hoses when not in use; guarding floor openings; and keeping electrical and other wires out of the way. Work areas should be kept clear of any extra equipment or materials, floors should be kept clean and dry (to the extent possible), and adequate lighting should be available in all work areas. The Aurora site is located in an area that gets an average of 2,124 millimetres (mm) of rain per year, and work will have continue during rainy conditions. For this reason, workers will likely encounter slippery conditions and should always wear shoes with non-skid soles and take extra care when working outside during rainy conditions.

4.12 Heat Stress

The Aurora Project site is located in a hot and humid tropical climate with two rainy and two dry seasons. Temperatures may range from 22° C to 34 °C with 65% to 100% humidity (TetraTech 2013). Although many workers are acclimatized to these conditions, there is still the potential for heat stress to occur, which can be a life-threatening situation. Site visitors or workers used to other climates may be more prone to heat stress. Workers and visitors should therefore stay hydrated with water or other hydrating fluids, especially when conducting strenuous work or wearing multiple layers of PPE. SOP GG-39, “Heat Stress”, provides additional guidelines on this topic.

4.13 Training

All workers, visitors, and contractors on the Aurora Project will undergo health and safety training with a focus on accident prevention. As detailed in SOP GG-06, “ESMS Training Program”, all new hires will undergo introductory health and safety training with an emphasis on safe work practices, vehicle safety, spill response, and waste management. Workers will be trained in the proper use of any PPE that they are required to wear (referenced in SOP GG-09, GG-11, “Personal Protective Equipment”), and the Site Medics will provide training on communicable disease prevention. Additional supervised on-the-job, self-directed, and/or classroom training will be assigned as needed for workers. The Health and Safety Officer, with assistance from Area Supervisors, will conduct and periodically update training needs assessments for all staff to determine the OHS and other training needed for each worker. In addition, all contractors and visitors to the Aurora site will receive training prior to travelling to the site (unless travelling by air, in which case training will occur as soon as possible after arriving).

4.14 Safety Meetings

SOP GG-23, “Operational Safety Meetings”, outlines the process for establishing a safety committee and for conducting safety meetings. The Health and Safety Officer and Area Managers or supervisors will hold “toolbox” safety meetings at least monthly, at the start of significant new tasks or operations, and any time that changing conditions warrant a change in safe work practices or PPE. These meetings will cover (as applicable) the nature of the task or operation, the proper work procedures, any known or potential hazards, methods to control hazards, and proper use of PPE.

4.15 Reporting

The Health and Safety Officer will ensure that all employees undergo sufficient training to be able to recognize unsafe conditions and work practices, and, along with the Area Supervisors, the Health and Safety Officer will continuously monitor work areas for any unsafe conditions or acts. Additionally, all employees are required to report any hazard beyond a minor housekeeping issue (even if it can be corrected on the spot without incurring personal endangerment). When workers identify unsafe conditions or acts, they should stop work immediately and notify the Area Supervisor or the Health and Safety Officer. The worker should take immediate action to rectify the situation only if they can do so without risking their personal safety. The Area Supervisor and Health and Safety Officer will assess the situation and either immediately correct the unsafe condition or initiate a Corrective/Preventive Action Request (CPAR). Full details are provided in SOP GG-24, “Recognition and Reporting of Safety Hazards.”

4.16 Recordkeeping

All records will be maintained in accordance with the GG-05, “Records Management.” Records to be retained include those related to training, medical treatment, issue of PPE, safety meetings, confined space permits, MSDSs, spill response, CPARs, and other documents as specified in individual SOPs.

References

Internal References

- *ESMS Plan*
- *Emergency Preparedness and Response Plan;*
- *Hazardous Materials Management Plan;*
- *Spill Prevention, Control, and Contingency Plan;*
- *Buckhall Spill Contingency Plan;*
- *Transportation Management Plan;*
- *Waste Management Plan;*
- *Influx Management Plan;*
- *ESHS Monitoring Plan.*
- *Construction Management Plan – Major Construction;*
- *Blasting Management Plan;*
- *Overburden Management Plan;*
- *Annual Mining Plan;*
- *Mill/Leach Plant Operations Plan;*
- *Tailings Area Management Plan;*
- *Cyanide Management Plan;*
- *Waste Management Plan;*
- *Air Quality Management Plan;*
- *Noise Vibration Management Plan.*
- GG-01, “Solid Waste Management”;
- GG-02, “Preparation, Review, Approval, and Update of Standard Operating Procedures”;
- GG-03, “Field Inspections”;
- GG-04, “Identification of Non-conformances and Corrective/Preventive Action”;
- GG-05, “Records Management”;
- GG-06, “ESMS Training Program”;
- GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks” ;
- GG-10, “Prevention and Monitoring of Communicable Diseases”;
- GG-11, “Personal Protective Equipment”;
- GG-12, “First Aid and Emergency Medical Response”;
- GG-13, “Transportation Safety – Light Vehicles”;
- GG-14, “Handling and Storage of Hazardous Materials”;
- GG-15, “Forklift Safety”;
- GG-16, “Safe Operation of Heavy Equipment”;
- GG-17 “Vehicle Fuelling and Spill Prevention”;
- GG-18, “Machine Guards and Safety Barriers”;
- GG-19, “Welding and Cutting Safety”;
- GG-20, “Electrical Safety”;
- GG-21, “Confined Space Work Safety”;
- GG-22, “Fire Prevention Program”;
- GG-23, “Operational Safety Meetings”;
- GG-24, “Recognition and Reporting of Safety Hazards”;

- GG-26, “Safe Use of All-Terrain Vehicles”;
- GG-27, “Chainsaw Safety”;
- GG-28, “Heat Stress”;
- GG-29, “Determination of Environmental and Social Aspects and Significant Impacts”;
- GG-30, “Environmental and Social Objectives, Targets, and Performance Improvement Program”;
- GG-31, “Development and Maintenance of Legal and Regulatory Requirements Register”;
- GG-32, “Regulatory Compliance Verification Audits”;
- GG-35, “Community Health and Safety Awareness Meetings”;
- GG-36, “Lockout/Tag-out Requirements”;
- GG-38, “Working from Heights”;
- GG-39, “Monitoring and Maintenance of Potable Water Quality”;
- GG-40, “Site Security”;
- GG-41, “Management of Aviation Fuel and Fuelling Operations”;
- GG-42, “Helicopter Safety”; and
- GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”;

External References

(GNBS, 2004. Guyana Standard: Specification for Drinking Water. Guyana National Bureau of Standards, Georgetown, Guyana. 2004.

TetraTech, 2013. NI 43-101 Technical Report: Updated Feasibility Study, Aurora Gold Project, Guyana, South America. TetraTech, Inc., Golden, Colorado. January 29, 2013.



Emergency Preparedness and Response Plan

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
Seattle, WA

Date:
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All	All	First issue of *Emergency Preparedness and Response Plan*

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Acronyms

APELL	Awareness and Preparedness for Emergencies at a Local Level
ASM	Artisanal/small-scale Mining
CEO	Chief Executive Officer
CQA	Construction Quality Assurance
CRO	Community Relations Officer
CSR	Corporate Social Responsibility
EPA	(Guyana) Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
FWP	Fresh Water Pond
GGI	Guyana Goldfields, Inc.
GIIP	Good International Industrial Practice
HSE	Health, Safety, and Environmental
ICMC	International Cyanide Management Code
IFC	International Finance Corporation
MSDS	Material Safety Data Sheets
MWP	Mine Water Pond
SOP	standard operating procedure
TMA	Tailing Management Area
UN	United Nations
UNEP	United Nations Environmental Programme
WAD_{CN}	Weak Acid Dissociable (Cyanide)

1 Introduction

This *Emergency Preparedness and Response Plan* has been prepared for the Guyana Goldfields Inc. (GGI) Aurora Gold Project (the Project). It is consistent with the guidance provided by the United Nations (UN) Environment Programme Awareness and Preparedness for Emergencies at a Local Level (APELL) for Mining (UNEP, 2001); the International Finance Corporation (IFC) Performance Standards (IFC, 2012); and good international industrial practices (GIIPs) typically employed by the international mining industry.

1.1 Purpose

The guidance and procedures provided in this plan and the other supporting plans and standard operating procedures (SOPs) referenced herein collectively support GGI policies for minimizing potential hazards to human health and the environment; see Appendix C of the Project *Environmental and Social Management System Plan (ESMS Plan).*

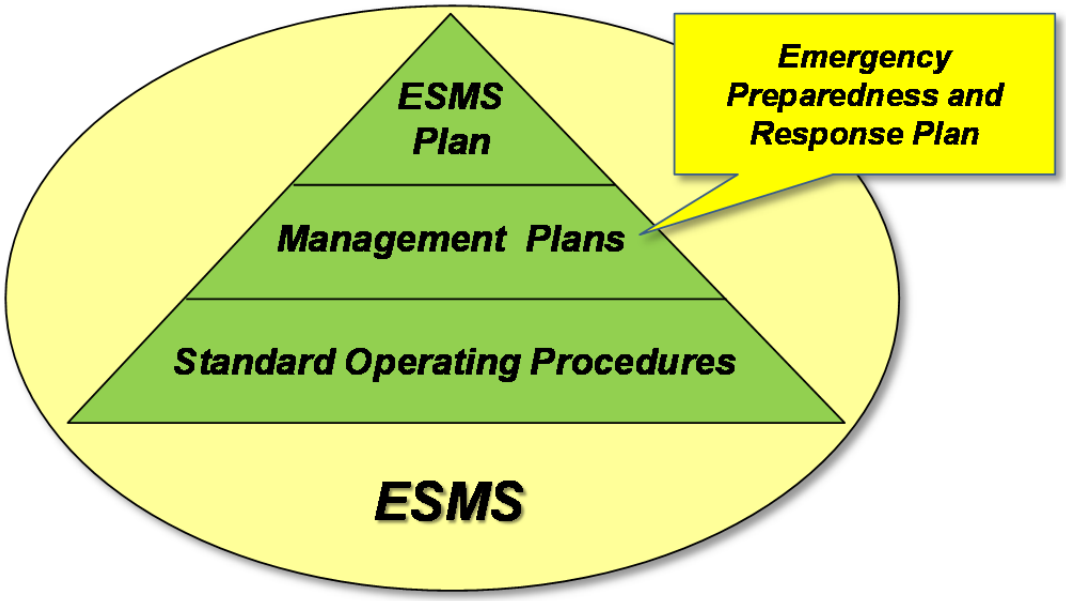
The *Emergency Preparedness and Response Plan* reflects a "prevent" and "prepare" approach to emergency management in order to minimize the potential for emergency situations to occur. In the event of an emergency, the primary goal is to contain damage and minimize exposures to human beings and the natural environment. Preplanning, taking preventive measures, providing adequate and appropriate training, and practicing and testing the effectiveness of emergency response procedures will collectively serve to minimize the potential hazards and reduce the potential impact should an incident occur.

1.2 Relationship of *Hazardous Materials Management Plan* to Environmental and Social Management System and Environmental and Social Impact Assessment

GGI has established an Environmental and Social Management System (ESMS) for the Project, which is embodied in a Project-specific *ESMS Plan* based on the requirements of IFC Performance Standard 1 (PS 1), "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012), IFC PS 3, "Resource Efficiency and Pollution Prevention" (IFC, 2012), and other recognized good international industrial practices (GIIPs) for environmental and health and safety (EHS) and social program management.

This *Emergency Preparedness and Response 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 EHS or social impacts, and supports the final Environmental and Social Impact Assessment (ESIA) prepared for the Project. **Figure 1.2-1** depicts the relationship of the *Emergency Preparedness and Response Plan* to the overall structure of the Project ESMS (see Section 1.2 of the *ESMS Plan* for additional details).

Figure 1.2-1: Position of *Emergency Preparedness and Response Plan* in ESMS Document Hierarchy



1.3 Change Management

This *Emergency Preparedness and Response Plan* will be periodically updated to incorporate more detailed site-specific information, as well as updates and refinements of the project design as such information becomes available, other Project conditions, and changing EHS and social management needs, in accordance with the controls established by Section 1.3 of the *ESMS Plan*.

1.4 *Scope of Emergency Preparedness and Response Management Plan*

This plan is intended for use by Project staff, Emergency Response Teams, and contractors, when invoked through applicable procurement conditions; see Section 4.3.3 of the Project *ESMS Plan*. The *Emergency Preparedness and Response Plan* addresses the following emergency response elements:

- a general description of Project conditions;
- identification of populations vulnerable to potential emergency conditions;
- identification of environmental conditions that may compound emergency scenarios;
- summary of organizational responsibilities;
- identification of potentially significant emergency scenarios at the Project site, as well as the transit corridor used for shipment of project materials and equipment;
- risk review and emergency incident classification;
- emergency response organization and organizational responsibilities;

- requirements for coordination with external/governmental emergency response organizations;
- emergency alarms and communication systems;
- emergency response and media communication procedures;
- evacuation procedures;
- emergency response equipment;
- considerations for post-emergency recovery and mitigation;
- spill prevention measures;
- emergency preparedness inspections and incident simulations or mock drills; and
- actions taken to ensure the continued effectiveness of the plan.

While this *Emergency Preparedness and Response Plan* is designed to provide guidance for a range of plausible emergencies, details cannot be provided for all possible emergency situations. Trained personnel will be expected to make and execute appropriate decisions in response to unexpected emergencies, consistent with the guidance provided.

2 Site Description

The Project is located in a remote, forested, and largely uninhabited area of northwestern Guyana, and is comprised of four major physical components:

- the ***Aurora mine site***, located on the southern bank of the Cuyuni River approximately 170 km west of Georgetown, and within the boundaries of an approved 5,802 ha A1 Mining License area (see **Figure 2.0-1**);

- the ***Buckhall*** river port and logistics support facility, on the west bank of the Essequibo River (see **Figure 2.0-2**);

- the ***Barama (M3) road***, which provides access to a large hardwood timber concession north of the Cuyuni River owned by Barama Company Ltd., and for which GGI has negotiated a shared usage arrangement; and

- the ***Aurora M3 road extension***, a new 33 km road constructed by GGI connecting the end of the Barama road with Tapir Crossing (a GGI-managed vehicle barge ferry landing on the Cuyuni River), and extending due west to the Aurora mine site as shown in **Figures 2.0-1 and 2.0-2.**

The layout of the Aurora mine site (projected at maximum development prior to closure) is depicted in **Figure 2.0-3**, and at full development will contain the following features:

- interconnected open pit mine areas, protected from the probable maximum (1:10,000 year) flood (PMF) of the Cuyuni River by two earthen dikes on the northern edges of the pits;
- four sequentially developed and revegetated waste rock stockpiles and one waste saprolite stockpile;
- the Rory's Knoll underground mine, consisting of a main portal, adit, spiral declines, mined galleries, ventilation raises, underground shops and work areas, and supporting infrastructure;
- the Mine Water Pond (MWP), Fresh Water Pond (FWP), associated spillway, and (as required) downstream sedimentation ponds and monitoring wells;
- crushers, conveyor systems, and the run of mine (ROM) ore stockpile;
- two ball mills and the mineral separation process plant, including cyanide leach and detoxification circuits, concrete secondary containments, and a lined (tertiary containment) event pond;
- detoxified tailings and reclaim water pipelines, the Tailings Management Area (TMA), a spillway, two TMA dilution ponds, and (as required) downstream sedimentation ponds and monitoring wells;
- a power plant and bulk (No. 4) fuel storage tanks, and associated secondary containments;

Figure 2.0-1: Aurora Gold Project Site Layout Environmental Area of Influence (AOI) and Concession Boundary

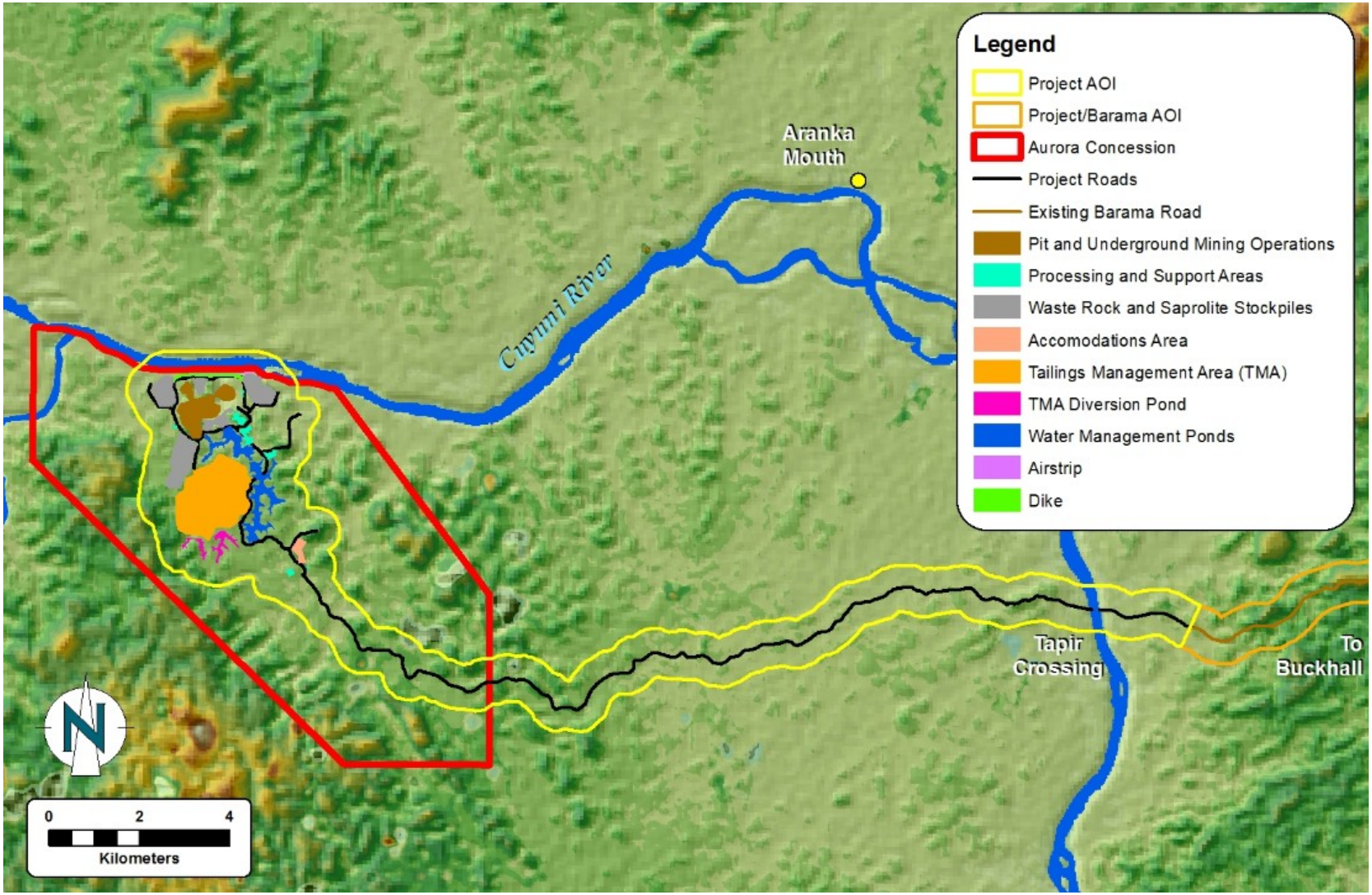


Figure 2.0-2: Aurora Gold Project Location and Buckhall to Aurora Site Transportation Corridor

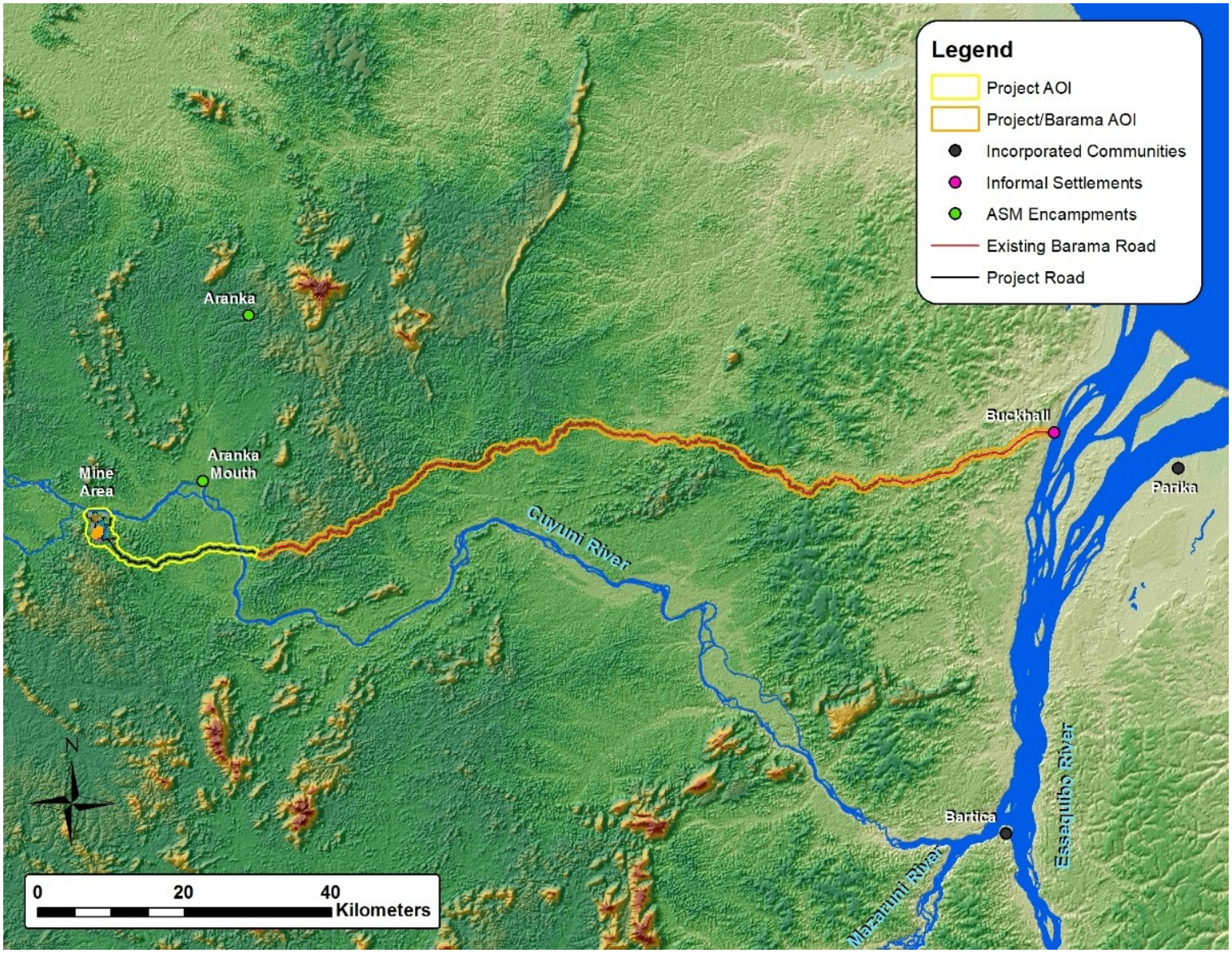
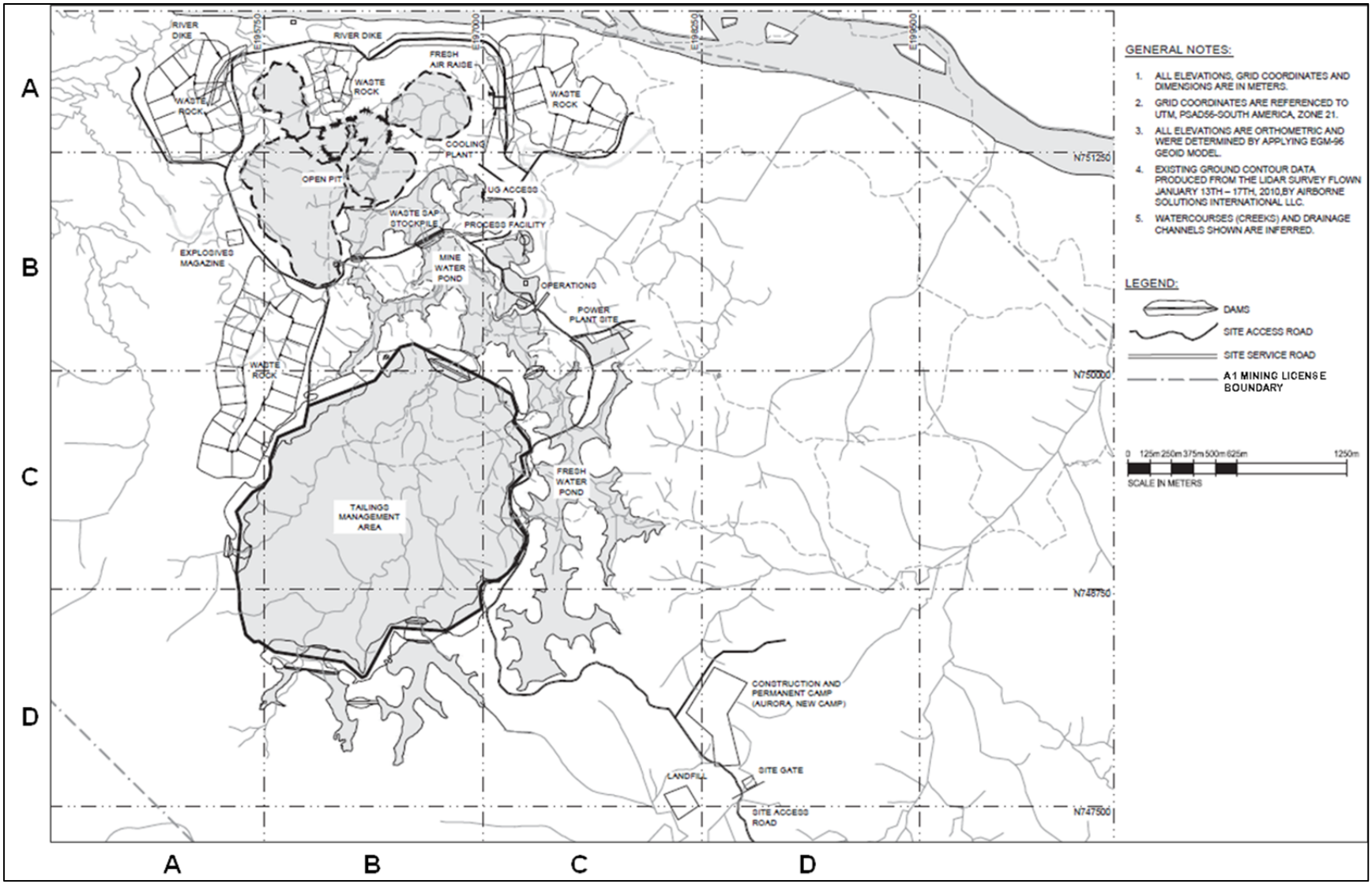


Figure 2.0-3: Aurora Mine Site Plan (Source: TetraTech DWG-C0105, Rev A)

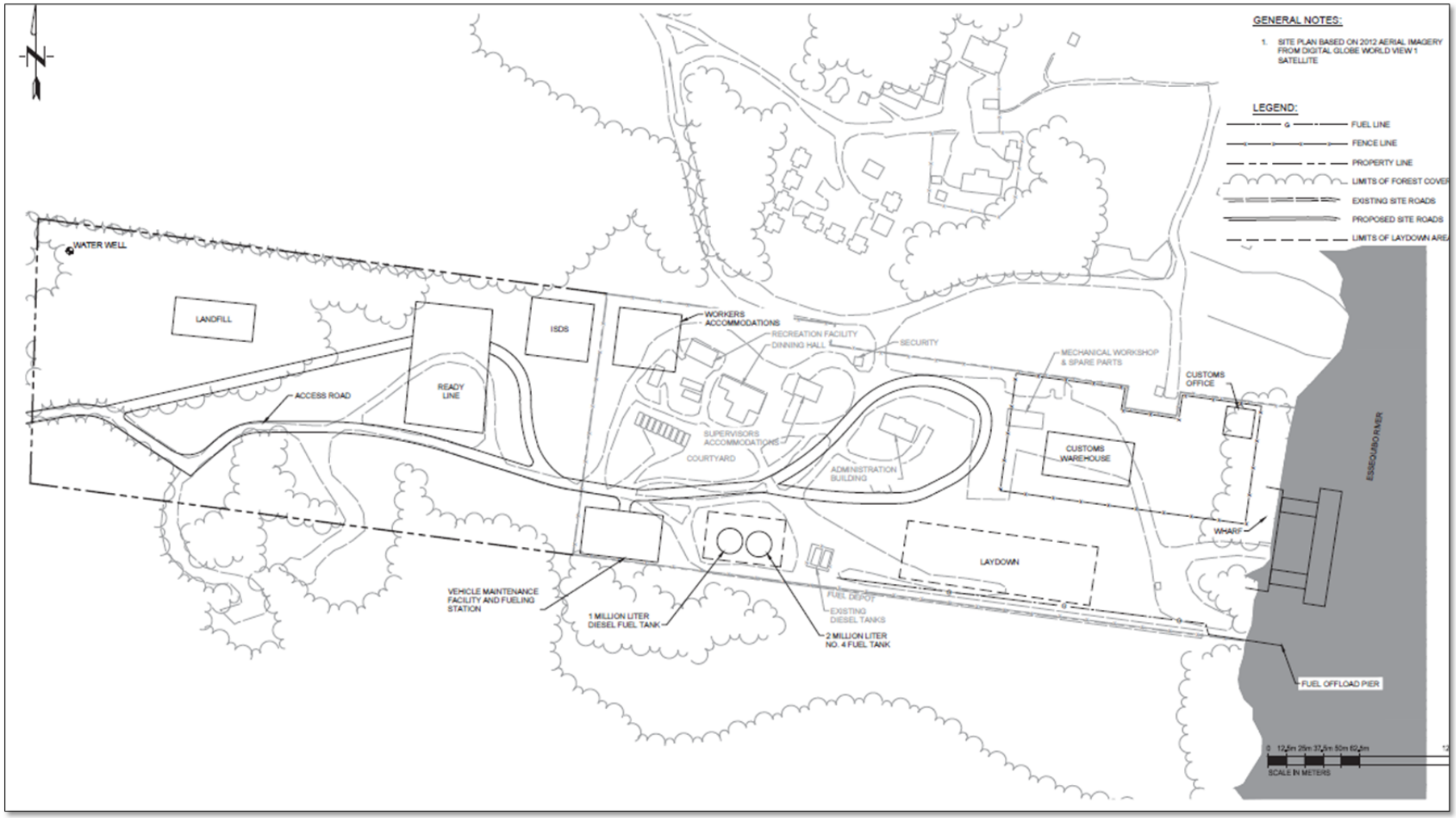


- a haul truck ready line staging area, fuelling station, and double-walled modular/bulk fuel and lubricant storage tank and dispensing facilities;
- administrative offices, warehouse storage, and laydown areas;
- a 475-person man camp, with accommodations, canteen, recreation areas, potable water and wastewater treatment systems, sanitary landfill, and other infrastructure;
- secure contractor-managed blasting magazines and storage silos for 2-part blasting agents; and
- an airstrip, connecting roadways, power transmission lines, security gates and fencing, and other infrastructure.

The general layout of the Buckhall logistics support facility is presented in **Figure 2.0-4**; the facility includes:

- a dock facility which consist of a wharf and short piers that connect the wharf to the shoreline;
- a covered storage area and workshop for maintaining equipment and vehicles;
- a fuel barge offloading trestle, with a floating spill containment boom and waterway spill recovery kit;
- covered fuel storage tanks with secondary containment provisions and spill kit;
- covered controlled storage areas for fuel barrels and accumulated waste oil barrels, with secondary containment provisions and spill kits;
- a covered fuel dispensing/transfer facility, with secondary containment provisions and spill kit;
- security fencing, lighting, and associated structures;
- a small-boat landing;
- an open lay-down/storage area and truck convoy marshaling yard;
- administrative offices, living quarters, and potable water and wastewater treatment systems;
- a canteen building; and
- a sanitary landfill.

Figure 2.0-4: Site Plan – Buckhall Logistics Support Facility (Source: TetraTech DWG-C0103, Rev A)



3 Populations Vulnerable to Potential Emergency Conditions

The Project is set in a remote and sparsely populated area. There are no communities in the immediate area of the Project's A1 Mining License or environmental AOI; see **Figures 1.0-1 and 1.0-2**. Two informal communities are considered to be in the Project's direct (social) area of influence, however, and are the primary focus of the Project's *Community Relations Management Plan*; these are:

- ***Aranka Mouth,*** an isolated informal settlement engaged primarily in artisanal and small-scale mining (ASM), located on the Cuyuni River approximately 16 kilometers (km) downstream from the Aurora site, and approximately 10 km due north of the Aurora (M3) road extension; and

- ***Buckhall,*** an informal community at the eastern end of the Barama (M3) road, adjacent to (due north) of GGI's secure logistics facility of the same name. The Buckhall community is on the western bank of the Essequibo River, due south of the Barama Company Ltd. timber concession, with residents engaged primarily in logging, ASM, and light commerce.

The Project's environmental AOI does not encroach on (nor is it adjacent to) any titled Amerindian lands or lands frequented by Amerindians. The nearest Amerindian community is Kurutuku, approximately 40 km upstream from the Aurora site on the Cuyuni River.

The only other populations potentially vulnerable to emergency conditions would be transient small groups or individuals engaged in ASM that may be encountered near the boundaries of the Aurora site Mining License, as noted in **Figure 2.0-1**, or potentially encountered when traveling along the Barama/Aurora (M3) extension road. The presence of such individuals or groups is routinely monitored in accordance with the Project *Influx Management Plan* and *Community Relations Management Plan.*

4 Environmental Conditions Compounding Emergency Scenarios

Infrastructure and local emergency service resources are virtually non-existent in the area of the Project. Because of the remoteness of the location, and the general underdevelopment of adjacent communities, there are few if any institutions or service providers that have any potential to partner with GGI in the development or execution of emergency preparedness response efforts or to serve on emergency response teams. Although appropriately qualified external resources may increase with time, it is assumed that the Project must be self-sufficient, relying primarily on its own resources in preparedness for or response to potential emergency situations.

The project area has generally low relief and is covered with dense forest, and rainfall in the region amounts over 2 meters (m) per year. The property is adjacent to Cuyuni River and is approximately 45 m above sea level (masl). Heavy rainfall may periodically result in the closure of the Barama/Aurora M3) extension road, which is the only roadway to the site. Given the remoteness of the site, the road can only be safely travelled during daylight hours. Chartered air travel between the Aurora site airstrip and Georgetown may be restricted by low cloud cover, heavy rainfall, and flood conditions on the Cuyuni River (which may encroach on the Project airstrip). Emergency travel to the Aurora site on the Cuyuni River via small outboard-powered workboats is possible on the downstream side, but travel upstream is problematic in dry season conditions due to the rapids at Devil's Hole.

5 Organizational Responsibilities

Major roles, responsibilities and training requirements for key emergency response staff and site personnel are outlined in this section.

5.1 Emergency Coordinator

The Camp Managers for the Buckhall and Aurora sites will serve as primary Emergency Coordinators, with the Environmental Manager, Environmental Manager, and/or Health and Safety Officer serving as potential alternates, at management's discretion. The role of the Emergency Coordinator is critical to ensure accurate, appropriate, and consistent responses to emergency situations, regardless of scale or scope. The Emergency Coordinator is management's representative and is responsible for ensuring that proper staffing, training, and equipment are in place so that GGI can respond to and recover from any emergency situation, whether it occurs at the Aurora or Buckhall sites, or during the transportation or shipping of materials or equipment on the Barama/Aurora (M3) extension road.

The Emergency Coordinator and any potential designees will be trained in:

- the entire contents of this *Emergency Preparedness and Response Plan*, the *Transportation Management Plan*, the *Hazardous Materials Management Plan*, and (as appropriate) the *Buckhall Spill Contingency Plan* or the *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas)*; and

- all standard operating procedures (SOPs) cited herein (see the list of internal references at the end of this *Emergency Preparedness and Response Plan*).

The Emergency Coordinators must also have a working understanding of (or direct access to):

- the location and capabilities of all emergency response equipment and other GGI equipment that may be used in an emergency event;

- the type, quantity, and location of all onsite hazardous materials, chemicals, and wastes;

- the overall facilities layout and routine operations of the site;

- transportation and shipping schedules and routes for all hazardous materials, chemicals and wastes being moved to and from the site;

- the composition and capabilities of emergency response teams; and

- rosters of "First Responder" trained employees, with current contact information.

All training shall be documented in accordance with GG-06, "ESMS Training Program."

The Emergency Coordinators shall also:

- ensure that properly trained and appropriately staffed Emergency Response Teams are in place for each operating shift;
- ensure that all necessary equipment and supply inventories are appropriately staged;
- in the event of a Level 3 or 4 emergency (see Section 6 for definitions), request the assistance of the Health and Safety Officer to assist in the resolution of the emergency;
- ensure that all members of Emergency Response Teams, First Responders, and other project staff/employees are trained in the requirements of the SOPs cited herein (see the internal references at the end of this document);
- establish and maintain effective working relationships with the Aranka Mouth and Buckhall communities through the Corporate Social Responsibility (CSR) Manager, the Community Relations Officer (CRO), and the *Community Relations Management Plan*, as well as with the Georgetown Public Hospital and charter aircraft services;
- at least annually, request the conduct of emergency response exercises to test Emergency Response Team and First Responder readiness, noting that the exercises at Buckhall will include representatives from the local community Stakeholder Committees in accordance with the *Community Relations Management Plan;* and
- review this *Emergency Preparedness and Response Plan* for effectiveness after any actual emergency events and/or after each mock drill, and update the plan as required per Section 1.3.

The Emergency Coordinator will ensure that the Vice President (VP), Aurora Gold Project; Security Manager; Environmental Manager, and other key personnel are all notified with respect to any incident, and will ensure that an incident report (see **Figure 5.1-1**) is created that documents the date, time, basic emergency information, and the name of the First Responder. The Emergency Coordinator will gather sufficient information from the First Responder to

- ensure that the incident is documented and thoroughly investigated;
- ensure that appropriate corrective and preventative actions are taken; and
- ensure that all emergency response equipment is properly cleaned, stored, and/or replaced.

5.2 Health and Safety Officer

The Health and Safety Officer or a qualified designee will assist the Emergency Coordinator as necessary, based on the type and severity of the reported incident. The Health and Safety Officer or his designee will be trained in emergency preparedness as noted in Section 13.1. Either the Health and Safety Officer or his designee must be at the Aurora or Buckhall sites at all times.

Figure 5.1-1: Incident Report Form

Incident Report – Aurora Gold Project

Reported to Emergency Coordinator/Camp Manager by: (First Responder):	**Date/Time Reported:**

Incident description: (describe/attach photos or sketches)

Emergency contacts made: (tick each when complete):

□ Head Office, GGI (592) 225-0289
□ Guyana Fire Service - 911
□ Environmental Protection Agency EPA (592) 225-0506
□ V. Smith, VP, Aurora Gold Project, GGI (592)-226-6400, (592)-640-4821
□ C. King, Project Coordinator, GGI (592) 628-9964
□ A. Riley, Environmental Manager, GGI (592) 689-7992
□ C. Harris, Camp Manager, GGI (592) xxx-xxxx
□ R. Beltran, Environmental Specialist, IFC (202) 473-9369, (202) 640-0786 (cell)
□ Mr. Edwards, Project Engineer, GGI (592) xxx-xxxx
□ St. John Lees, Construction Manager, GGI (592) 601-3769
□ M. Williams, Health & Safety Officer, GGI (592) 689-7992
□ J. Critchlow, Environmental Manager, GGI (592) 650-2404
□ W. Johnson, Chief Security Officer, GGI (592) 692-7001
□ Dr. Laxas, Woodlands Hospital (592) 223-7023-4

Incident Report – Aurora Gold Project	
Response actions taken: (describe/attach photos or sketches)	
Root cause:	
Preventive action taken: (to preclude recurrence)	
Action approved: **VP, Aurora Gold Project**	**Action approved:** **Environmental Manager**

In the event of an emergency, the Health and Safety Officer or designee will proceed to the incident site as quickly as possible. Once on site, the Health and Safety Officer will make contact with the First Responders to assess the emergency. The Health and Safety Officer will ensure that the Emergency Coordinator has received all of the information required for the incident report and is informed of the results of the assessment.

The Health and Safety Officer will initiate and physically direct the execution of appropriate responses as outlined in the appropriate response scenario (see Section 7). While the response scenarios defined therein are designed to anticipate and guide response actions, situations will arise that are not covered in the scenarios. In these cases, the Health and Safety Officer is specifically designated the authority to design and implement alternative response actions as long as they are in keeping with the training provided and GIIPS.

The Health and Safety Officer will also

- have the authority to call for and direct additional Emergency Response Teams and external support (e/g/. medical teams, fire brigades, equipment) as they deem necessary;
- participate in all post incident investigations to determine whether or not safety hazards were present or safety standards as outlined in SOPs were violated;
- provide recommendations for improvements or modifications going forward;
- maintain and, as appropriate, distribute current copies of all Material Safety Data Sheets (MSDS) for all chemicals and hazardous materials present on site, and in the event of an emergency they will locate the relevant MSDS and make that information available to the Emergency Coordinator as needed;
- participate in the evaluation of hazardous waste spills, leaks, or releases to determine whether evacuation is necessary and will conduct air monitoring to determine what type of protective equipment emergency response personnel will require; and
- assist in the development and distribution of any news releases associated with the incident.

The Health and Safety Officer, First Responders, and Emergency Response Teams are only responsible for the initial containment and stabilization of a situation. They are to remain in place (and in control) until spills are contained, fires are extinguished, and/or injured persons are stabilized.

Once the probability of further damage or recurrence has been reduced, coordination of long- term clean- up and decontamination shall be the responsibility of the Emergency Coordinator.

5.3 First Responder

Any employee or contractor that observes (or is advised) that a potential emergency exists is considered a "First Responder." The primary responsibility of a First Responder is to immediately summon help by dialling GGI security or the Emergency Coordinator directly using any available phone line (land or cell) or through use of two-way radio communications. If the First Responder is unable to contact security then contact should be made with the closest available manager or supervisor who can then contact security or the Emergency Coordinator directly.

No First Responder shall take actions for which they are not properly trained or qualified, or which have the potential to put themselves or others at risk.

First Responders should be prepared to explain the nature of the emergency (e.g., accident, fire, spill, or explosion), the number of persons involved, and the general location.
Once the appropriate persons have been identified, the First Responder should stand by, but not approach the emergency unless specifically directed otherwise by Emergency Coordinator or Health and Safety Officer. First Responders should not attempt to intervene in an emergency situation unless they have been properly trained and are authorized by the Emergency Coordinator or Health and Safety Officer.

5.4 Emergency Response Teams

Because of the remoteness of the Project and the general underdevelopment of adjacent communities, there are few if any pre-existing institutions or service providers that have the potential to partner with GGI in the development or execution of emergency preparedness response efforts or to serve on Emergency Response Teams.

GGI will therefore establish, equip, train, and maintain its own fire and hazardous material response (HAZMAT) brigades for both the Aurora and Buckhall sites. The Emergency Coordinators and Health and Safety Officer have the authority to dispatch either of these teams to address incidents at Tapir Crossing or that may have occurred along the Barama/Aurora (M3) extension road.

In addition to the fire and HAZMAT teams, GGI maintains qualified site medics at the both the Aurora and Buckhall sites that may be dispatched to address medical emergencies on an as needed basis.

These teams will all participate in emergency response drills as directed by the Emergency Coordinator, and may be called on to assist with training and drills specific to their skill areas.
It will be the responsibility of the Emergency Coordinator to ensure that these training requirements are met and that current certifications are kept on file.

When "on call" and on site, Emergency Response Team members will carry cell phones or two-way radios.

5.5 Other Management Personnel

Depending on the nature of the emergency, it may be prudent to call upon representatives from other departments to assist with the response, including representatives from security, maintenance, operations, environmental, and health and safety. Operations and maintenance departments and personnel may be called on to assist with shutting down process operations using pre-established procedures, securing areas, assessing damages, and determining needs and necessary steps to bring their areas back to full operating capacity, managing repairs related to their areas of operation. They may also provide temporary/auxiliary utilities, facilities, or equipment to be used during the recovery process.

The Environmental Manager will assist with the evaluation of the incident, determining scale, scope and range of consequences; they may provide technical and regulatory guidance to help determine the extent of the problem and the range of potential responses. They will oversee the collection and analysis of environmental samples in accordance with established procedures and external rules and regulations and will support necessary control, clean-up, or remediation activities. They also will work with the communications team to develop outreach and education materials to inform the general public. They will be the primary point of contact and liaison with relevant external agencies. Finally, they will be responsible for ensuring compliance with environmental rules and regulations and for external regulatory notification associated with accidents, spills or releases of hazardous materials.

5.6 External Emergency Organizations and External Response Plans

Because of the remote location of the GGI site and the limited development of the surrounding communities, external emergency support capabilities are limited to the Georgetown Public Hospital, with the Woodlands Hospital (also in Georgetown) as an alternate. Contact information is provided as follows:

- **Georgetown Public Hospital**
  New Market Street, Georgetown,
  Guyana
  Telephone: +592 256 900 or 227-8232/8204

- **Woodlands Hospital**
  110 Carmichael Street, North Cummingsburg, Georgetown,
  Guyana
  Telephone: +592 225 4050
  Fax: +592 225 5865

6 Emergency Classification

In an emergency situation, time is critical. Accurately characterizing the situation allows responders to understand the nature of the situation and the type of response that will be required. An incident classification system provides consistent criteria that can be used by First Responders and others to quickly assess and classify an incident. Classification can be modified and refined as information becomes available, but knowing who needs to respond and at what degree of intensity, can often mean the difference between a low-level accident and a major incident. In general, incidents are classified by level of seriousness and required response.

- **Level 1:** No offsite impact, can be managed by trained onsite personnel without additional assistance or need for evacuation.
- **Level 2:** Impact may be on or off site. Assistance of fire, HAZMAT, Health and Safety Officer and (potentially) medical personnel will be required.
- **Level 3:** Impact may be on or off site. Assistance of fire, HAZMAT, or medical personnel will be required. Evacuation of employees, contractors, or visitors will be required, and assistance of the Health and Safety Officer will be required.
- **Level 4:** Known or potential offsite impacts exist and present threats to human health and/or the environment such that community emergency plans must be activated in addition to on site response plans; assistance by the Health and Safety Officer will be required.

These levels are described in more detail in the following paragraphs.

6.1 Level 1

These types of incidents occur on site incidents and can be effectively managed by trained First Responders on site. Examples include spills of chemicals, wastes, or fuels that can be contained and abated with spill control kits or other immediately accessible equipment; and small fires that can be extinguished with portable fire extinguishers or fire hoses. It is assumed that evacuation is not required.

Level 1 incidents shall be reported to the Emergency Coordinator, the Health and Safety Officer, and the Environmental Manager. If necessary, the Emergency Coordinator will ensure that the necessary information is communicated to external regulatory agencies. Once the emergency situation is under control, Level 1 incidents may require external resources (equipment, contractors) for clean-up or other final actions.

6.2 Level 2

These types of incidents may occur on or off site. The major distinction is that the assistance of the Health and Safety Officer is mandatory; additional HAZMAT, medical or emergency response capabilities will be called upon, and/or special equipment or supplies will be needed, even if it is later determined that they were not needed. Examples include spills of chemicals, wastes, or fuels that occur off site; fires or explosions that occur off site; offsite accidents or medical emergencies that involve mine personnel, property or equipment; spills of chemicals, wastes or fuels on site that cannot be contained and abated with spill control kits or other immediately accessible equipment; onsite fires that cannot be extinguished or involve hazardous materials and require HAZMAT or fire

brigade assistance; serious medical emergencies that require medical team support. For Level 2 incidents, evacuation is not required.

Level 2 incidents shall be reported to the Emergency Coordinator, the Health and Safety Officer and the Environmental Manager. If necessary, the Emergency Coordinator will ensure that the necessary information is communicated to external regulatory agencies. Once the emergency situation is under control, Level 2 incidents may require external resources (equipment, contractors) for clean-up or other final actions.

6.3 Level 3

The primary distinction between a Level 2 and a Level 3 incident is the additional requirement for evacuation.

Examples of Level 3 incidents include onsite spills of chemicals, waste streams, or fuels that require the assistance of HAZMAT teams or the use of specialized equipment to contain and abate the release and require the evacuation of mine personnel, contractors, visitors, or members of the general public; major onsite fire or explosions that cannot be contained or involve hazardous materials and require the assistance of HAZMAT teams and fire brigades and require the evacuation of mine personnel, contractors, visitors, or members of the general public; any situation that requires the evacuation from one or more areas of the Project

Level 3 incidents require the assistance of the Health and Safety Officer. Level 3 incidents will be reported to the Emergency Coordinator, the Health and Safety Officer, and the Environmental Manager. The Emergency Coordinator will work with the Health and Safety Officer to ensure that the necessary information is communicated to external regulatory agencies. Once the emergency situation is under control, Level 3 incidents may require external resources (equipment, contractors) for clean-up or other final actions.

6.4 Level 4

Level 4 incidents pose a real threat to human health or the environment. They may occur on site or beyond the project boundaries. Because Level 4 incidents will require the engagement of local communities as well as local, regional, and possibly national level regulatory authorities, this classification will only be applicable at Buckhall. Level 4 incidents may also require the activation of community emergency response plans as well as the assistance of external HAZMAT, fire or medical brigades. Evacuation may also be necessary. Level 4 incidents will require close coordination between the facility and the community.

Examples of Level 4 incidents at Buckhall might be an explosion or fire at one or both of the large diesel and No. 4 fuel storage tanks, or other spills of chemicals, fuels, or equipment in transit to the project site that pose significant health or environmental risks that cannot be contained or controlled with on-site resources and that may require an additional emergency response from (or evacuation by) the community.

Level 4 incidents require the assistance of the Health and Safety Officer and require immediate notification of the VP, Aurora Gold Project; the Environmental Manager; and the CSR Manager.

7 Emergency Incident Scenarios

The tables provided below identify several incident scenarios that could potentially occur at the Aurora and Buckhall sites if noted preventive measures are not adequate. Each scenario identifies known or potential preventive measures, and the specific actions the may be taken by the First Responder, Emergency Coordinator, Health and Safety Officer, Emergency Response Team(s), and other GGI management representatives.

While this *Emergency Preparedness and Response Plan* and the potential emergency incident scenarios discussed in this section are designed to provide guidance for a range of plausible emergencies, details cannot be provided for all possible emergency situations. Trained personnel will be expected to make and execute appropriate decisions in response to unexpected emergencies, consistent with the guidance provided.

7.1 Emergency Scenarios - Barama/Aurora (M3) Extension Road

Table 7.1-1 identifies three major emergency incident scenarios applicable to the Barama/Aurora (M3) Extension Road; these include:

- spills of fuel or dry or liquid chemicals (non-cyanide);
- spills due to a cyanide container delivery accident; and
- vehicle accidents (not involving spills of fuel or chemicals).

Table 7.1-1: Barama/Aurora (M3) Extension Road - Emergency Scenarios

Scenario # 1: Fuel or Dry/Liquid Chemical Spill, Road Transportation	
Incident – scenario description	• During convoy transport from storage facilities at Buckhall to the Aurora site, a spill of liquid fuel, lubricants, or granular or liquid reagents[1] occurs due to a vehicular accident that results in a tank puncture, breach, or leak.

1 Non-cyanide; all cyanide will be delivered in sold dry briquette form in dedicated stainless steel ISO containers. See Scenario #2

Scenario # 1: Fuel or Dry/Liquid Chemical Spill, Road Transportation	
Preventive measures	• All transportation on the Barama/Aurora (M3) extension road shall comply with the *Transportation Management Plan.* • All bulk fuel deliveries shall be made in purpose-built, welded steel tanker trucks. • All containerized fuel /reagent delivery shall be made in plastic or metal totes, barrels, or drums, packed inside steel intermodal sea containers. • Contracted drivers shall be trained and licensed for delivery of hazardous materials and in delivery of first aid. • All vehicles will carry dry chemical fire extinguishers, spill kits, and first aid kits. • All GGI vehicle operators will be trained in the requirements of : – GG-12, “First Aid and Emergency Medical Response”; – GG-13, “Transportation Safety - Light Vehicles”; – GG-14, “Handling and Storage of Hazardous Materials”; – GG-16, “Safe Operation of Heavy Equipment” (as appropriate); and – GG-24, “Recognition and Reporting of Safety Hazards.”

Scenario # 1: Fuel or Dry/Liquid Chemical Spill, Road Transportation	
Emergency Coordinator actions	• Document the incident on an Incident Report form. • Notify and dispatch Health and Safety Officer and Emergency Response Team and ambulance if injuries are noted. If travel is restricted due to weather, establish direct radio/telephone communication linkages between the Health and Safety Officer and the First Responder. • Notify and engage Barama dispatcher; if the incident is on the Barama section of the road and Barama assumes an emergency response lead, offer additional equipment and/or Emergency Response Team assistance as appropriate. • Notify and engage Aurora or Buckhall convoy dispatcher, determine safest action for unaffected vehicles in convoy (shelter in place or continue to destination); direct First Responder or other qualified individuals to remain on site to assist in recovery and, if necessary, care/treatment of injured personnel. • If on the Aurora (M3) extension, facilitate the movement of additional equipment and/or emergency response teams as requested by the Health and Safety Officer, and manage long term clean- up /restoration efforts. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Stop convoy, secure incident site with barriers and/or assistance of other convoy drivers. • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, “First Aid and Emergency Medical Response.” • Contact Emergency Coordinator and communicate information as required or requested. • Remain on site to receive guidance from Emergency Coordinator and/or Health and Safety Officer; at the Emergency Coordinator’s direction, direct convoy leader to have convoy remain in place, or authorize convoy to continue to destination.

Scenario # 1: Fuel or Dry/Liquid Chemical Spill, Road Transportation	
Health and Safety Officer actions	• Assess the magnitude of spill and relative "level" of incident; notify Emergency Coordinator, and recommend response. Identify necessary resources and if a HAZMAT or other Emergency Response Team will be required • Arrange for evacuation of injured personnel to Buckhall or Aurora medical clinics; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital • Assess potential for impacts to surface water and take immediate action to prevent impacts. • Identify and request any additional equipment that may be required to contain the spill. • Develop action plan to halt the spill, contain the material, and stabilize the environment; coordinate with the Environmental Manager for acquisition of soil samples to determine completeness of cleanup and for storage or disposal of cleanup waste per GG-01, "Solid Waste Management (Pre-Construction Phase)" or *Waste Management Plan,* as well as for decontamination of waste handling equipment.
Emergency Response Team actions	• Comply with Health and Safety Officer directions. • Locate MSDS sheets for any spilled material (with driver of affected vehicle and convoy leader), delineate extent of spill. • If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Buckhall or Aurora medical clinics or air evacuation to Georgetown Public Hospital. • Undertake cleanup per Health and Safety Officer's cleanup action plan.

Scenario # 1: Fuel or Dry/Liquid Chemical Spill, Road Transportation	
Other GGI management actions	• CSR Manager contact Barama community relations staff for coordination of press releases. • VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager and GGI Community Relations Officers (CROs) engage Stakeholder Committee/key leaders from any potentially impacted groups (Buckhall community or ASMs in area of spill). • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario # 2 – Cyanide Container Delivery Accident/Road Transportation	
Incident – scenario description	• During convoy transport from storage facilities at Buckhall to the Aurora site, a cyanide transport contractor vehicle accident occurs that breaches or compromises the integrity of the heavy wall stainless steel ISO container leading to a spill of dry cyanide briquettes.
Preventive measures	• All transportation on the Barama/Aurora (M3) extension road shall comply with the *Transportation Management Plan.* • All cyanide will be purchased and delivered in accordance with the Project's ICMC-compliant *Cyanide Management Plan;* GGI will take ownership of the cyanide at the point of delivery, i.e., at the point the container is connected to mineral processing plant mixing lines at the Aurora site • Cyanide will be delivered in dry briquette form in intrinsically safe, certified dedicated heavy-wall stainless steel ISO containers rated for open water/ocean transport. • Cyanide deliveries will be made only by ICMC-certified transporters, subcontracted to the cyanide producer, who will be contractually obligated (and fully equipped) to execute all spill response actions en route to the Aurora site pending ownership transfer. • The cyanide producer/transporter will provide a copy of its ICMC-approved emergency response plan for cyanide transport, for advance review and reference by GGI management. • Contracted drivers shall be trained and licensed for delivery of hazardous materials and in delivery of first aid, as well as all spill response actions required by the ICMC • All convoy vehicles will carry dry chemical fire extinguishers, spill kits, and first aid kits. • All GGI vehicle operators will be trained in the requirements of : – GG-12, "First Aid and Emergency Medical Response"; – GG-13, "Transportation Safety - Light Vehicles"; – GG-14, "Handling and Storage of Hazardous Materials"; – GG-16, "Safe Operation of Heavy Equipment" (as appropriate); and – GG-24, "Recognition and Reporting of Safety Hazards."

Scenario # 2 – Cyanide Container Delivery Accident/Road Transportation	
Emergency Coordinator actions	• Document the incident on an Incident Report form. • Directly engage the transport contractor's lead driver, and offer assistance (equipment or Emergency Response Team personnel) as required or appropriate. • Contact the VP, Aurora Gold Project; the GGI Environmental Manager; and the GGI Procurement Manager (who shall immediately advise the cyanide supplier). • Notify and dispatch the Health and Safety Officer to the spill site; if travel is restricted due to weather, establish direct radio/telephone communication linkages between the Health and Safety Officer and the First Responder. • Notify and engage Barama dispatcher. • Notify and engage Aurora or Buckhall convoy dispatcher, determine safest action for unaffected vehicles in convoy (shelter in place or continue to destination); direct First Responder or other qualified individuals to remain on site to assist then transport contractor's emergency response personnel. • Conduct post-cleanup incident investigation with cyanide producer and transporter representatives, with the assistance of the Environmental Manager and Procurement Manager, and undertake appropriate corrective/preventive action.
First Responder actions	• Stop convoy, engage transport contractor's lead driver, ensure that the contractor initiates their emergency response plan, and offer assistance if required. • Contact Emergency Coordinator and communicate information as required or requested. • Remain on site to receive guidance from Emergency Coordinator and/or Health and Safety Officer; at the Emergency Coordinator's direction, direct convoy leader to have convoy shelter in place, or authorize convoy to continue to destination.

Scenario # 2 – Cyanide Container Delivery Accident/Road Transportation	
Health and Safety Officer actions	• Assess the magnitude of spill and relative "level" of incident; monitor transport contractor's cleanup operations per contractor's ICMC-approved emergency response plan, notify Environmental Manager and Procurement Manager if significant deviations are noted. • Offer assistance in evacuation of injured personnel to Buckhall or Aurora medical clinics; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital.
Emergency Response Team actions	• None unless specifically directed by Health and Safety Officer based on transport contractor's specific request.
Other GGI management actions	• CSR Manager contacts Barama community relations staff for coordination of press releases. • VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Procurement Manager engages cyanide producer/transporter to ensure effectiveness of corrective/preventive action with respect to future deliveries. • Environmental Manager contacts IFC representative. • CSR Manager and CROs engage Stakeholder Committee/key leaders from any potentially impacted groups (Buckhall community or ASMs in area of spill). • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario # 3 – Vehicle Accident (no spills of bulk fuel or bulk quantities of hazardous materials), Road Transportation	
Incident – scenario description	• During transport from Buckhall to the Aurora site, a vehicle accident occurs involving a passenger vehicle, worker transport van, or truck owned or operated by GGI or Project contractors
Preventive measures	• All transportation on the Barama/Aurora (M3) extension road shall comply with the *Transportation Management Plan.* • Contracted drivers shall be trained and licensed for delivery of hazardous materials and in delivery of first aid. • All vehicles will carry dry chemical fire extinguishers, spill kits, and first aid kits. • All GGI vehicle operators will be trained in the requirements of : – GG-12, “First Aid and Emergency Medical Response”; – GG-13, “Transportation Safety - Light Vehicles”; – GG-14, “Handling and Storage of Hazardous Materials”; – GG-16, “Safe Operation of Heavy Equipment” (as appropriate); and – GG-24, “Recognition and Reporting of Safety Hazards.”

Scenario # 3 – Vehicle Accident (no spills of bulk fuel or bulk quantities of hazardous materials), Road Transportation	
Emergency Coordinator actions	• Document the incident on an Incident Report form. • Notify and dispatch Health and Safety Officer and Emergency Response Team and ambulance if injuries are noted. If travel is restricted due to weather, establish direct radio/telephone communication linkages between the Health and Safety Officer and the First Responder. • Notify and engage Barama dispatcher; if the incident is on the Barama section of the road and Barama assumes an emergency response lead, offer additional equipment and/or Emergency Response Team assistance as appropriate. • Notify and engage Aurora or Buckhall convoy dispatcher, determine safest action for unaffected vehicles in convoy (shelter in place or continue to destination); direct First Responder or other qualified individuals to remain on site to assist in vehicle recovery and, if necessary, care/treatment of injured personnel. • If on the Aurora (M3) extension, facilitate the movement of additional equipment and/or emergency response teams as requested by the Health and Safety Officer, and manage any necessary clean- up /restoration efforts. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Stop convoy, secure accident site with barriers and/or assistance of other convoy drivers. • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, “First Aid and Emergency Medical Response.” • Contact Emergency Coordinator and communicate information as required or requested. • Remain on site to receive guidance from Emergency Coordinator and/or Health and Safety Officer ; at the Emergency Coordinator’s direction, authorize convoy to continue to destination.

Scenario # 3 – Vehicle Accident (no spills of bulk fuel or bulk quantities of hazardous materials), Road Transportation	
Health and Safety Officer actions	• Assess the relative "level" or severity of incident; notify Emergency Coordinator, and recommend response. Identify necessary resources and if a HAZMAT or other Emergency Response Team will be required (i.e., spillage of fuel or lubricants from damaged vehicle • Arrange for evacuation of injured personnel to Buckhall or Aurora medical clinics; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital • Assess potential for impacts to surface water spillage of fuel or lubricants from damaged vehicle and take immediate action to prevent impacts. • Identify and request any additional equipment that may be required to contain spillage or retrieve the damaged vehicle • Develop action plan to recover the damaged vehicle, address any spillage of fuel or lubricants from damaged vehicle, and ensure the safety of the adjacent roadway (i.e., repair damaged bridges or barriers)
Emergency Response Team actions	• Comply with Health and Safety Officer directions. • Locate delineate extent of any spillage of fuel or lubricants from damaged vehicle. • If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Buckhall or Aurora medical clinics or air evacuation to Georgetown Public Hospital. • Undertake cleanup per Health and Safety Officer's cleanup action plan.

Scenario # 3 – Vehicle Accident (no spills of bulk fuel or bulk quantities of hazardous materials), Road Transportation	
Other GGI management actions	• CSR Manager contact Barama community relations staff for coordination of any press releases. • VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager and Buckhall CRO engage Stakeholder Committee from Buckhall community per *Community Relations Management Plan* requirements. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

7.2 Emergency Scenarios - Buckhall Logistics Support Facility

Table 7.2-1 identifies three major emergency incident scenarios applicable to the Buckhall logistics support facility; these include:

- spills of fuel or dry or liquid chemicals (non-cyanide);
- spills due to a cyanide container delivery accident; and
- fuel explosion or fire.

Table 7.2-1: Buckhall Logistics Support Facility - Emergency Scenarios

Scenario # 4: Fuel or Dry/Liquid Chemical Spill, Buckhall Logistics Support Facility	
Incident – scenario description	• During fuel offloading or during temporary storage or staging of delivery containers, a fuel or non-cyanide dry/liquid chemical spill occurs due to a human error or accident that results in a leak or container or tank puncture or breach.

Scenario # 4: Fuel or Dry/Liquid Chemical Spill, Buckhall Logistics Support Facility	
Preventive measures	• All storage areas will comply with the Project *Hazardous Materials Management Plan*. • All bulk fuel deliveries shall be made in purpose-built, welded steel tanker trucks. • Bulk fuel deliveries will be made using a purpose-built fueling trestle and pipeline and floating containment boom. • Bulk fuel storage will be within concrete secondary containments sized to contain 110% of the largest contained tank, plus flowback. • All containerized fuel /reagent deliveries shall be made in plastic or metal totes, barrels, or drums, packed inside steel intermodal sea containers which shall not be opened unless destined specifically for use at the Buckhall site. • Contracted drivers shall be trained and licensed for delivery of hazardous materials and in delivery of first aid. • All vehicles will carry dry chemical fire extinguishers, spill kits, and first aid kits. • GGI forklift and crane operators will be trained, respectively, in in the requirements of GG-15, “Forklift Safety” and GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”, as well as the Project *Hazardous Materials Management Plan* and the *Buckhall Spill Contingency Plan* • All GGI vehicle operators will be trained in the requirements of : – GG-12, “First Aid and Emergency Medical Response”; – GG-13, “Transportation Safety - Light Vehicles”; – GG-14, “Handling and Storage of Hazardous Materials”; – GG-16, “Safe Operation of Heavy Equipment” (as appropriate); and – GG-24, “Recognition and Reporting of Safety Hazards.”

Scenario # 4: Fuel or Dry/Liquid Chemical Spill, Buckhall Logistics Support Facility	
Emergency Coordinator actions	• Document the incident on an Incident Report form. • Direct the immediate control and cleanup of the spill in accordance with the *Buckhall Spill Contingency Plan.* • Assess the magnitude of spill and relative "level" of incident; identify necessary resources and if a HAZMAT or other Emergency Response Team will be required. • Arrange for evacuation of injured personnel to Buckhall medical clinic; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital • Assess potential for impacts to surface water and take immediate action to prevent impacts. • Identify and request any additional equipment that may be required to contain the spill. • Develop action plan to halt the spill, contain the material, and stabilize the environment; coordinate with the Environmental Manager for acquisition of soil samples to determine completeness of cleanup and for storage or disposal of cleanup waste per GG-01, "Solid Waste Management (Pre-Construction Phase)" or *Waste Management Plan,* as well as for decontamination of waste handling equipment. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Secure the spill site with barriers or cones • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, "First Aid and Emergency Medical Response." • Contact Emergency Coordinator and communicate information as required or requested. • Remain on site to receive guidance from Emergency Coordinator and/or Health and Safety Officer
Health and Safety Officer actions	• None; role directly assumed by Emergency Coordinator.

Scenario # 4: Fuel or Dry/Liquid Chemical Spill, Buckhall Logistics Support Facility	
Emergency Response Team actions	• Comply with Emergency Coordinator directions. • Locate MSDS sheets for any spilled material and delineate extent of spill. • If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Buckhall or Aurora medical clinics or air evacuation to Georgetown Public Hospital. • Undertake cleanup per *Buckhall Spill Contingency Plan*.
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager and Buckhall CRO engage Stakeholder Committee from Buckhall community per *Community Relations Management Plan* requirements. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario # 5 – Cyanide Container Delivery Accident/Buckhall Logistics Support Facility	
Incident – scenario description	• During preparations for convoy transport from Buckhall to the Aurora site, a cyanide transport contractor vehicle accident occurs that breaches or compromises the integrity of the heavy wall stainless steel ISO container, leading to a spill of dry cyanide briquettes.
Preventive measures	• All cyanide will be purchased and delivered in accordance with the Project's ICMC-compliant *Cyanide Management Plan;* GGI will take ownership of the cyanide at the point of delivery, i.e., at the point the container is connected to mineral processing plant mixing lines at the Aurora site • Cyanide will be delivered in dry briquette form in intrinsically safe, certified dedicated heavy-wall stainless steel ISO containers rated for open water/ocean transport. • Cyanide deliveries will be made only by ICMC-certified transporters, subcontracted to the cyanide producer, who will be contractually obligated (and fully equipped) to execute all spill response actions en route to the Aurora site pending ownership transfer, including accidents while at the Buckhall facility. • The cyanide producer/transporter will provide a copy of its ICMC-approved emergency response plan for cyanide transport, for advance review and reference by GGI management. • Contracted drivers shall be trained and licensed for delivery of hazardous materials and in delivery of first aid, as well as all spill response actions required by the ICMC. • All GGI staff will be trained in the requirements of: – *Hazardous Materials Management Plan* – GG-12, "First Aid and Emergency Medical Response"; – GG-14, "Handling and Storage of Hazardous Materials"; – GG-15, "Forklift Safety" (as appropriate): – GG-16, "Safe Operation of Heavy Equipment" (as appropriate); and – GG-24, "Recognition and Reporting of Safety Hazards."

Scenario # 5 – Cyanide Container Delivery Accident/Buckhall Logistics Support Facility	
Emergency Coordinator actions	• Directly engage the transport contractor's lead driver, and offer assistance (equipment or Emergency Response Team personnel) as required or appropriate. • Contact the VP, Aurora Gold Project; the Environmental Manager; and the Procurement Manager (who shall immediately advise the cyanide supplier). • Assess the magnitude of spill and relative "level" of incident; monitor transport contractor's cleanup operations per contractor's ICMC-approved emergency response plan, notify Environmental Manager and Procurement Manager if significant deviations are noted. • Offer assistance in evacuation of injured personnel to Buckhall or Aurora medical clinics; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital. • Provide secure stage area for damaged container and any encapsulated cleanup waste pending return to the cyanide producer. • Document the incident on an Incident Report form. • Conduct post-cleanup incident investigation with cyanide producer and transporter representatives, with the assistance of the Environmental Manager and Procurement Manager, and undertake appropriate corrective/preventive action.
First Responder actions	• Contact Emergency Coordinator and transporter's lead driver, communicate information as required or requested.
Health and Safety Officer actions	• None; role assumed by Emergency Coordinator
Emergency Response Team actions	• None unless specifically directed by Health and Safety Officer, based on transport contractor's specific request.

Scenario # 5 – Cyanide Container Delivery Accident/Buckhall Logistics Support Facility	
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Procurement Manager engages cyanide producer/transporter to ensure effectiveness of corrective/preventive action with respect to future deliveries. • Environmental Manager contacts IFC representative. • CSR Manager and Buckhall CRO engage Stakeholder Committee from Buckhall community per *Community Relations Management Plan* requirements, advise on spill response and recovery actions conducted by transport contractor. • CSR Manager; VP, Aurora Gold Project; and GGI CEO develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario # 6: Buckhall Logistics Support Facility, Fuel Explosion/Fire	
Incident – scenario description	• At the Buckhall site an explosion or fire occurs that is associated with fuel storage facilities or fuel loading/unloading operations due to equipment failure, operator error, unidentified ignition source, electrical system failure or other causes.
Preventive measures	• All fuel storage areas will comply with the Project *Hazardous Materials Management Plan*. • Bulk fuel deliveries will be made using a purpose-built fueling trestle and pipeline and floating containment boom. • Bulk fuel storage will be within concrete secondary containments sized to contain 110% of the largest contained tank, plus flowback; portable dry chemical fire extinguishers are placed in all storage areas • Firefighting pumps and hoe assemblies are prepositioned to permit rapid response to fires not controlled by portable extinguishers; firefighting water will be pumped directly from the Essequibo River. • All GGI staff will be trained in the requirements of: – *Buckhall Spill Contingency Plan;* – *Hazardous Materials Management Plan* – GG-12, “First Aid and Emergency Medical Response”; – GG-14, “Handling and Storage of Hazardous Materials”; – GG-17, “Vehicle Fuelling and Spill Prevention” – GG-19, “Welding and Cutting Safety” – GG-20, “Electrical Safety”; – GG-22, :Fire Prevention Program”; and – GG-24, “Recognition and Reporting of Safety Hazards.”

Scenario # 6: Buckhall Logistics Support Facility, Fuel Explosion/Fire	
Emergency Coordinator actions	• Dispatch appropriately trained Emergency Response Team(s) to fight fire. • Arrange for evacuation of injured personnel to Buckhall medical clinic; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital • Assess potential for impacts to surface water and take immediate action to prevent impacts. • Identify and request any additional equipment that may be required to contain the fire. • Contact the Buckhall Community Relations Officer (CRO), who shall immediately contact the community Stakeholder Committee, advise them of the situation, and take steps to ensure the safety of community residents. • Develop action plan to control and extinguish the fire, and stabilize the environment; coordinate with the Environmental Manager for or disposal of fire cleanup waste per GG-01, "Solid Waste Management (Pre-Construction Phase)" or *Waste Management Plan.* • Advise GGI management in Georgetown (VP. Aurora Gold Project; Environmental Manager; CSR Manager). • Document the incident on an Incident Report form. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Notify security and sound fire alarm • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, "First Aid and Emergency Medical Response." • Contact Emergency Coordinator and communicate information as required or requested
Health and Safety Officer actions	• None; role directly assumed by Emergency Coordinator

Scenario # 6: Buckhall Logistics Support Facility, Fuel Explosion/Fire	
Emergency Response Team actions	• Respond to fire using appropriate PPE; comply with Emergency Coordinator directions. • If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Buckhall or Aurora medical clinics or air evacuation to Georgetown Public Hospital. • Advise Emergency Coordinator immediately if additional equipment (e.g., firefighting pumps and hose reels) or firefighting personnel are required .
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager and CRO engage key leaders from Buckhall community. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

7.3 Emergency Scenarios - Aurora Site

Table **7.3-1** identifies six major incident scenarios potentially applicable at the Aurora mine site; these include:

- spills of fuel or dry or liquid chemicals (non-cyanide);
- fuel explosion or fire
- flooding of the Cuyuni River and breaching of the dikes protecting the open pit and underground mining operations;
- slope failures, open pit highwalls;
- collapse in the underground mine; and
- TMA overtopping or embankment failure.

Table 7.3-1: Aurora Site - Emergency Scenarios

Scenario # 7: Fuel or Dry/Liquid Chemical (non-Cyanide) Spill, Aurora Site	
Incident – scenario description	• During offloading of fuel or dry/liquid chemical storage, a occurs due to a human error or accident that results in a leak, or in the puncture or breach of a container or tank.
Preventive measures	• All storage areas will comply with the Project *Hazardous Materials Management Plan*. • All bulk fuel deliveries from Buckhall to the Aurora site shall be made in purpose-built, welded steel tanker trucks. • Bulk fuel storage at Buckhall will be in API-complaint steel tanks within concrete secondary containments sized to contain 110% of the largest contained tank, plus flowback. • All containerized fuel /reagent deliveries shall be made in plastic or metal totes, barrels, or drums, packed inside steel intermodal sea containers. • GGI forklift and crane operators will be trained, respectively, in in the requirements of GG-15, “Forklift Safety” and GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”, as well as the Project *Hazardous Materials Management Plan* and the *Buckhall Spill Contingency Plan* • All GGI warehousing personnel will be trained in the requirements of : – GG-12, “First Aid and Emergency Medical Response”; – GG-14, “Handling and Storage of Hazardous Materials”; and – GG-24, “Recognition and Reporting of Safety Hazards.”

Scenario # 7: Fuel or Dry/Liquid Chemical (non-Cyanide) Spill, Aurora Site	
Emergency Coordinator actions	• Direct the immediate control and cleanup of the spill in accordance with the *Spill Prevention, Control, and Contingency Plan (Aurora Site Areas)* • Assess the magnitude of spill and relative "level" of incident; identify necessary resources and if a HAZMAT or other Emergency Response Team will be required. • Arrange for evacuation of injured personnel to Aurora medical clinic; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital. • Assess potential for impacts to surface water and take immediate action to prevent impacts. • Identify and request any additional equipment that may be required to contain the spill. • Develop action plan to halt the spill, contain the material, and stabilize the environment; coordinate with the Environmental Manager for acquisition of soil samples to determine completeness of cleanup and for storage or disposal of cleanup waste per GG-01, "Solid Waste Management (Pre-Construction Phase)" or *Waste Management Plan,* as well as for decontamination of waste handling equipment. • Document the incident on an Incident Report form. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Secure the spill site with barriers or cones • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, "First Aid and Emergency Medical Response." • Contact Emergency Coordinator and communicate information as required or requested. • Remain on site to receive guidance from Emergency Coordinator.
Health and Safety Officer actions	• None; role directly assumed by Emergency Coordinator.

Scenario # 7: Fuel or Dry/Liquid Chemical (non-Cyanide) Spill, Aurora Site	
Emergency Response Team actions	• Comply with Emergency Coordinator directions. • Locate MSDS sheets for any spilled material and delineate extent of spill. • If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Aurora medical clinic or air evacuation to Georgetown Public Hospital. • Undertake cleanup per *Spill Prevention, Control, and Contingency Plan (Aurora Site Areas).*
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager and Buckhall CRO engage Stakeholder Committee from Buckhall community per *Community Relations Management Plan* requirements. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario # 8: Aurora Site, Fuel Explosion/Fire	
Incident – scenario description	• At the Aurora site an explosion or fire occurs that is associated with fuel storage facilities or fuel loading/unloading operations due to equipment failure, operator error, unidentified ignition source, electrical system failure or other causes.
Preventive measures	• All fuel storage areas will comply with the Project *Hazardous Materials Management Plan*. • All bulk fuel deliveries from Buckhall to the Aurora site shall be made in purpose-built, welded steel tanker trucks. • Bulk fuel storage at Buckhall will be in API-complaint steel tanks within concrete secondary containments sized to contain 110% of the largest contained tank, plus flowback; portable dry chemical fire extinguishers are placed in all storage areas • All containerized fuel /reagent deliveries shall be made in plastic or metal totes, barrels, or drums, packed inside steel intermodal sea containers. • Firefighting pumps and hoe assemblies are prepositioned to permit rapid response to fires not controlled by portable extinguishers; firefighting water will be provided by a gravity tank. • All GGI staff will be trained in the requirements of: – *Hazardous Materials Management Plan* – GG-12, “First Aid and Emergency Medical Response”; – GG-14, “Handling and Storage of Hazardous Materials”; – GG-17, “Vehicle Fuelling and Spill Prevention” – GG-19, “Welding and Cutting Safety” – GG-20, “Electrical Safety”; – GG-22, :Fire Prevention Program”; and – GG-24, “Recognition and Reporting of Safety Hazards.”

Scenario # 8: Aurora Site, Fuel Explosion/Fire	
Emergency Coordinator actions	• Dispatch appropriately trained Emergency Response Team(s) to fight fire. • Arrange for evacuation of injured personnel to Aurora medical clinic; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital. • Assess potential for impacts to surface water and take immediate action to prevent impacts. • Identify and request any additional equipment that may be required to contain the fire. • Advise GGI management in Georgetown (VP. Aurora Gold Project; Environmental Manager; CSR Manager). • Develop action plan to control and extinguish the fire, and stabilize the environment; coordinate with the Environmental Manager for or disposal of fire cleanup waste per GG-01, "Solid Waste Management (Pre-Construction Phase)" or *Waste Management Plan.* • Document the incident on an Incident Report form. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Notify security and sound fire alarm • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, "First Aid and Emergency Medical Response." • Contact Emergency Coordinator and communicate information as required or requested.
Health and Safety Officer actions	• None; role directly assumed by Emergency Coordinator.

Scenario # 8: Aurora Site, Fuel Explosion/Fire	
Emergency Response Team actions	• Respond to fire using appropriate PPE; comply with Emergency Coordinator directions. • If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Buckhall or Aurora medical clinics or air evacuation to Georgetown Public Hospital. • Advise Emergency Coordinator immediately if additional equipment (e.g., firefighting pumps and hose reels) or firefighting personnel are required. .
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario #9: Cuyuni River Floods and Breaches Protective Dikes	
Incident – scenario description	Extreme weather conditions greater that the probable maximum (1:10,0000 year) flood (PMF) event cause the breaching of one or more protective dikes resulting in the flooding of open pit and underground mining operations
Preventive measures	• Design of dikes for 1:10,000 year PMF. • Installation of relief wells on the pit side toes of the dikes. • Daily monitoring of dike faces for signs of excessive erosion per the *Erosion Prevention and Control Plan*. • Daily monitoring of the river stage, rainfall, and water levels in relief wells; and pumping of water from relief wells where accumulation is significant. • Prepositioning of water management pumps and pipeline assemblies to permit rapid response to increased pit/underground dewatering needs. • All GGI staff will be trained in the requirements of GG-24, “Recognition and Reporting of Safety Hazards.”
Emergency Coordinator actions	• Notify and dispatch Health and Safety Officer/geotechnical engineer to assess situation • Order immediate evacuation of pit and underground mining areas. • Facilitate the movement of emergency equipment and/or emergency response teams as requested by the Health and Safety Officer. • Document the incident on an Incident Report form. • Conduct incident investigation and assist in the development of appropriate corrective/preventive action.
First Responder actions	• Notify security and sound general evacuation alarm. • Contact Emergency Coordinator and communicate information as required or requested.

Scenario #9: Cuyuni River Floods and Breaches Protective Dikes	
Health and Safety Officer actions	• Confirm evacuation of pit and/or underground work areas. • Assess the magnitude of the event and relative "level" of incident; notify Emergency Coordinator, and recommend appropriate response. Identify necessary resources and if one or several Emergency Response Teams will be required. • Develop an action plan to stabilize any breaches or potential breaches in the dikes, with input from the TMA design contractor and the Construction Manager.
Emergency Response Team actions	• Comply with Health and Safety Officer directions. • If not already done, seal off dangerous areas with barriers, warning cones, and/or exclusion tape. • Assist in execution of Health and Safety Officer's action plan.
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager; VP, Aurora Gold Project; and GGI CEO develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario #10: Slope Failure in Pit Highwalls	
Incident – scenario description	Extreme weather conditions or geotechnical instability generates conditions leading to failure (landslides) in pit highwalls, potentially endangering workforce in pit
Preventive measures	• Daily visual monitoring of highwall faces for signs of slippage or excessive erosion. • Daily monitoring of the river stage, rainfall, and water levels in Cuyuni River dike relief wells; and pumping of water from relief wells where accumulation is significant. • All GGI staff will be trained in the requirements of GG-24, "Recognition and Reporting of Safety Hazards."
Emergency Coordinator actions	• Notify and dispatch Health and Safety Officer/geotechnical engineer to assess situation • Order immediate evacuation of pit areas and headcount to determine if all workers are accounted for. • Facilitate the movement of emergency equipment and/or emergency response teams as requested by the Health and Safety Officer. • Document the incident on an Incident Report form. • Conduct incident investigation and assist in the development of appropriate corrective/preventive action.
First Responder actions	• Notify security and sound general evacuation alarm. • Contact Emergency Coordinator and communicate information as required or requested.

Scenario #10: Slope Failure in Pit Highwalls	
Health and Safety Officer actions	• Confirm evacuation of pit work areas. • Assess the magnitude of the event and relative "level" of incident; notify Emergency Coordinator, and recommend appropriate response. Identify necessary resources and if one or several Emergency Response Teams will be required. • Develop an action plan to stabilize the pit highwalls, with input from the mine design contractor/geotechnical engineer and the Construction Manager.
Emergency Response Team actions	• Comply with Health and Safety Officer directions. • If not already done, seal off dangerous areas with barriers, warning cones, and/or exclusion tape. • Assist in execution of Health and Safety Officer's action plan.
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager; VP, Aurora Gold Project; and GGI CEO develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario # 11: Collapse in Underground Mine	
Incident – scenario description	A collapse occurs in active underground mining areas, spiral declines, or adit at the Rory's Knoll underground mine that traps one or more miners.
Preventive measures	• Mine construction/rockbolting/tunnel stabilization in accordance with final approved mine design and observed geotechnical conditions • Mine design with designated emergency shelter areas and egress provisions via ventilation raises. • Geotechnical/geomechanical conditions in underground monitored in compliance with final approved mine design. • All underground mining staff will be trained in the requirements of: – GG-12, "First Aid and Emergency Medical Response"; and – GG-24, "Recognition and Reporting of Safety Hazards", with emphasis on underground hazards. • Emergency Response Team(s) will be trained in underground mine rescue techniques; at least one full team will be onsite at all times during active underground mining operations. • Portal access control and underground personnel tracking system established to facilitate tracking and positive identification of all personnel working underground. • All underground miners trained in self-rescue methods and supplied with emergency breathing air, and other supplies in addition to regular PPE.

Scenario # 11: Collapse in Underground Mine	
Emergency Coordinator actions	• Dispatch appropriately trained Underground Rescue/ Emergency Response Team(s) and Health and Safety Officer • Arrange for emergency drilling or excavation and evacuation of injured personnel to Aurora medical clinic; if injuries are serious, arrange for air evacuation to Georgetown Public Hospital. • Identify and request any additional equipment that may be required. • Advise GGI management in Georgetown (VP. Aurora Gold Project; Environmental Manager; CSR Manager). • Document the incident on an Incident Report form. • Conduct incident investigation and undertake appropriate corrective/preventive action.
First Responder actions	• Notify security and sound fire alarm • If qualified, provide stabilizing emergency first aid to injured persons per GG-12, “First Aid and Emergency Medical Response.” • Contact Emergency Coordinator and communicate information as required or requested.
Health and Safety Officer actions	• Perform headcount to determine if any miners are missing; review mining plans to locate likely work areas with missing personnel. • Develop action plan to access and recue missing personnel, in conjunction with Emergency Response Team

Scenario # 11: Collapse in Underground Mine	
Emergency Response Team actions	• If not already done, seal off the area with barriers, warning cones, and/or exclusion tape; if personnel injuries are noted, assist in evacuation to Buckhall or Aurora medical clinics or air evacuation to Georgetown Public Hospital. • Review safety procedures; inspect communications, PPE, and other safety equipment; and enter mine to search for missing personnel in accordance with action plan developed by Health and Safety Officer. • Advise Health and Safety Officer and Emergency Coordinator immediately if additional equipment or personnel are required. .
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

Scenario #12: TMA Overtopping or Embankment Failure	
Incident – scenario description	• Extreme weather conditions beyond the design storm event cause overtopping of the TMA or a breach on one or more TMA embankments
Preventive measures	• Adherence to all parameters for dam construction and construction quality assurance (CQA) inspection as specified in the final design parameters for the TMA. • Monitoring and maintenance of emergency freeboard as defined in final TMA design and *Tailings Area Management Plan.* • Monitor decant pond level and geotechnical condition of TMA and downstream dilution structures (TMA Diversion Ponds 1 and 2 and any addition settling pond) on daily basis per *Tailings Area Management Plan* and *ESMS Monitoring Plan.* • If monitoring reveals worsening or unexpected conditions, ensure clear passage on TMA spillway, shut down mill and process plant and tailings pipelines, pump down decant pond, pump down TMA diversion Ponds 1 and 2, and otherwise minimize inflow into TMA by placement of diversion berms or dikes.
Emergency Coordinator actions	• Notify and dispatch Health and Safety Officer to assess situation • Order immediate evacuation of downgradient areas below compromised embankments. • Facilitate the movement of emergency equipment and/or emergency response teams as requested by the Health and Safety Officer. • Document the incident on an Incident Report form. • Conduct incident investigation and assist in the development of appropriate corrective/preventive action.
First Responder actions	• Move upgradient as soon as possible, contact Emergency Coordinator and communicate information as required or requested. • Remain on site to receive guidance from Emergency Coordinator and/or Health and Safety Officer.

Scenario #12: TMA Overtopping or Embankment Failure	
Health and Safety Officer actions	• Assess the magnitude of the event and relative "level" of incident; notify Emergency Coordinator, and recommend appropriate response. Identify necessary resources and if a HAZMAT or other Emergency Response Team will be required • Develop action plan to stabilize an breaches or potential breaches and prevent/mitigate waterway impacts, with input from the TMA design contractor and the Construction Manager. • Once stabilized, initiate downstream sampling for residual weak acid dissociable (WAD) cyanide in TMA effluent/receiving waterways
Emergency Response Team actions	• Comply with Health and Safety Officer directions. • If not already done, seal off dangerous areas with barriers, warning cones, and/or exclusion tape. • Assist in execution of Health and Safety Officer's action plan.
Other GGI management actions	• VP, Aurora Gold Project identifies local, regional and national government agencies and private organizations that need to be informed, and makes appropriate contacts. • Environmental Manager contacts IFC representative. • CSR Manager and GGI Community Relations Officers (CROs) engage Stakeholder Committee/key leaders from Aranka Mouth and key leaders of any potentially impacted groups (e.g., personnel engaged in ASM downstream from the mine site). Arrange for potable water supplies to be transported to Aranka Mouth if sampling indicates WAD_{CN} values in the Cuyuni River $\underline{>}$ 0.5 mg/L. • CSR Manager; VP, Aurora Gold Project; and GGI Chief Executive Officer (CEO) develop appropriate press releases to be shared with Guyana EPA, other governmental organizations or external stakeholders.

8 Communication and External Coordination

Effective communication during an emergency situation can often mean the difference between a small scale incident and a major catastrophe. Timely and accurate communication calms anxiety and alleviates fear and uncertainty.

There are three major types of communications systems that will be essential in an emergency situation: 1) emergency alarms and notification chains that help involved parties to understand and respond to situations correctly; 2) communications chains and networks to notify external stakeholders and communities who may be impacted, along with third party responders who may be called upon to assist; and 3) protocols and procedures to guide engagement and communication with the media and the wider public.

8.1 Communications Systems

Point-to-point satellite communication will be the main communication system between the mine and rest of the world. The system includes voice/data/video/fax, and internet services, including links between the mine site and the GGI office in Georgetown.

A backup/emergency satellite system will also be provided for redundancy. The backup/emergency system includes voice/data/fax, TV and internet access for a minimum number of users. VHF/UHF radio communication will be available within a 10 km radius from the process plant area.

The phone system will be a voice over internet protocol. End-to-end IP video connectivity with business quality transmission will provide video conferencing capabilities. At least three satellite phones installed at strategic areas will be provided for emergency communications.

The connection between IT devices and end-users will be via a network system capable of providing high-throughput, secure, reliable and redundant service for data and voice. The network system will be connected to business networks through routers with firewalls and will provide remote access as required. All the remote access will have security and encryption to prevent unauthorized access to the system.

8.2 Internal Communication Procedures

Cell phones, two- way radios, and land lines are all in use for normal business communications. These items are all available for use during emergency situations as well.

In addition, Emergency Coordinators, the Health and Safety Officer, and their alternates will carry portable two way radios while on site and will carry cell phones and pagers when “on call” and off site. Two-way radios will normally be used to communicate instructions to and from the Emergency Coordinators, Health and Safety Officer, and responders during emergency events.

The Aurora and Buckhall sites will have two alarm systems: a site-wide system that can be heard from all areas, and specific building/site alarms. The site-wide system will be used to notify all employees, contractors, and visitors if a site-wide evacuation is required. This system may only be activated by the Emergency Coordinator or a Health and Safety Officer, or at their

direction. The area or building-specific alarms will have distinct tones from the site wide alarm. Area or building-specific alarms will be used to notify persons at or near a particular building or area of an incident or the need for evacuation, and may be activated by any First Responder or anyone observing or being made aware of a potential incident.

A continuous, sustained tone blast from either alarm system (site or Project) shall signal the need for immediate evacuation. An evacuation can also be triggered on a voice command from a First Responder, Health and Safety Officer, or Emergency Coordinator. Personnel in or near a specific building or area shall follow pre-determined evacuation procedures.[2] In the event of a sustained tone from the project alarm, all personnel should immediately begin to implement applicable evacuation procedures. Employees in critical operational positions should follow predetermined procedures for systems shutdown. All emergency response team members should report to pre-assigned emergency situations.

A verbal "all clear" will be announced over the loudspeaker and two-way radio systems to indicate an all clear. The all clear command can only be given by the Emergency Coordinator.

In the event of a site specific incident, the project alarm may be used to notify others on site of the occurrence. A series of five-second blasts, followed by two-second pauses will indicate that a Level 1-4 emergency has occurred (and in the case of Level 3 or 4 emergencies, will alert those present to the potential need for near future evacuation). In the event of such an alarm, employees and others should remain in place and continue normal activity. The Health and Safety Officer and Emergency Responders should stand by for further instructions to be communicated by two-way radio.

In addition to the alarm systems, all buildings will have loudspeaker systems and emergency locker/supply stations will each have bullhorns in order to facilitate verbal communication.

8.3 External Communications Procedures

There are three primary external audiences with whom communication will be critical during an emergency event: 1) external stakeholders who may be impacted by the incident; 2) family members of employees who may have been impacted by the incident, and 3) the media. Communication with and between the appropriate regulatory and governmental agencies and required reporting will be handled by the GGI CEO; the VP, Aurora Gold Project; the CSR Manager; the Environmental Manager; and the Health and Safety Officer as appropriate.

In the event of an incident that has immediate or near-term potential to impact the health and safety of external stakeholders in the Buckhall community, the Health and Safety Officer will immediately notify the CSR Manager, who will work with the impacted community to activate and implement pre-determined evacuation and/or response procedures.

[2] To be developed during the major construction phase after completion of final facility designs and key operational management plans, e.g., the *Tailings Area Management Plan, Mill/Leach Plan Operations Plan, Blasting Management Plan,* and *Annual Mining Plan.*

The VP, Aurora Gold Project; the CSR Manager; the CRO; the Environmental Manager; and the Health and Safety Officer will also assist in the development of any press releases; the CEO must approve all such statements prior to release or to any website postings.

The VP, Aurora Gold Project or the CSR Manager, if delegated, will have primary responsibility for communicating with family members and relatives of employees who may be injured or killed on site or in a work related incident.

The CSR Manager will develop and maintain a current list of local and regional media outlets and their contact information (in particular TV and radio).

9 Emergency Response Equipment

The Project will maintain an appropriate inventory of emergency response equipment. The Emergency Coordinator shall, with the leads for the fire and HAZMAT brigades, ensure that the equipment is included in the Project's automated preventive maintenance system to help ensure that it is regularly serviced and maintained in proper working order.

It shall be the responsibility of the Health and Safety Officer to ensure that the fire and HAZMAT brigades are properly trained in the use and management of the equipment. HAZMAT and fire teams will drill with their equipment quarterly.

9.1 Fire Fighting Equipment

- **Vehicles:** All GGI and contractor vehicles (e.g., heavy trucks/equipment, light trucks, buses, ambulances) are required to carry a dry chemical fire extinguisher.
- **Fire Trucks:** GGI will maintain fire trucks at both the Aurora and Buckhall sites, ready for use on a 24-hour basis.
- **Portable Fire Extinguishers:** At the Aurora site, appropriately sized portable dry chemical fire extinguishers will be located throughout all individual buildings (including living quarters and in food preparation areas), warehouse and storage areas, administration buildings, fuelling facilities and power generation plant, crusher facilities, the mill and process plant, and at individual shop or work station locations in the underground mine, Fire extinguishers will also be located inside any storage facilities that may be constructed or erected at Buckhall Landing or at Kingston Warf. The location of fire extinguishers will be noted on a schematic diagram and/or map and will be included in the Emergency Response notebook.
- **Fire Suppression Systems:** Portable fire pumps and high-pressure hose reels are provided at Buckhall in the event of a major fire. Appropriately engineered fire suppression systems for the mill and mineral separation plant, fuel storage tanks and dispensing areas, power plant, warehouse area, man-camp, and other facilities at the Aurora site will be defined as part of final design prior to the major construction phase of the Project.

9.2 Other Vehicles

In the event of a major emergency, such as a pit highwall or dike failure, the Project has a number of vehicles that may be called into service to support emergency earthworks, road repairs, spill containment, or personnel evacuation. These include:

- ambulance trucks/rescue vehicles;
- tracked bulldozers;
- rubber-tired bulldozers;
- road graders;
- water trucks;

- drum compactor;
- flatbed trucks;
- extended cab mine pickup trucks;
- passenger vans or buses;
- maintenance and service trucks;
- utility backhoes;
- tractors;
- hydraulic cranes;
- haul/dump trucks; and
- outboard motor-powered work boats (for Buckhall and Tapir Crossing).

9.3 Emergency Response Lockers

One or several emergency response equipment lockers will be placed at strategic Project locations; at a minimum, lockers shall be established at a mine recue station by the underground mine portal; the mill/mineral processing plant; the Buckhall logistics support facility, and the guardhouses at Tapir Crossing. Inventories may be adjusted by the Health and Safety Officer based on the range of activities routinely conducted at each location, but will consider the master inventory presented in **Table 9.3-1**.

Table 9.3-1: Master Inventory List, Emergency Response Equipment

Emergency Response Equipment	***Comments***
Rubber gloves	Rated for potential fuel/chemical spills
Tyvek coveralls	Rated for potential fuel/chemical spills
High boots	Rated for potential fuel/chemical spills
High-visibility plastic cones and warning tape	For controlling access to spill/accident site
Self-Contained Breathing Apparatus (SCBA)	Required at mineral processing plan/detoxification plant, mine rescue station at underground mine portal, and Buckhall logistics support facility
Portable hydrogen cyanide gas (HCN) monitors	Required at mineral processing plan/detoxification plant, and Buckhall logistics support facility
Portable winches, climbing rope, hoist points, safety harnesses, high-visibility overalls, rock helmets, straps, escape oxygen, atmospheric oxygen monitors, other appropriate mine rescue hardware	For the mine rescue station at the underground mine portal

Emergency Response Equipment	*Comments*
Two-way radios	For Emergency Coordinator, Health and Safety Officer , and Emergency Response Team communications
Spill response kits, with absorbent pads, barriers, and dry granular absorbent	Rated for potential fuel/chemical spills
Push brooms,	For dry spill clean-up
Scoop and fire shovels	For dry spill clean-up and utility use
Battery-powered bullhorns	For emergency site communication
First Aid Kits	Rate for at least 25 people, with cyanide antidote kits and emergency oxygen tank (for Buckhall and Aurora sit mineral processing plant
Portable eyewash stations	--
Back board/emergency litter	Required at mineral processing plan/detoxification plant, mine resource station at underground mine portal, and Buckhall
Portable flashlights with spare batteries	--
Bottled potable water supplies	For first aid/emergency worker use
Plastic tarpaulins/sheeting	--
Duct tape	For sealing coveralls, other utility purposes
Portable suction pumps and suction/discharge hoses	Rated for potential fuel/chemical spills
Plastic waste collection bags and drums	--

9.4 Emergency Lighting

Emergency lighting equipment portable generators will be stored and maintained at Buckhall and the Aurora site.

9.5 Materials Safety Data Sheets

Hard copies of all applicable MSDS will be maintained with the Health and Safety Officer in the administration building, in the emergency response lockers, and with the HAZMAT and fire brigade and other Emergency Response Teams.

9.6 Emergency Response Notebooks

The Emergency Coordinator shall ensure that emergency response notebooks or binders are be kept in each emergency response locker, including lockers at Buckhall and Tapir Crossing and with the fire and HAZMAT team leads. Notebooks shall contain key MSDSs, and copies of Emergency Response Plan Tables based on the emergency response scenarios presented in Section 7, an up-to-date contact list, maps of evacuation plans, and maps of emergency response locker locations. In addition, each person qualified to serve as a Health and Safety Officer shall have their own copy of the notebook.

10 Recovery from Emergency Situations

The Environmental Coordinator or assigned Health and Safety Officer will remain in control of the site until it has been determined that the situation is stabilized; all impacted persons have been notified, evacuated, and treated (as the situation warrants); all fires are extinguished; spills stopped and contained; and the risk of immediate recurrence is deemed minimal. It will be the responsibility of the Health and Safety Officer to conduct and confirm personnel accountability in accordance with relevant SOP's before sounding the all clear.

10.1 All Clear Signal

The Emergency Coordinator or Health and Safety Officer will make the final determination to sound an "all clear" signal. The all clear signal will consist of a series of 10 one-second blasts on the site-wide alarm system. If employees have been evacuated from a building or work area and all personnel have been accounted for by the Emergency Coordinator or Health and Safety Officer , the all clear signal may be considered as an indication that it is safe to return to work.

10.2 Return to Regular Operations

In the event of an emergency that required a facility shut down or caused an interruption of regular operations, the start-up and return to normal operations will be contingent on the completion of all predetermined start-up procedures relevant to the affected area. The all clear alarm does NOT signal the completion of the necessary start-up protocols for interrupted or shut down operations. Employees should NOT restart or initiate start-up procedures and protocols until they receive instructions from their area supervisors.

If an event involves the use of HAZMAT teams or other Emergency Response Teams, employees involved in the incident, emergency response personnel, emergency response equipment, buildings, processing equipment, secondary containment systems, and floors all may have come into contact with hazardous materials. All personnel must be decontaminated prior to returning to normal operations as noted in Section 11.

11 Post-Emergency Mitigation

Once the initial emergency situation has been contained, long-term responsibility for clean-up and mitigation will be returned to the Emergency Coordinator. The Health and Safety Officer and emergency response team members are responsible ONLY for responses during the emergency (e.g., stopping and containing spills, medical services to stabilize injured persons, fire fighting or conducting rescue or evacuation operations). Once the situation is stabilized, clean-up and decontamination operations are the responsibility of the Emergency Coordinator and other delegated departments, organizations, or contractors. These actions will likely involve production, maintenance, environmental, and health and safety departments.

11.1 Post-Emergency Actions

After the situation has been stabilized and the Health and Safety Officer has sounded the all clear, the Emergency Coordinator will ensure that the following actions occur:

- full documentation of the incident; see Figure 5.1-1;
- investigation of the overall effectiveness of the response, to review the requirements of this *Emergency Preparedness and Response Plan* and any associated SOPs, and to undertake modifications or improvements based on lessons learned;
- follow up communications with any regulatory agencies and community representatives;
- ensure that all emergency equipment and supplies are cleaned, replaced, and fit for use before operations are resumed;
- develop a long-term clean-up or restoration plan, if required;
- develop a plan to treat, store, or dispose of recovered waste, contaminated soil or surface water, or any other material that results from the incident.

11.2 Clean-up Plan

At a minimum, the aforementioned clean-up plan shall include or address the following:

- Immediate actions that must be taken before normal operations can be restored and operations that were shut down or interrupted returned to normal operation;
- longer-term actions that must be taken to fully restore the facility to pre-emergency/incident conditions;
- assessment of PPE required for all non-routine clean-up activities;
- compliance with the *Occupational Health and Safety/Accident Prevention Plan* and applicable safety SOPs;
- identification of additional training necessary for personnel to be able to handle new, non-routine clean-up associated tasks;

- protocols for industrial hygiene monitoring;
- protocols for environmental sampling (as required);
- assessment of clean-up equipment required;
- protocols for clean-up waste classification, handling, and disposal;
- process for any required decontamination of buildings and process equipment;
- work plan (including schedule) for decontamination, clean-up, and site restoration; and
- recommendations (including schedule and draft purchase orders) for any specific outside contractor support.

11.3 Employee Decontamination

Any employee whose clothing or person comes into direct contact with a hazardous substance that is potentially acutely harmful through skin and eye contact or through inhalation must be immediately be decontaminated by:

- removing contaminated clothing;
- proceeding to a safe emergency shower or eye station which is away from the hazard;
- flushing the affected areas for a minimum of 15 minutes;
- receiving first aid care on site; and
- being taken to the Aurora or Buckhall medical clinic for examination and additional treatment (in the clinics or at the Georgetown Public Hospital) as required.

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11.4 Emergency Response Personnel Decontamination

In the event of First Responder or Emergency Response Team contamination, all contaminated clothing should be immediately removed and properly disposed of as hazardous waste (or properly cleaned for re-use if appropriate). Exposed personnel should shower and put on clean clothing before leaving GGI property or returning to the Aurora or Buckhall accommodation areas.

If a First Responder or Emergency Response Team is overcome by hazardous materials and becomes unconscious, other Emergency Response Team must decontaminate the unconscious person before he or she is released for transport to a first aid or medical facility. Decontamination should be sufficient to prevent possible danger to medical personnel but should not impede transport to or receipt of medical assistance. Paramedics or medical transport team members must be informed of the exposure and provided with MSDS for those materials.

11.5 Equipment Decontamination

All emergency response equipment involved incident response and clean-up must be cleaned and returned to working order before being returned to normal operations.

Washing down the affected equipment with a mild alkaline solution will usually be sufficient. However, MSDSs should be consulted in case additional efforts are required. The Emergency Coordinator or Health and Safety Officer should ensure that all washing liquids (and any solids that may be removed) are captured and properly handled and disposed of (i.e., by evaporation in the Aurora site lined event pond, or disposal in the Mine Water Pond).

11.6 Clean-up Committees and Community Clean-up Plan

In the event of an offsite incident at Buckhall, similar protocols will be followed. The Emergency Coordinator will assume primary leadership for managing the clean-up and response. Protocols for investigation, decontamination, and development of a clean-up plan outlined in the previous sections will also apply. In this instance, stakeholders and the Buckhall Stakeholder Committee representatives will be involved in the development of a long-term clean-up plan, in keeping with the requirements of the *Community Relations Management Plan*.

The community clean-up plan shall address (at a minimum) the following:

- implementation of immediate actions that must be taken to prevent further human health and environmental impacts;
- establishing clean-up goals and guidance;
- establishing longer-term actions that must be taken to restore the environment and community to pre-emergency conditions;
- assessment of PPE required for any non-routine clean-up activities;
- identification of additional training necessary for personnel to be able to handle new, non-routine clean-up associated tasks;
- establishment of protocols for industrial hygiene monitoring and environmental sampling (as required);
- assessment of clean-up equipment required;
- establishment of protocols for clean-up waste classification, handling, and disposal;
- defining the process of decontamination of buildings and process equipment;
- development of a work plan (including schedule) for decontamination, clean-up, and site restoration;

- recommendations (including schedule and draft purchase orders) for any specific outside contractor support;

- development of procedures and schedule for decontamination of soils, surface water and groundwater, vegetation or wildlife, buildings, residences, or other properties; and

- establishment of procedures for decontamination and/or replacement and storage of all equipment used during the emergency and recovery period.

12 Incident Investigation and Documentation

Documentation of the incident should begin with the filing of the initial incident report (see Figurer 5.1-1). During the incident, the Emergency Coordinator or assigned Health and Safety Officer on site should be maintaining a log of activities and events related to the incident. These documents will form the basis of post incident analysis and reporting. The Emergency Coordinator is responsible for reviewing these and other documents and records. All records should be maintained in accordance with GG-05, “Records Management.”

Based on this review, recommendations for modification of procedures and protocols may be made. In addition, new protocols and procedures may be proposed to ensure that similar incidents do not occur in the future.

The incident investigation goals are to determine (and document):

- the root cause of the incident;
- if appropriate emergency response actions were taken;
- if the plans and protocols for emergency response were effective; and
- corrective and preventive actions that should be taken to prevent recurrence.

13 Emergency Preparedness

GGI will train personnel and conduct periodic inspections and drills to ensure that personnel have the necessary knowledge and skills to effectively respond in an emergency situation, and that emergency response systems are maintained in good working order.

13.1 Training

All employees and Emergency Response Team members shall have emergency preparedness training and shall participate in periodic drills as per the requirements of this plan. All training shall be documented and recorded in accordance with GG-05, “ESMS Training Program.”

13.1.1 General Training

All employees shall have training in basic cardio-pulmonary resuscitation (CPR) and emergency first aid per GG- 12, “First Aid and Medical Response”, and shall have reviewed and read all MSDS relevant to their work areas. Employees shall also receive training on the use of portable fire extinguishers per GG-22, “Fire Prevention Program” and the use of personal protective equipment (PPE) in accordance with GG-11, “Personal Protective Equipment.”

13.1.2 Emergency Response Team Member Training

All personnel serving as part of an Emergency Response Team or fire brigade shall receive annual training in the following:

- respiratory protection training per GG-11, “Personal Protective Equipment”;
- lockout/tag-out training per GG-36, “Lockout/Tag-out Requirements”;
- confined space entry training per GG-21, “Confined Space Work Safety”;
- fire prevention, protection, and fire-fighter training per GG-22, “Fire Prevention Program”;
- ladder/scaffolding and fall protection training per GG-38, “Working from Heights”;
- first aid training per GG-12, “First Aid and Emergency Medical Response”, as well as blood-borne pathogen and CPR training.

13.1.3 HAZMAT Team Training

All persons serving as part of a HAZMAT team and/or persons who shall be selected to serve as ICs shall have, at minimum, the following training:

- Hazard communication training per GG-24, “Recognition and Reporting of Safety Hazards”; and

- Initial HAZMAT response and HAZMAT personal protective equipment training.

In addition, HAZMAT team members shall receive annual refresher training in:

- respiratory protection training per GG-11, “Personal Protective Equipment”;

- lockout/tag-out training per GG-36, “Lockout/Tag-out Requirements”;

- confined space entry training per GG-21, “Confined Space Work Safety”;
- fire prevention, protection, and fire-fighter training per GG-22, “Fire Prevention Program”;
- ladder/scaffolding and fall protection training per GG-38, “Working from Heights”;
- first aid training per GG-12, “First Aid and Emergency Medical Response”, as well as blood-borne pathogen and CPR training.

13.1.4 Medical Personnel Training

All persons serving as part of a medical team shall receive the same training as the HAZMAT team, plus appropriate medical technician training.

13.2 Inspections

Inspections of emergency response equipment will be conducted by the Health and Safety Officer on a quarterly basis in accordance with GG-03, “Field Inspections” in order to ensure that equipment is in place and in proper working order and in place. The results of these inspections and any necessary corrective /preventive actions will be retained on file in accordance with GG-05, “Records Management.”

All bulk storage tanks containing fuels, reagents, chemicals or other hazardous materials shall be subject to ultrasonic thickness testing every two years, for corrosion monitoring purposes; they will also be inspected by plant operators or Preventive Maintenance (PM) personnel on a daily basis. This inspection will include a visual inspection for tank integrity; signs of leaks bulges, rusting or other indications of chronic or potential failure; condition of the secondary containment systems; condition of piping and pumping systems; and conditions of bermed areas, and conditions of loading and unloading pads. Inspection results shall be logged by the operator or PM technician; the numbers of work orders issued to resolve any noted conditions shall be noted in the log book.

13.3 Testing/Mock Drills

All building and area alarms and the plant wide alarm system will be sounded at 12:00 noon every Monday. A full test of all alarms and communications systems on site will be conducted quarterly to ensure that they are in proper working order. The results of these tests will be documented and placed in the operations log book.

Communications systems (including phone extensions, two way communication systems and other key communications systems) shall be tested quarterly.

Full response/call-out drills for onsite and offsite emergencies will be conducted once annually. Following the drills a full review of the protocols and procedures established by this *Emergency Preparedness and Response Plan* will take place and any modifications or recommendations made will be record in the revision history table on the second page of this plan.

13.4 Review and Maintenance of the Response Plan

13.4.1 Annual Review of Plan

This *Emergency Preparedness and Response Plan* will be reviewed after each actual emergency and at least annually in those years in which no emergency occurs. Initiation and coordination of the review is the responsibility of the Environmental Manager, with the assistance of the Health and Safety Officer and Emergency Coordinators. The review will determine:

- if the emergency plan, emergency response organization, and emergency procedures are adequate or need to be modified;
- amend the plan to be current with facility operations, equipment, and personnel;
- amend the plan to be consistent with the community emergency plan;
- obtain GGI management approval; and
- ensure that all distributed copies of the plan are current.

13.4.2 Document Control

Distribution of the *Emergency Preparedness and Response Plan* shall be controlled in compliance with GG-07, “Distribution and Control of ESMS Documents.” Unauthorized copying or distribution of the Emergency Preparedness and Response Plan is expressly prohibited.

References

Internal References

- GG-03, “Field Inspections”;
- GG-04, “Identification of Non-conformances and Corrective/Preventive Action;”
- GG-05, “Records Management”;
- GG-06, “ESMS Training Program”;
- GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks”;
- GG-11; “Personal Protective Equipment”;
- GG-12, “First Aid and Emergency Medical Response”;
- GG-13, “Transportation Safety – Light Vehicles”
- GG-14, “Handling and Storage of Hazardous Materials”;
- GG-15, “Forklift Safety”;
- GG-16, “Safe Operation of Heavy Equipment”;
- GG-17, “Field Fuelling and Spill Prevention”;
- GG-19, “Welding and Cutting Safety”;
- GG-22, “Fire Prevention Program”;
- GG-24, “Recognition and Reporting of Safety Hazards”;
- GG-36, “Lockout/Tag-out Requirements”;
- GG-37, “Control of Erosion and Sedimentation”;
- GG-38, “Working from Heights”;
- GG-39, “Monitoring and Maintenance of Potable Water Quality”;
- GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes:
- *Cyanide Management Plan;*
- *Buckhall Spill Contingency Plan*
- *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas);*
- *Emergency Preparedness and Response Plan;*
- *Overburden Management Plan;*
- *Tailings Area Management Plan;*
- *Annual Mining Plan*
- *Mill/Leach Plant Operations Plan;*
- *Waste Management Plan;*
- *Blasting Management Plan;*
- *Transportation Management Plan*
- *Community Relations Management Plan*
- *Influx Management Plan;* and
- *ESHS Monitoring Plan.*

External References

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Hazardous Materials Management Plan

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
Seattle, WA

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Record of Revisions

Revision Level -0-

Page	Section	Description of Change
All	All	First issue of *Hazardous Material Management Plan*

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Acronyms

AOI	Area of Influence
EHS	Environmental, Health, and Safety
EPA	(Guyana) Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GGI	Guyana Goldfields, Inc.
GIIP	Good International Industrial Practice
HDPE	High-density Polyethylene
IFC	International Finance Corporation
MSDS	Material Safety Data Sheet
SOP	standard operating procedure

1 Introduction

This *Hazardous Materials Management Plan* is prepared for the Guyana Goldfields Inc. (GGI) Aurora Gold Project (the Project). The Project is located in a remote, forested, and largely uninhabited area of northwestern Guyana, and is comprised of four major physical components:

- the ***Aurora mine site***, located on the southern bank of the Cuyuni River approximately 170 km west of Georgetown, and within the boundaries of an approved 5,802 ha A1 Mining License area (see **Figure 1.0-1**)

- the ***Buckhall*** river port and logistics support facility, on the west bank of the Essequibo River (see **Figure 1.0-2**);

- the ***Barama (M3) road***, which provides access to a large hardwood timber concession north of the Cuyuni River owned by Barama Company Ltd., and for which GGI has negotiated a shared usage arrangement; and

- the ***Aurora M3 road extension***, a new 33 km road constructed by GGI connecting the end of the Barama road with Tapir Crossing (a GGI-managed vehicle barge ferry landing on the Cuyuni River), and extending due west to the Aurora mine site as shown in **Figures 1.0-1 and 1.0-2.**

1.1 Purpose

This *Hazardous Materials Management Plan* describes the overall methods that GGI shall use to prevent or minimize the potential environmental impacts associated with the use of hazardous materials (primarily fuel, reagents, and other consumables), as well appropriate practices for handling and storage. The *Hazardous Materials Management Plan* is directly supported by Standard Operating Procedure (SOP) GG-14, " Handling and Storage of Hazardous Materials", which addresses specific training requirements for the handling of hazardous materials, preparation and management of storage areas, general requirements for the receiving and warehousing of such materials, and cross-references to appropriate spill response and emergency management practices. The guidance and procedures provided in this plan and the other supporting plans and SOPs referenced herein collectively support GGI policies for minimizing potential hazards to human health and the environment; see Appendix C of the Project *Environmental and Social Management System Plan (ESMS Plan).*

Figure 1.1-1: Aurora Gold Project Site Layout Environmental Area of Influence (AOI) and Concession Boundary

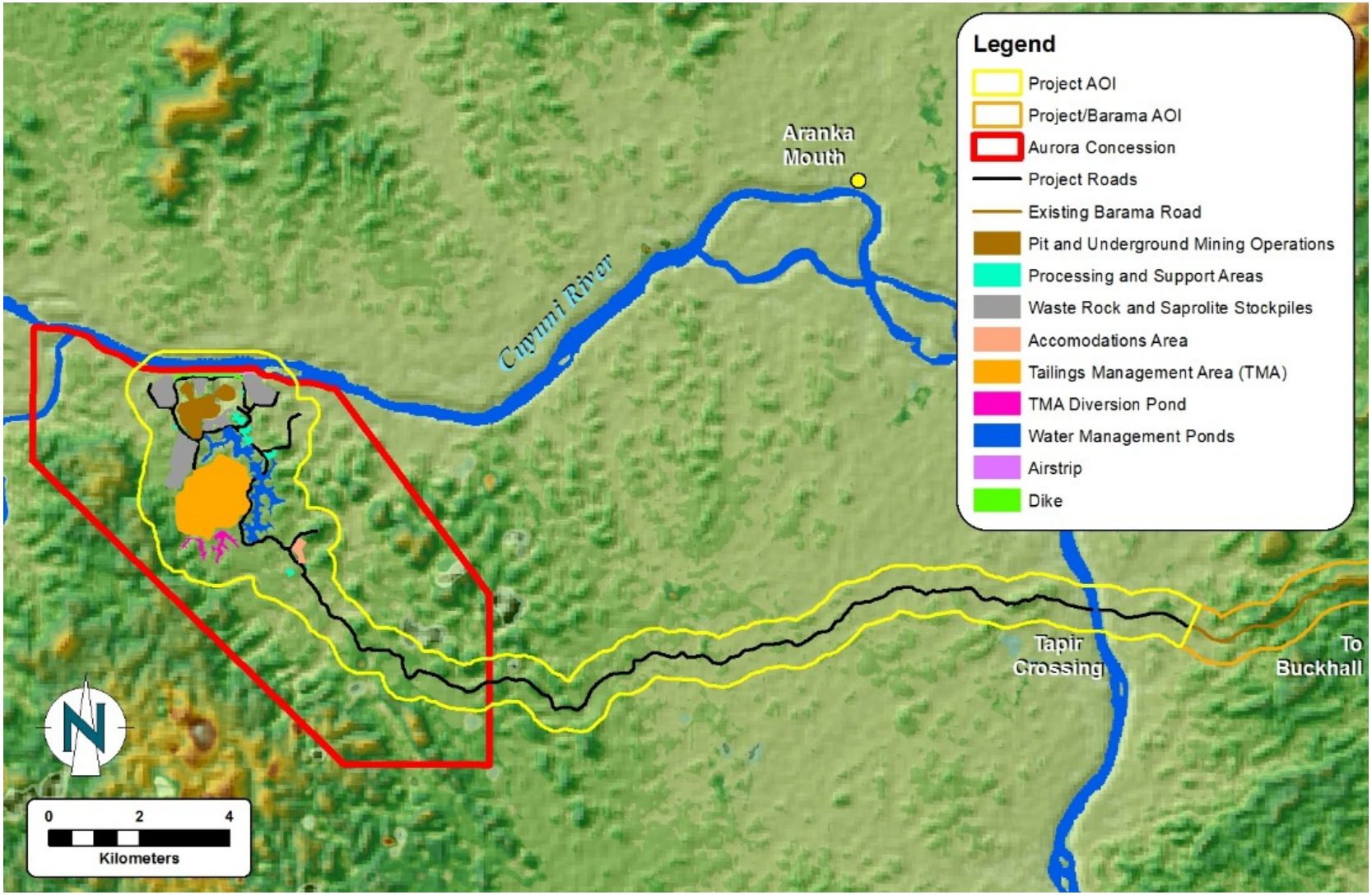
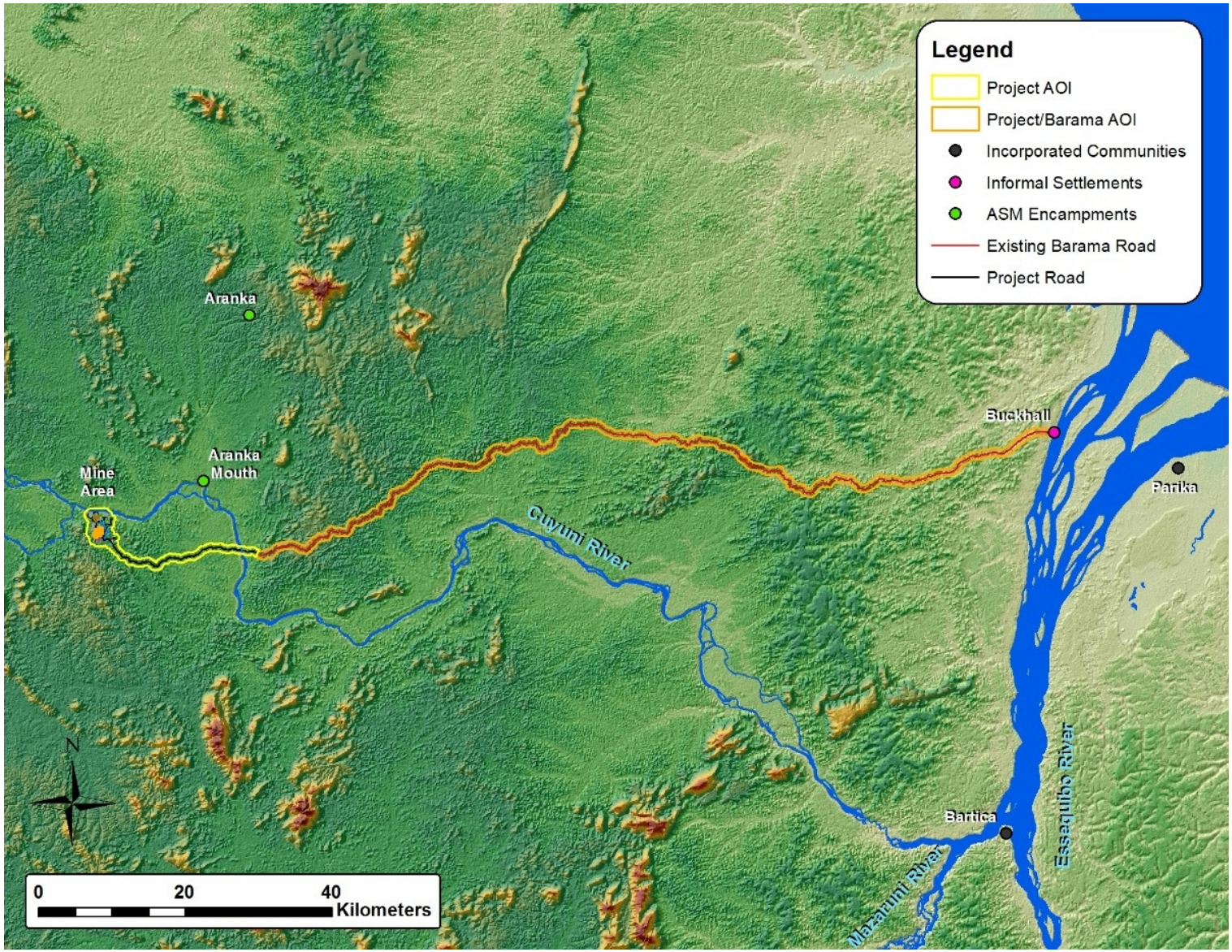


Figure 1.0-2: Aurora Gold Project Location and Buckhall to Aurora Site Transportation Corridor

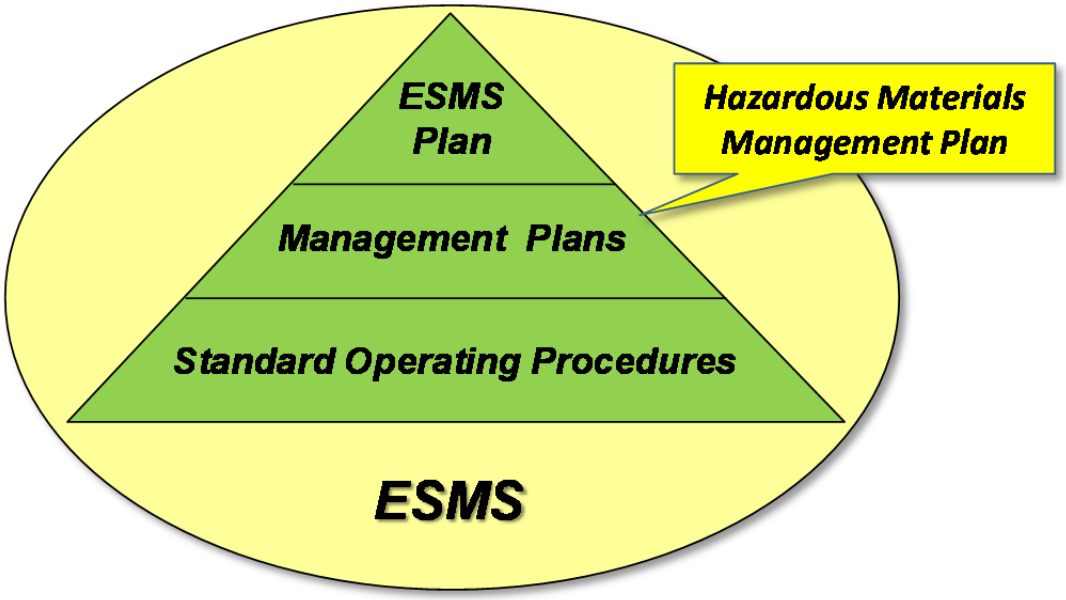


1.2 Relationship of *Hazardous Materials Management Plan* to Environmental and Social Management System and Environmental and Social Impact Assessment

GGI has established an ESMS for the Project, which is embodied in a Project-specific *ESMS Plan* that is based on the requirements of International Finance Corporate (IFC) Performance Standard 1 (PS 1), "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012), IFC PS 3, "Resource Efficiency and Pollution Prevention" (IFC, 2012), and other recognized good international industrial practices (GIIPs) for environmental and health and safety (EHS) and social program management.

This *Hazardous Materials Management 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 EHS or social impacts, and will support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project. **Figure 1.2-1** depicts the relationship of the *Hazardous Materials Management Plan* to the overall structure of the Project ESMS (see Section 1.2 of the ESMS Plan for additional details).

Figure 1.2-1: Position of *Hazardous Materials Management Plan* in ESMS Document Hierarchy



1.3 Change Management

This *Hazardous Materials Management Plan* will be periodically updated to incorporate more detailed site-specific information, as well as updates and refinements of the project design as such information becomes available. Periodic evaluations and updates will be conducted response to these and other changing Project conditions and environmental, health, and safety (EHS) and social management needs, in accordance with the controls established by Section 1.3 of the *ESMS Plan*.

1.4 Exclusions/Exceptions

This *Hazardous Material Management Plan* is intended only for use by Project personnel (or contractors, if specified as a procurement conditions; see Section 4.3.3 of the Project *ESMS Plan*) and has been designed to incorporate the pertinent aspects of management of consumable hazardous materials. The following specific exclusions are addressed under separate management plans, within the context of the Project's ESMS as noted in Section 1.2.

- ***Cyanide Management:*** Requirements for procurement, transport, and handling of cyanide reagent comply with the International Cyanide Management Code (ICMC, 2013) and will be addressed in the Project *Cyanide Management Plan*[1]. The latter will be developed and issued prior to initial transportation of cyanide reagent to the Aurora site early in the operational phase of the Project.
- ***Explosives Management:*** Requirements for transport, handling, and safe and secure storage of explosives and primer/detonator materials will be addressed in the *Blasting Management Plan,* to be prepared by a specialty contractor under the direction of the Project's blasting engineer prior to the initiation of mining operations.
- **Solid Waste Management:** Requirements for identification, segregation, and safe disposal of non-hazardous and hazardous solid waste streams are addressed in SOP GG-01, "Solid Waste Management (Pre-Construction Phase)" and the Project *Waste Management Plan.*
- **Waste Rock and Tailings Management:** Requirements for placement, storage, and monitoring of waste rock and tailings are addressed, respectively, in the Project *Overburden Management Plan* and *Tailings Area Management Plan.*

[1] Cyanide will be purchased exclusively as solid briquettes, delivered in fully welded, certified intermodal stainless steel "ISO" transportation/mixing containers. ISO containers are sized for intermodal (truck, rail, ship) transport, and are highly protective of the dry cyanide during transportation and delivery. This material form/delivery system eliminates the need for special warehousing or secondary containment until such time as mixing operations occur.

2 Definitions

2.1 Container

For the purposes of this *Hazardous Materials Management Plan*, any bag, barrel, bottle, box, can, cylinder, drum, vessel, storage tank, or similar receptacle that is used to store hazardous material is considered a container.

2.2 Hazardous Materials

Hazardous materials are defined as any substance (biological, chemical, or physical) that has the potential to cause harm to humans, animals, or the environment. Such materials may include substances or chemical that constitutes a health hazard or physical hazard, and includes chemicals that are carcinogens, toxic agents, irritants, corrosives, or sensitizers; agents that damage the lungs, skin, eyes, or mucous membranes; chemicals that are combustible, explosive, flammable, or oxidizers; and chemicals that (in the course of normal handling, use, or storage) may produce toxic dusts, gases, fumes, or vapors.

At the Project, hazardous materials are largely confined to consumables, and include:

- diesel, No. 4 (a blend of diesel and heavy fuel oil used for onsite power generation), gasoline, and aviation fuels, and special fuel mixtures (i.e., chainsaw fuel);
- machinery/engine lubricants and coolants;
- hydraulic oil, brake fluid, and transmission fluid;
- paints and solvents;
- cleaning compounds and sanitizing chemicals;
- insecticides, rodenticides, and herbicides;
- mineral processing and detoxification reagents;
- wastewater and potable water treatment reagents, and
- analytical and metallurgical laboratory chemicals.

2.3 Hazardous Waste

Hazardous waste is waste or combination of wastes which, because of its quantity; concentration; or physical, chemical, or infectious characteristics may pose a substantial hazard to human health and includes hazardous industrial waste; hazardous waste chemicals; severely toxic waste; leachable toxic waste; polychlorinated biphenyl wastes; and other flammable, corrosive, reactive, radioactive wastes.

Hazardous wastes are considered a special subset of hazardous materials, and are managed separately under GG-01, “Solid Waste Management (Pre-Construction Phase) and the Project *Waste Management Plan.*

3 Site Plans

Hazardous materials will be received and temporarily stored within the fenced security perimeter of the Buckhall logistics support facility (see **Figure 3.1-1**) pending transport to the Aurora site over the Barama/Aurora (M3) extension road, which crosses the Cuyuni River at Tapir Crossing as shown in **Figure 1.0-2**. Bulk fuels will be offloaded from barges or lighters, stored in bulk storage tanks as shown in **Figure 3.1-1**, and subsequently reloaded into tanker trucks for transportation to bulk storage tanks at the Aurora site. With the exception of the relatively modest quantities of consumables necessary to operate and support the Buckhall man-camp, administrative offices, and shops, sea containers will not be opened and offloaded at Buckhall, which will greatly reduce the potential for spillage. Containers will be placed onto trailers and transported to the mine site in daily truck convoys, in accordance with the Project *Transportation Management Plan.*

The general layout of the Aurora site is shown on **Figure 3.1-2**. Bulk diesel fuel will be delivered to a series of modular, double-wall steel tanks at the haul truck ready line and fuelling station (see **Figure 3.1-3**). No. 4 fuel (and in future, additional supplies of diesel fuel) will be delivered to steel bulk storage tanks located at the power plant site, as noted in **Figure 3.1-4**. Staging areas for cyanide ISO tanks and warehouse storage for other chemicals are located near the process plant as shown in **Figure 3.1-5**. All of these locations are well within the security perimeter that will be established for the Aurora site.

Figure 3.1-1: Site Plan – Buckhall Logistics Support Facility (Source: TetraTech DWG-C0103, Rev A**)**

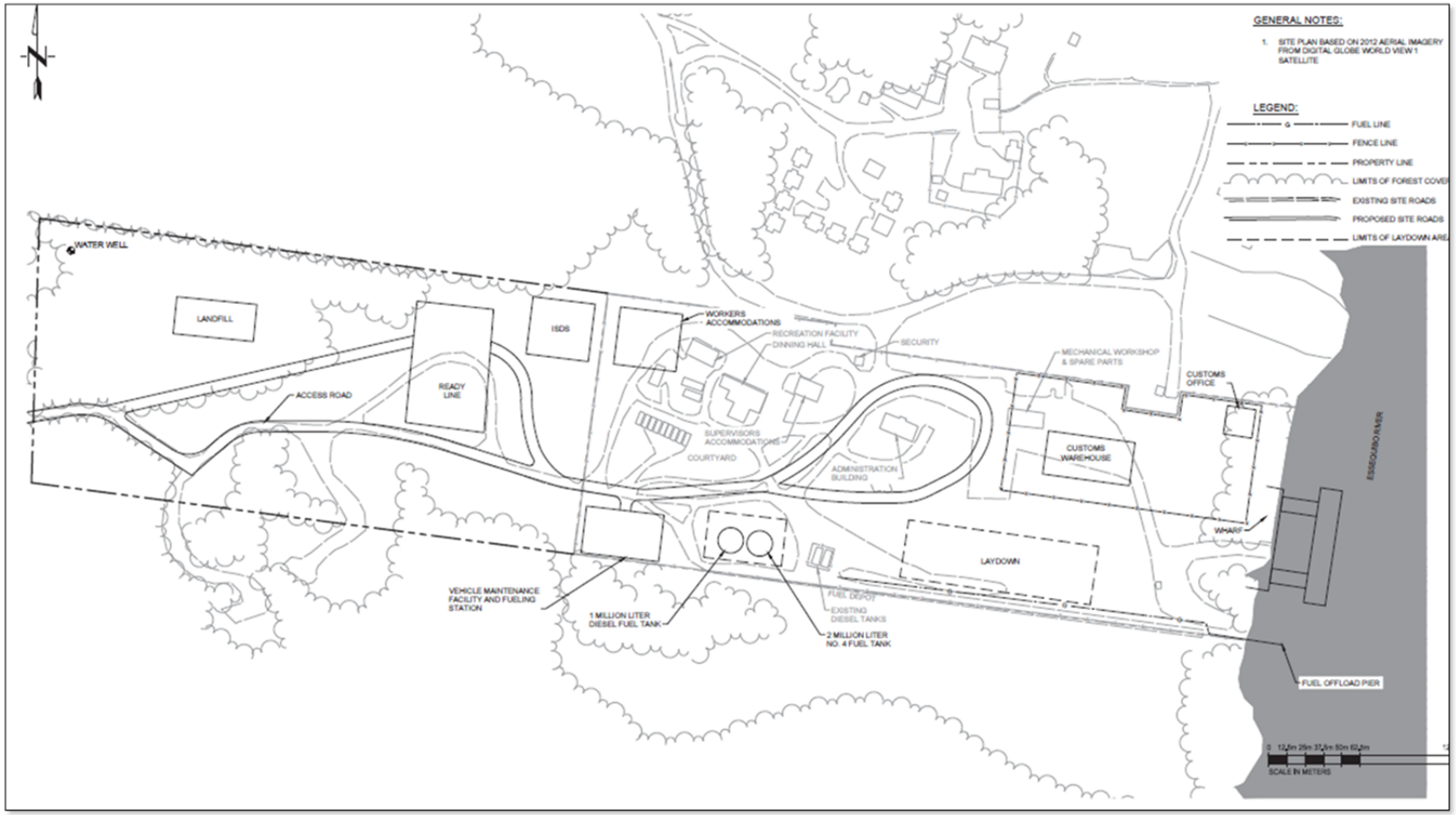


Figure 3.1-2: Aurora Mine Site Plan (Source: TetraTech DWG-C0105, Rev A)

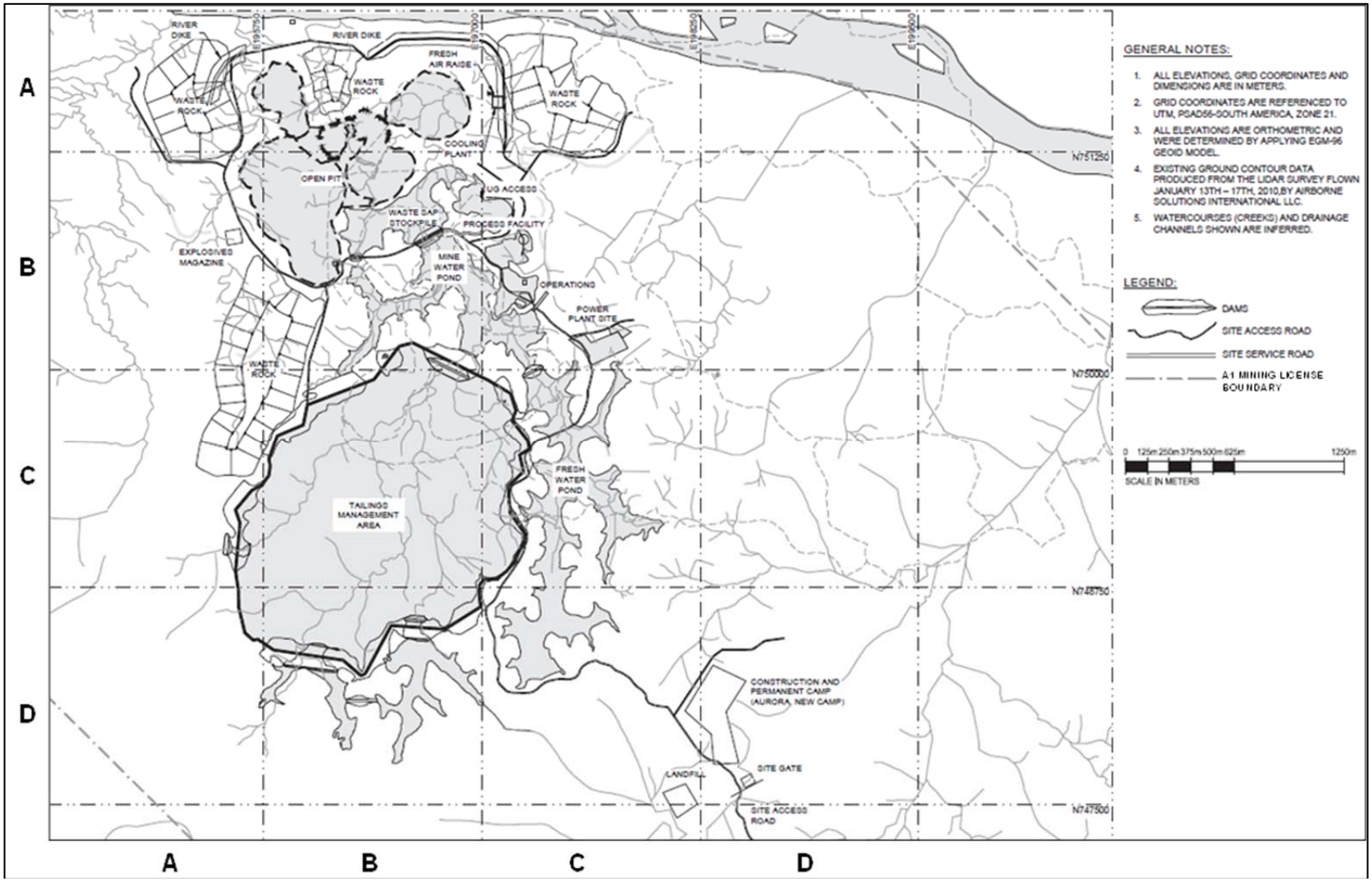


Figure 3.1-3: Fuel Storage Farm Layout (Source: TetraTech DWG-M0102, Rev A)

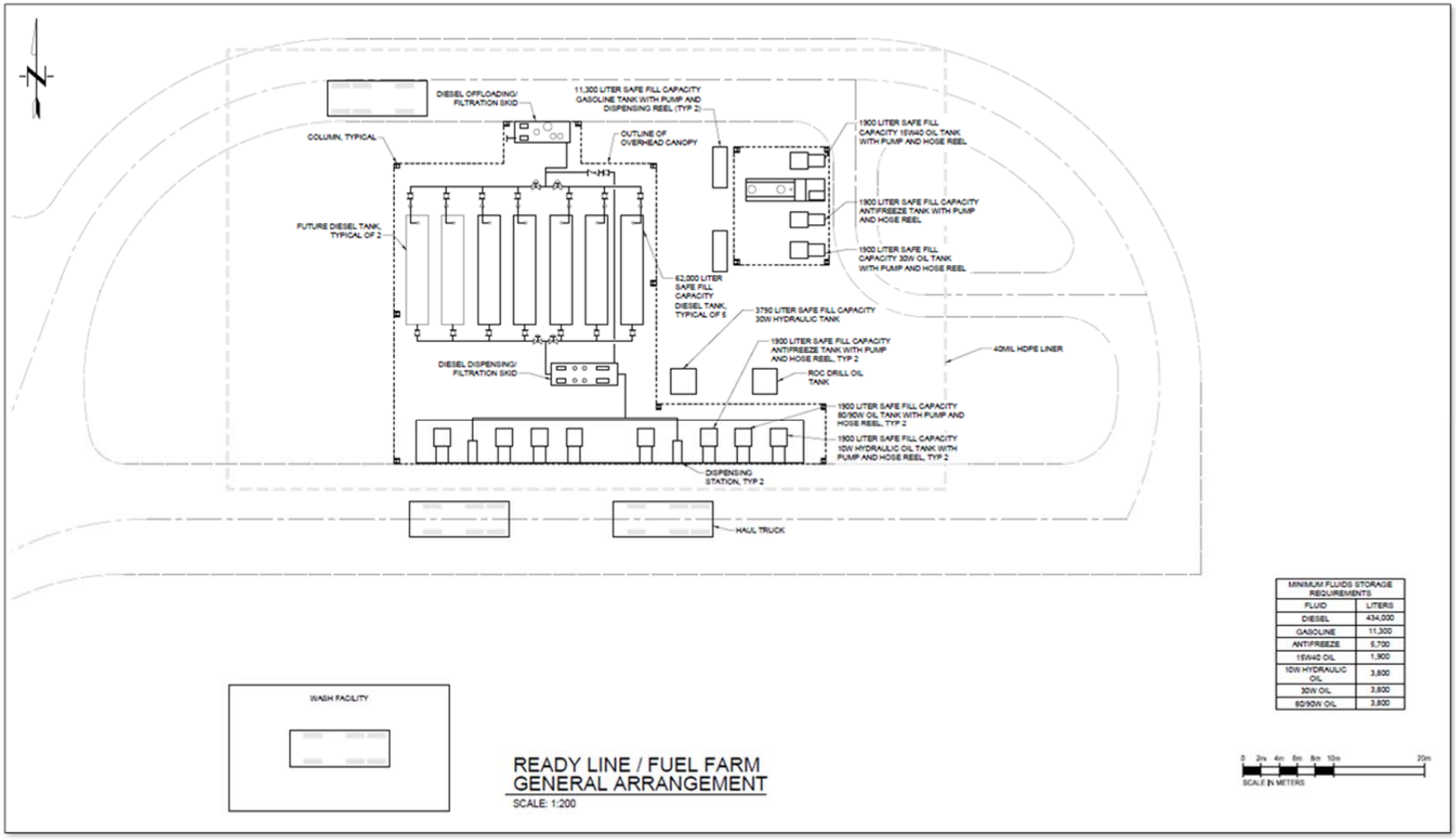


Figure 3.1-4: Powerplant Area Layout (Source: TetraTech DWG-M0102, Rev A)

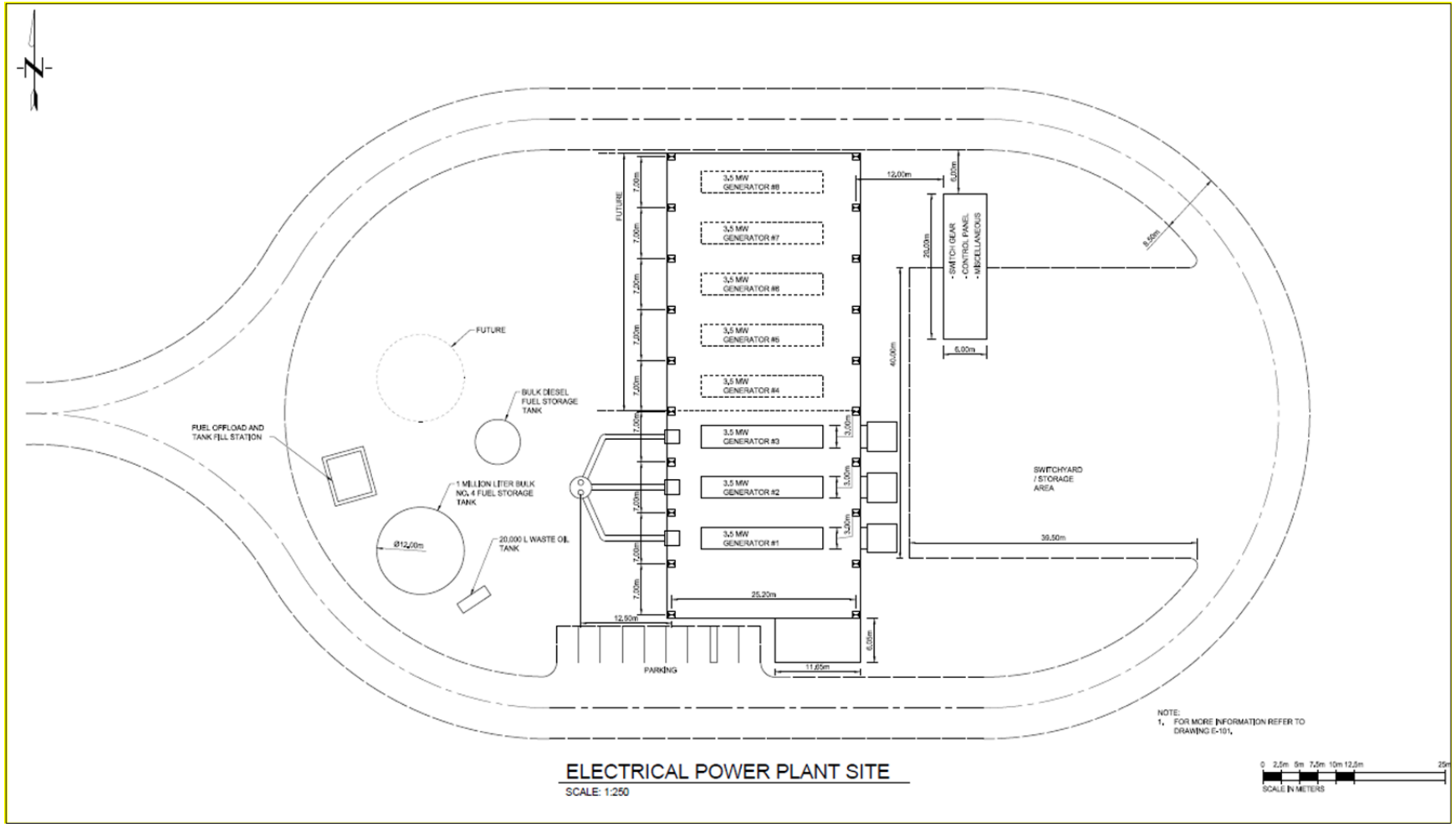
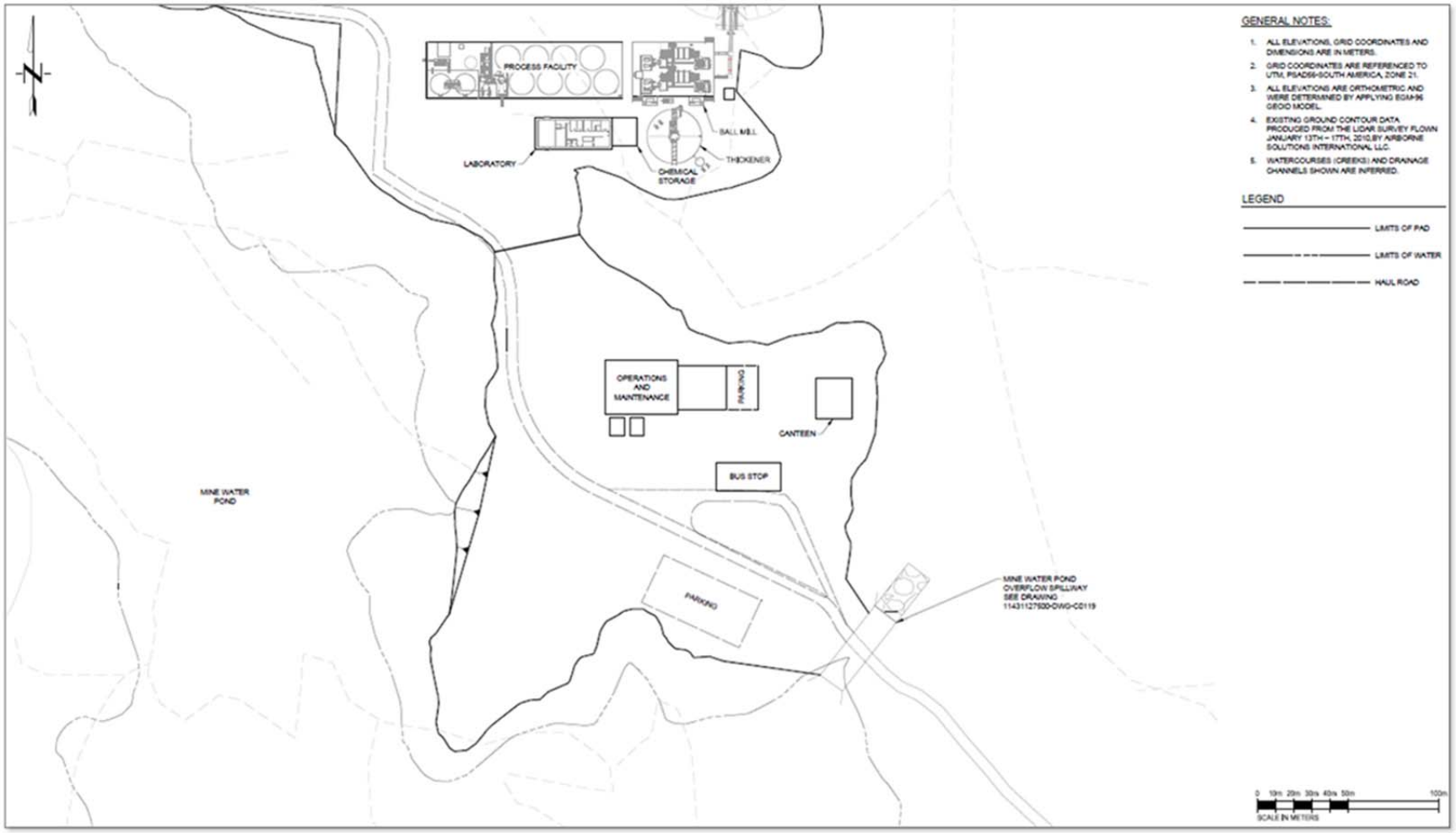


Figure 3.1-5: Mill/Mineral Separation Plan Layout (Source: TetraTech DWG-C0106, Rev A)



4 Organizational Responsibilities

The major roles, responsibilities, and training requirements for key Project staff with respect to the handling and storage of hazardous materials are outlined in the following paragraphs.

4.1 Environmental Manager and Health and Safety Officer

The Environmental Manager and Health and Safety Officer are responsible for coordinating proper hazardous materials handling and storage practices with the responsible area Managers or supervisors at the Aurora and Buckhall sites. The Health and Safety Officer is responsible to the Environmental Manager for seeing that the general handling and storage requirements of this SOP are followed on a day-to-day basis. The Health and Safety Officer is also responsible for ensuring that affected employees receive training in appropriate hazardous materials handling and storage methods, and that appropriate Material Safety Data Sheet (MSDS) information for hazardous materials stored on site is collected, maintained, and made available to support training activities or reference purposes.

4.2 Area Managers or Supervisors

Area managers or supervisors are responsible for ensuring that all employees in their assigned areas of responsibility have undergone appropriate training in the handling and storage of hazardous materials in their work areas, in accordance with: this *Hazardous Materials Management Plan;* GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks”; GG-14, “Handling and Storage of Hazardous Materials”; and GG-06, “ESMS Training Program.” Managers and supervisors shall ensure that employees comply with such training in all day-to-day activities involving the handling or storage of hazardous materials, and shall immediately advise the Camp Manager, Health and Safety Officer, or Environmental Manager if they observe or are advised of any potentially harmful or hazardous actions or working conditions.

4.3 Aurora Project Workforce

As noted in Section 4.2, affected employees shall receive training on the handling and storage of hazardous materials onsite, as well as procedures and actions for identifying potentially unsafe conditions, and are responsible for handling and storing hazardous materials as trained. Workers shall inform their immediate supervisor, the Camp Manager, the Health and Safety Officer, or the Environmental Officer if they observe or are advised of any potentially harmful or risky actions or conditions involving hazardous materials.

4.4 Procurement Manager

The Procurement Manager for the Project shall ensure that the Environmental Manager is advised of all hazardous materials procurements, and that all such materials are purchased with international MSDS information from the distributor or manufacturer. The Procurement Manager shall route copies of all MSDSs to the Health and Safety Officer for maintenance of a master MSDS log book for the Project, and for posting copies with key staff and at specific storage locations as noted in Section 5.

5 Hazardous Materials Management Procedures

The general process to be followed for the handling and storage of hazardous materials is presented in the following paragraphs.

5.1 Training

The Health and Safety Officer shall coordinator with area management sand supervisors to ensure that all Project employees involved in the use and handling of hazardous materials undergo training addressing the general requirements of hazardous material management, as described in:

- this *Hazardous Materials Management Plan;*
- GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks”;
- GG-14, “Handling and Storage of Hazardous Materials: and
- material-specific hazard information as described in applicable MSDSs.

Training sessions shall be organized for affected staff members and documented as noted in GG-06, “ESMS Training Program.”

5.2 Procurement

The Procurement Manager shall ensure that the Environmental Manager and Health and Safety Officer are advised of all hazardous materials procurements. The Procurement Manager shall also ensure that all hazardous materials are purchased with international MSDS information, provided from either the distributor and/or the manufacturer. Upon procurement of hazardous materials, the PM shall route copies of all MSDSs to the Health and Safety Officer for retention in the Project MSDS log book.

5.3 MSDS Log Book

As mentioned above, the Procurement Manger will ensure that all hazardous materials are purchased with international MSDS information from the distributor or manufacturer, and that such information is routed to the Health and Safety Officer. Once received by the HSO, the MSDSs will be compiled into an active MSDS log book which shall be maintained in the site medical clinic, available for review and reference for all applicable Project personnel. Copies of the MSDS log book will also be maintained by the Fire Brigade/Emergency Response Team leaders as noted in the Project’s *Emergency Preparedness and response Plan*. Relevant MSDSs shall also be maintained in appropriate locations or weatherproof containers near actual storage areas.

5.4 Classification of Material

All hazardous materials shall be classified based on the United Nation (UN) scheme for the classification of dangerous goods[2] as noted in **Table 5.4-1**. Each substance shall be assigned

[2] Derived from Globally Harmonized System of Classification and Labeling of Chemicals (UN, 2012)

an appropriate four-digit UN identification number that identifies hazardous substances and articles.

Table 5.4-1: UN Dangerous Goods Classifications, Labels, and Applicability to Project Operations

UN Class	UN Label Examples	Description	Potential Applicability to Project Operations?
Class 1	**TBD**	**Explosives** 1.1 Substances and articles that have a mass explosion hazard 1.2 Substances and articles that have a projection hazard, but not a mass explosion hazard 1.3 Substances and articles that have a fire hazard and either a minor blast hazard or a minor projection hazard, or both but not a mass explosion hazard 1.4 Substances and articles that present no significant hazard 1.5 Very insensitive substances which have a mass explosion hazard 1.6 Extremely insensitive articles which do not have a mass explosion hazard	Yes; see Project *Blasting Management Plan*
Class 2	**See below**	**Gases**	Yes, welding, cutting, laboratory, mineral processing, wastewater and potable water treatment operations
		2.1 Flammable gases	See above

UN Class	UN Label Examples	Description	Potential Applicability to Project Operations?
Class 2 (cont.)		2.2 Non-flammable, non-toxic gases	Yes, welding, cutting, laboratory, mineral processing, wastewater and potable water treatment operations
		2.3 Toxic gases	See above
Class 3		**Flammable Liquids**	Yes; fuels for motorized equipment and vehicles, dispersal agent for malaria fogging
Class 4	**TBD**	**Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gas** 4.1 Flammable solids, self-reactive substances and solid desensitized explosives 4.2 Substances liable to spontaneous combustion	**TBD**

UN Class	UN Label Examples	Description	Potential Applicability to Project Operations?
		4.3 Substances that in contact with water emit flammable gases	
Class 5	**See below**	**Oxidizing substances and organic peroxides**	Yes, laboratory, and mineral processing operations
		5.1 Oxidizing substances	See above
		5.2 Oxidizing peroxides	See above

UN Class	UN Label Examples	Description	Potential Applicability to Project Operations?
Class 6		**Toxic and infectious substances** 6.1 Toxic substances	Yes, laboratory, and mineral processing operations
Class 7	**N/A**	**Radioactive material**	**N/A**
Class 8		**Corrosive substances**	Yes, laboratory, and mineral processing operations

UN Class	UN Label Examples	Description	Potential Applicability to Project Operations?
Class 9		**Miscellaneous dangerous substances and articles**	Yes, laboratory, and mineral processing operations

5.5 Labelling

All hazardous materials containers (including bulk storage tanks) shall be clearly labelled to identify the name of material, its hazard classification, and UN identifier. Examples of representative hazardous materials placards are included on **Table 5.4-1**.

5.6 Receipt and Unloading of Hazardous Materials

The only means for transport of hazardous materials will be via the Barama/Aurora (M3) extension road, which crosses the Cuyuni River using the Tapir Crossing barge ferry. Security personnel shall be responsible for collaborating with the Procurement Manager and site Health and Safety Officer to ensure that all hazardous materials are checked in upon receipt and that quantities and material descriptions match associated shipping manifests. Additionally, Security personnel will be tasked with providing drivers specific directions on the final delivery location, and shall alert the Health and Safety Officer or their designee, who will monitor the off-loading or staging of the delivered materials. Hazardous materials or containers may only be moved or transferred within the site by qualified, trained vehicle operators, using appropriate industrial forklifts or other vehicles (see GG-15, “Forklift Safety”; GG-16, “Safe Operation of Heavy Equipment”; and GG-44, “Safe Operation of Grove Model 530 Hydraulic Cranes”).

5.7 Storage and Containment

The majority of chemicals/consumables (outside of fuels) will be stored and handed within bunded warehouse areas near the process plant; see **Figure 3.1-5**. All storage area shall be designed with the protection of environmental and health and safety in mind, incorporating appropriate engineering design; bulk fuel tanks will be double-walled (as in the modular diesel fuel tanks noted in **Figure 3.1-3**) or will be constructed within concrete or HDPE-lined bunded impoundments. Such impoundments will be covered and/or monitored for accumulated precipitation, and maintained to ensure the continued availability of full containment capacity.

Additional details for the design and operation of hazardous material storage areas are provided as follows:

- Hazardous materials shall be stored and handled in accordance with applicable MSDS requirements.

- Storage facilities shall be constructed with a bermed concrete pad suitably sized to retain the containers used for shipment (e.g., supersacks, totes, barrels). Where acids or other corrosive substances are stored, the pad and any associated sump areas shall be suitably protected with an epoxy coating or similar protective measures.

- Chemically incompatible materials shall not be stored in adjacent areas, and secondary containment shall be provided for all bulk materials (e.g., fuel, lubricants) consisting of an impermeable high-density polyethylene (HDPE) or concrete floor and containment walls, dikes, or berms, with a volume sufficient to contain any reasonably possible scenario of spills or discharges that may harm personnel or the environment.

- Containments should be generally designed to accept 110% of the largest stored volume, including the volume of any piping system component that could drain back to the containment.

- Containment areas should also be covered to prevent accumulation of precipitation. Where roofing cannot be reasonably provided, monitoring shall be conducted on a weekly basis to ensure that accumulated precipitation is routinely drained or removed from the containment.

- Provisions shall be made for portable pumps within the processing area for use in pumping any chemical spills within bunded areas back to the storage tanks or emergency holding tanks.

- Provisions shall be made for appropriate fire protection/fire suppression facilities compatible with the volatility, stored volumes, and flammable properties of the stored reagents/chemicals.

- Valves between containment areas or on containment drains shall be designed to be lockable in the closed position.

- All containers and storage tanks must be clearly labelled with the correct chemical name. Pipelines carrying hazardous chemicals or fuel shall be labelled with the contents and direction of flow.

- Hazardous material containers must be labelled to describe contents and any expiration date or shelf life limitations. Containers shall be organized to facilitate use of oldest stock first. Empty containers shall be accumulated and returned to the vendor for re-use or crushed and properly disposed of in accordance with the *Waste Management Plan.*

- Hazardous materials shall be stored within security fencing or barriers, away from high traffic areas, and posted with appropriate signage. Access to storage shall be controlled, and limited to authorized personnel only.

- Hazardous material storage areas shall be inspected for integrity or evidence of leakage on at least a weekly basis; any observed leaks or container damage shall be responded to as noted in Section 5.13.

- The Environmental Manager shall coordinate with area managers and supervisors to ensure that secondary containment systems are functional and that spill response equipment is pre-positioned in close proximity to fuel and lubricant offloading and storage areas, in accordance with the *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* and *Buckhall Spill Contingency Plan.*

- Locking cabinets or storerooms shall be provided for separate storage of stocks of engine oil, paints, solvents, brake fluids, cleaners, and laboratory chemicals. A separate

locking cabinet under the control of the camp medics will be provided for all insecticides, rodenticides, or biocides.

- Appropriate spill containment and cleanup kits will also be provided near each storage area. Personal protective equipment (PPE; see GG-11, "Personal Protective Equipment") shall be selected based on the current risk register (see GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks") and made available in clean, dedicated storage areas adjacent to all hazardous material storage areas.

5.8 Compatibility and Segregation

To prevent adverse reactions from occurring during transport and/or storage, hazardous materials shall be stored in containers and/or areas that are compatible with the type of other materials being stored.

Hazardous materials are generally classified by their UN class and/or primary hazard characteristic code and since it is not practical to provide a completely detailed, item-by-item listing of these materials and their storage requirements, ten (10) broad areas of hazardous materials storage will be designated as follows[3]:

Table 5.8-1: Hazard Storage Area Codes

A	Radioactive
C	Corrosive
D	Oxidizer
E	Explosive
F	Flammable
G	Gas, Compressed
L	Low Hazard (General Purpose)
P	Peroxide, Organic
R	Reactive
T	Poison

These codes will provide the basis for a material segregation scheme that prevents or reduces the risks of hazardous reactions that could occur. When used in conjunction with **Tables 5.4-1**, **6.0-1,** and **6.0-2**, the codes provide a means, for directing hazardous materials to the most

[3] Derived from "Storage and Handling of Hazardous Materials", US Defense Logistics Support Command, January 13, 1999. The procedures described in this publication were written in accordance with the US Code of Federal Regulations and comply with the UN classification system for hazardous materials management.

appropriate/ compatible storage area. Within each of the 10 major storage areas, further segregation is possible based on the compatibility of the individual items whose general properties indicate they may be stored in the same storage area.

These concepts provide a general guideline for compatibility of hazardous materials and combustible liquids storage; final segregation, storage, and signage determinations shall be made by the Health and Safety Officer after review of the affected MSDSs.

5.9 Signage

Appropriate signage will be posted on each shipping container/storage area to identify the material being stored. The signage shall meet the UN class labelling system used for international transportation of dangerous goods; see **Table 5.4-1**.

5.10 Ventilation

Safety features for the reagent storage area shall include appropriate mechanical and/or natural ventilation systems in areas where dispensing and mixing of chemicals/reagents may occur.

5.11 Security Inspections

Security personnel shall be responsible for:

- collaborating with the Procurement Manger and Health and Safety Officer to ensure that all hazardous materials are checked in upon receipt.

- completion of regular inspections of locked storage areas to ensure that access is restricted to authorized mine employees.

- Completion of regular perimeter inspections to ensure that the fence has not breached or the facility otherwise compromised.

5.12 Inventory/Inspection

Documented inspections of hazardous materials in each storage area shall be conducted at least monthly in accordance with GG-03, “Field Inspections.” The materials shall be stored in a manner that provides access into each area to permit inspection of the integrity of each hazardous materials container to identify leakage or corrosion/staining indicative of potential leakage. Any suspect container will be removed and the material repacked.

Aurora site security will also conduct documented quarterly perimeter inspections of the Project areas to ensure that fenced areas have not breached or the facility otherwise compromised. Similar inspections of the security fencing at Buckhall will be conducted at least monthly. Any observed non-conformances shall be resolved in accordance with GG-04, “Identification of Non-conformances and Corrective/Preventive Action.”

5.13 Spill Response

Project staff shall immediately report any evidence of leakage or container damage to their immediate supervisor, the Camp Manager, the Environmental Manager, or the AM, or the

Health and Safety Officer and initiate evacuation if necessary in compliance with the Project *Emergency Preparedness and Response Plan.* Staff members shall secure the site and remain in a safe location where they can provide additional information to GGI management or the Emergency Response Team when they arrive, but shall not attempt to stop, contain, or clean up chemical or fuel spills unless they have had specific training in applicable cleanup methods.

Control and containment of spilled materials, cleanup, and disposal of cleanup waste shall comply with the requirements of the *Waste Management Plan*, as appropriate for the type of spill involved. Material-specific cleanup information shall be as described in currently available international MSDSs.

All spills involving hazardous materials are categorically considered to be non-conformances, subject to documentation, cooperative investigation, and systematic corrective and preventive action, in accordance with GG-04, “Identification of Non-conformances and Corrective/Preventive Action.”

5.14 Recordkeeping

Records of hazardous materials procurement and receipt will be maintained, along with the master MSDS log book and records of the periodic inspections noted in 5.11 and 5.12 above. Records shall be retained in accordance with GG-05, “Records Management.”

6 Hazardous Materials/Reagent Descriptions

The following table indicates the United Nations Classification of a number of general chemical/consumables that may be used by the Project during the operational phase.

Table 6.0-1: General List of Chemicals/Consumables

Name	UN Classification
Sodium Cyanide (NaCN) – Solid	UN Number: 1689 Dangerous Good Class: 6.1 (Toxic)
Magnafloc Flocculant	UN Number: None Dangerous Good Class: None
Hydrochloric Acid	UN Number: 1789 Dangerous Good Class: 8 (Corrosive)
Sodium Hydroxide (caustic soda)	UN Number: 1824 Dangerous Good Class: 8 (Corrosive)
Hydrogen Peroxide	UN Number: 2015 Dangerous Good Class: 5.1 (Oxidizing Agent), 8 (Corrosive)
Sulphuric Acid	UN Number: 1830 Dangerous Good Class: 8 (Corrosive)
Hydrated Lime (Calcium Hydroxide)	UN Number: None Dangerous Good Class: None
Sodium Metabisulphate	UN Number: None Dangerous Good Class: None
Activated Carbon	UN Number: None Dangerous Good Class: None
Diesel Fuel	UN Number: None Dangerous Good Class: 3 (Flammable Liquid)
Gasoline	UN Number: None Dangerous Good Class: 3 (Flammable Liquid)
No. 4 Fuel	UN Number: None Dangerous Good Class: 3 (Flammable Liquid)
Liquid Oxygen	UN Number: 1073 Dangerous Good Class: 2.2 (Non-flammable, non-toxic)
Acetylene	UN Number: 1001 Dangerous Good Class: 2.1 (Flammable Gas)
Ferrous Sulphate	UN Number: 3077 Dangerous Good Class: 9 (Environmentally hazardous)

Table 6.0-2 identifies the predicted capacities of major fuel and lubricant storage facilities, along with their secondary containment considerations.

Table 6.0-2: Material Storage Capacities and Containment Methods
[Source: (TetraTech, 2013)]

Area	Material Type	Maximum Quantity Stored	Usage	Containment Method
Buckhall logistics support facility	Diesel	1 M liters	Vehicle fuel	Welded carbon steel tanks in bunded concrete containment sized to 110% of largest contained tank, plus flowback
	No. 4 fuel	2 M liters	Electrical power generator fuel	Welded carbon steel tanks in bunded concrete containment sized to 110% of largest contained tank, plus flowback
	Other reagents, paints, solvents, cleaners, biocides for onsite use	TBD	TBD	TBD
	Diesel	TBD	Vehicle fuel	Welded carbon steel tanks in bunded concrete containment sized to 110% of largest contained tank
Fuelling/Fuel Storage Area, Aurora site	Diesel	310,000 liters	Vehicle fuel	5 double-wall steel modular tanks
	Gasoline	22,600 liters	Vehicle fuel	2 double-wall steel modular tanks
	Motor oil (14W40)	1900 liters	Vehicle lubricant	2 double-wall steel modular tank
	Motor oil (30W)	1900 liters	Vehicle lubricant	2 double-wall steel modular tanks

Area	Material Type	Maximum Quantity Stored	Usage	Containment Method
Fuelling/Fuel Storage Area, Aurora site	Hydraulic oil (30W)	3800 liters	Hydraulic fluid	1 double-wall steel modular tank
	Hydraulic oil (10W)	3800 liters	Hydraulic fluid	2 double-wall steel modular tanks
	80/90W oil	3800 liters	Vehicle lubricant	2 double-wall steel modular tanks
	Antifreeze	3800 liters	Engine coolant	2 double-wall steel modular tanks
Milling and Recovery Mill/process plant area warehouses	Cyanide briquettes	Onsite working reserve-TBD]	Mineral separation	Dedicated stainless intermodal ISO tanks on trailers
	Other reagents, paints, solvents, cleaners, biocides	TBD	TBD	TBD
Underground Mine Operations	Reserved	Reserved	Reserved	Reserved

Diesel fuel will be delivered primarily in bulk by barge to the Buckhall river terminal (or by tanker truck to the temporarily place tanks at Aurora Base) and stored in a covered aboveground steel bulk storage tank farm. The storage tank and associated pumps, piping, and delivery systems will be constructed to conform to applicable American Petroleum Institute (API) standards, and will incorporate concrete or HDPE-lined earth bermed secondary containments capable of storing at least 110 per cent of the total volume of the tank as well as any portion of the supply pipeline that could drain back to the impoundment. The berms will be fitted with valved drains that permit discharge of accumulated stormwater or routing of contaminated water through an oily water separator; valves shall be normally locked in the closed position. Transfer pipelines will be pressure tested and subject to regular inspection for potential leakage or corrosion. The tanks will be fitted with visual or electronic tank level indicators.

If fuel or lubricants is delivered in barrels, covered and bermed secondary containments (concrete or HDPE as previously noted) will be provided, along with appropriate signage.

Health and Safety or Environmental Officers shall periodically inspect the storage tank area to ensure that stormwater is drained out of the tank containment, that containment valves are

locked in the closed position, and, by examination of the tank level indicators, that the tank is capable of receiving the full volume of fuel carried by the bulk carrier.

If a fuel transfer is being made to an onsite fuelling vehicle, available capacity shall be verified before the transfer, and the vehicles shall be parked on an impermeable, bunded fuelling apron as previously noted.

If the Health and Safety or Environmental Officers detect maintenance issue that must be completed before accepting a load of fuel, the Mechanical Shop Manager shall be immediately advised. The Health and Safety or Environmental Officer shall observe the entire fuel offloading operation.

7 References

Internal References

- GG-03, “Field Inspections”;
- GG-04, “Identification of Non-conformances and Corrective/Preventive Action;”
- *GG-05, “Records Management”;*
- *GG-06, “ESMS Training Program”;*
- *GG-09, “ Identification of Project-related Safety Hazards and Assessment of Risks”;*
- *GG-11; “ Personal Protective Equipment”;*
- *GG-12, “ First Aid and Emergency Medical Response”;*
- *GG-14, “ Handling and Storage of Hazardous Materials”;*
- *GG-15, “Forklift Safety”;*
- *GG-22, “Fire Prevention Program”;*
- *GG-24, “Recognition and Reporting of Safety Hazards”;*
- *Cyanide Management Plan;*
- *Buckhall Spill Contingency Plan*
- *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas);*
- *Emergency Preparedness and Response Plan;*
- *Overburden Management Plan;*
- *Tailings Area Management Plan;*
- *Waste Management Plan;*
- *Blasting Management Plan;* and
- *ESHS Monitoring Plan.*

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Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
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Date:
June 2013
Project Number:
01-29301A1

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Page	Section	Description of Change
All	All	First issue of *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)*

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Acronyms

ANFO	Ammonium Nitrate/Fuel Oil
ARD	Acid Rock Drainage
CIL	Carbon in Leach
EPA	(Guyana) Environmental Protection Agency
ESHS	Environmental, Social, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GGI	Guyana Goldfields, Inc.
GIIP	Good International Industrial Practice
HDPE	High-Density Polyethylene
IFC	International Finance Corporation
MSDS	Material Safety Data Sheet
MWP	Mine Water Pond
OHS	Occupational Health and Safety
PMF	Probable Maximum Flood
PPE	Personal Protective Equipment
ROW	Right of Way
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Contingency
TMA	Tailings Management Area
TPH	Total Petroleum Hydrocarbons

1 Introduction

1.1 Scope and Purpose

This *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* is prepared for the Guyana Goldfields Inc. (GGI) Aurora Gold Project (the Project). The Project is located in a remote, forested, and largely uninhabited area of northwestern Guyana, and is comprised of four major components:

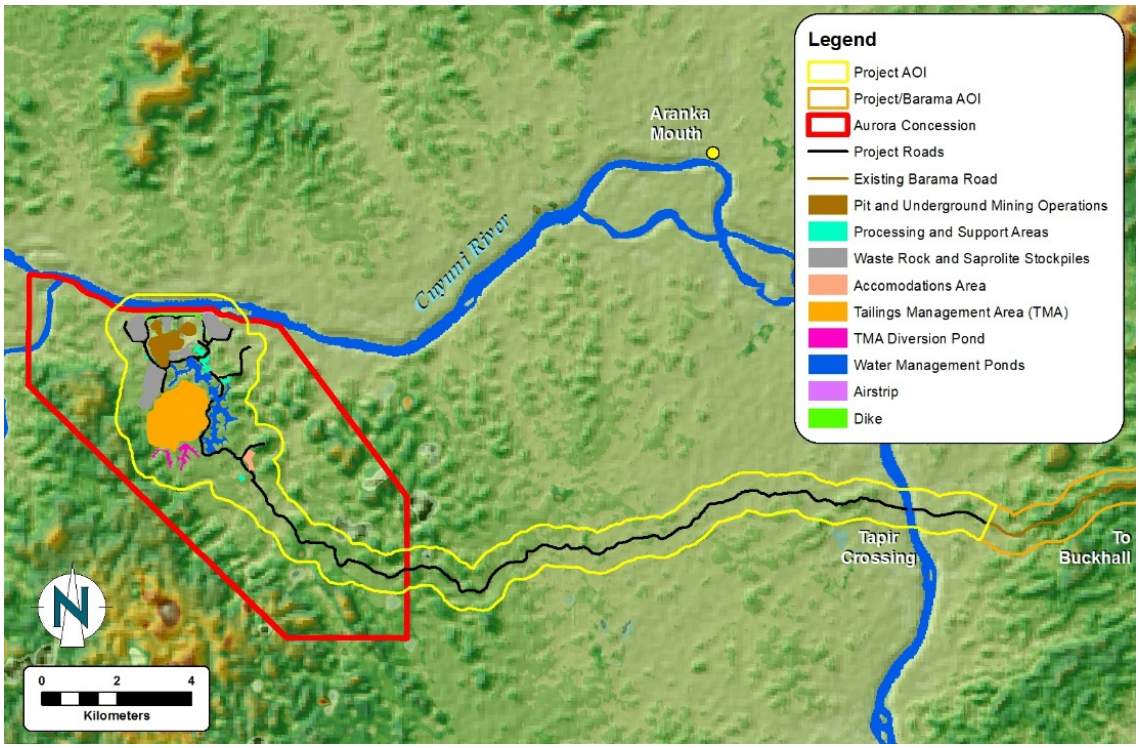
- the ***Aurora mine site***, located on the southern bank of the Cuyuni River approximately 170 km west of Georgetown, and within the boundaries of an approved 5,802 ha A1 Mining License area (see **Figure 1.1-1**)

- the ***Buckhall*** river port and logistics support facility, on the west bank of the Essequibo River;

- the ***Barama (M3) road***, which provides access to a large hardwood timber concession north of the Cuyuni River owned by Barama Company Ltd., and for which GGI has negotiated a shared usage arrangement; and

- the ***Aurora M3 road extension***, a new 33 km road constructed by GGI connecting the end of the Barama road with Tapir Crossing (a GGI-managed vehicle barge ferry landing on the Cuyuni River), and extending due west to the Aurora mine site as shown in **Figure 1.1-1.**

Figure 1.1-1: Aurora Gold Project Site Layout



This *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* addresses the preventive measures and response actions associated with potential spills of fuel, reagents, or other dangerous substances that could potentially occur in the Aurora mine site infrastructure areas, at the vehicle barge ferry and landings at Tapir Crossing, and during the routine transportation of materials and equipment over the Barama/Aurora (M3) extension road. Similar considerations specific to the Buckhall logistics support facility are separately addressed by the *Buckhall Spill Contingency Plan.*

This plan is prepared in keeping with the requirements of the Guyana Environmental Protection Act, specifically Part V section 19, subsection (5) which states:

> *"The agency may require an applicant, either by himself or through an independent agent, to carry out and report on any test or experiments relating to the plant, structure, equipment, apparatus, mechanism or thing or to the methods, processes or devices to be employed to control or prevent the discharge of any contaminant into any part of the natural environment."*

Hence, this plan also cross-references procedures for storing, transporting, and handling potentially hazardous chemicals, reagents, and/or waste materials that will be used or generated at the Project.

The overall goal of this *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* is to:

- minimize the potential risk to human health, environment, and property associated with accidental release, improper handling, and/or use of these materials;
- ensure all environmental impacts are understood and can be mitigated in the event of a spill;
- define emergency procedures to be used for the containment and mitigation of potential spill events at the noted locations; and
- establish minimum requirements for training, reporting, and keeping appropriate records of any spill events.

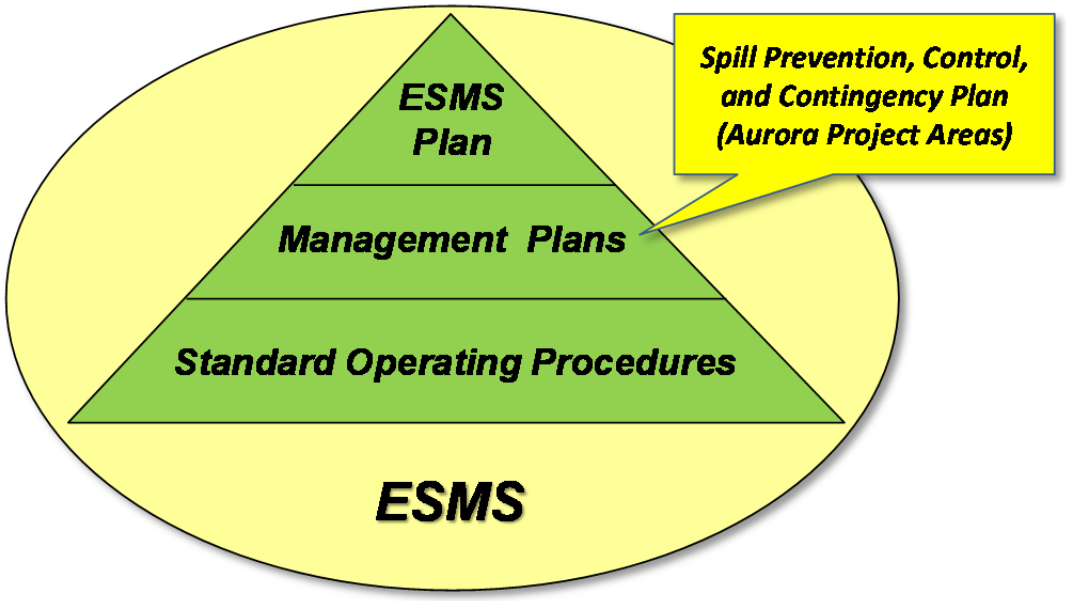
1.2 Relationship of *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* to Environmental and Social Management System and Environmental and Social Impact Assessment

GGI has established an Environmental and Social Management System (ESMS) for the Project, which is embodied in a Project-specific *ESMS Plan*. The *ESMS Plan* is based on the requirements of International Finance Corporate (IFC) Performance Standard 1 (PS 1), "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012), IFC PS 3, "Resource Efficiency and Pollution Prevention" (IFC, 2012), and other recognized good international industrial practices (GIIPs) for environmental and health and safety (EHS) and social program management.

This *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* 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 EHS or social impacts, and will support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project.
Figure 1.2-1 depicts the relationship of the *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* to the overall structure of the Project ESMS (see Section 1.2 of the ESMS Plan for additional details).

Figure 1.2-1: Position of *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* in ESMS Document Hierarchy



1.3 Change Management

The initial iteration of this *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* is general in nature and will be updated to incorporate more detailed site- specific information, as well as updates and refinements of the project design as such information becomes available. Periodic evaluations and updates will be conducted response to these and other changing Project conditions and EHS and social management needs, in accordance with the controls established by Section 1.3 of the *ESMS Plan*.

2 Project Description

The following paragraphs describe major project activities in each phase of the Project, based on the latest iteration of the Project design as presented in the latest feasibility study for the Project (TetraTech, 2013). Aspects of these activities that contain potential spill risks are noted, along with a summary of the most significant spill risks likely to be encountered. Cross-references to the preventive measures the GGI will implement for each set of spill risks discussed in this section are provided in **Table 2.0-1**. These preventive measures notwithstanding, a general action plan and specific response procedures to be taken in event of a spill are summarized in Sections 3 and 4, respectively.

2.1 Early Works Construction Phase

Early works construction phase Project activities are concentrated primarily on the development of basic infrastructure at the Buckhall logistics support facility and the construction of the Aurora (M3) road extension. Other work in this phase includes the reclamation of right of way (ROW) areas on the new road extension and the development of a new, modular man-camp at the Aurora site.

Potential spill risks associated with these construction activities are largely confined to fuel transport, fuel storage, field fuelling operations, and accidental hydraulic or fuel system ruptures on all-terrain vehicles (ATVs), light trucks, or heavy equipment.

2.2 Major Construction Phase

The major construction phase of the Project will be comprised of the activities noted in the following paragraphs.

2.2.1 Cuyuni River Dike Construction, Airstrip Renovation, and Open Pit Area Clearances

Earthen dikes (see zones AA, AB, and AC in **Figure 2.2-1**) will be constructed in two locations alongside the Cuyuni River in order to mitigate potential flood risks to the open pit and underground mining areas. The existing airstrip lies between the area of the two dikes and the southern bank of the Cuyuni River, and will be regraded and resurfaced as necessary after completion of dike construction. Initial ground surface clearances will also be made for the Rory's Knoll pit and associated haul roads, as noted in Zone AB of **Figure 2.2-1**. When the Rory's Knoll pit is fully developed, the remaining pit areas will be cleared and developed simultaneously with the underground operation.

Potential spill risks associated with these activities are largely confined to fuel transport, storage, field fuelling operations, and accidental hydraulic or fuel system ruptures on light trucks and heavy equipment.

2.2.2 Mine Waste Rock Stockpile Footprint Preparation

Waste rock will be placed in four sequentially constructed stockpiles near the perimeters of the open pits as noted in **Figure 2.2-1**; one additional stockpile will be constructed for waste

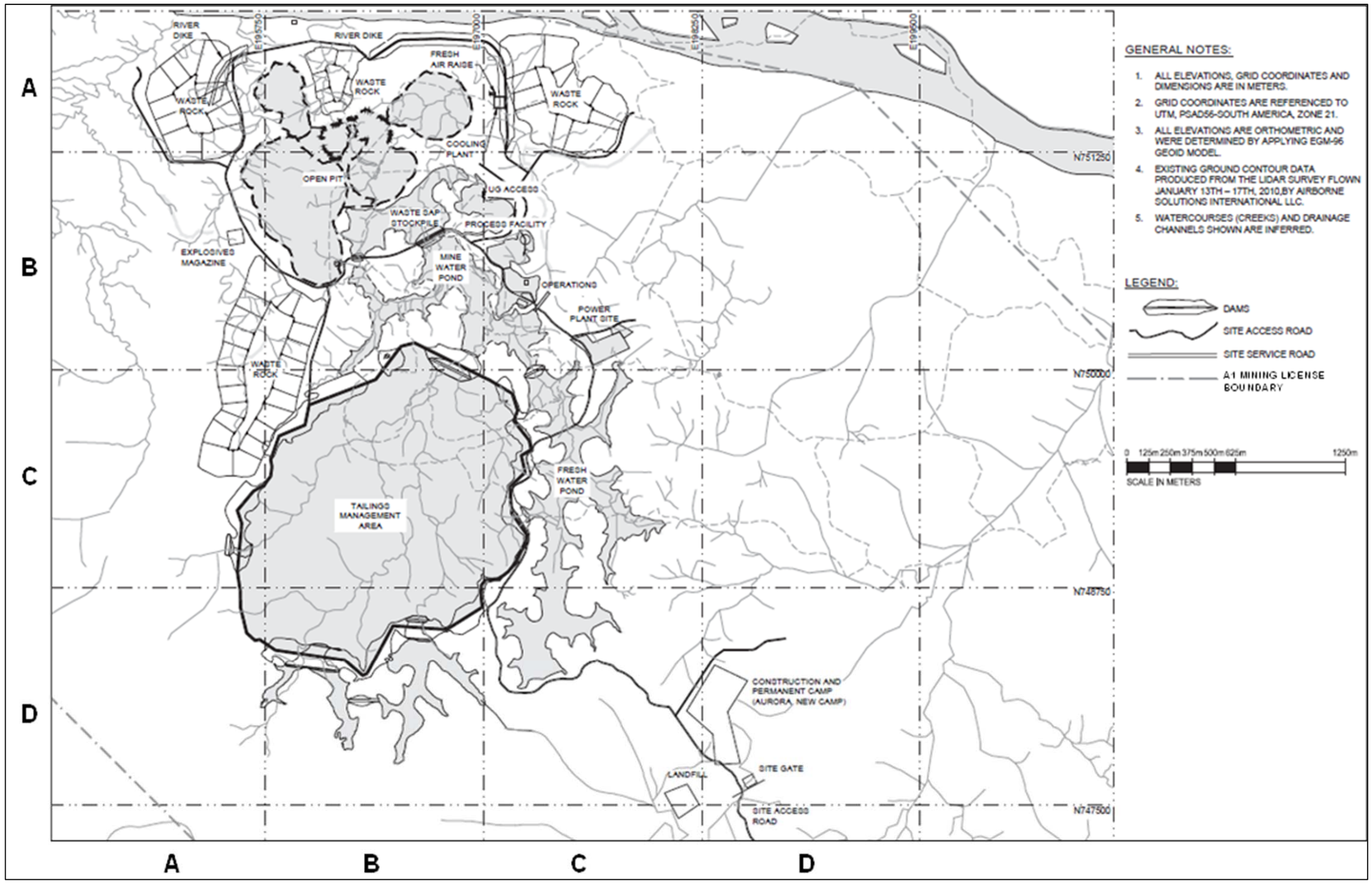
Table 2.0-1: Phase-Specific Spill Risks and Associated Preventive Measures

Phase	*Activities*	*Primary Spill Risks*	*Preventive Measures*
Early Works Construction	All	Fuel transport, fuel storage, field fuelling operations, and accidental hydraulic or fuel system ruptures on ATVs, light vehicles, forklifts, or heavy equipment; fuel tanker truck accidents in transit from Buckhall.	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment (including Tapir Crossing barge ferry) • Covered and/or regularly monitored secondary containment, all fuel storage areas • Containment capacity >110% of largest contained tank • Monitoring for containment integrity, accumulation of precipitation • Implementation of *Hazardous Material Management Plan*, *ESHS Monitoring Plan*, and GG-17, “Field Fuelling and Spill Prevention” • Training of operators in requirements of: – GG-13, “Transportation Safety – Light Vehicles”; – GG-14, “Handling and Storage of Hazardous Materials”; GG-15, “Forklift Safety”; – GG-16- “Safe Operation of Heavy Equipment”; – GG-17, “Field Fuelling and Spill Prevention”; – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards” – GG-41, “Management of Aviation Fuel and Fuelling Operations”; and – GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”
Major Construction	• Cuyuni River dike construction, airstrip renovation, and open pit area clearances • Mine waste rock stockpile footprint preparation • Mill area infrastructure construction • Tailings and reclaim pipelines and initial Tailings Management Areas (TMA) clearance and construction • Mine Water Pond (MWP) and Fresh Water Pond (FWP) Clearance and Construction • Underground Mine Construction • Man-Camp Completion • Decommissioning and closure of Tapir camp	Fuel transport, storage, field fuelling operations, and hydraulic or fuel system ruptures on heavy equipment; fuel tanker truck accidents in transit from Buckhall	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment (including Tapir Crossing barge ferry) • Covered and/or regularly monitored secondary containment, all fuel storage areas • Containment capacity >110% of largest contained tank • Monitoring for containment integrity, accumulation of precipitation • Implementation of *Hazardous Material Management Plan*, *Transportation Management Plan*, *ESHS Monitoring Plan*, and GG-17, “Field Fuelling and Spill Prevention” • Training of operators in requirements of: – GG-16- “Safe Operation of Heavy Equipment”; – GG-17, “Field Fuelling and Spill Prevention”; – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards” – GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”
Operational Phase	• Power generation	No. 4 fuel transport and storage; field fuelling operations, and hydraulic or fuel system ruptures on heavy equipment; and fuel tanker truck accidents in transit from Buckhall	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment (including Tapir Crossing barge ferry) • Covered and/or regularly monitored secondary containments, all fuel storage areas • Containment capacity >110% of largest contained tank • Monitoring for containment integrity, accumulation of precipitation • Implementation of *Hazardous Material Management Plan* , *Transportation Management Plan*, and GG-17, “Field Fuelling and Spill Prevention” • Training of operators in requirements of: – GG-16- “Safe Operation of Heavy Equipment”; – GG-17, “Field Fuelling and Spill Prevention”; – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards”

Phase	*Activities*	*Primary Spill Risks*	*Preventive Measures*
Operational Phase	• Open-pit mining operations • Underground mining operations	Fuel transport, storage, field fuelling operations, and hydraulic or fuel system ruptures on heavy equipment; fuel tanker truck accident in transit from Buckhall; release of contaminated mine wastewater from the breaching or overtopping of the MWP; or spillage of blasting agent from silos or drillhole loading trucks	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment (including Tapir Crossing barge ferry) • Covered or regulatory monitored secondary containment, all fuel storage areas • Containment capacity >110% of largest contained tank • Monitoring for containment integrity, accumulation of precipitation • Collection of pit and underground mine drainage and routing to Mine Water Pond (MWP) • Design of MWP to manage potential contaminants via dilution; installation of downstream settling ponds as necessary to manage residual concentrations < (IFC, 2007) limits • Implementation of *Hazardous Material Management Plan* , *Transportation Management Plan*, *Water Management Plan, ESHS Monitoring Plan*, and GG-17, “Field Fuelling and Spill Prevention” • Secondary containments required for blasting agent silos per *Blasting Management Plan* • Spill kits required for all contractor-owned drillhole loading trucks • Training of operators in requirements of: – GG-16- “Safe Operation of Heavy Equipment”; – GG-17, “Field Fuelling and Spill Prevention”; – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards”
	Mineral processing operations	Reagent tanker truck accident in transit from Buckhall; spills of detoxification reagents in warehouse; breach of containment in process plant; breach of tailings pipeline; breach or overtopping of Tailings Management Area (TMA)	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment (including Tapir Crossing barge ferry) • Cyanide purchased exclusively in intrinsically safe, dedicated, steeliness steel solid-to-liquid system delivery/mixing tanks, from suppliers certified to the ICMC • Transportation of cyanide to the Aurora site by transporters certified to the ICMC • Covered or regularly monitored secondary containments for all leach tank/detoxification circuit areas and cyanide mixing/offloading apron • Containment capacity >110% of largest contained tank • Containment designs for leach and detoxification tanks and circuits in compliance with ICMC • Detoxification of residual cyanide in tailings stream to <0.5 mg/L weak acid dissociable (WAD) cyanide, prior to deposition in TMA [Note: 0.5 mg/L WAD_{CN} is the discharge limit defined by (IFC, 2007) Table 1 and the ICMC] • Design of detoxification facility with parallel treatment systems to ensure no loss of treatment capacity during maintenance actions • Implementation of *Cyanide Management Plan, Mill/Leach Operations Plan*, *Tailings Area Management Plan, Transportation Management Plan*, *Hazardous Materials Management Plan*, *Water Management Plan, Emergency Preparedness and Response Plan,* and *ESHS Monitoring Plan*, including operator training per GG-06, “ESMS Training Program” • Training of operators in requirements of: – GG-14, “Handling and Storage of Hazardous Materials” – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards – GG-36, “Lockout/Tag-out Requirements”; and – GG-37, “Control of Erosion and Sedimentation” • Construction of 2000 m^3 HDPE-lined emergency pond (tertiary containment for process plant) • Design of TMA and diversion ponds to manage potential contaminants via dilution and periodic spillway discharges; installation of downstream settling ponds as necessary to manage residual concentrations < (IFC, 2007) limits

Phase	*Activities*	*Primary Spill Risks*	*Preventive Measures*
Operational Phase	Man-camp, administrative offices, warehouse, and mechanical shop operations	Sanitary wastewater treatment plat reagent spills or system upsets/sewage releases, as well as the potential spills of oils, reagents, or other hazardous substances within the warehouse	• Secondary containments for wastewater treatment plants • Secondary containments and cleanup sumps/oily water separators in the warehouse and shop areas • Preventive maintenance program for major equipment • Implementation of *Hazardous Material Management Plan* and *ESHS Monitoring Plan* • Training of operators in requirements of: – GG-23, “Operational Safety Meetings”; and – GG-24, “Recognition and Reporting of Safety Hazards”
Decommissioning, Reclamation, and Closure Phase	All	Fuel transport, storage, field fuelling operations, and hydraulic or fuel system ruptures on light trucks or heavy equipment; spillage from fuel tanker or other truck accident in transit to or from Buckhall.	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment • Covered or regularly monitored secondary containment, all fuel storage areas • Containment capacity >110% of largest contained tank • Monitoring for containment integrity, accumulation of precipitation • Implementation of *Hazardous Material Management Plan*, *Transportation Management Plan*, *ESHS Monitoring Plan*, and GG-17, “Field Fuelling and Spill Prevention” • Training of operators in requirements of: – GG-16- “Safe Operation of Heavy Equipment”; – GG-17, “Field Fuelling and Spill Prevention”; – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards” – GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”
Post-closure Phase	All	Field fuelling operations, hydraulic or fuel system ruptures on light trucks or heavy equipment, as well as potential spillage from fuel tankers or other truck accidents in transit to or from Buckhall.	• Spill kits on all heavy vehicles • Preventive maintenance program for all vehicles and major equipment • Implementation of *Hazardous Material Management Plan*, *Transportation Management Plan*, *ESHS Monitoring Plan*, and GG-17, “Field Fuelling and Spill Prevention” • Training of operators in requirements of: – GG-16- “Safe Operation of Heavy Equipment”; – GG-17, “Field Fuelling and Spill Prevention”; – GG-23, “Operational Safety Meetings”; – GG-24, “Recognition and Reporting of Safety Hazards”

Figure 2.2-1: Aurora Gold Project – Aurora Mine Site Plan (Source: TetraTech DWG-C0105, Rev A)



saprolite, as also shown in zone BB.

The footprint area for the Rory's Knoll except for the saprolite stockpile area will also be cleared in the construction phase of the Project. Perimeter drains to intercept any potential acid rock drainage (ARD) will be installed around the footprint of each prepared stockpile pad. Monitoring wells will be installed upgradient of all projected sedimentation pond locations. Cleared footprint areas will be inspected and amended as necessary by local compaction or the placement of compacted clay in areas with exposed bedrock.

Potential spill risks associated with these activities are largely confined to fuel transport; fuel storage; field fuelling operations; hydraulic or fuel system ruptures on heavy equipment (at Aurora site or in transit from Buckhall); or a fuel tanker truck accident in transit from Buckhall.

2.2.3 Mill Area Infrastructure Construction

Major elements of infrastructure in the mill area will be built in the construction phase of the project. The overall preliminary design layout of the mill area is depicted in **Figure 2.2-2**; major construction features are described in the following paragraphs.

- ***Crushing Circuit:*** a three-stage crushing circuit will be constructed as shown along with conveyor systems and a ROM ore pad area.

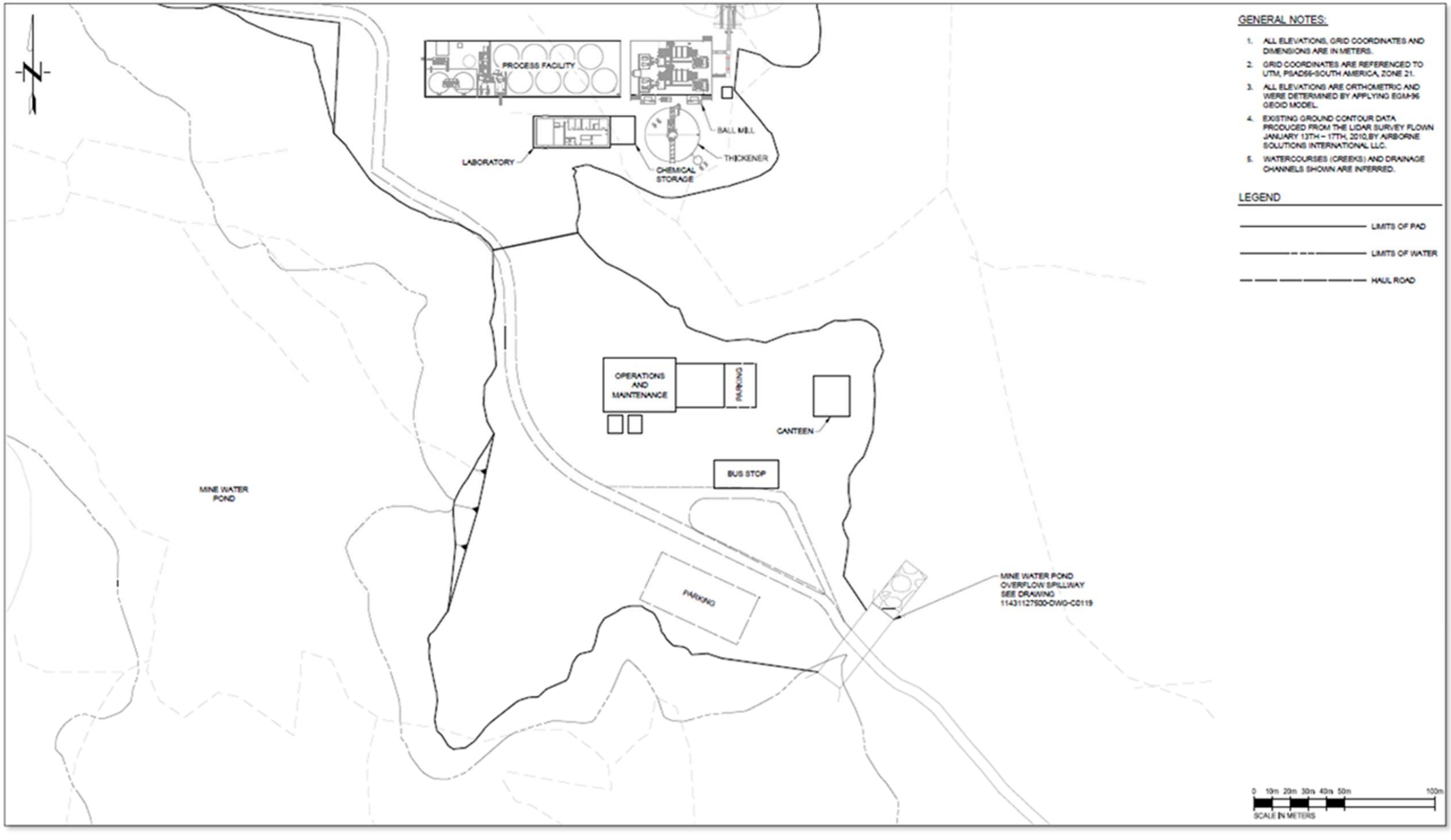
- ***Mill:*** two ball mills will be installed adjacent to the processing plant.

- ***Process Plant:*** because the Project will employ a cyanide-based mineral extraction process, the process plant will be designed to incorporate specific International Cyanide Management Code (ICMC) requirements for secondary containment, materials selection, and workplace health and safety. Equipment layouts in the final design will consider the proper separation of potentially incompatible materials (e.g., cyanide solution and strong acids). Coated concrete foundations and secondary containments will be constructed with means for the periodic evacuation of accumulated precipitation. Concrete cyanide mixing aprons[1], solution storage tanks, a clarifier, two leach tanks, a series of six carbon in leach (CIL) tanks, elution columns, carbon regeneration kilns, two cyanide detoxification tanks, an enclosed gold room with electrowinning cells and gold doré furnace, an enclosed operational control room, and all interconnecting piping, electrical, and control systems will all be constructed.

  Process plant secondary containment volumes will be 110% of the maximum working volume of the largest contained tank, plus potential piping system flowback volumes,

[1] Cyanide will be delivered in dedicated heavy-wall stainless steel delivery/mixing containers ("ISO containers") that are recognized as the most intrinsically safe means of cyanide delivery; no separate mixing facilities will be constructed, but in-delivery tank mixing events will be conducted on concrete containment aprons that drain to the primary secondary containment areas of the process plant. Empty containers will be rinsed and returned to the cyanide supplier for re-use.

Figure 2.2-2: Aurora Site – Mill Area Site Plan (Source: TetraTech DWG-C0106, Rev A)



plus contingency for the potential volume associated with a 24 hour, 100 year precipitation event. In addition, a double-lined emergency discharge pond will be located immediately west of the process facility that will provide an additional 2,000 m^3 containment capacity.

- ***Power Plant and Power Distribution Lines***: the power plant site and access roadways will be cleared and will initially require construction of a 1M liter steel bulk storage tank for No. 4 generator fuel, with concrete foundations and secondary containments; associated fuel offloading facilities; generator and electrical equipment foundations; and three 3.5 MW No. 4 fuel fired generator sets. Up to five additional generator sets and potentially one more 1M liter No. 4 fuel tank may be installed in the operational phase of the Project. Overhead distribution lines and transformers will also be installed.

- ***Fuel Storage*****:** access roadways and pad areas for the ready line and fuel farm will be cleared; diesel fuel for mobile and stationary equipment will be stored in five 62,000 liter double-walled modular tanks as shown in **Figure 2.2-3**, along with lubricant tanks and offloading and dispensing equipment (with appropriate secondary containment/spill prevention and control equipment). The fuel offloading, storage, and dispensing area will be provided with a canopy roof and will be underlain with an HDPE liner draining to appropriately designed spill collection sumps to facilitate product recovery.

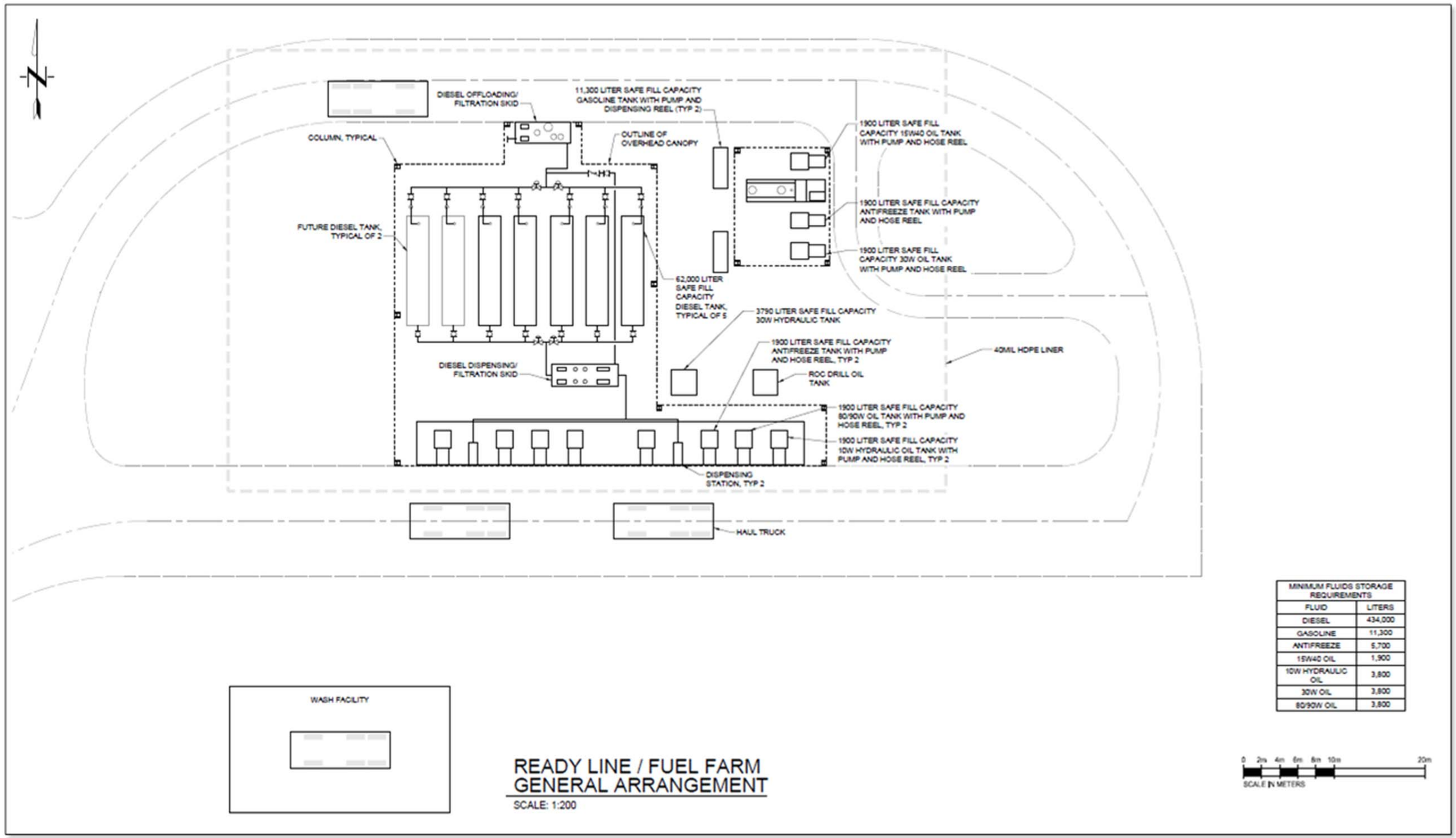
- ***Warehouse, Laboratory, Operations and Maintenance Offices, Maintenance Shop, Canteen, and Other Ancillary Facilities*****:** adjacent to the access roadways, pad areas will be cleared for construction of heavy and light vehicle maintenance shops, warehouses, offices, laboratory, canteen, and other ancillary facility areas a noted in **Figure 2.2-2**. Shop and warehouse foundations will typically be slab on grade, with containment provided for chemical storage areas and spill collection drains and oily water separators installed at the vehicle maintenance shops. Sanitary waste from the canteen, office, and shop areas will be collected and piped to a modular sewage treatment system that will be built east of the operations and maintenance facility. Secure explosives storage magazines and blasting agent silos will also be built.

Potential spill risks associated with these construction activities include fuel transport; fuel storage; field fuelling operations; hydraulic or fuel system ruptures on heavy equipment (at Aurora site or in transit from Buckhall); a fuel tanker truck accident in transit from Buckhall; or sanitary wastewater treatment system upset.

2.2.4 Tailings and Reclaim Pipelines and Initial TMA Clearance and Construction

In the construction phase, an HDPE tailings pipeline and reclaim water return pipeline will be constructed between the detoxification circuit at the process plant and the TMA. The TMA

Figure 2.2-3: Fuel Storage Farm Layout (Source: TetraTech DWG-M0102, Rev A)



footprint area will be cleared, with topsoil reserved for use in progressive restoration. The cleared basin will be inspected for bedrock outcrops or other geological features that could potentially represent a source of channeling or excessive seepage in the constructed facility. Any suspect areas will be amended by placement of compacted clay or other appropriate methods, as necessary to ensure generally uniform hydraulic conductivity across the basin area. The TMA starter dam and each successive raise are designed with internal drains; appropriate seepage collection and pumped return systems for each phase of construction will be developed as part of the final design. Two additional dams (TMA Diversion Dams 1 and 2) will also be built to intercept the runoff from an approximately 225 ha watershed located to the south of the TMA. Two additional raises of the TMA will be required in the operations phase of the Project.

Potential spill risks associated with these construction activities include fuel transport; fuel storage; field fuelling operations; hydraulic or fuel system ruptures on heavy equipment (at Aurora site or in transit from Buckhall); or a fuel tanker truck accident in transit from Buckhall.

2.2.5 MWP and FWP Clearance and Construction

In the construction phase of the Project, the MWP and FWP basins footprint areas (see **Figure 2.2-1**) will be cleared, inspected, and amended as necessary by the placement of compacted clay or other appropriate materials. A dam and spillway will be constructed at the northern edge of the FWP, discharging into the MWP.

Potential spill risks associated with these construction activities are largely confined to fuel transport; fuel storage; field fuelling operations; hydraulic or fuel system ruptures on heavy equipment (at Aurora site or in transit from Buckhall); or a fuel tanker truck accident in transit from Buckhall.

2.2.6 Underground Mine Construction

Construction of the underground mine portal and advancement of a spiral access decline and associated ventilation raises is expected to commence approximately two years prior to the cessation of open pit operations (i.e., well into the operational phase of the Project). See Section 2.3.3 for a description of the underground mine and mining operations.

Potential spill risks associated with these construction activities are largely confined to fuel transport; fuel storage; field fuelling operations; hydraulic or fuel system ruptures on heavy equipment (at Aurora site or in transit from Buckhall); or a fuel tanker truck accident in transit from Buckhall.

2.2.7 Man-Camp Completion

Construction activities at the Aurora site man-camp will be completed, and will include final construction and commissioning of the following facilities:

- security guardhouse, fencing, and vehicle barriers;
- all required modular housing units;
- canteen and food storage areas;

- recreation center;
- medical clinic/infirmary;
- laundry facilities;
- a lined raw water surface catchment, 400,000 gal raw water supply tank, and connecting pipelines;
- modular self-contained potable water treatment plant and 120,000 gal potable water storage tank;
- primary and backup sanitary wastewater treatment lagoons and modular wastewater treatment plants;
- fire water storage suppression system, pump station and pipelines connecting to the raw water supply tank;
- vehicle parking areas; and
- a licensed solid waste landfill .

2.2.8 Decommissioning and Closure of Tapir Camp

Except for jetties and security guardhouses on the eastern and western banks of the Cuyuni River at Tapir Crossing, all structures associated with the temporary man-camp and exploration/early works construction phase support facilities at Tapir will be decommissioned prior to the operational phase of the Project. The only remaining structures or infrastructure at Tapir Crossing will consist of the two jetties, ferry landings, security guardhouses, the barge ferry itself, and one or more backup outboard-powered workboats; see **Figure 2.2.4**. The site generator, fuel tanks, salvageable buildings, materials, and equipment will be removed to the Aurora site. Remaining structures or unsalvageable materials will be demolished and removed to landfill areas, which will be covered prior to regrading and revegetation. Support for Tapir Crossing (e.g., security staff, ferry barge operators, boat operators, fuelling services) during the major construction and operational phases of the Project will be provided on an ongoing basis from the Aurora site.

Potential spill risks associated with the closure of the Tapir camp are largely confined to fuel transport; fuel storage; field fuelling operations; hydraulic or fuel system ruptures on heavy equipment (at Aurora site or in transit from Buckhall); or a fuel tanker truck accident in transit from Buckhall.

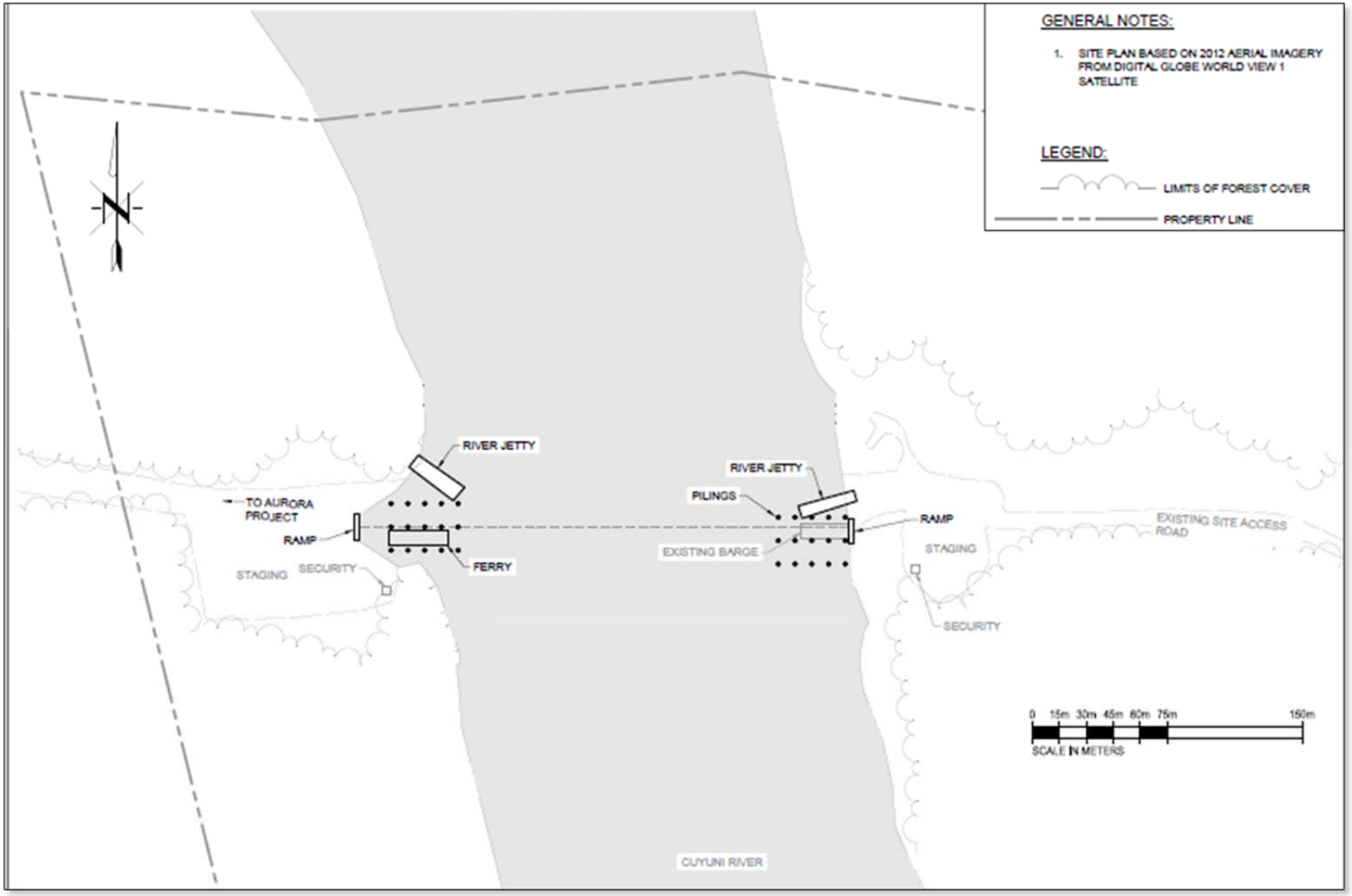
2.3 Operational Phase

Major activities in the operational phase of the Project are presented in the following paragraphs.

2.3.1 Power Generation

Electrical power will be provided by a series of 3.5 MW No. 4 fuel-fired generator sets (gensets). Three gensets will be installed in the construction phase of the project. Up to five additional gensets may be required to meet the power demands of the underground operations and the full throughput required by Phase 2 of the mining effort.

Figure 2.2-4: Tapir Crossing Site Plan (Source: TetraTech DWG-C0104, Rev A)



Potential spill risks associated with power generation activities include the transport and storage of No. 4 fuel transport and storage, and potential fuel tanker truck accidents in transit from Buckhall.

2.3.2 Open Pit Mining Operations

The Rory's Knoll open pit will be mined first. Near-surface saprolite and fresh rock ore deposits will be mined and access developed to the underground deposits as early in the operational phase as possible. Mining operations will be conducted around the clock, 365 days per year unless delays are causes by extreme weather events or other unusual conditions. Blasting operations are expected to be conducted by a specialty contractor who will manage blasting magazines and blasting agent silos, and will provide downhole delivery services. Blasting agents will include water resistant emulsion, with some potential for ammonium nitrate/fuel oil (ANFO) products in dry zones.

As noted in (TetraTech, 2013), open pit mine design is based on a conventional surface mine operation using, front end loaders for ore and waste loading, and haulage by a fleet of 43.5 tonne capacity trucks. Mining of the four pits is planned to be generally in parallel after the Rory's Knoll pit has reached its design depth and underground operations are under way.

Precipitation, roadway runoff, and groundwater inflow into the pit areas from the pit highwalls will be collected from all pits and pumped to surface sumps located new the rim of the pit, from which it will be pumped to the MWP for settling and dilution. Pumping infrastructure will advance with the active mining as it advances deeper into each pit, and will continue until Project completion and decommissioning/closure of the underground mine.

Potential spill risks associated with open pit mining activities include fuel transport, storage, field fuelling operations, and hydraulic or fuel system ruptures on heavy equipment; fuel tanker truck accident in transit from Buckhall; release of potentially contaminated mine wastewater from the breaching or overtopping of the MWP; or spillage of blasting agents from silos or drillhole loading trucks.

2.3.3 Underground Mining Operations

Construction of the underground mine portal and advancement of a spiral access decline and accompanying ventilation/emergency egress raises is expected to commence approximately two years prior to the cessation of open pit operations. Based on the production grade assumptions presented in (TetraTech, 2013), after a two-year construction and preproduction period, the Rory's Knoll underground mine is expected to be operated for approximately 13.5 years.

Potential spill risks associated with underground mining activities include fuel transport, storage, field fuelling operations, and hydraulic or fuel system ruptures on heavy equipment; fuel tanker truck accident in transit from Buckhall; release of contaminated mine wastewater from the breaching or overtopping of the MWP; or spillage of blasting agents from storage silos.

2.3.4 Man-Camp, Warehouse, and Auxiliary Infrastructure Operations

The Aurora man-camp will accommodate up to 475 workers in the operational phase. Warehouses, mechanical shops, wastewater treatment plants, and other auxiliary infrastructure will also be operated. Potential spill risks include release of untreated sewage from a sanitary wastewater treatment system upset, as well as the potential spills of oils, wastewater treatment reagents, or other hazardous substances within the warehouse.

2.3.5 Mineral Processing Operations

Major steps in mineral processing operations are described as follows.

- ***Ore Crushing, Milling, and Grinding*:** The ore will be crushed to a millable size using a three-stage crushing operation.

- ***Mineral Separation*:** the mill and mineral separation facility is designed to treat a nominal 1.75 Mt/a during Phase I and 3.5 Mt/a after Phase 2; the gold leaching process will use a modified carbon in leach (CIL) circuit for leaching and doré recovery.

- ***Tailings Detoxification Operations:*** all process tailings will be detoxified for residual cyanide prior to tailings disposal. This system will be operated to achieve a nominal weak acid dissociable (WAD) cyanide concentration of 0.5 mg/l in the tailing stream as it enters the tailings pipeline and is deposited in the TMA.

- ***TMA Operations*:** detoxified tailings with a nominal WAD_{CN} concentration of 0.5 mg/L will be deposited in the TMA via a dedicated tailings slurry pipeline, and reclaim water will be pumped back to the process facility from a reclaim pond barge for industrial use in the mill complex. In the operational phase, the main tailings dam and a small saddle dike will be constructed in two major raises at the north end of the TMA. The TMA will be equipped with a two-level spillway, which will be raised along with each dam raise. The low flow spillway is designed to provide the required retention time. The high flow spillway is set to provide 0.5 m of freeboard above the Probable Maximum Flood (PMF) level. The main TMA dam is designed with internal drains; appropriate seepage collection and pumped return systems will be developed as part of the final design. Any water discharged from the TMA spillway will flow into the pond at TMA Diversion Dam 2 and be further diluted prior to entering the environment. If necessary, an additional sedimentation or polishing pond may be installed to provide additional dilution or treatment capability.

Spill risks associated with these operational activities include potential reagent tanker truck accidents in transit from Buckhall; spills of detoxification reagents in warehouses; breach of containment in the process plant; breach of tailings pipeline; and breaching or overtopping of the TMA.

2.4 Decommissioning, Reclamation, and Closure Phase

Current estimates of mine life indicate that mining operations will cease approximately 18 years after the start of open pit mining operations. Ownership of the Project airstrip, the Aurora (M3) road extension to the end of the Barama road, the ferry landings at Tapir Crossing, and the Buckhall river port and logistics center is expected to revert to the Government of Guyana. The following elements of infrastructure will be closed in accordance with the Project *Mine Reclamation and Closure Plan:*

- all open pit mining areas;
- the Cuyuni River dikes;
- the underground mine and associated adits, airshafts, and infrastructure;
- waste rock/saprolite stockpiles;
- the ROM ore stockpile;
- the power plant, power distribution substation, and transmission lines;
- the fuel storage tank farm, secondary containments, and fuelling station;
- the mineral processing plant (including leaching, and detoxification circuits;
- the TMA and TMA Diversion Ponds 1 and 2;
- the FWP and MWP;
- laydown areas and warehouses;
- mechanical and maintenance shops;
- permitted solid waste landfill;
- hazardous waste storage facility area;
- haul and access roads;
- man-camp and administrative buildings; and
- potable water and septic/wastewater treatment systems.

In addition, closure actions at the end of mine life will include:

- placement of final soil cover, regrading, and re-vegetation of the permitted solid waste landfill at the Aurora man-camp;

- selective breaching, modification, and re-vegetation of the Cuyuni River dikes, and selective breaching, regrading, and re-vegetation of the FWP, MWP, TMA, and TMA Diversion Pond embankments;

- placement of soil cover and revegetation of the dewatered beach areas of the TMA;

- construction of effluent settling, dilution, and/or polishing ponds for the FWP, MWP, TMA, and TMA Diversion Ponds if necessary to ensure consistency of discharged water quality with respect to the (IFC, 2007) effluent standards;

- development of interconnected pit lakes and a stable natural drainage channel to the Cuyuni River (with a security berm and warning signs established throughout the period of pit lake infilling);

- controlled closure and abandonment of monitoring wells and piezometers at the end of post-closure monitoring.

- removal of motorized equipment from the site for transfer to other GGI operations or sale;

- demolition or disposal of non-operational motorized equipment, tanks, pumps, piping systems, and wood, metal, or concrete structures;.

- disposal of decontaminated tanks and piping in the underground mine or in a special inert waste disposal cell constructed in the final waste rock stockpile;

- razing, regrading, revegetation of concrete foundation areas; and

- flushing of cyanide facility equipment, tanks, with rinseate routed to the detoxification plant prior to disposal in the TMA, after which the rinsed detoxification plant and the tailings pipelines will also be demolished and disposed of in the underground mine or in an inert waste cell constructed in the final waste rock stockpile.

Residual hazardous materials (e.g., unused reagents, fuel, lubricants, paints, insecticides, reagents, or explosives) will be returned to suppliers for credit or otherwise sold to properly licensed or reputable dealers, and strictly for the purposes intended by the manufacturer. Any residual hazardous wastes will be accumulated in the onsite hazardous waste storage facility prior to being routed to an approved offsite hazardous waste landfill; residual medical wastes will be routed to an approved medical waste incinerator in Georgetown.

Potential spill risks associated with decommissioning and closure activities include fuel transport, storage, and field fuelling operations; hydraulic or fuel system ruptures on light trucks or heavy equipment; and spillage of fuel or wastes from other truck accidents in transit to or from Buckhall.

2.5 Post-closure Phase

Post-closure monitoring actions may include:

- physical maintenance and inspection of earthworks, including embankments and any permanent spillways, drains, settling ponds, or diversion channels;
- continuation of surface and groundwater monitoring programs;
- continued monitoring of revegetated areas to assess the success of vegetative rebound and colonization of reclaimed areas by native fauna.

Potential spill risks associated with these operational activities include fuel transport, field fuelling operations, and hydraulic or fuel system ruptures on light trucks or heavy equipment, as well as potential spillage from fuel tankers or other truck accidents in transit to or from Buckhall.

3 Action Plan

General environmental impacts information and general containment and response methods to be taken in event of a spill are summarized in the following paragraphs.

3.1 Environmental Impacts of Spills

3.1.1 Diesel or No. 4 Fuel Oil

Environmental impacts: Diesel and No. 4 fuel oil may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Diesel burns slowly and thus risk to the environment is reduced during recovery as a burn can be more readily contained compared with volatile fuels. Runoff into water bodies must be avoided.

3.1.2 Gasoline/Aviation Fuel

Environmental impacts: Gasoline and aviation fuel (both of which may be kept in small quantities at the Aurora site) may be harmful to wildlife and aquatic life. They are not readily biodegradable and have the potential for bioaccumulation in the environment. They are both quick to volatize, and runoff into water bodies must be avoided.

3.1.3 Waste Oil and Miscellaneous Oils/Grease

Environmental impacts: Waste oils may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Runoff into water bodies must be avoided.

3.1.4 Process Reagents

Environmental impacts: Process reagents (e.g., mixed cyanide solution, or detoxification or water treatment system reagents) may be immediately and extremely harmful to wildlife and aquatic life if released at high concentrations. Given the right conditions and solution strengths, various reagents can be highly reactive in the natural environment, especially water. *Any runoff or release of reagents to waterways must be avoided*.

3.2 Spill Containment Methods/Response

In all emergency situations, the following order of priorities shall apply:

1. ***Protect human safety***
2. ***Protect the environment***
3. ***Protect GGI property or assets***

General spill response actions are summarized as follows:

Identify the spilled material and determine appropriate safety precautions:

- ✓ Follow the precautions listed on the MSDS for the specific material or chemical.
- ✓ Administer first-aid or arrange for emergency medical treatment as needed, per GG-12, "First Aid and Emergency Medical Response."
- ✓ Identify and eliminate all hazards from fire, explosion, or chemical exposure, if safe to do so.
- ✓ Notify your immediate supervisor or designated emergency response team leader.

Control the spill source and confine the spill to the smallest possible area:

- ✓ Shut off valves, plug drains, upright drums, or otherwise eliminate the source of the spill.
- ✓ Access stored spill control materials, use to divert or contain flow, deploy secondary containment, or create barriers to prevent spread of the material.
- ✓ Prevent spilled material from entering waterways, or other sensitive areas, if at all possible without endangering safety.

Notify the Project Health & Safety and Environmental Officers, Environmental Manager, and other GGI management representatives:

- ✓ Use the fastest means of communication possible (cell or satellite phone);
- ✓ Initiate spill countermeasures and cleanup actions as soon as possible;
- ✓ Deploy sorbents, neutralizers, pumps and other response equipment; and
- ✓ Gather contaminated materials for appropriate disposal per GG-01, "Solid Waste Management (Pre-construction Phase) or the Project *Waste Management Plan.*"
- ✓ Take additional actions as directed by Environmental Manager, and other GGI management representatives:

The following sections provide more detailed spill containment and cleanup instructions.

3.2.1 Containment of Spills on Land

Spills on land include spills within containments or on rock, gravel, soil and/or vegetation. First response steps will vary depending on the specific conditions of the spill; however, the following steps can be used to establish control and provide containment:

- If in containment, the spill should be covered with bulk absorbent material from the associated spill kit. Spill cleanup waste collection and disposal will be as defined by SOP GG-01, "Solid Waste Management" or the *Waste Management Plan*.

For any spills occurring outside of containment, soil acts as a natural sorbent; as a consequence, spills on soil are generally less serious than spills on water. *It is important that all measures be undertaken to avoid spills reaching open water bodies*, including but not limited to the following:

- If the material is not immediately soaking into the ground, use shovels or heavy equipment to build a soil berm/dyke across the path, causing the material to pool. Prevent the material from spreading and moving toward drainage and waterways. A plastic tarp can be placed on and at the base of the dyke such that spilled material can pool up and subsequently be removed with sorbent materials or by pumping into plastic barrels. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up fuels before they migrate away from the source of the spill.

- Sorbents (especially sorbent booms) can be used for containment; stake them down at the leading edge of the spill to avoid displacing the sorbent.

- Quickly assess the potential for material entering local waterways by way of drainage ditches or small channels. Block all drainage channels using soil dams, sorbents, curtains, or other materials.

- It may also be possible to dig a shallow pit in front of the spill and line it with plastic sheeting. Dig shallow trenches leading to the pit and line them with plastic sheeting. Stake or anchor the edges of the plastic sheeting. Pits and trenches so lined will contain the substance until it can be recovered.

- Spilled material recovery should begin as soon as possible so that the material does not soak into the soils or top over the constructed containment area. Begin pumping the pooled material as soon as it has collected to a depth sufficient for the pump being used. A small portable pump may be used to transfer the material to a portable storage tank or drum.

- Minor spills can be cleaned up using small sheets of sorbent to cover the spill area. Use sorbent rolls to cover the surface of ponds and larger spills. Rolls and pads can be used in any combination that is effective. Sorbents turn a yellowish color when saturated with diesel or fuel. Saturated sheets must be retrieved for reuse or disposal. Sorbents can be reused by processing them through a sorbent wringer. Sorbents can be reused until

they fall apart. Wringers are especially useful at remote locations where sorbent supplies are not readily available.

- Spill cleanup waste collection and disposal will be completed per GG-01, Solid Waste Management or the comprehensive *Waste Management Plan;*

- For soils with low levels of total petroleum hydrocarbons (TPH), it may be possible to aerate materials (i.e., "landfarm" until TPH levels have been sufficiently reduced that they can be safely disposed of

3.2.2 Containment of Spills on Water

- Spills on water such as rivers, streams or lakes are the most serious types of spills as they can negatively impact water quality and aquatic life. Prevent entry into water, if possible, by building a berm or trench.

- If the spill is in open water, contain spill as close to release point as possible to minimize the size of the spill area;

  - Use a spill containment boom to concentrate spilled material for recovery.

  - On small spills, use absorbent pads.

  - On larger spills, use skimmer on contained slicks.

  - Intercept slicks in quiet areas using absorbent (preferably) or non-absorbent booms.

  - Do not use absorbent booms/pads in fast currents and turbulent water; focus on intercepting in calm areas.

  - Deploy containment booms to minimize spill area; the effectiveness of booms may be limited by wind, waves, and other factors. Slowly encircle and absorb spilled material. Once secured skimmers may be used to draw in hydrocarbons and minimal amounts of water.

  - If the spill is away from the shoreline a boat will need to be used to reach the spill, and deploy the boom. Some booms are designed to float and have sorbent materials built into them to absorb fuels at the edge of the boom. Other designs are impervious, allowing floating sorbent pads to absorb contained spillage.

  - Any spilled fuel contained within the perimeter of the boom will be recovered using sorbent materials or pumps and placed into barrels or bags for disposal.

  - Spill cleanup waste collection and disposal will be completed per GG-01, "Solid Waste Management" or the Project *Waste Management Plan.*

4 Standard Spill Contingency Procedures

4.1 Major Spill (>100 gallons/380 liters)

Area	*Standard Spill Contingency Procedures*
Barama/Aurora (M3) Extension Road and Tapir Crossing	• Ensure safety of all personnel, if there are injuries, follow GG-12, "First Aid and Emergency Medical Response." • Assess spill hazards and risks per applicable MSDSs (with driver of affected load). • Remove all sources of ignition if petroleum hydrocarbons are involved. • Initiate spill containment by first determining what will be affected by the spill. • Assess speed and direction of spill and cause of movement (water, wind, or slope). • Determine best location for containing spill, avoiding water bodies. • Stop the spill if safely possible (e.g. replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Ensure that correct protective gear is used when handling fuel in accordance with GG-11, "Personal Protective Equipment." • No matter what the volume is, immediately notify the convoy leader, who will report the spill to the Aurora Camp Manager, who shall in turn contact the Barama dispatcher (if on the Barama portion of the road) and GGI management. • Maintain contact with security every two hours while response actions are taking place. • Contain the spill – use contents of spill kits to place sorbent materials on the spill, or use shovels or earth-moving equipment to dig a trench or dike to contain spill. Methods will vary depending on the nature of the spill. In case of major spillage into water ways deploy booms to contain spread of spilled material. • For any dry spills (powders/solids/reagents/cement), immediately consolidate/collect material for reuse and/or disposal and provide cover to mitigate contact with water (precipitation or otherwise) until cleanup can occur. • Dispose of spill cleanup waste per GG-01, "Solid Waste Management (Preconstruction Phase)" or *Waste Management Plan.* If so directed by Environmental Manager, take confirmatory soil sample from beneath excavated soils. • Log incident per Figure 4.2.2 and route to Environmental Manager for review and further action as required.

Area	*Standard Spill Contingency Procedures*
Mine. Mill, and Mineral Processing Plant	• Ensure safety of all personnel, if there are injuries, follow GG-12, "First Aid and Emergency Medical Response." • Assess spill hazards and risks per applicable MSDSs • Remove all sources of ignition if petroleum hydrocarbons are involved. • Initiate spill containment by first determining what will be affected by the spill. • Assess speed and direction of spill and cause of movement (water, wind, or slope). • Determine best location for containing spill, avoiding water bodies. • Stop the spill if safely possible (e.g. replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Ensure that correct PPE is used when handling fuel or reagents in accordance with GG-11, "Personal Protective Equipment." • No matter what the volume is, immediately notify your direct supervisor or the Camp Manager and Health and Safety Officer and initiate evacuation, if necessary per the project *Emergency Preparedness and Response Plan* • Staff members not trained in spill response should stay in a safe location, provide information to environmental or health and safety officers or emergency responders, but should not attempt to stop, contain, or clean up chemical or fuel spills. • Staff members trained in spill response should contain the spill – use contents of spill kits to place sorbent materials on the spill, or use shovels or earth-moving equipment to dig a trench or dike to contain spill. Methods will vary depending on the nature of the spill. In case of major spillage into water ways deploy booms to contain spread of spilled material. • For any dry spills (powders/solids/reagents/cement), immediately consolidate/collect material for reuse and/or disposal and provide cover to mitigate contact with water (precipitation or otherwise) until cleanup can occur. • Dispose of spill cleanup waste per GG-01, "Solid Waste Management (Preconstruction Phase)" or *Waste Management Plan.* If so directed by Environmental Manager, take confirmatory soil sample from beneath excavated soils. • Log incident per Figure 4.2.2 and route to Environmental Manager for review and further action as required.

Area	*Standard Spill Contingency Procedures*
Man-camp Area	• Ensure safety of all personnel, if there are injuries, follow GG-12, "First Aid and Emergency Medical Response." • Assess spill hazards and risks per applicable MSDSs • Remove all sources of ignition if petroleum hydrocarbons are involved. • Initiate spill containment by first determining what will be affected by the spill. • Assess speed and direction of spill and cause of movement (water, wind, or slope). • Determine best location for containing spill, avoiding water bodies. • Stop the spill if safely possible (e.g. replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Ensure that correct PPE is used when handling fuel or reagents in accordance with GG-11, "Personal Protective Equipment." • No matter what the volume is, immediately notify your direct supervisor or the Camp Manager and Health and Safety Officer and initiate evacuation, if necessary per the project *Emergency Preparedness and Response Plan* • Staff members not trained in spill response should stay in a safe location, provide information to environmental or health and safety officers or emergency responders, but should not attempt to stop, contain, or clean up chemical or fuel spills. • Staff members trained in spill response should contain the spill – use contents of spill kits to place sorbent materials on the spill, or use shovels or earth-moving equipment to dig a trench or dike to contain spill. Methods will vary depending on the nature of the spill. In case of major spillage into water ways deploy booms to contain spread of spilled material. • For any dry spills (powders/solids/reagents/cement), immediately consolidate/collect material for reuse and/or disposal and provide cover to mitigate contact with water (precipitation or otherwise) until cleanup can occur. • Dispose of spill cleanup waste per GG-01, "Solid Waste Management (Preconstruction Phase)" or *Waste Management Plan.* If so directed by Environmental Manager, take confirmatory soil sample from beneath excavated soils. • Log incident per Figure 4.2.2 and route to Environmental Manager for review and further action as required.

4.2 Minor Spill (≤100 gallons/380 liters)

Area	Standard Operating Procedures
Minor Spill Contingency	
Barama/Aurora (M3) Extension Road and Tapir Crossing	• Assess spill hazards and risks. • Remove all sources of ignition. • Initiate spill containment by first determining what will be affected by the spill. • Stop the spill if safely possible (e.g. replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Ensure that correct PPE is used when handling fuel or reagents in accordance with GG-11, "Personal Protective Equipment." • Immediately notify your direct supervisor, Camp Manager, and the security gate at the Aurora site. The Camp Manager will report the spill to head office and other key individuals. • Maintain contact with security every two hours, in conformance with GG-13, Transportation Safety. • Contain the spill – use contents of spill kits to place sorbent materials on the spill. • In case of spillage directly into water way (Cuyuni River and/or Tributaries) deploy booms or sorbent materials to collect spilled material. • Dispose of spill cleanup waste per GG-01, "Solid Waste Management (Preconstruction Phase)" or *Waste Management Plan.* If so directed by Environmental Manager, take confirmatory soil sample from beneath excavated soils. • Log incident per Figure 4.2.2 and route to Environmental Manager for review and further action as required.

Area	Standard Operating Procedures
Aurora Site Man-camp Area, Mine. Mill, and Mineral Processing Plant	• Assess spill hazards and risks. • Remove all sources of ignition. • Initiate spill containment by first determining what will be affected by the spill. • Stop the spill if safely possible (e.g. replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Ensure that correct PPE is used when handling fuel or reagents in accordance with GG-11, "Personal Protective Equipment." • Contain the spill – use contents of spill kits to place sorbent materials on the spill. • In case of spillage directly into water way (Cuyuni River and/or Tributaries) deploy booms or sorbent materials to collect spilled material. • Immediately notify your direct supervisor, Camp Manager, and the security gate at the Aurora site. The Camp Manager will report the spill to head office and other key individuals. • For process leaks, contact site engineer to determine if problem can be fixed or further advice is needed from Georgetown. • Dispose of spill cleanup waste per GG-01, "Solid Waste Management (Preconstruction Phase)" or *Waste Management Plan.* If so directed by Environmental Manager, take confirmatory soil sample from beneath excavated soils. • Log incident per Figure 4.2.2 and route to Environmental Manager for review and further action as required.

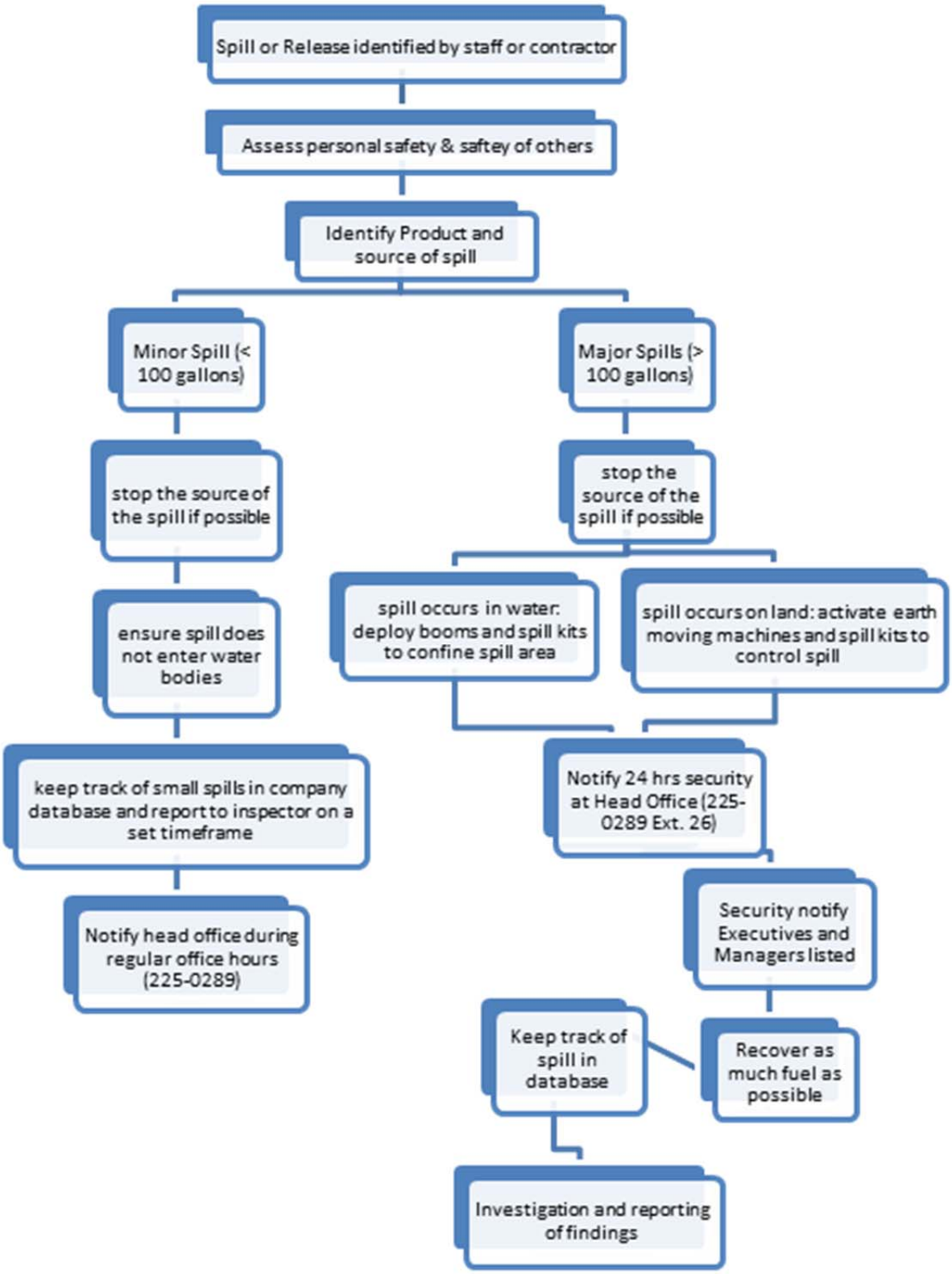
4.3 Reporting Procedure

All spills on the Barama/Aurora (M3) extension road, at Tapir Crossing, and at the Aurora site must be immediately reported to the Aurora Security Manager, Camp Manager, and Health and Safety Officer, who will determine the correct course of action for reporting the spill (which will depend on the volume of material spilled). The Camp Manager and/or Health and Safety Manager must record all major spill events on a standard spill report form (see **Figure 4.3-1**), which will provide a reference for further investigation, determination of the root cause of the spill, corrective/ preventive action, and any necessary follow-on monitoring activities. **Figure 4.3-2** is a flowchart that summarizes all required response and reporting actions.

Figure 4.3-1: Major Spill Report Form

Major Spill Report – Aurora Gold Project	
Reported to Camp Manager by:	**Date/Time Reported:**
Spill description? (describe/attach photos or sketches)	**Estimated volume?**
Emergency contacts: (tick each when complete): □ Head Office, GGI (592) 225-0289 □ Guyana Fire Service - 911 □ Environmental Protection Agency EPA (592) 225-0506 □ V. Smith, VP, Aurora Gold Project, GGI (592)-226-6400, (592)-640-4821 □ C. King, Project Coordinator, GGI (592) 628-9964 □ A. Riley, Environmental Manager, GGI (592) 689-7992 □ C. Harris, Camp Manager, GGI (592) xxx-xxxx □ R. Beltran, Environmental Specialist, IFC (202) 473-9369, (202) 640-0786 (cell) □ Mr. Edwards, Project Engineer, GGI (592) xxx-xxxx □ St. John Lees, Construction Manager, GGI **(592) 601-3769** □ M. Williams, Health & Safety Officer, GGI (592) 689-7992 □ J. Critchlow, Environmental Officer, GGI (592) 650-2404 □ W. Johnson, Chief Security Officer, GGI (592) 692-7001 □ Dr. Laxas, Woodlands Hospital (592) 223-7023-4	
Containment, Control, and Response actions taken: (describe/attach photos or sketches)	
Root cause:	
Preventive action taken: (to preclude recurrence)	
Action approved: **VP, Aurora Gold Project**	**Action approved:** **Environmental Manager**

Figure 4.2-2: Spill Response/Reporting Flowchart



5 Roles and Responsibilities

Roles and responsibilities for key personnel with respect to the management of potential spills are presented in the following paragraphs

5.1 Executives

Executive roles and responsibilities include the following:

- ensuring that this plan is proactively and effectively implemented;
- ensuring that appropriate SOPs are in place to enable effective implementation of the plan; and
- in keeping with GGI's environmental policies, ensure that this plan is reflected in the company's activities and provide internal and external personnel as necessary to assist in the formulation and implementation of training and SOPs.

5.2 Site Managers

Site manager roles and responsibilities include the periodic evaluation update of this plan, as well as for ensuring:

- employee understanding of this plan, its supporting SOPs, and the GGI communication network;
- proactive assessment of potential spills, and continually seeking improvements in all aspects spill prevention, management, and containment;
- that Project safety systems and procedures are followed;
- that all existing equipment used in managing spills is fully functional in conformance with international standards and GIIPs;
- a high standard of housekeeping is maintained, and that working conditions do not compromise the integrity of fuel or reagent storage areas or pipeline systems;
- that the necessary arrangements for fire prevention; firefighting and emergency response are enforced per GG-22, "Fire Prevention Program" and the *Emergency Preparedness and Response Pla*n;
- that tanks, pumps, pipelines, and emergency equipment is in a satisfactory condition for use, including (for rotating equipment) having correct machine guards installed per GG-18, "Machine Guards and Safety Barriers";
- that safety training is undertaken for new hires and whenever safety practices are upgraded or modified, in accordance with GG-05, "ESMS Training Program";
- that the equipment, material, protective devices and personal protective equipment (PPE) provided by the employer are suitable and adequate for employees' individual work assignments, and are maintained in good condition per GG-11, "Personal Protective Equipment"; ;
- accurate recordkeeping is conducted in relation to fuel and reagent receipt, storage, and transfer; workforce environmental, health and safety, and operational training; and in

reviews of any emergency situations and resolution of any associated non-conformances per GG-04, “Identification of Non-conformances and Corrective/Preventive Action”;

- that proper orientation procedures for visitors and non-personnel are implemented, and correct PPE is made available; and
- remaining available on call 24 hours/7 days a week, in case of a spill or other potential emergency.

5.3 Supervisors

Supervisory duties and responsibilities include the following:

- monitoring storage and handling of fuel and other hazardous substances, per GG-14, “Handling and Storage of Hazardous Materials” and the Project *Hazardous Materials Management Plan;*
- ensuring that the appropriate safety systems and procedure are followed by all concerned;
- ensuring that all equipment items associated with fuel storage and transfer are in good working order, as well as emergency equipment related to the control of fuel spills;
- ensuring that all areas within their responsibility are maintained in a clean and safe condition, with a high standard of housekeeping;
- ensuring that the day-to-day work practices within their area of responsibility does not increases the risk of fuel spill;
- ensuring that fire prevention, firefighting, spill containment and emergency evacuation procedures are understood and practiced, as appropriate, within their of responsibility; and
- setting a good example to subordinates by working and conducting themselves in a professional manner and by taking fast remedial action in the event of fuel spill.

5.4 Health, Safety and Environmental Officers

Duties and responsibilities of the Health and Safety Officer and Environmental Officer include the following:

- maintaining primary responsibilities for ensuring adequate practices and procedures are in place that address the health and safety needs of GGI employees, as well as the environmental management considerations of the Aurora Project and other potential GGI projects;
- ensuring that emergency plans are understood and can be carried out efficiently and effectively;
- follow-up on training exercises and mock drill scenarios;
- inspecting established environmental monitoring stations for water and soil and collecting samples for analysis;

- serving as primary emergency response coordinators;
- conducting routine monitoring exercises to ensure fuel delivery systems are in good working condition;
- maintaining the operational effectiveness of the emergency response equipment and for ensuring the security of the operations;
- monitoring and advising on GGI's overall compliance with this plan and related management systems;
- investigating all fuel spills and known "near misses" and participating in the resolution of any non-conformances and the development of appropriate corrective and preventive actions;
- ensuring appropriate signage and warning notices relating to fuel handling and storage are in good condition and properly displayed, and that they comply with any governing regulations;
- ensuring that control systems (e.g., spill kits and other resources) are strategically placed to provide effective responses to accidents; and
- ensuring that sufficient administrative and engineering controls are in place to reduce risk to as low as is reasonably practicable.

5.5 Employees/Workers

Duties and responsibilities of individual GGI employees include the following:

- observing regulations concerning health, safety, and environment;
- cooperating actively with managers, supervisors, and others to implement emergency procedures;
- reporting immediately to supervision any accidents, near-misses, damage, spills, potential hazards, or potentially dangerous practices or occurrences;
- assisting in the maintenance of high standards of housekeeping; and
- not engaging in any reckless activity that will increase risk of accident or spill.

5.6 Convoy Leaders and Contract Employees/Drivers

Duties and responsibilities of Convoy Leaders and individual GGI contract employees and drivers include the following:

- observing regulations concerning health, safety, and environment;
- co-operating actively with managers, supervisors and others to implement emergency procedures;
- reporting immediately, to supervision, any accidents, near-misses, damage, spills, potential hazards, or potentially dangerous practices or occurrences;
- assisting in the maintenance of high standards of housekeeping; and
- not engaging in any reckless activity that will increase risk of accident or spill.

5.7 Contact List

Minor spills (i.e., spills to the ground surface only that can be readily contained and cleaned up without extraordinary measures) are to be addressed by field managers or supervisors or any other on site personnel and reported to upper management in periodic progress reports or other routine operational reports. However, ***in case of a major spill, all of the contacts listed below should be contacted within two hours.***

Head Office, GGI
7 North Road, Georgetown
(592) 225-0289

Guyana Fire Service
911

Guyana Environmental Protection Agency (EPA)
(592) 225-0506

V. Smith
Vice President, Aurora Gold Projects/Country Manager, GGI
(592)-226-6400, (592)-640-4821

A. Riley
Environmental Manager, GGI
(592) 689-7992

St. John Lees
Construction Manager, GGI
(592) 601-3769

M. Williams
Health & Safety Officer, GGI
(592) 689-7992

J. Critchlow
Environmental Officer, GGI
(592) 650-2404

W. Johnson
Chief Security Officer, GGI
(592) 692-7001

Dr. Laxas
Woodlands Hospital
(592) 223-7023-4

In addition, the Environmental Manager will notify IFC of the spill event; contact information is as follows:

Raymi Beltran
Environmental Specialist
(202) 473-9369
(202) 640-0786 (cell)

6 Training

All GGI employees and/or subcontractors (including transportation contractors) working at the Aurora or Tapir Crossing sites or routinely involved in transportation of materials, equipment, and/or personnel to and from the Aurora site will be trained in the requirements of this *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)*. In addition, all such personnel shall be trained in the requirements of the following SOPs and Management Plans, as appropriate for the spill prevention and response aspects of their work assignments

- GG-09, " Identification of Project-related Safety Hazards and Assessment of Risks";
- GG-11; " Personal Protective Equipment";
- GG-12, " First Aid and Emergency Medical Response";
- GG-13; " Transportation Safety – Light Vehicles";
- GG-14, " Handling and Storage of Hazardous Materials";
- GG-15, "Forklift Safety";
- GG-16, Safe Operation of Heavy Equipotent";
- GG-17, "Vehicle Fuelling and Spill Prevention";
- GG-22, "Fire Prevention Program";
- GG-23, "Operational Safety Meetings";
- GG-24, "Recognition and Reporting of Safety Hazards";
- GG-26, "Safe Use of All-=Terrain Vehicles";
- GG-41, "Management of Aviation Fuel and Fuelling Operations";
- GG-43, "Safe Operation of Grove Model 530 Hydraulic Cranes";
- *Cyanide Management Plan*
- *Hazardous Materials Management Plan*
- *Emergency Preparedness and Response Plan*

All training will be conducted and documented as described in SOP GG-06," ESMS Training Program." Training in firefighting, fuel containment and first aid should specifically be targeted to all GGI employees employed within each of the work area, as applicable, as well as tanker/supply truck drivers who transport fuel to the Aurora Project site. The fire protection training program should be developed through the collaborative effort of the Environmental, Health and Safety Division of GGI, and the Guyana Fire Service. In addition,

- Specific training sessions (including participation in mock spill exercises) will be scheduled for individuals who will be directly involved in handling fuel spills. The purpose of this training is to ensure that responsible individuals are aware of, and can execute the steps needed to control potential spillage.

- Supervisors and the Camp Manager are also required to have advanced training in first aid as well as in the transport of dangerous goods.

- The aforementioned training will be carried out cooperatively with representatives from the Guyana Fire Service and the Red Cross.

All training records shall be retained in accordance with GG-05, “Records Management.”

7 Monitoring

Secondary containment structures should be inspected on a weekly basis for any signs precipitation accumulation, degradation, or release of hazardous contents, as note in the Project *ESHS Monitoring Plan*. Subsequent to visual inspection, in absence of any evidence of release (e.g., sheens, odor.) accumulated precipitation may be drained to the land surface.

Documented monthly inspections at each of the mine facilities will be carried out at the direction of the Environmental Manager in accordance with GG-03, “Field Inspections”, in order to ensure that training is being properly conducted and that spill response and cleanup systems (e.g., spill kits, boom equipment, containment arrangements) are in good working order, and risk of spillage is thereby minimized.

8 Records

Detailed records of training activities and exercises will be retained by the Camp Manager or an assigned Buckhall site Health and Safety or Environmental Officer. Records of all other health, safety, and environmental monitoring activities shall also be retained, as well as all records that document the detection and resolution of spills, leaks or other non-conformances. These records will be organized to permit ready access and kept in a secure, weather-protected file box or cabinet that is under the direct control of the Environmental and Health and Safety Officers.

All records will be forwarded (electronically or as hard copies) to safe storage in the Aurora Project Office in Georgetown on at least a monthly basis for retention in accordance with GG-05, “Records Management.”

References

Internal References

- GG-01, “Solid Waste Management”;
- GG-03, “Field Inspections”;
- GG-04,. “Identification of Non-conformance and Corrective/Preventive Actions”;
- GG-05, “Records Management”;
- GG-06, “ESMS Training Program”;
- GG-09, “ Identification of Project-related Safety Hazards and Assessment of Risks”;
- GG-11; “ Personal Protective Equipment”;
- GG-12, “ First Aid and Emergency Medical Response”;
- GG-13; “ Transportation Safety – Light Vehicles”;
- GG-14, “ Handling and Storage of Hazardous Materials”;
- GG-15, “Forklift Safety”;
- GG-16, Safe Operation of Heavy Equipotent”;
- GG-17, “Vehicle Fuelling and Spill Prevention”;
- GG-22, “Fire Prevention Program”;
- GG-23, “Operational Safety Meetings”;
- GG-24, “Recognition and Reporting of Safety Hazards”;
- GG-26, “Safe Use of All-Terrain Vehicles”;
- GG-41, “Management of Aviation Fuel and Fuelling Operations”;
- GG-43, “Safe Operation of Grove Model 530 Hydraulic Cranes”;
- *Cyanide Management Plan;*
- *Hazardous Materials Management Plan;*
- *Emergency Preparedness and Response Plan;*
- *Mine Reclamation and Closure Plan;*
- *Waste Management Plan;*
- *Transportation Management Plan;*
- *Tailings Area Management Plan;*
- *Water Management Plan;*
- *Blasting Management Plan;* and
- *ESHS Monitoring Plan.*

External References

IFC, 2007. Environmental, Health and Safety Guidelines for Mining. World Bank/International Finance Corporation, Washington, DC. December 10, 2007.

IFC, 2012. IFC Performance Standards on Environmental and Social Sustainability. World Bank/International Finance Corporation, Washington, DC. January 1, 2012.

Republic of Guyana, 2000. Environmental Protection (Hazardous Wastes Management) Regulations. Republic of Guyana, Georgetown, Guyana. 2000.

TetraTech, 2013. NI 43-101 Technical Report: Updated Feasibility Study, Aurora Gold Project, Guyana, South America. TetraTech, Inc., Golden, Colorado. January 29, 2013.

Buckhall Spill Contingency Plan



Revision 2
June, 2013

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1. INTRODUCTION

This spill contingency plan is prepared for Guyana Goldfields Inc. (GGI) Buckhall facility which is located on the West bank of the Essequibo River. This site is the permanent port facility which serves as a transshipment area to the Aurora Gold Project site and other GGI properties. This plan is prepared in keeping with the requirements of the Environmental Protection Act, specifically Part V section 19, subsection (5) which states that:

> *"The agency may require an applicant, either by himself or through an independent agent, to carry out and report on any test or experiments relating to the plant, structure, equipment, apparatus, mechanism or thing or to the methods, processes or devices to be employed to control or prevent the discharge of any contaminant into any part of the natural environment."*

Hence, this spill contingency plan will focus specifically on emergency procedures which will be employed in the event of a spill at the site.

1.1 Company Name, Location and Mailing Address

Guyana Goldfields Inc.
7 North Road, Georgetown, Guyana/
Toronto, Ontario, Canada MSH
Tel: (592)-225-0289
Tel: (416)-628-5936

1.2 Objectives

- Ensure all environmental impacts are understood and can be mitigated in the event of a spill;
- Define Standard Operating Procedures (SOPs) for containment and mitigation of spill events; and
- To develop a framework for training, reporting, and keeping appropriate records of any spill events.

1.3 Health, Safety, Environmental, and Community Relations Planning Considerations

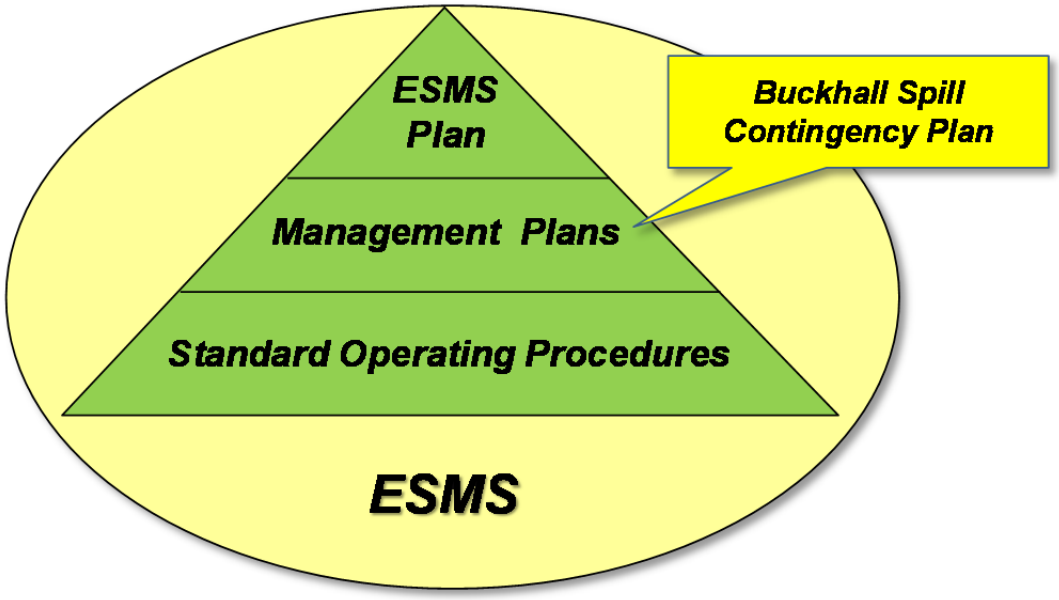
Guyana Goldfields Inc. is committed to seeking sustainability in all aspects of mine development, and has established Human Resources, Community Relations, and Environmental, Health, and Safety Policies[1] as the overall framework for achieving its sustainability goals.

[1] See Appendix C of the GGI *ESMS Plan*

The International Finance Cooperation (IFC) has been involved with the project since 2006. In keeping with the requirements of IFC's own Policy on Environmental and Social Sustainability, GGI has established an Environmental and Social Management System (ESMS) for the Aurora Project, which is embodied in a Project-specific *ESMS Plan.* The *ESMS Plan* is based on IFC Performance Standard 1, "Assessment and Management of Environmental and Social Risks and Impacts" (PS 1; IFC, 2012) and other internationally recognized good international industry practices (GIIPs) for environmental and health and safety program management. The GGI *ESMS Plan* will be periodically updated at specific points or phases in the mine life cycle in response to changing Project conditions and environmental, health and safety, and social management needs.

The *Buckhall Spill Contingency Plan* is one of a series of Management Plans that will be activated at various phases of the mine life cycle (see Section 1.2 of the *ESMS Plan* for further discussion), and will support the final updated Environmental and Social Impact Assessment (ESIA) for the Project. **Figure 1** describes the relationship of the *Buckhall Spill Contingency Plan* to the overall structure of the Project ESMS.

Figure 1: Relationship of Buckhall Spill Contingency Plan to ESMS



1.4 Site Description

The port and logistics support facility occupies approximately 10 fenced hectares on the west bank of the Essequibo River in the area of Buckhall and is designed to handle the

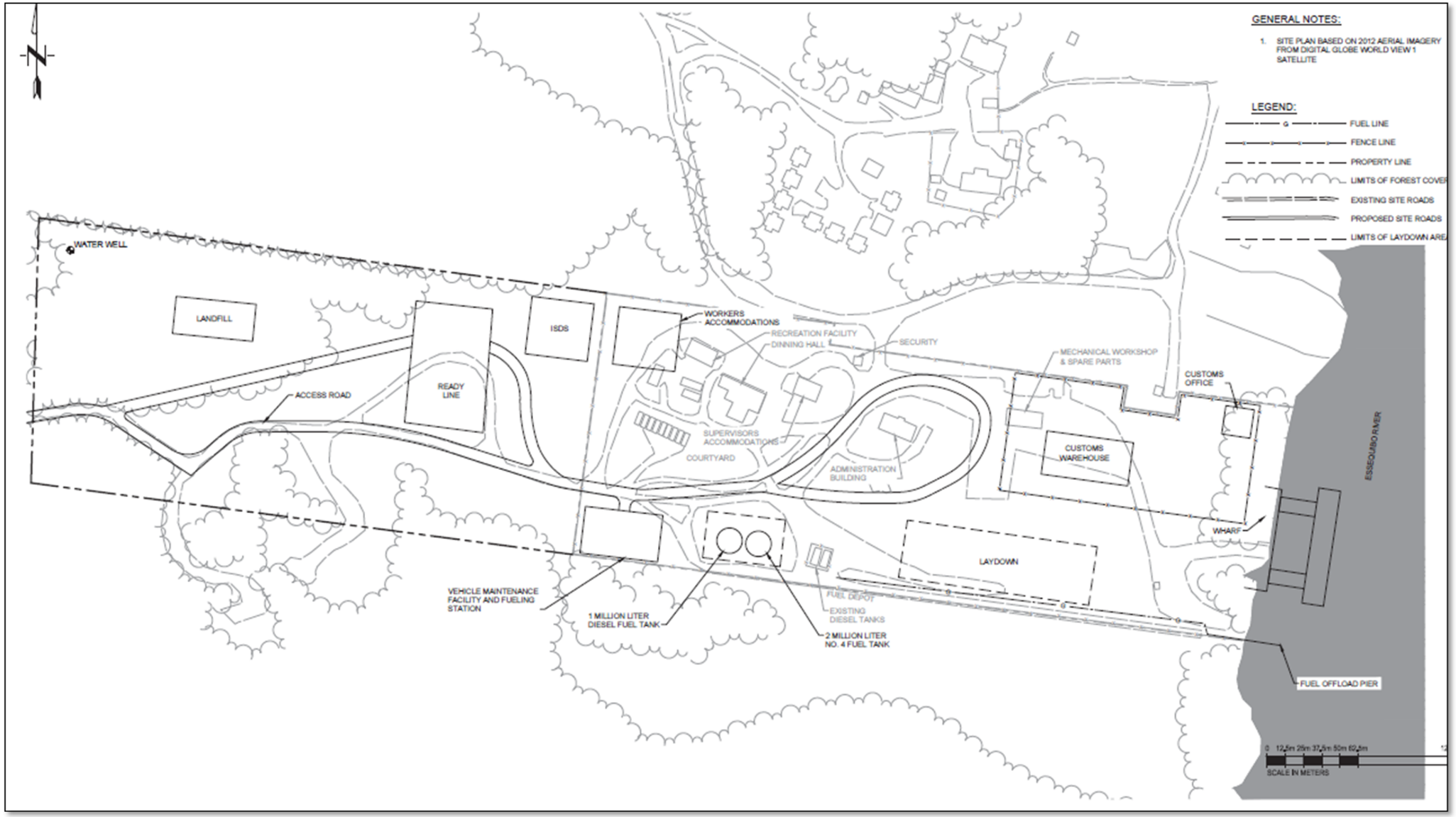
receipt of bulk fuel as well as general cargo. The facility is used as a transfer point for materials in transit to and from the Aurora Gold Project site. Materials are delivered to the port by barges and small and mid-sized vessels. The facility includes the following:

- A dock facility which consist of a wharf and a short pier that connects the wharf to the shoreline;
- A covered storage area and workshop for maintaining equipment and vehicles;
- A fuel barge offloading trestle, with floating containment boom and waterway spill recovery kit;
- Covered fuel storage tanks with secondary containment provisions and spill kit;
- Covered controlled storage areas for fuel barrel and accumulated waste oil barrels, with secondary containment provisions and spill kits;
- A covered fuel dispensing/transfer facility, with secondary containment provisions and spill kit;
- Security fencing, lighting, and associated structures;
- A small-boat landing;
- An open lay-down/storage area; and
- Administrative offices, living quarters, and canteen buildings.

Fuel will be stored in barrels and two 20,000 gallon steel storage tanks pending commissioning of a 1M liter steel diesel storage tanks and a 2M liter steel tank for No. 4 fuel (for the Aurora site power plant) as shown in the current site plan (**Figure 2**). Barrel storage will be within a covered, bunded containment pads constructed of concrete or high-density polyethylene (HDPE). The large steel tanks are designed to American Petroleum Institute (API) or equivalent standards, and will be constructed on raised concrete foundations within an impervious bunded concrete impoundment (tank-in-a-box system). The impoundment capacity will be >110% of the total tank volumes, well in excess of the containment capacity recommended by Section 1.5 of the IFC *Environmental, Health, and Safety General Guidelines* (IFC, 2007).[2] The tank impoundment will be covered or will be subject to daily inspection programs to prevent accumulation of precipitation; secure drain arrangements will be provided, along with oily water separators. Electricity is provided by an on-site diesel-powered generator with a separate, covered, concrete bunded steel storage tank of 1,000 gallons (TetraTech, 2013).

[2] Section 1.5 of the IFC *Environmental, Health, and Safety General Guidelines* requires containment equal to or the greater of 110% of the largest contained tank volume or 25%+ of all combined tank volumes.

Figure 2: Site Plan – Buckhall [Source: (TetraTech, 2013)]



The site plan in **Figure 2** shows topographic relief overlain with an as-built layout of the Buckhall site. The eastern half of the fenced area has a gentle relief, which in a case of a spill from storage area would contribute to low velocity of fuel, thus making containment and cleanup more manageable. The living quarters and kitchen area are situated on higher elevations more to the west. The main storage tanks are approximately 285 meters from the river. The pipeline has been pressure-tested and is supported on a string of concrete support risers to minimize stress on welded joints, and extends from the storage tanks onto the pier, which is approximately 1.5 meters above the mean spring high water level.

2. ACTION PLAN

2.1 Environmental Impacts of Spills

2.1.1 Diesel Fuel and No. 4 Fuel

Environmental impacts: Diesel and No.4 blended fuel may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Both fuels burn slowly and thus risk to the environment is reduced during recovery as burning fuel can be more readily contained compared with volatile fuels. Runoff into water bodies must be avoided.

2.1.2 Gasoline

Environmental impacts: Gasoline may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Gasoline is quick to volatize. Runoff into water bodies must be avoided.

2.1.3 Waste Oil and Miscellaneous Oils/Grease

Environmental impacts: Waste oils may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Runoff into water bodies must be avoided.

2.2 Spill Containment Methods

2.2.1 Containment of Spills on Land

Spills on land include spills within containments or on rock, gravel, soil and/or vegetation. If in containment, the spill will be covered with bulk absorbent material (diatomaceous earth) from the associated spill kit. Spill cleanup waste collection and

disposal will be as defined by SOP GG-01, "Solid Waste Management – Pre-Construction Phase" or the comprehensive *Waste Management Plan* that will be issued after construction of licensed landfilsls at Buckhall and the Aurora site. For any spills occurring outside of containment, it is important to note that soil is a natural sorbent, thus spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies.

Dykes

Dykes can also be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled fuel. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of fuel that may reach it. A plastic tarp can be placed on and at the base of the dyke such that fuel can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly a dyke may not be necessary and sorbents can be used to soak up fuels before they migrate away from the source of the spill. Spill cleanup waste collection and disposal will be as defined by SOP GG-01, "Solid Waste Management – Exploration/Early Works Construction Phase Activities" or the comprehensive Waste *Management Plan* that will be issued prior to the start of major Project construction activities.

2.2.2 Containment of Spills on Water

Spills on water such as rivers, streams or lakes are the most serious types of spills as they can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water.

Booms

Booms are commonly used to recover fuel floating on the surface of lakes or slow moving water bodies. They are released from the shore of a water body to create a circle around the spill. If the spill is away from the shoreline a boat will need to be used to reach the spill, then the boom can be set out. Booms are designed to float and have sorbent materials built into them to absorb fuels at the edge of the boom. Other designs are impervious, allowing floating sorbent pads to be used to clean up any contained spillage. Any spilled fuel contained within the perimeter of the boom will be recovered using sorbent materials or pumps and placed into barrels or bags for disposal. [3] Spill cleanup waste collection and disposal will be as defined by SOP GG-01, "Solid Waste Management – Pre-Construction Phase" or the comprehensive *Waste Management Plan* that will be issued after construction of licensed landfilsls at Buckhall and the Aurora site.

[3] Renewable Resources & Environment, (2007); Guidelines for Spill Contingency Planning

3. SPILL CONTINGENCY STANDARD OPERATING PROCEDURE

3.1 Major Spill (> 100 gallon)

Area	Standard Operating Procedures
Large Spill Contingency	
Trestle	• Ensure safety of all personnel. • Assess spill hazards and risks. • Remove all sources of ignition. • Initiate spill containment by first determining what will be affected by the spill. • Assess speed and direction of spill and cause of movement (water, wind and slope). • Determine best location for containing spill, avoiding any water bodies. • Stop the spill if safely possible e.g. shut of pump, replace cap, tip drum upward, patch leaking hole. Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Ensure that correct protective gear is used when handling fuel. • No matter what the volume is, notify Camp Manager (use of two-way radio would save time). Camp manager will report spill to head office and other key individuals. • Contain the spill – use contents of spill kits to place sorbent materials on the spill, or use of earth moving equipment to dig dike to contain spill. Methods will vary depending on the nature of the spill. • Dispose of spill cleanup waste in accordance with GG-01, "Solid Waste Management – Exploration/Early Works" or *Waste Management Plan*. **Land** • Use earth moving equipment and spill kits to contain spill. Construction of trenches or small dyke me be required. **Water** • In case of major spillage into water way (Essequibo River) deploy booms to curtain spread of fuel. • Camp Manager coordinates containment effort until environmental is on the ground. • Log incident in records to aid in further investigations. .
Pipeline	• Assess spill hazards and risks. • Remove all sources of ignition. • Identify source area of spill. • Stop the spill if safely possible (e.g., shut off pump). • Notify Camp Manager (use of two-way radio will save time); Camp Manager will report spill to head office and other key individuals. • Use spill kits and equipment to contain leaking. • Dispose of spill cleanup waste in accordance with GG-01, "Solid Waste Management – Exploration/Early Works" or *Waste Management Plan*. • Log incident in records to aid in further investigations.

Area	Standard Operating Procedures
Fuel Bund	• Ensure safety of all personnel. • Assess spill hazards and risks. • Remove all sources of ignition. • Initiate spill containment by first determining what will be affected by the spill. • Contain the spill – use contents of spill kits to place sorbent materials on the spill, or use of earth moving equipment to dig dike to contain spill. Methods will vary depending on the nature of the spill. • Dispose of spill cleanup waste in accordance with GG-01, "Solid Waste Management – Exploration/Early Works" or *Waste Management Plan*. • Notify Camp Manager (use of two-way radio will save time); Camp Manager will report spill to head office and other key individuals. • Log incident in records to aid in further investigations.

3.2 Minor Spill (< 100 gallon)

Area	Standard Operating Procedures
Minor Spill Contingency	
Trestle	• Assess spill hazards and risks. • Remove all sources of ignition. • Initiate spill containment by first determining what will be affected by the spill. • Stop the spill if safely possible e.g. shut of pump, replace cap, tip drum upward, patch leaking hole; use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. • Ensure that correct protective gear is used when handling fuel. • Contain the spill – use contents of spill kits to place sorbent materials on the spill. • Dispose of spill cleanup waste in accordance with GG-01, "Solid Waste Management – Exploration/Early Works" or *Waste Management Plan*. • Notify Camp Manager. • Log incident in records to aid in further investigations.
Pipeline	• Assess spill hazards and risks. • Remove all sources of ignition. • Identify source area of spill. • Stop the spill if safely possible e.g. shut of pump, close valve. • Notify Camp Manager (use of two-way radio will save time); Camp Manager will report spill to head office and other key individuals. • Contact site engineer to determine if problem can be fixed or further advice is needed from Georgetown. • Use spill kits and equipment to contain leaking. • Dispose of spill cleanup waste in accordance with GG-01, "Solid Waste Management – Exploration/Early Works" or *Waste Management Plan*. • Log incident in records to aid in further investigations.

Area	Standard Operating Procedures
Fuel Bund	• Assess spill hazards and risks. • Remove all sources of ignition. • Initiate spill containment by first determining what will be affected by the spill. • Notify Camp Manager. • Use nearest spill kit and apply absorbent to spill. • Dispose of spill cleanup waste in accordance with GG-01, "Solid Waste Management – Exploration/Early Works" or *Waste Management Plan*. • Log incident in records to aid in further investigations.

3.3 Reporting Procedure

All spills must be immediately reported to the Camp Manager, who will determine the correct course of action for reporting the spill (this will be dependent on the volume of fuel spilled). The Camp Manager will have a copy of the Spill Contingency Plan. The spill contingency plan will also be an item included in each spill kit. The Camp Manager must record all major spill events on a standard spill report form (see **Figure 3**), which will provide a reference for further investigation, determination of the root cause of the spill, corrective/ preventive action, and any necessary follow-on monitoring activities.

Figure 3: Major Spill Report Form

<table>
<tr><th colspan="3">Fuel Spill Report – Buckhall Fuel Terminal and Storage Facility</th></tr>
<tr><td colspan="2">Reported to Camp Manager by:</td><td>Date/Time Reported:</td></tr>
<tr><td colspan="2">Spill description? (describe/attach photos or sketches)</td><td>Estimated volume?</td></tr>
<tr><td colspan="3">Emergency contacts: (tick each when complete):

□ Head Office, Guyana Goldfields Inc.
(592) 225-0289
□ Guyana Fire Service - 911
□ Environmental Protection Agency EPA
(592) 225-0506
□ V. Smith, Country Manager, Guyana Goldfields Inc.
(592)-226-6400, (592)-640-4821
□ C. King, Project Coordinator, Guyana Goldfields Inc., (592) 628-9964
□ A. Riley, Environmental Manager, Guyana Goldfields Inc., (592) 689-7992
□ A. Peters, Camp Manager, Guyana Goldfields Inc.
(592) 661-7176
□ R. Beltran, Environmental Specialist, IFC
(202) 473-9369, (202) 640-0786 (cell)
□ Mr. Edwards
Project Engineer, Guyana Goldfields Inc.
(592) xxx-xxxx
□ J. Bates, Construction Manager, Guyana Goldfields Inc., (592) 601-3769
□ M. Williams
Health & Safety Officer, Guyana Goldfields Inc.
(592) 689-7992
□ J. Critchlow
Environmental Officer, Guyana Goldfields Inc.
(592) 650-2404
□ W. Johnson, Chief Security Officer, Guyana Goldfields Inc.
(592) 692-7001
□ Dr. Laxas, Woodlands Hospital
(592) 223-7023-4</td></tr>
<tr><td colspan="3">Containment, Control, and Response actions taken: (describe/attach photos or sketches)</td></tr>
<tr><td colspan="3">Root cause:</td></tr>
<tr><td colspan="3">Preventive action taken: (to preclude recurrence)</td></tr>
<tr><td colspan="2">Action approved:

Aurora Project Manager</td><td>Action approved:

Environmental Manager</td></tr>
</table>

4. ROLES AND RESPONSIBILITIES

4.1.1 Executives

Roles and responsibilities include:

- Ensuring that this Plan is proactively and effectively implemented;
- Ensuring that appropriate SOPs are in place to enable effective implementation of the Plan; and
- In keeping with GGI's environmental policies, ensure that this Plan is reflected in the Company's activities and provide internal and external personnel as necessary to assist in the formulation and implementation of training and SOPs.

4.1.2 Site Manager

Roles and responsibilities include:

- Ensuring employee understanding of the Plan, supporting SOPs, and the GGI communication network;
- Taking a proactive stance on potential spills, thus seeking improvements in every facet of spill prevention, management, and containment;
- Periodically appraising and updating this Plan;
- Ensuring that GGI safety systems and procedures are followed;
- Ensuring that all existing equipment used in managing spills is fully functional and in keeping with international standards and GIIPs;
- Ensuring that a high standard of housekeeping is maintained, and that working conditions do not compromise the integrity of fuel storage area or pipeline systems;
- Ensure the necessary arrangements for fire prevention; fire fighting and emergency response plan are enforced;
- Ensuring that tanks, pumps, pipelines, and emergency and other equipment is in a satisfactory condition for use, including (for rotating equipment) having correct machine guards installed;
- Ensuring that safety training is undertaken for new hires and whenever safety practices are upgraded or modified;
- Ensuring that the equipment, material, protective devices and clothing provided by the employer are suitable and adequate for employees' individual work assignments, and are maintained in good condition;
- Ensuring that the corrective measures and procedures prescribed in this Plan are carried out in day-to-day workplace operations;
- Ensure proper docking and fuel line coupling and uncoupling procedures are followed;
- Ensure accurate recordkeeping is conducted in relation to fuel receipt, storage, and transfer; workforce environmental, health and safety, and operational

training; and in reviews of any emergency situations and resolution of any associated non-conformances;
- Ensuring that proper orientation procedures for visitors and non-personnel are implemented, and correct appropriate personal protective equipment (PPE) is made available per GG-11, "Personal Protective Equipment"; and
- Remaining available on call 24 hours/7 days a week, in case of emergency.

4.1.3 Supervisors

Duties and responsibilities include:
- Monitoring storage and handling of fuel;
- Ensuring that the appropriate safety systems and procedure are followed by all concerned;
- Ensuring that all equipment items associated with fuel storage and transfer are in good working order, as well as emergency equipment related to the control of fuel spills;
- Ensuring that all areas within their responsibility are maintained in a clean and safe condition, with a high standard of housekeeping;
- Ensuring that the day-to-day work practices within their area of responsibility does not increases the risk of fuel spill;
- Ensuring that fire prevention, fire-fighting, spill containment and emergency evacuation procedures are understood and practiced, as appropriate, within their of responsibility; and
- Setting a good example to subordinates by working and conducting themselves in a professional manner and by taking fast remedial action in the event of fuel spill.

4.1.4 Health, Safety and Environmental Officers

Duties and responsibilities include:
- Maintaining primary responsibilities for ensuring adequate practices and procedures are in place that address the health and safety needs of GGI employees, as well as the environmental management considerations of the Aurora Project and other potential GGI projects;
- Ensuring that emergency plans are understood and can be carried out efficiently and effectively;
- Follow-up on training exercises and mock drill scenarios;
- Inspecting established environmental monitoring stations for water and soil and collecting samples for analysis;
- Serving as primary emergency response coordinators;
- Conducting routine monitoring exercises to ensure fuel delivery systems are in good working condition;

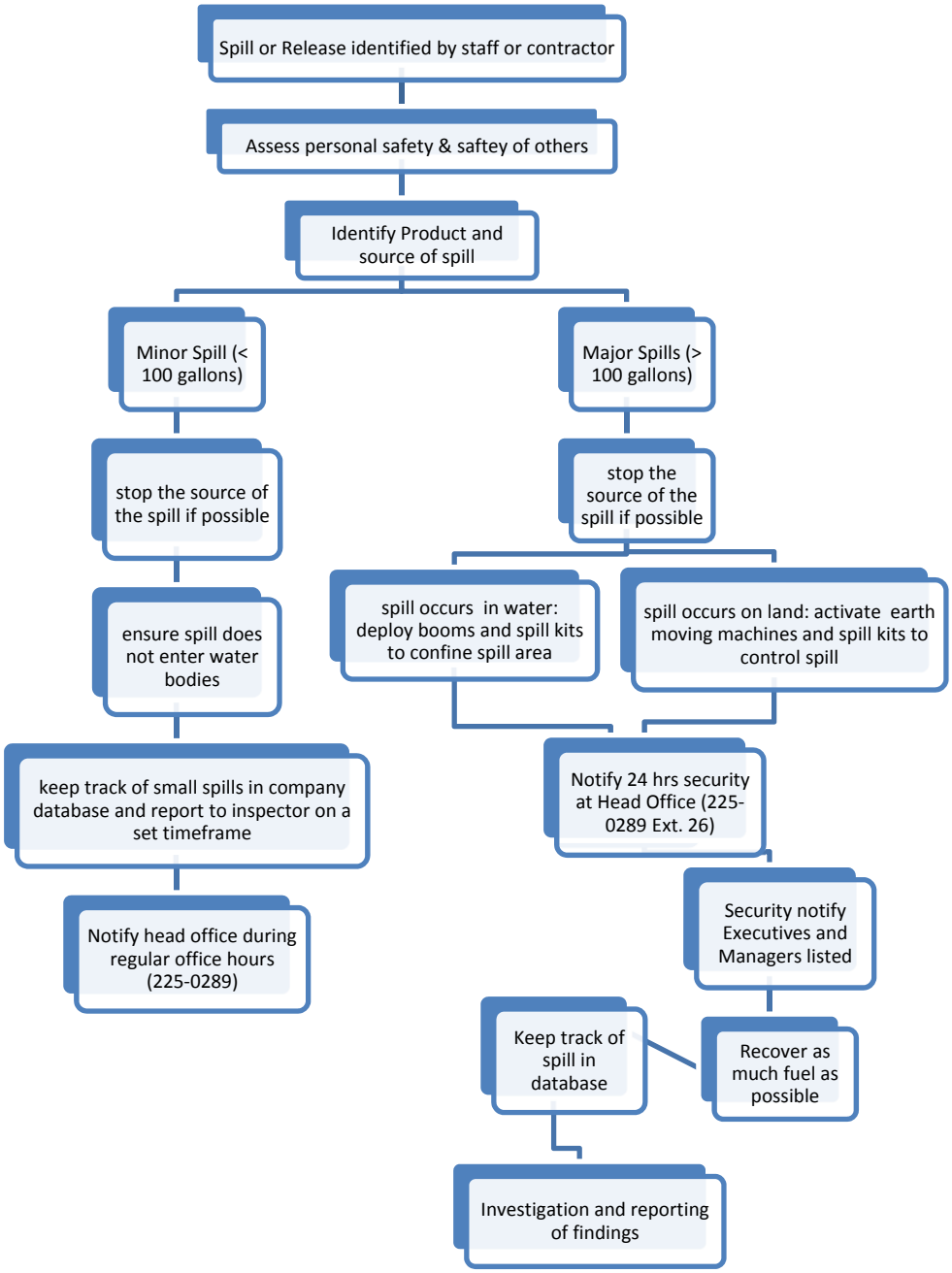
- Maintaining the operational effectiveness of the emergency response equipment and for ensuring the security of the operations;
- Monitoring and advising on GGI's overall compliance with this Plan and related management systems;
- Investigating all fuel spills and known "near misses" and participating in the resolution of any nonconformances and the development of appropriate corrective and preventive actions;
- Ensuring appropriate signage and warning notices relating to fuel handling and storage are in good condition and properly displayed, and that they comply with any governing regulations;
- Ensuring that control systems (e.g., spill kits and other resources) are strategically placed to provide effective responses to accidents; and
- Ensuring that sufficient administrative and engineering controls are in place to reduce risk to as low as is reasonably practicable.

4.1.5 Employees/Workers

Duties and responsibilities of individual GGI employees include:

- Observing regulations concerning Health, Safety, and Environment;
- Co-operating actively with Managers, supervisors and others to implement emergency procedures;
- Reporting immediately, to supervision, any accidents, near-misses, damage, spills, potential hazards, or potentially dangerous practices or occurrences;
- Assisting in the maintenance of high standards of housekeeping; and
- Not engaging in any reckless activity that will increase risk of accident or spill.

Figure 4: Flow Chart for Spill Response Procedures



4.2 Contact List

All the contacts listed below should be contacted within 2 hours of a major spill. Minor spills (i.e., spills to the ground surface only that can be readily contained and cleaned up without extraordinary measures) are to be addressed by field managers or supervisors or any other on site personnel and reported to upper management in periodic progress reports or other routine operational reports.

Head Office, Guyana Goldfields Inc.
7 North Road, Georgetown
(592) 225-0289

Guyana Fire Service
911

Environmental Protection Agency EPA
(592) 225-0506

V. Smith
Country Manager, Guyana Goldfields Inc.
(592)-226-6400, (592)-640-4821

C. King
Project Coordinator, Guyana Goldfields Inc.
(592) 628-9964

A. Riley
Environmental Manager, Guyana Goldfields Inc.
(592) 689-7992

A. Peters
Camp Manager, Guyana Goldfields Inc.
(592) 661-7176

J. Bates
Construction Manager, Guyana Goldfields Inc.
(592) 601-3769

M. Williams
Health & Safety Officer, Guyana Goldfields Inc.
(592) 689-7992

J. Critchlow
Environmental Officer, Guyana Goldfields Inc.
(592) 650-2404

W. Johnson
Chief Security Officer, Guyana Goldfields Inc.
(592) 692-7001

Dr. Laxas
Woodlands Hospital
(592) 223-7023-4

In addition, the Environmental Manager will notify IFC within 3 days of the spill event; contact information is as follows:

Raymi Beltran
Environmental Specialist
(202) 473-9369
(202) 640-0786 (cell)

5. TRAINING

All training will be conducted and documented as described in SOP GG-06, "ESMS Training Program." Training in firefighting, fuel containment and first aid is specifically targeted to all GGI employees who are stationed at the Buckhall site, as well as tanker truck drivers who transport fuel to the Aurora Project site. The training program is developed through the collaborative effort of the Environmental, Health and Safety Division of GGI, and the Guyana Fire Service (GFS).

The following are key components of the program:

- Visitors to the site are required to participate in brief orientation session, which will provided general instruction on:
  - the key requirements of this Plan;
  - the location of a copy of this Plan, spill kits, and fire extinguishers; and
  - the location of a Buckhall site layout map showing locations of all emergency response equipment and safe assembly areas in case of emergency (a copy of this map will be placed on the billboard at the main gate security office).

- Specific training sessions (including participation in mock spill exercises) will be scheduled for individuals who will be directly involved in handling fuel spills. The purpose of this training is to ensure that responsible individuals are aware of, and can execute the steps needed to control potential spillage.

- Supervisors and the Camp Manager are required to have advance training in first aid as well as in the transport of dangerous goods.

- The aforementioned training will be carried out cooperatively with representatives from the GFS and Red Cross.

6. MONITORING

Documented monthly inspections at the Buckhall site will be carried out at the direction of the Environmental Manager, in accordance with GG-03, "Field Inspections", in order to ensure that training is being properly conducted and that spill response and cleanup systems (e.g., spill kits, boom equipment, containment arrangements) are in good working order, and risk of spillage is thereby minimized. In addition, security personnel stationed at this facility will be required to carry out daily inspections of fuel receipt, storage, and delivery system to identify potential security threats.

7. RECORDS

Detailed records of training activities and exercises will be retained by the Camp Manager or an assigned Buckhall site Health and Safety or Environmental Officer. Records of all other health, safety, and environmental monitoring activities shall also be retained, as well as all records that document the detection and resolution of spills, leaks or other non-conformances. These records will be organized to permit ready access and kept in a secure, weather-protected file box or cabinet that is under the direct control of the Environmental and Health and Safety Officers.

All records will be forwarded (electronically or as hard copies) to safe storage in the Aurora Project Office in Georgetown on at least a monthly basis for retention in accordance with GG-05, "Records Management."

8. REFERENCES

IFC, 2007. Environmental, Health and Safety General Guidelines. World Bank/International Finance Corporation, Washington, DC. April 30, 2007.

IFC, 2012. IFC Performance Standards on Environmental and Social Sustainability. International Finance Corporation, Washington, D.C. January 1, 2012.

Renewable Resources & Environment, 2007. Guidelines for Spill Contingency Planning. Accessed online at http://www.aadnc-aandc.gc.ca/eng/1100100024236/1100100024253 Aboriginal Affairs and Northern Development Canada (AANDC), Gatineau, Quebec, Canada. April 2007.

TetraTech, 2013. NI 43-101 Technical Report: Updated Feasibility Study, Aurora Gold Project, Guyana, South America. TetraTech, Inc., Golden, Colorado. January 29, 2013.



Transportation Management Plan

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
Seattle, WA

Date:
June 2013

Project Number:
01-29301A1

Record of Revisions

Revision Level -0-

Page	Section	Description of Change
All	All	First issue of *Transportation Management Plan*

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Acronyms

ASM	Artisanal and Small-Scale Mining
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GGI	Guyana Gold, Inc.
GPS	Global Positioning System
IFC	International Finance Corporation
SOP	Standard Operating Procedure

1 Introduction

1.1 General Description of Roadway Access to Aurora Gold Project

This *Transportation Management Plan* is intended to guide the management of all roadway transportation activities associated with the Guyana Goldfields Inc. (GGI) Aurora Gold Project (Project).[1] The Project is located in a remote, forested, and largely uninhabited area of northwestern Guyana; see **Figures 1.1-1 and 1.1-2.** The Project is comprised of four major physical components:

- the ***Aurora mine site***, located at latitude 6°45′N, longitude 59°45′W, on the southern bank of the Cuyuni River approximately 170 km due west of Georgetown;
- the ***Buckhall*** river port and logistics support facility, on the west bank of the Essequibo River;
- the 140 km long ***Barama (M3) road***, which was built in the 1990s to provide access to a large hardwood timber concession north of the Cuyuni River owned by Barama Company Ltd., and for which GGI has negotiated a shared usage arrangement; and
- the ***Aurora M3 road extension***, built in 2011-2012, a new 33 km road constructed by GGI which connects the end of the Barama road with Tapir Crossing (a vehicle barge ferry landing on the Cuyuni River; see **Figure 1.1-3**), and extends from Tapir crossing due west to the Aurora mine site.

Roadway traffic and transportation activities are summarized below and described in further detail in Section 4.0.

- Vehicle access to the Buckhall logistics support center and the eastern end of the Barama/Aurora (M3) road will provided by barge, disembarking at GGI's wharf facility at Buckhall; see **Figure 1.1-4**. It is expected that most goods will be packaged in steel intermodal (sea) containers and/or on pallets prior to off-loading from barges onto trucks. It is also expected that minimal repackaging or reloading of equipment or materials at Buckhall will be required.

[1] Other access to the Aurora mine site for personnel and high-value or dedicated equipment and periodic shipments of doré bullion may be provided by chartered aircraft using a private (GGI-owned and maintained) airstrip located on the southern bank of the Cuyuni River immediately adjacent to the dike system north of the open pit area of the Aurora site. Charter flights are scheduled and managed by GGI' s logistics support offices in Georgetown. Other workboat access to the Tapir Crossing and Aurora site may be used for specific environmental and social monitoring purposes or for the transportation of exploration teams.

Figure 1.1-1: Location of Barama/Aurora (M3) Road

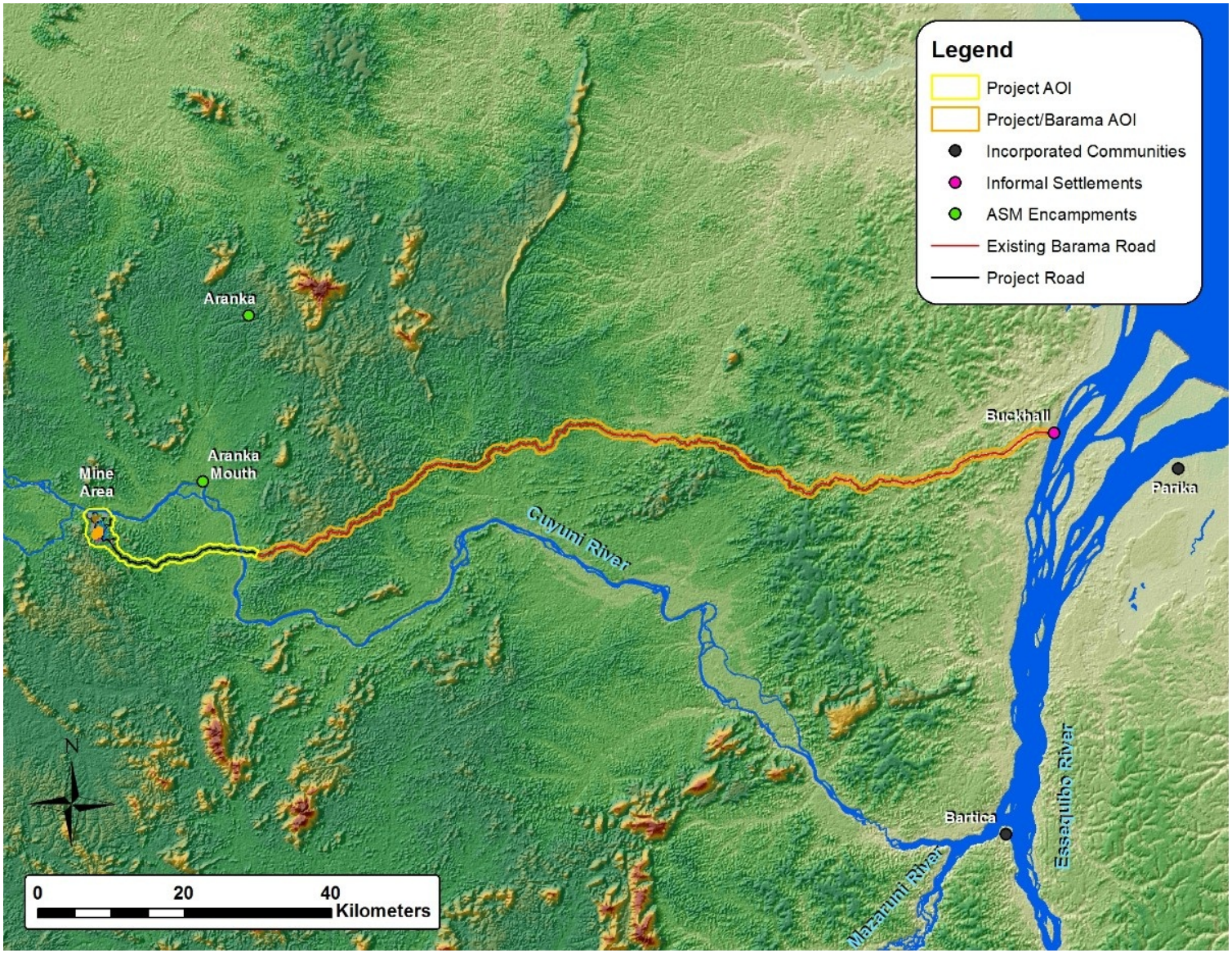


Figure 1.1-2: Barama/Aurora (M3) Road Showing Aurora Extension and Tapir Crossing

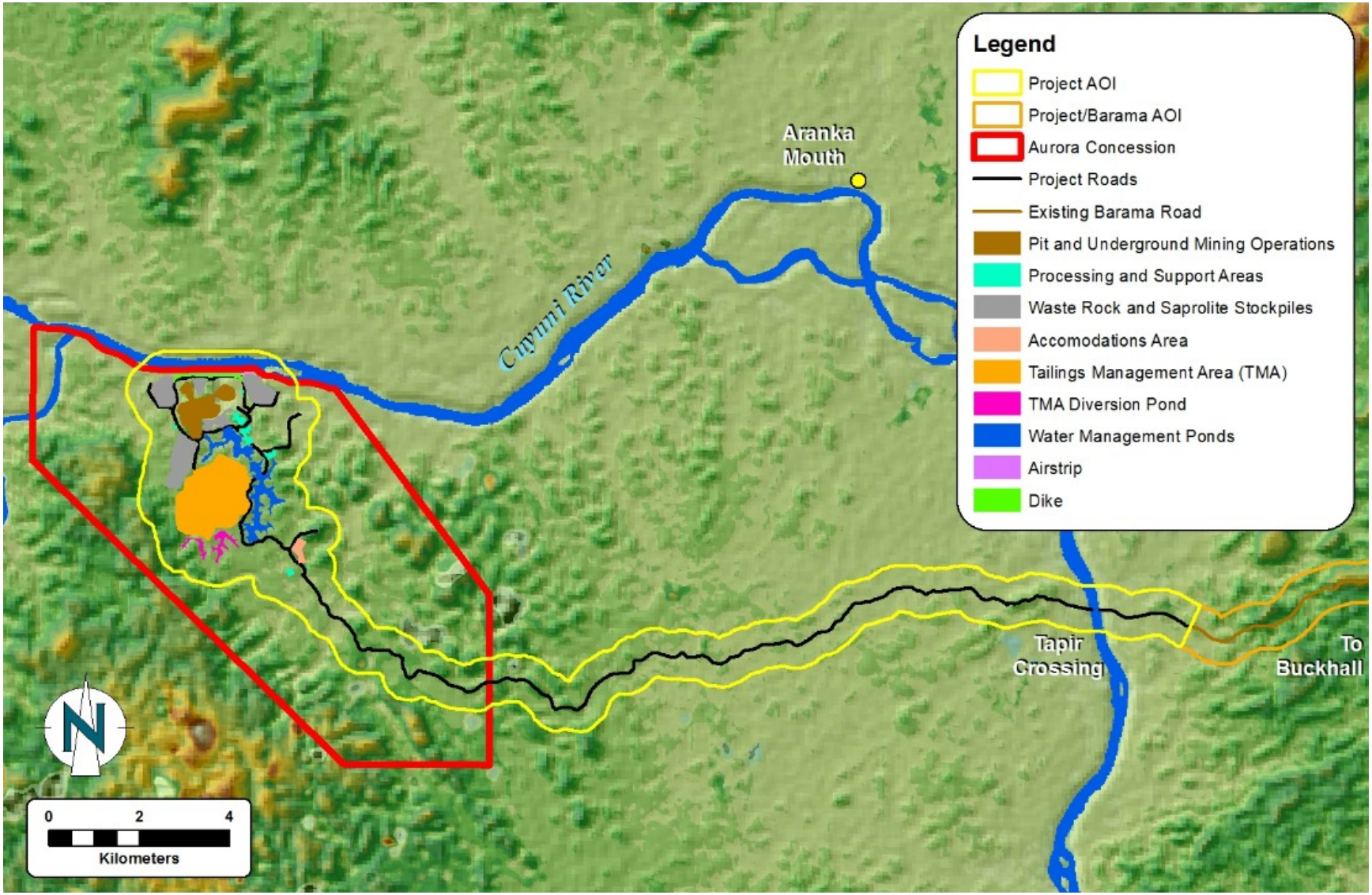


Figure 1.1-3: Tapir Crossing Site Plan (Source: TetraTech DWG-C0104, Rev A)

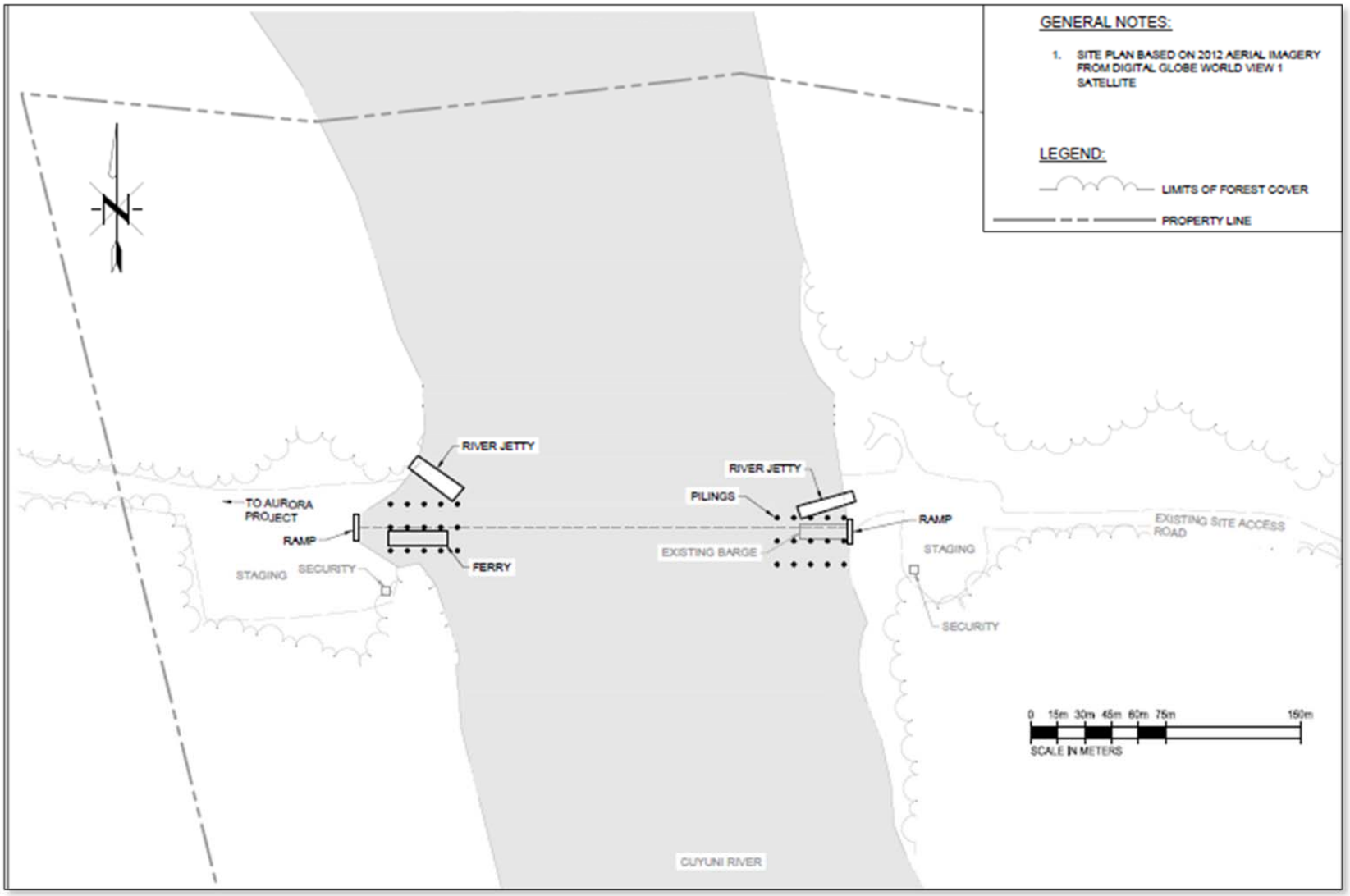
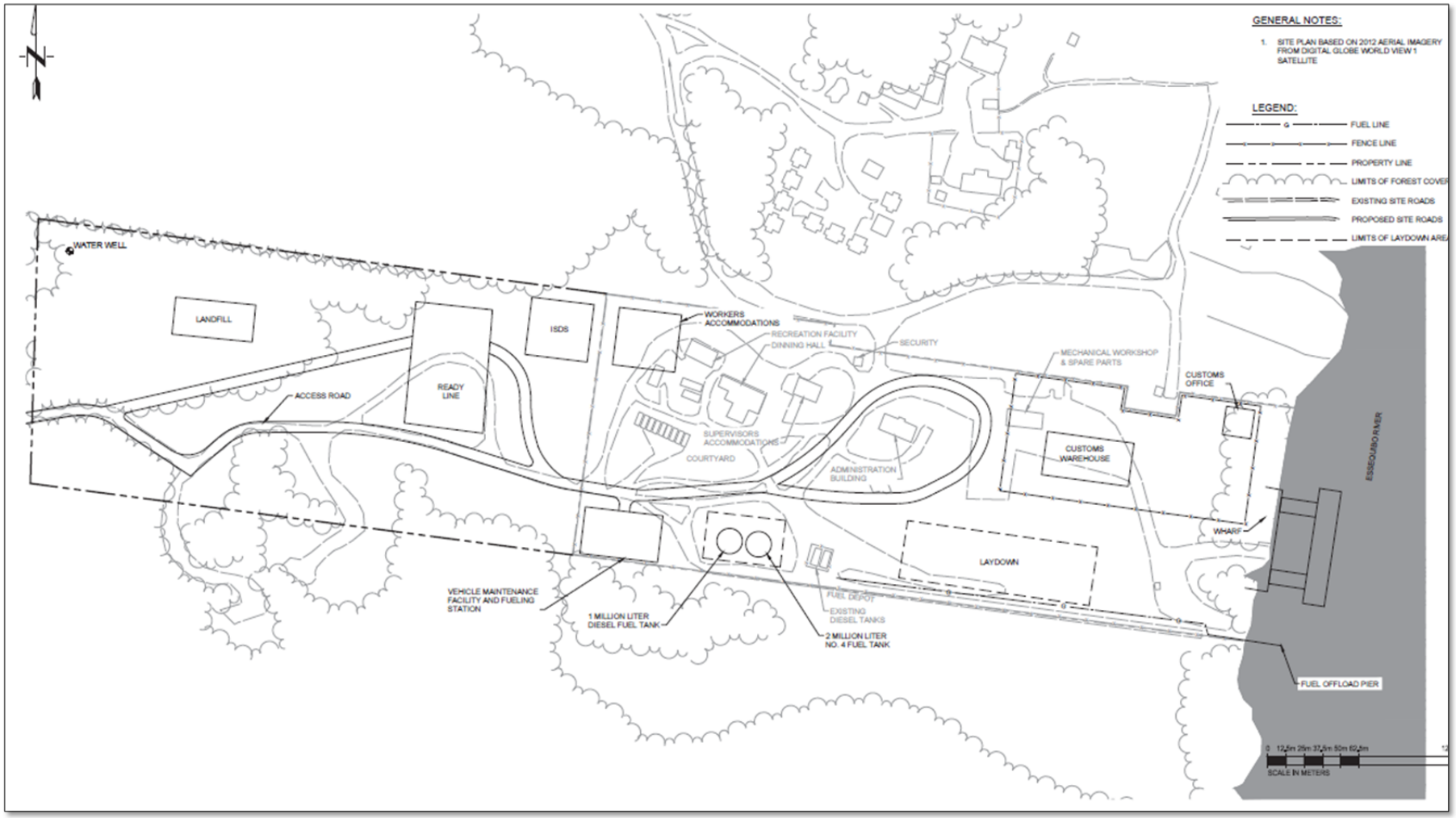


Figure 1.1-4: Site Plan – Buckhall Logistics Support Facility (Source: TetraTech DWG-C0103, Rev A)



- The Barama road and the Aurora (M3) extension serve as the primary artery from the Buckhall logistics support center to the Aurora site, and are referred to hereafter as the Baramal/Aurora (M3) extension road.
- The Barama/Aurora (M3) extension road crosses the Cuyuni River at Tapir Crossing as shown in **Figures 1.1-1 and 1.1-2;** a motorized barge ferry, ferry docks, security guardhouses, and staging areas will be provided to accommodate convoy operations as noted in **Figure 1.1-3**.
- GGI Security and the Logistics Officer will monitor the progress of all GGI traffic (vehicles and drivers/passengers travelling on the Barama/Aurora (M3) extension road to ensure safe arrivals at each destination
- To the extent possible, large truck/heavy equipment traffic to and from the Aurora site will be organized in periodic convoys, scheduled so that all transportation can be safely completed during daylight hours, as no convoy operations will be permitted to proceed at night.
- To the extent possible, regular maintenance work on the Barama/Aurora (M3) extension road will be scheduled on days with no convoy traffic.
- As a general rule, no more than two convoys per day will be permitted to depart Buckhall,. Individual convoy sizes will vary with operational and construction needs and supplier delivery schedules to the Buckhall wharf, but will generally range between 3 and 8 truck/trailer combinations, with at least one pilot vehicle (i.e., a light four-wheel drive crew-cab pickup truck with warning signs, visibility wands, and rotating beacons) in advance of each convoy.
- Convoys returning to Buckhall from the Aurora site may be longer (i.e., made up of more individual vehicles), as they will generally be unladen and can safely travel at higher speeds; to the extent possible, timing of the return convoys should be scheduled on days when no convoy traffic is scheduled from Buckhall.
- Light truck and crew bus traffic on the Buckhall/Aurora (M3) extension road will be timed so as not to interfere with convoy operations. The Barama portion of the road (see **Figure 1.1-1**) may potentially be closed by the Barama Dispatcher due to heavy rainfall or other unsafe conditions, so close coordination between the GGI Logistics Officer and the Barama Dispatcher is essential in minimizing the potential for situations in which Project convoys or other vehicles may be required to shelter in place overnight.

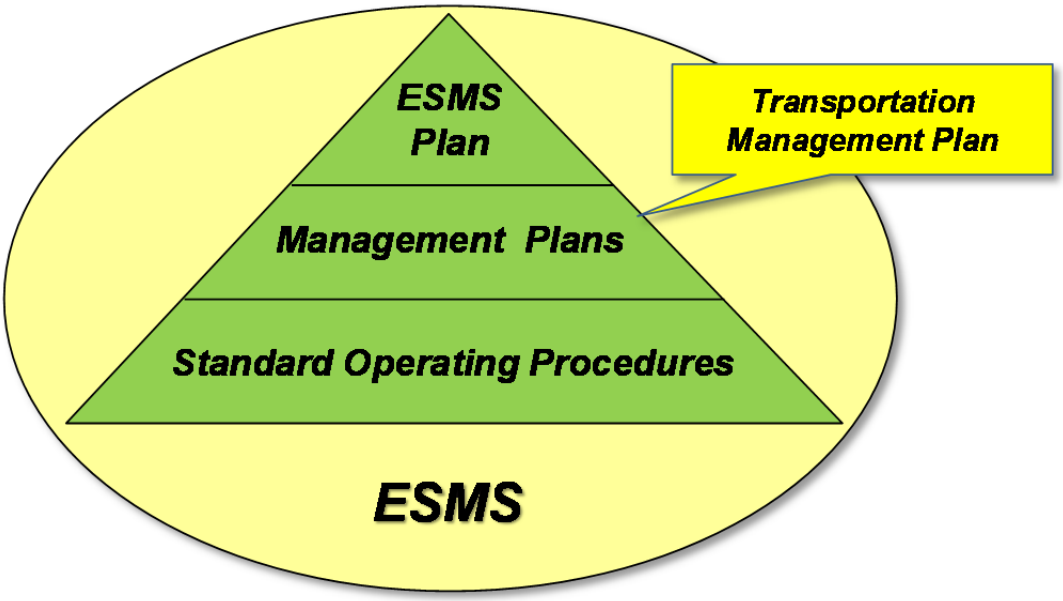
1.2 Relationship to Environmental and Social Management System (ESMS) and Environmental and Social Impact Assessment (ESIA)

In keeping with the requirements of IFC Performance Standard No. 1 (PS 1) “Assessment and Management of Environmental and Social Risks and Impacts” (IFC, 2012), GGI has established an Environmental and Social Management System (ESMS) for the Project. An integral part of the ESMS is a series of supporting management/mitigation plans and Standard Operating Procedures (SOPs) that will be periodically updated at specific points in the mine life cycle to

ensure that the ESMS remains responsive and contains a level of detail that is commensurate with available resources and the activities being conducted.

The *Transportation Management Plan* is one in a series of management plans that will be activated at various phases of the mine life cycle and will support the final Environmental and Social Impact Assessment (ESIA) for the Project. **Figure 1.2-3** presents the relationship of the *Transportation Management Plan* to the overall structure of the Project ESMS. This plan will apply over the life of the Project, and specifically supports Section 4.3.2 (Management of Social and Environmental Impacts) of the *ESMS Plan*, the *Occupational Health and Safety/Accident Prevention Plan*, and other GGI management plans and SOPs when specified.

Figure 1.2-3: ESMS Document Hierarchy



1.3 Plan Structure

The *Transportation Management Plan* is structured as follows:

- Section 1 contains a general introduction and outlines the overall structure and objectives of the *Transportation Management Plan*.
- Section 2 discusses key transportation management responsibilities held by GGI and contractor staff.
- Section 3 summarizes expected road conditions and traffic patterns on the Barama/Aurora (M3) extension road.
- Section 4 discusses measures for managing traffic and transport, including planning requirements, convoy organization, communication and emergency response procedures, training, and reporting requirements.

- Section 5 discusses special transportation considerations for shipments of hazardous materials (e.g., fuel, reagents, and explosives).

1.4 Objectives and Purpose

Over the life of any mining project, transportation risks may ultimately be among the most significant encountered because they are encountered on a daily basis and may involve adjacent communities or external stakeholders. The primary objective of the *Transportation Management Plan* is therefore to reduce the potential for traffic/transport-associated incidents at the Project by establishing:

- a uniform code of conduct for GGI and contractor drivers;
- uniformly understood “rules of the road”;
- uniform requirements for vehicle inspection and maintenance;
- guidelines for the safe transport of materials (including hazardous materials), equipment, and personnel, over the entire length of the Barama/Aurora (M3) extension road;
- guidelines for the safe transit of vehicles and drivers at Tapir Crossing;
- procedures to follow that will assist GGI in monitoring ASM activity or other non-GGI and non-Barama traffic on the Barama/Aurora (M3) extension road;
- procedures to follow that will assist GGI management in monitoring and properly responding to potential erosional or maintenance issues;
- appropriate cross-references for plans and procedures to follow in the event of an accident or other transportation emergencies.

2 Responsibilities

The following sections describe the responsibilities of key personnel relative to the implementation of this *Transportation Management Plan*.

2.1 Procurement Manager

The Procurement Manager will provide the Logistics Officer and the Project Construction Manager or Operations Manager advance information regarding scheduled delivers of fuel, machinery, equipment, and supplies via barge to the wharf at the Buckhall logistics support facility. As moorage area is limited, the Procurement Manager will work with the Buckhall Camp Manager and the Logistics Officer to adjust delivery schedules to minimize potential offloading backlog at the wharf.

2.2 Logistics Officer

The Logistics Officer (or his qualified designee) will designate Convoy Leaders for each convoy. The Logistics Officer will also coordinate with the Construction or Operations Manager to schedule deliveries of materials and equipment to the Aurora site, and the return of (largely) unladen convoys to the Buckhall logistics support area pending barge return to their point of origin. To the extent possible, the Logistics Officer will organize and schedule convoys to minimize the potential for accidents or other transportation impacts as described by this Transportation Management Plan. The Logistics Officer will also coordinate closely with the Barama Dispatcher to avoid road closure situations that would potentially strand GGI convoys or result in overnight shelter in place situations.

2.3 Construction/Operations Managers

The Project Construction or Operations Managers shall coordinate with the Procurement Manager and the Logistics Officer to identify specific equipment and materials delivery needs and develop appropriately spaced delivery schedules that can form a logical basis for convoy organization and scheduling. To the extent possible, deliveries of major consumables requiring dedicated or unmixed convoys (i.e., cyanide reagent, fuel, lubricants, explosives) shall be organized on a regular schedule, interspersed with special or irregular shipments (e.g., major machinery or equipment deliveries during the construction phase); or shipments of materials that can be safely shipped as part of mixed convoys (e.g., shipments of grinding media, foodstuffs, tires, minor consumables).

2.4 Convoy Leader

The designated Convoy Leader will serve as the primary point of contact between a given convoy and the Logistics Officer, Security Officers, Emergency Coordinators, or other GGI personnel who may need to contact a convoy in transit. The Convoy Leader is responsible for ensuring that: all drivers complete a pre-trip vehicle inspection (see Section 4 and **Figure 4.1-3**); the convoy proceeds to its destination in a safe and orderly manner; and for completing an appropriately detailed trip report form (**Figure 4.1-2**) upon arrival at the convoy's destination.

2.5 Pilot Vehicle Drivers, Truck Drivers, and Equipment Operators

GGI drivers shall be responsible for operating their vehicles in compliance with GG-13, "Transportation Safety – Light Vehicles", if assigned pilot vehicle or other light truck driving duties. GGI drivers responsible for driving forklifts, heavy trucks, crew buses, cranes, or road graders or other road maintenance equipment shall operate their vehicles in compliance with GG-15, "Forklift Safety"; GG-16, "Safe Operation of Heavy Equipment", or GG-43, "Safe Operation of Grove Model 530 Hydraulic Cranes", as appropriate for their individual work assignments. All GGI or contractor drivers participating in convoys shall adhere to the direction provided by the designated Convoy Leader, and shall conducted a document pre-convoy vehicle survey in compliance with Section 4 of this Transportation Management Plan. All GGI and contractor drivers shall comply with the code of conduct presented in the GGI Labour Grievance Procedures (see Appendix A of the Project *ESMS Plan*). Unsafe or reckless driving, driving beyond posted speeds, inappropriate behaviors, or any use of drugs or alcohol is strictly forbidden and may result in immediate termination or cancellation of contract.

2.6 Security Officers

The Security Officers at Buckhall and the Aurora site are responsible for coordinating with the Logistics Officer to monitor the transit of all Project convoys and traffic from departure to arrival, with the intent of maintaining a current understanding of which vehicles, loads, and personnel are traveling on the Barama/Aurora (M3) extension road on any given day. Security Officers will also assist in the response to any reported security emergency that involves GGI or contractor vehicles and personnel in transit to either Buckhall or the Aurora site.

2.7 Pilot Vehicle and Operators.

All convoys shall have a lead (GGI or contractor) pilot vehicle, and, at the discretion of the Logistics Officer, have a rear pilot vehicle as well.

3 Road Conditions

The Barama/Aurora (M3) road is 173 km long, with a nominal maximum speed limit of 40 km/hour, with posted reductions as necessary to accommodate local terrain, culvert crossings, guard posts and way stations, and other roadway feature or hazard areas. The Barama portion of the road (see **Figure 1.1-1**) is 140 km long, and was originally constructed in the 1990s to support a major timber concession. This portion of the road is still used by heavy logging trucks, which present a special challenge to convoy passage and other light vehicle traffic to the Aurora site. Although GGI and Barama have a shared usage agreement for this portion of the road, as a general rule, GGI vehicles and convoys should always give way to Barama logging trucks, whether loaded or unloaded. Overwide/oversize loads will require special advance coordination with the Barama Dispatcher to ensure safe passage relative to Barama's routine use of the road for logging purposes.

The road is subject to occasionally heavy rainfall that creates additional hazards for the passage of large trucks, and Barama retains the authority to close the road to and from the interior pending improvement of weather conditions or completion of emergency maintenance actions. The Logistics Officer must therefore maintain close (daily or weekly) contact with the Barama Dispatcher in order to prevent the scheduling of convoys that may be stranded by extreme weather conditions or a Barama road closure order.

It is also noted that the road is generally constructed of native saprolitic soils, with aggregate placed in some areas. Due to the consistent heavy use of the road and seasonally heavy rainfall conditions, erosional issues are a consistent possibility, and the road requires frequent maintenance. GGI has sole responsibility for the maintenance of the 33 km long Aurora extension, and shares maintenance responsibilities with Barama over the remaining section of road. All GGI Convoy Leaders and drivers must remain alert to potential erosion issues, and notes and locational information must be kept on the location of any erosion problems, clogged culverts, treefalls, or other potential road clearance or repair issues that may be encountered. Any such information must be reported on the Convoy Trip Report (see Section 4 and **Figure 4.1-2**) and transmitted to GGI Preventive Maintenance personnel for initiation of appropriate repairs and erosion control measures, per the agreement with Barama and/or the GGI *Erosion Prevention and Control Plan.*

Except for the Buckhall community and occasional camp facilities and way stations operated by Barama along the easternmost 40-50 km, there are no permanent villages or habitations on the roadway. Due to the remoteness and lack of infrastructure, travel at night is not permitted, and "shelter in place" stopovers on the road will be permitted only in emergency circumstances. There will always be some potential for ASM or other intrusive human activities to occur along the roadway, and it is imperative for the Convoy Leader and drivers to note the presence of any individuals or groups encountered. Interactions with transient groups or individuals are expressly prohibited expect in obvious cases of humanitarian need or medical emergency. General information on groups or individuals encountered, whether or not any vehicles were

noted, and the location of the encounter should be recorded on the Convoy Trip report and routed to the Security Manager, Environmental Manager, and Community Relations Officer for review and potential action pursuant to the requirements of the Project *Community Relations Management Plan* and *Influx Management Plan.*

4 Convoy/Traffic Management

Convoys will be organized to control the transportation of equipment and materials to and from the Buckhall and Aurora sites. Convoy planning and preparation activities are designed specifically to minimize the potential for accidents or incidents to occur en route. Planning details for Buckhall to Aurora site convoys are presented in Section 4.1; return convoys are discussed in Section 4.2. Both discussions are summarized as process flowcharts in **Figures 4.1-1 and 4.2-1**, respectively.

4.1 Buckhall Logistics Support Facility to Aurora Site

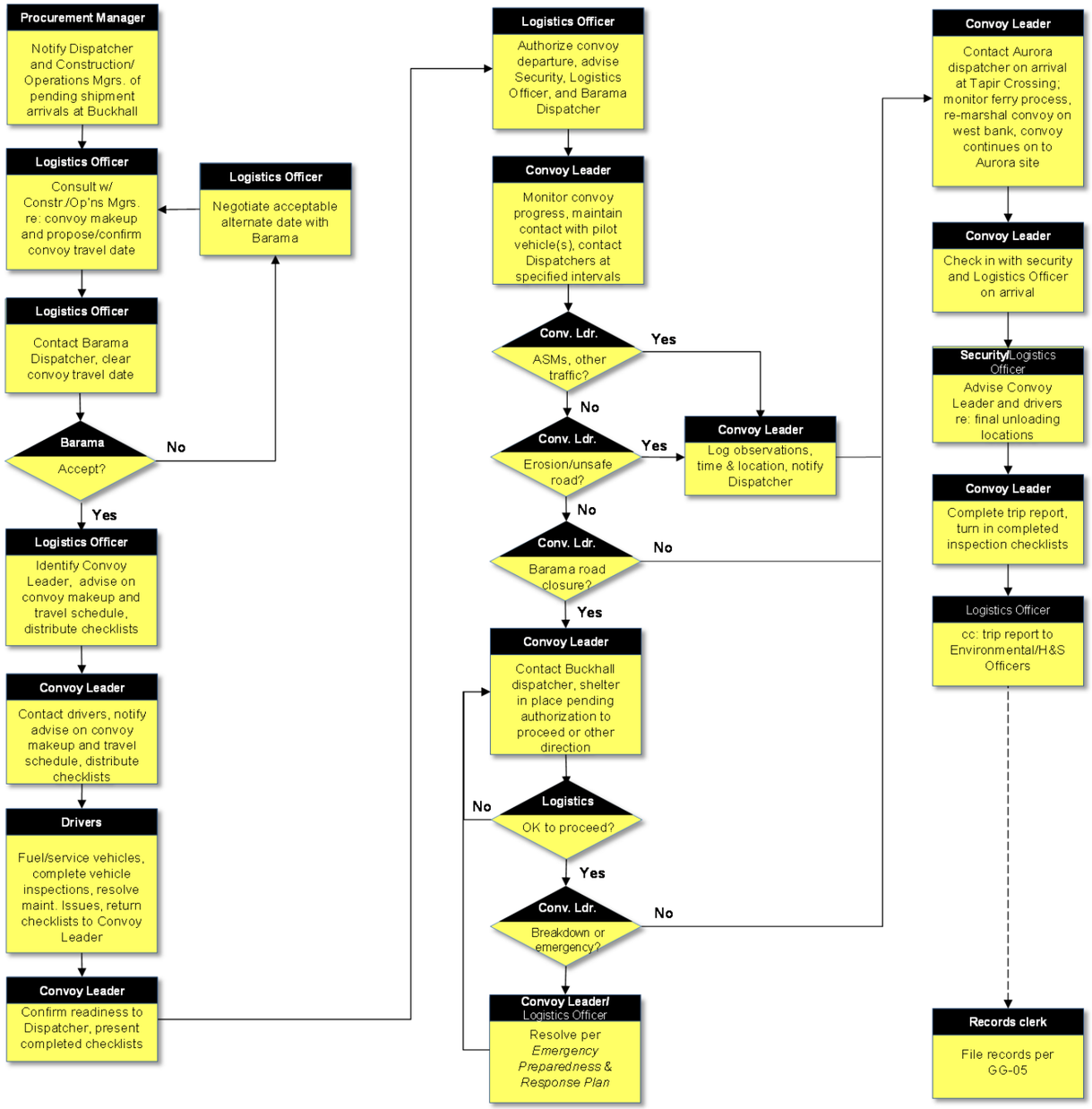
4.1.1 Convoy Preparation

The Procurement Manager will provide the Logistics Officer with periodically updated advance delivery schedules for fuel, equipment, and other supplies via barge or lighter to the Buckhall wharf, and will work with the Logistics Officer to ensure that barge deliveries are staggered to prevent potential waterway traffic/safety impacts from lack of available moorage or secure convoy staging areas. The Logistics Officer will coordinate with the Construction or Operations Managers to schedule deliveries that will properly support the Project's needs, while ensuring the safety of transportation convoys and minimizing potential roadway impacts. To the extent possible, deliveries of major consumables requiring dedicated or unmixed convoys (i.e., cyanide reagent, fuel, lubricants, explosives) shall be organized on a regular schedule, interspersed with special or less regular shipments (e.g., major machinery or equipment deliveries during the construction phase) or shipments of materials that can be safely shipped as part of mixed convoys (e.g., shipments of grinding media for the ball mills, foodstuffs, tires, other minor consumables).

The Logistics Officer will create proposed convoy schedules with input provided by the Construction, Operations, and Procurement Managers. Convoys will scheduled so that all transportation can be safely completed during daylight hours. It is recognized that in case of a weather closure or other emergency situation, convoys may be required to shelter in place (i.e., drivers and passengers must sleep in their in vehicles) overnight; as noted in **Figure 4.1-3**, drinking water, light provisions, and other emergency supplies will be required in each vehicle.

To the extent possible, regular maintenance work on the Barama/Aurora (M3) extension road will be scheduled on days with no convoy traffic. Individual convoy sizes will vary with operational and construction needs and supplier delivery schedules to the Buckhall wharf, but it is expected that they will generally range between 3 and 8 truck/trailer combinations per convoy, with at least one pilot vehicle (i.e., a light four-wheel drive crew-cab pickup truck with warning signs, visibility wands, and rotating beacons; see GG-13, "Transportation Safety – Light Vehicles") at the front of the convoy. A second pilot vehicle may be required if extra-long or -wide loads are involved for which overtaking vehicles might present a hazard. Light truck and crew bus traffic on the Buckhall/Aurora (M3) extension road will also be timed so as not to interfere with convoy

Figure 4.1-1: Convoy Process – Buckhall Logistics Support Facility to Aurora Site



operations. All GGI vehicles shall be provided with 2-way radios or cell phones that permit communications with the Logistics Officer and Security Officers. For convoys involving contract drivers, the pilot vehicle, Convoy Leader, and the last vehicle in the convoy will be provided 2-way radios or cell phones in order to maintain communication contacts within the convoy as well as with the Logistics Officer and Security Officers. Proposed schedules will then be discussed with the Barama Dispatcher to identify any potential road closures or restrictions on travel or clear passage on the proposed convoy day. Any required adjustments will be discussed with the Construction or Operations Managers, and a final convoy date settled upon and communicated to the Barama Dispatcher and designated Convoy Leader.

4.1.2 Convoy Movement – Buckhall to Tapir Crossing

Designated Convoy Leaders are responsible for preparing the Convoy Checklist and Trip Report form (**Figure 4.1-2**) and will distribute Convoy Driver's Daily Inspection Report forms (**Figure 4.1-3**) to each individual driver. Drivers shall present their approved drivers' licenses to the Convoy Leader for review. Drivers are responsible for all vehicle fuelling, preparations, and inspection; all inspection issues must be satisfactorily resolved prior to convoy departure. The inspection report forms shall be completed, signed, and returned to the Convoy Leader.

Once the Convoy Leader has collected all drivers' inspection forms, the Logistics Officer and the Security Officer will be advised that the convoy is ready to depart. A brief pre-departure meeting will be with the Convoy Leader and drivers; any specific road safety issues that may have been relayed by the Barama Dispatcher will be discussed, and functionality of two-way radio communications between the Logistics Officer, Security, the Convoy Leader, and the first and last vehicles in the convoy will be tested.

The Convoy Leader will ride in or drive the pilot car or the first vehicle in the convoy, and will set the pace for the convoy. In no case will the convoy exceed the posted speed limit (40 km/hour maximum). No overtaking or passing is permitted unless a vehicle becomes disabled, in which case the last vehicle in the convoy will call the Convoy Leader, who will direct the entire convoy to stop until the situation can be assessed. Drivers shall endeavor to maintain a 50 m minimum spacing between trucks, and shall endeavor to maintain visual contact with the vehicles in front and behind. If an accident or breakdown is observed, drivers shall sound their hours ten time in rapid succession, which shall be repeated up and down the convoy as an "all stop signal." Three long horn blasts will be initiated by the Convoy Leader when it has been determined to be safe to restart the convoy.

The Convoy Leader shall check in with the Logistics Officer every two hours until arrival at Tapir Crossing. The Convoy Leader shall be alert to the potential for erosion issues on the road, as previously noted, and shall document the observed condition and GPS coordinates of any road areas requiring potential maintenance or rework. Any encounters with groups or

Figure 4.1-2: Convoy Checklist and Trip Report Form

AURORA GOLD PROJECT

CONVOY CHECKLIST AND TRIP REPORT

Destination: (Aurora or Buckhall)	**Date:**

Convoy Vehicles	Load Description	Driver's name	Vehicle insp./driver quals. OK?
1. Pilot vehicle			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Trip Report (describe traffic encountered, road conditions, erosional issues noted, unauthorised personnel, weather conditions, other potential hazards):

Convoy Leader	**Date**	**Time**

Figure 4.1-3: Convoy Driver's Daily Inspection Report Form

AURORA GOLD PROJECT

CONVOY DRIVER'S DAILY INSPECTION REPORT

Vehicle Make/Model/License Number:	**Driver's Name/Employer** (GGI or Contractor)**:**

Trailer/Load Description (include container and/or waybill number)**:**

Inspection items	Comments
1. Headlights/running lights – operability	
2. Brakes – operability	
3. Wheels – hub cracks, missing lug nuts	
4. Tires – inflation pressure	
5. Fuel tanks - cracks, leaks, full fuel level	
6. Engine oil – nominal level	
7. Hydraulic hoses – obvious cracks or leaks	
8. Rear lights – functional	
9. Hydraulic oil reservoir – cracks/leaks	
10. Horn/backup alarms - functional	
11. Backup mirrors/windscreens – no interference with operator vision	
12. Coolant - nominal level	
13. Wiper systems – reservoirs full, blades functional	
14. Spill kit on board	
15. First aid kit on board	
16. Dry chemical fire extinguisher on board	
17. Roadside warning sign (triangle) stowed	
18. Potable water bottles on board (2 liters per individual)	
19. Emergency food rations/lunch on board, (1 per individual)	
20. Emergency flashlight/spare batteries	
21. 2-way radio/spare batteries (Convoy Leader +1st/ last vehicles)	
22. GPS/spare batteries (Convoy Leader only)	

Operator	**Convoy Leader**	**Date**	**Time**

individuals engaged in ASM or other activities on the roadway shall also be documented, as well as any encounters with non-Barama, non-GGI, or non-GGI contractor vehicles. In the latter

situation, license numbers shall be recorded if visible. However, no interaction with such groups or individuals is permitted unless there is clear evidence of a humanitarian need (i.e., stuck vehicle, flat tire) or medical issue (i.e., injuries) requiring first aid. Any such interactions will be managed by the Convoy Leader after first discussing the situation with the Security Officer via radio.

If Barama barricades the road due to weather or safety concerns, the Convoy Leader shall immediately contact the Logistics Officer and request direction. The Logistics Officer shall discuss the situation with his Barama counterpart. The convoy may be directed to shelter in place at a roadside location to be specified by Barama, or, if there is sufficient daylight remaining, the convoy may be requested to return to Buckhall.

If the convoy suffers an equipment breakdown or other emergency (i.e., vehicle fire or accident), the Convoy Leader shall report the incident and fulfill the other responsibilities of the First Responder under the requirements of the Project *Emergency Preparedness and Response Plan;* resolution of the emergency shall follow the guidance contained therein. The convoy may be permitted to proceed to destination less the affected vehicle or vehicles, or the entire convoy may be requested to return to Buckhall. See Section 4.3 below.

As a general rule, no convoy will be requested to shelter in place for more than one night except in extreme circumstances (i.e., significant road washouts or major vehicle fires or spill events).

4.1.3 Convoy Movement –Tapir Crossing to Aurora Site

The Cuyuni River narrows to approximately 280 m at Tapir Crossing, as noted in **Figure 1.1-3**. A GGI-operated barge ferry powered by two large outboard motors will be used to ferry convoy vehicles to the other side of the river. Upon arrival at Tapir Crossing, the Convoy Leader shall advise the Logistics Officer and check in with the barge captain and site security officer. The convoy will be directed to a staging area while it waits to cross. One vehicle and driver will be ferried across at a time, with the Convoy Leader crossing with the last vehicle. Extra passengers may be ferried by an outboard-powered crew boat at the barge captain's discretion. All convoy drivers and passengers shall be requested to properly don a life vest prior to crossing; after crossing, vests shall be returned to the life vest stores maintained at the security shelters on either side of the crossing.

After crossing, the convoy vehicles shall queue in order at the west bank staging area shown in **Figure 1.1-3**, and will proceed to the Aurora site as soon as the Convoy Leader sounds the three-blast convoy restart signal. The crossing will typically take 20-30 minutes per vehicle.

Upon arrival at the main gate at the Aurora site, the Convoy Leader will notify the Logistics Officer and will check in with the Security Officer. Individual trucks will be routed to their final delivery/unlading locations based on instructions provided by the Logistics Officer. Crew buses or other transport will be provided to shuttle drivers between delivery sites or return convoy staging areas and man-camp accommodations pending return to Buckhall.

The Convoy Leader will complete the trip report section of the form provided in **Figure 4.1-2**, and will transmit the signed trip report and all vehicle inspection checklists to the Logistics

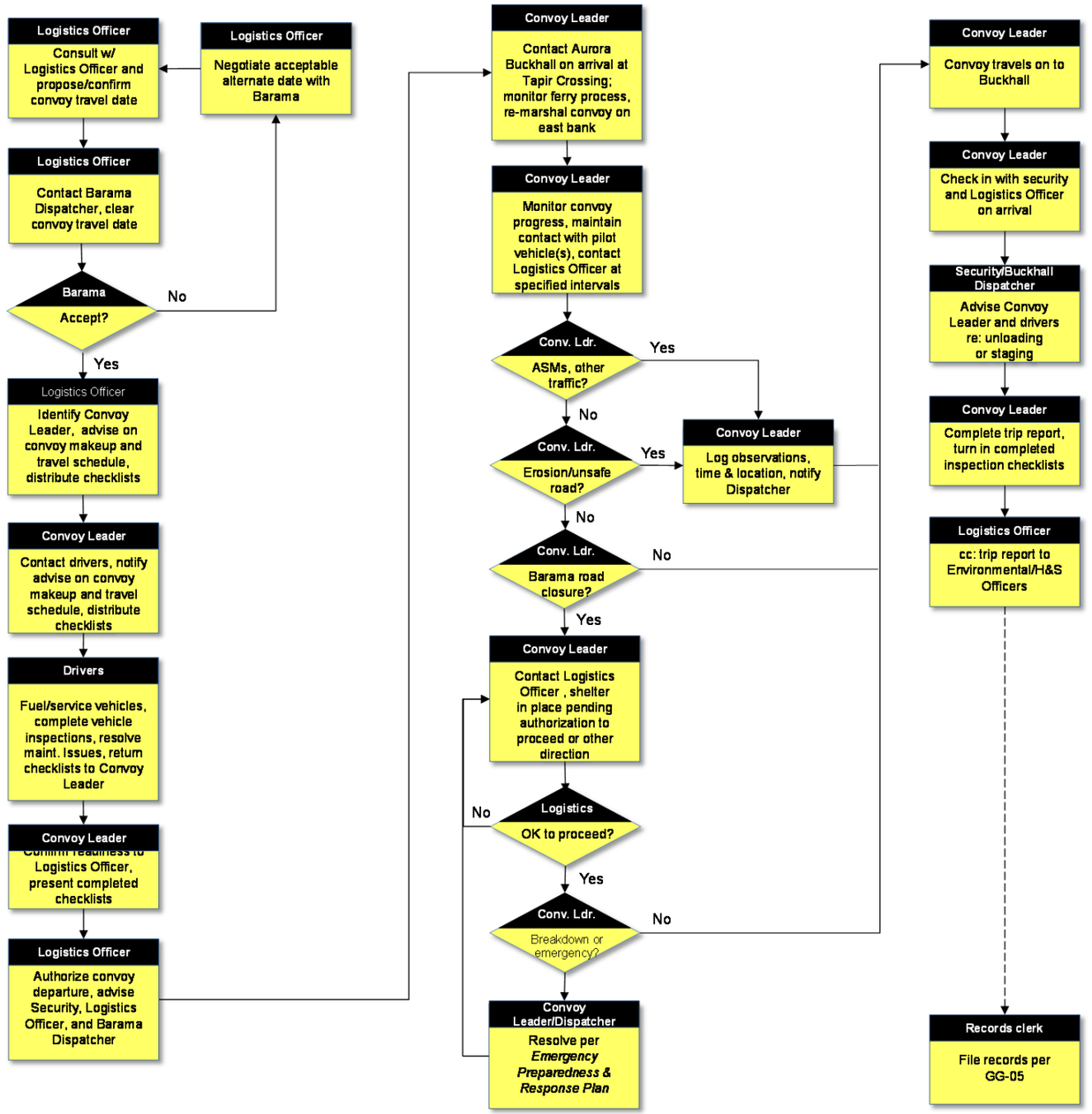
Officer. The Logistics Officer will note any required road maintenance or erosion prevention actions recommended on the report and forward the request on to Preventive Maintenance planners for initiation of an appropriate work order. Contacts with groups or individuals will be referred to the CRO and CSR Manager for their review and appropriate action, with copies of the reports and inspection forms provided to the Environmental and Health and Safety Officers for their information and additional action as may be indicated. Record copies shall be maintained in accordance with GG-05, "Records Management."

4.2 Convoy Returns – Aurora Site to Buckhall

Convoy returns to Buckhall shall follow the general guidance provided in **Figure 4.2-1** and Section 4.1, noting that:

- vehicle inspection forms will need to be completed for all vehicles, along with a new trip report;
- the number of vehicles may be increased at the Logistics Officer's discretion, as unladen travel times may be expected to be shorter;
- the staging areas at Tapir Crossing may be considered as an appropriate "shelter in place" location if notification is received that the Barama Road is closed due to heavy rainfall or other emergency conditions;
- the appointed Convoy Leader must check in with the Logistics Officer when leaving the Aurora Site, at Tapir Crossing, and upon arrival in at the Buckhall logistics support facility.

Figure 4.2-1: Convoy Process – Return Convoy, Aurora Site to Buckhall Logistics Support Facility



4.3 Emergency Response Requirements

Any vehicle accidents or any spills of fuel, lubricants, or chemical reagents that may occur on the Barama/Aurora (M3) extension road are considered Level 2 or 3 emergencies under the Project's *Emergency Preparedness and Response Plan*. Due to the proximity of the Buckhall community, such accidents or spills could potentially be considered a Level 4 emergency if they were to occur within 1 km of the departure point at the Buckhall logistics support facility. Scenarios 1, 2, and 3 in Section 7 of the *Emergency Preparedness and Response Plan* summarize minimum response actions to be taken in the event of:

- spills of fuel or dry or liquid chemicals (non-cyanide);
- spills due to a cyanide container delivery accident; and
- vehicle accidents (not involving spills of fuel or chemicals).

4.4 Training Requirements

All GGI vehicle operators shall be trained (and, as appropriate, qualified in accordance with) this *Transportation Management Plan* as well as:

- *Emergency Preparedness and Response Plan*;
- *Hazardous Material Management Plan*;
- *Buckhall Spill Contingency Plan*;
- *Spill Prevention, Control, and Contingency Plan(Aurora Site Areas)*
- GG-09, "Identification of Project-related Safety Hazards and Assessment of Risks";
- GG-11, "Personal Protective Equipment";
- GG-12, "First Aid and Emergency Medical Response";
- GG-13, "Transportation Safety – Light Vehicles" (if assigned operator responsibilities);
- GG-14, "Handling and Storage of Hazardous Materials";
- GG-15, "Forklift Safety" (if assigned operator responsibilities);
- GG-16, "Safe Operation of Heavy Equipment" ; (if assigned operator responsibilities);
- GG-17, "Vehicle Fuelling and Spill Prevention;
- GG-24, "Recognition and Reporting of Safety Hazards"; and
- GG-43, "Safe Operation of Grove Model 530 Hydraulic Cranes" (if assigned operator responsibilities).

Contractor drivers shall be briefed in the requirements of the Project *Emergency Preparedness and Response Plan* and this *Transportation Management Plan* upon arrival at Buckhall, and shall complete vehicle inspections prior to joining any convoy to or from the Aurora site as note in Sections 4.1 and 4.2. Additional contract- specific environmental or health and safety requirements may be defined for specific categories of hazardous procurements in governing contracts or purchase orders, as noted in Section 5 below and Section 4.3.3 of the Project *ESMS Plan.*

All training received shall be documented and retained on file in accordance with SOP GG-05, "Records Management."

5 Special Transportation Considerations for Hazardous Material Procurements

Procurements of cyanide reagent, explosives and tow-part blasting agents, and fuel delivery services will involve special conditions that may affect convoy makeup and management under this *Transportation Management Plan*, as well as the implementation of the Project *Emergency Preparedness and Response Plan*. These conditions are generally described as follows:

- **Cyanide reagent;** as noted in the Project *Cyanide Management Plan*, all cyanide reagent stocks will be purchased from manufacturers certified to the International Cyanide Management Code (ICMC) (ICMC, 2013), and delivered to the Aurora site by transportation contractors who are also certified to the ICMC. Cyanide will be delivered exclusively in dry briquette form, packed in heavy-wall stainless steel transport/mixing tanks, sized for international intermodal transport and rated for open water/ocean transport. This delivery form is recognized as the most intrinsically robust of any currently available method; see **Figure 5.0-1** for an example of a typical delivery/mixing container.

  The terms of the cyanide procurement contract are expected to extend to all transportation links, and the cyanide supplier will expected to manage all aspects of the transportation chain, from the manufacturing facility to all ocean ports and ocean transport, lightering or barge transport to the Buckhall wharf, and by truck all the way to the point of acceptance, i.e., the cyanide storage area adjacent to the mill/mineral separation process plant at the Aurora site. As the cyanide producer will be fully responsible for the entire supply chain pursuant to ICMC requirements, GGI's handling and temporary storage facilities at Buckhall will need to be included in the cyanide supplier's overall supply chain certification process.

  It is expected that the cyanide producer will arrange for a special emergency response team to accompany the final leg of the cyanide shipment, and, as GGI will not take ownership of the cyanide until it has been safely delivered to the Aurora site, any cyanide spill or emergency situation involving the transporter's vehicles will be the responsibility of the transporter to resolve. As previously noted, GGI will send a pilot vehicle with all cyanide convoys, and will not permit cyanide deliveries to be mixed with shipments of other types of materials. In the event of a spill or emergency, auxiliary resources or general logistics support will be offered to the transporter in keeping with the terms of the governing contract, but GGI staff will not be directly involved in the response action. See Scenarios #2 and #5 in Section 7 of the Project *Emergency Preparedness and Response Plan.*

Figure 5.0-1: Typical Cyanide Delivery/Mixing Container (Source: ENVIRON)



- **Explosives/Blasting Agents;** delivery of high explosives (detonators/initiators) and blasting agents to magazines/silos at the Aurora mine site (and blasthole delivery and loading services) will be contracted to a specialty blasting services contractor. Contractual responsibilities will resemble those established for the cyanide producer, in that the blasting contractor will be responsible for safe delivery of all explosives as well as all required regulatory permits and all aspects of emergency preparedness response. Explosives shipments will not be mixed with shipments of any other materials or equipment. GGI will provide a pilot vehicle, and in the event of a spill or emergency, auxiliary resources or general logistics support will be offered to the transporter in keeping with the terms of the negotiated contract
- **Fuel delivery services;** bulk (no. 4 and diesel) fuel delivery services between the bulk storage tanks at the Buckhall logistics support facility and bulk and/or modular tanks at the Aurora site will be contracted to a licensed fuel delivery contractor, who shall provide appropriately certified and properly maintained tanker trucks and qualified drivers. To the extent possible, fuel shipments will not be mixed with shipments of any other materials or equipment. GGI will provide a pilot vehicle, however, and in the event of a spill or emergency, auxiliary resources or general logistics support will be offered to the transporter in keeping with the terms of the negotiated contract. GGI personnel will be involved in the response action to the extent generally indicated in the Project *Emergency Preparedness and Response Plan*, Section 7, Scenario #1.

References

Internal References

- *ESMS Plan*, Appendix A, “Labour Grievance Procedure”
- GG-03, “Field Inspections”;
- GG-04, “Identification of Non-conformances and Corrective/Preventive Action;”
- GG-05, “Records Management”;
- GG-06, “ESMS Training Program”;
- GG-09, “Identification of Project-related Safety Hazards and Assessment of Risks”;
- GG-11; “Personal Protective Equipment”;
- GG-12, “First Aid and Emergency Medical Response”;
- GG-13, “Transportation Safety – Light Vehicles”
- GG-14, “Handling and Storage of Hazardous Materials”;
- GG-15, “Forklift Safety”;
- GG-16, “Safe Operation of Heavy Equipment”;
- GG-17, “Field Fuelling and Spill Prevention”;
- GG-24, “Recognition and Reporting of Safety Hazards”;
- GG-37, “Control of Erosion and Sedimentation”;
- *Cyanide Management Plan;*
- *Hazardous Materials Management Plan;*
- *Buckhall Spill Contingency Plan;*
- *Spill Prevention, Control, and Contingency Plans (Aurora Project Areas);*
- *Emergency Preparedness and Response Plan;*
- *Community Relations Management Plan;*
- *Influx Management Plan;* and
- *Erosion Prevention and Control Plan.*

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ICMC, 2013. International Cyanide Management Code; accessed at http://www.cyanidecode.org/ about-cyanide-code/cyanide-code. International Cyanide Management Institute, Washington, DC. 2013.

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Waste Management Plan

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
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Seattle, WA

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Acronyms

EHS	Environmental Health and Safety
EPA	(Guyana) Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GGI	Guyana Goldfields, Inc.
GIIP	Good international industrial practice
HDPE	High-density polyethylene
IFC	International Finance Corporation
MSDS	Material Safety Data Sheets
SOP	Standard operating procedure
THWSF	Temporary Hazardous Waste Storage Facility
WHO	World Health Organization

1 Introduction

The *Waste Management Plan* describes the facilities and measures Guyana Goldfields, Inc. (GGI) will establish to manage solid and hazardous waste streams generated during the major construction and operational phases of the Aurora Gold Project (Project). The plan addresses wastes generated during general construction work and the operation of:

- the Aurora man-camp;
- the Buckhall logistics support facility;
- open pit and underground mines;
- the crushers, mill, conveyor systems, and mineral processing plant;
- vehicle and other general maintenance facilities; and
- other project activities.

The management of primary mining process-specific wastes (i.e., waste rock and process tailings) will be separately addressed in the Project *Overburden Management Plan, Mill/Leach Plant Operation Plan,* and *Tailings Area Management Plan*, and are not discussed in this document.

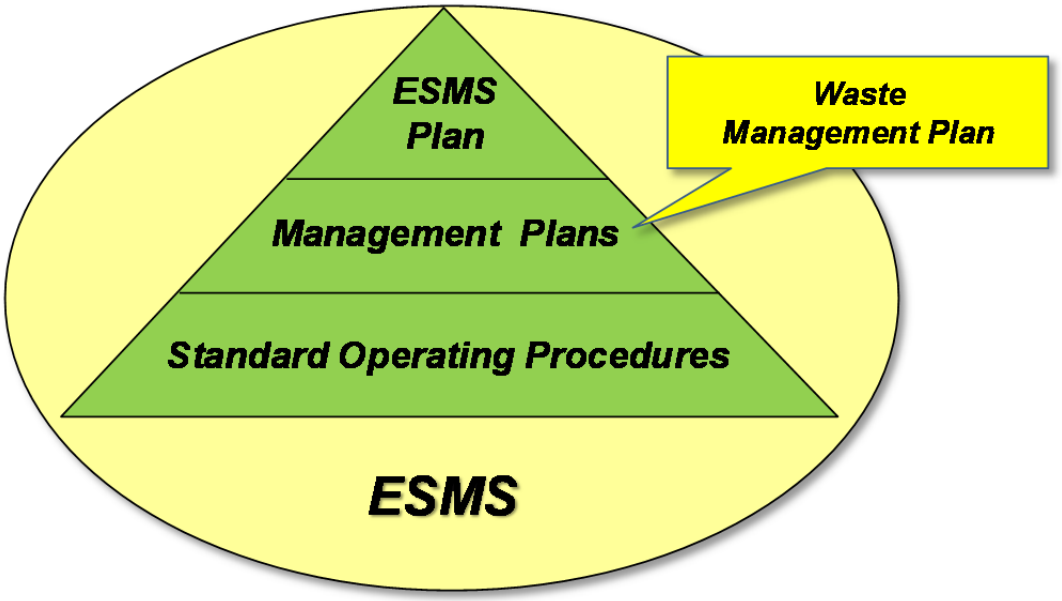
1.1 Purpose

The purpose of the *Waste Management Plan* is to manage solid and hazardous wastes in a legal and responsible manner through promotion of good international industrial practices (GIIPs). GIIPs will be applied on site, through appropriate management and maintenance of waste disposal and hazardous waste storage facilities, and off site, when and if viable recycling or disposal options resources are determined to exist. Where practical, and where necessary infrastructure is determined to be available, GGI aims to reduce the overall volumes of various project wastes through appropriate prevention, minimization, recovery, reuse, or recycling methods.

1.2 Relationship to Environmental and Social Management System and Environmental and Social Impact Assessment

GGI has established an Environmental and Social Management System (ESMS) for the Project, which is embodied in a Project-specific *ESMS Plan*. The *ESMS Plan* is based on the requirements of International Finance Corporate (IFC) Performance Standard 1 (PS 1), "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012), IFC PS 3, "Resource Efficiency and Pollution Prevention" (IFC, 2012), and other recognized GIIPs for environmental and health and safety (EHS) and social program management.
This *Waste Management 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 EHS or social impacts, and will support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project. **Figure 1.2-1** depicts the relationship of the *Waste Management Plan* to the overall structure of the Project ESMS (see Section 1.2 of the ESMS Plan for additional details).

Figure 1.2-1: Position of *Waste Management Plan* in ESMS Document Hierarchy



1.3 Change Management

The first iteration of this *Waste Management Plan* is intended to be issued to coincide with the commissioning of two solid waste landfills, to be constructed at the Aurora and Buckhall sites. This plan is intended to supersede standard operating procedure (SOP) GG-01, "Solid Waste Management", which was designed to serve as a bridging document in the exploration and early works construction phase of the Project, until such time as the landfills and other major construction-phase elements of infrastructure are operational.

This *Waste Management Plan* will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing EHS and social management needs, in accordance with Section 1.3 of the *ESMS Plan*.

2 Regulatory Considerations

In 1996, Guyana implemented its Environmental Protection Act, which was created in response to requirements outlined in Guyana's Constitution of 1980. The objective of the Act is:

> "…to provide for the management, conservation, protection and improvement of the environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment, the sustainable use of natural resources and for matters incidental thereto or connected therewith."

Guyana's Environmental Protection Agency (EPA) was established to monitor and enforce the regulations developed as a result of implementing the Act.

The principal requirements for management of waste in Guyana are:

- "Criteria for the Identification and Approval of Landfill Sites for Solid Waste Disposal in Guyana", (Guyana EPA - Special Projects Unit, no date); and

- "Environmental Protection (Hazardous Wastes Management) Regulations, 2000" (Guyana EPA, 2000).

Guyana currently has few available options for managing non-hazardous and hazardous wastes. Clinical or medical wastes may be disposed of at the Georgetown Public Hospital incinerator, but as of the issue date of this document, most municipal solid waste in Guyana is disposed of either through open pit dumping or through burn pits. There are also currently no permitted hazardous waste disposal facilities in Guyana. GGI will comply with the governing regulations, but given the general lack of appropriate waste treatment and disposal infrastructure, GGI has established its own procedures to proactively manage the solid and hazardous wastes generated by the Project.

In addition to meeting Guyana's regulatory requirements, GGI will follow international GIIPs, the IFC Performance Standards (IFC, 2012) and EHS guidelines (IFC, 2007a and IFC, 2007b) for managing waste. GGI will use current Ontario or other US or Canadian landfill standards as international GIIPs to form the basis for landfill design and operation. Preliminary designs of the non-hazardous waste landfills for the Aurora and Buckhall sites are based on Ontario's Landfill Regulation O. Reg. 232/98 (Province of Ontario, 1998).

3 Definitions

3.1 Municipal Solid Waste

Per the Guyana EPA landfill criteria document (Guyana EPA - Special Projects Unit, no date), ***municipal solid waste*** includes non- hazardous waste generated in households, commercial and business establishments, institutions, and light industrial process wastes, agricultural wastes, and sewage sludge.

3.2 Other Solid Waste

As also noted in the Guyana EPA landfill criteria document (Guyana EPA - Special Projects Unit, no date), ***other*** (non-hazardous) ***solid waste*** may include agricultural waste, commercial waste, debris, demolition waste, garbage, household waste, non-hazardous industrial waste, inert waste, putrescible solid waste, refuse, residential waste, and rubbish.

3.3 Special Waste

Per the Guyana EPA landfill criteria document, ***special wastes*** include hazardous wastes, ship-generated waste, clinical waste, and aircraft waste.

3.4 Clinical Waste

Medical or ***clinical waste*** refers to any waste that is generated in the diagnosis, treatment, or immunization of human beings and includes sharps (e.g., syringes, blood-test lancets, slides, slide cover glasses), soiled bandages, swabs, and outdated or residual pharmaceutical compounds.

3.5 Hazardous Waste

Per Prospectors & Developers Association of Canada (PDAC) guidance, in the absence of definitive national guidance, the United Nations hazardous waste system classification should be applied. For the purposes of this SOP, ***hazardous wastes*** are therefore considered to be wastes that are highly ignitable, reactive, corrosive, radioactive, or toxic. It is also understood that hazardous wastes may be in solid, liquid (e.g., waste oil or coolant) or sludge (e.g., waste grease) form.

4 Responsibilities

4.1 All Personnel

All personnel generating or handling waste are responsible for the following:

- minimizing the generation of litter or rubbish;
- segregating wastes and placing them in appropriate containers provided in designated locations or waste transfer stations;
- understanding and complying with the requirements of this Waste Management Plan, as well as SOP GG-14, “Handing and Storage of Hazardous Materials.”

4.2 Environmental Manager

The Environmental Manager is responsible for the following:

- overall responsibility for management of the waste management program;
- identification, review, and approval of any potential licensed offsite hazardous waste disposal facilities;
- vetting and approval of new hazardous materials, prior to delivery to site; and
- continued monitoring for potential opportunities to recycle, reuse, and reduce waste.

4.3 Environmental Officer

The Environmental Officer is responsible for monitoring the proper segregation, safe storage, and/or disposal of solid wastes (including hazardous liquids or sludges) at the Aurora (including Tapir Crossing) and Buckhall sites in accordance with this plan, and for assisting the Environmental Manager in identifying any new waste streams and the development of appropriate updates to the waste segregation and disposal guidelines provided in **Table 5.0-1.** More specifically, the Environmental Officer is responsible for

- training of GGI staff in the requirements of this *Waste Management Plan;*
- arranging for transfer of waste from the waste transfer stations to the appropriate landfill or, for hazardous wastes, the temporary hazardous waste storage facility (THWSF);
- managing the daily operations of the landfill and THWSF;
- maintaining records of the type and approximate quantity of wastes entering the landfills;
- maintaining an inventory of hazardous wastes stored in the THWSF; and

- preparing any required waste and shipping documents for waste shipments, should any off-site waste shipments ever be authorized.

4.4 Health and Safety Officer

The (Health and Safety Officer shall ensure that all employees involved in operating forklifts and heavy equipment used to managed waste or operate the landfills undergo equipment safety training as per SOPs GG-15, “Forklift Safety” and GG-16, “Safe Operation of Heavy Equipment.” Landfill operators will also be trained in waste management and hazardous materials management in accordance with GG-14, “Handling and Storage of Hazardous Materials.”

5 Waste Inventory and General Waste Disposal Guidelines

Table 5.0-1 consists of an initial waste inventory for the construction and operation phase of the Project, cross-referenced to general waste disposal guidelines. Additional details on specific types of disposal actions are provided by reference to Sections 6 through 12, as noted.

Table 5.0-1: Solid Waste Inventory and Waste Disposal Guidelines (Major Construction/Operations Phase)

Waste Category [1]	Waste Subcategory	Lower-tier Waste Subcategory (Hazardous Waste Only)[2]	Project Wastes, by Subcategory	Disposal Actions	Comments
Sanitary Landfill Waste	**Municipal solid waste:** includes non- hazardous waste generated in households, commercial and business establishments, institutions and light industrial process wastes, agricultural wastes, and sewage sludge	N/A	Junked all-terrain vehicles (ATVs) and scrap metal and plastic parts	Drain all fuel and oil into waste oil storage tanks; remove tires, segregate and store at the Aurora site laydown yard, pending identification of recycling or disposal options, or disposal in inert waste disposal cell to be constructed in a designated waste rock stockpile. See Sections 6.1, 6.2	Finalize design and seek permit approval of lined sanitary landfills at Aurora Base and Buckhall[4]; construct landfill when permit is granted.
		N/A	Construction waste	Segregate clean paper, cardboard, and unusable wood, and incinerate in controlled burn pit at Aurora site; segregate usable wood and metal and send to Aurora site laydown yare for storage pending re-use or identification of recycling options; route remaining waste to inert waste disposal cell, and cover with waste rock 2-3 times per week	Monitor for development of recycling options for glass and recyclable plastics, and institute segregation and recycling program when and if identified.
		N/A	General garbage from man-camps	Separate clean paper, cardboard, wood, and incinerate in controlled burn pit; route remaining garbage to Aurora or Buckhall sanitary landfills; cover with clean soil daily	Covered storage is to prevent accumulation of water and creation of mosquito habitat; monitor potential for in-country recycling. Inert waste option may require discussion with Guyana EPA; permits may be required
		N/A	Drained oil filters, containers, rags, other mechanical shop waste	Separate clean paper, cardboard, wood, and incinerate in controlled burn pit; route remaining material to Aurora or Buckhall sanitary landfills; cover with clean soil daily	Monitor for development of options for both in-country and regional hazardous waste disposal
		N/A	Non-toxic grease rags from drilling operations	Route to Aurora or Buckhall sanitary landfills; cover with clean soil daily	Monitor for development of options for both in-country and regional hazardous waste disposal
		N/A	Used paint cans (non-aerosol)	Remove covers and let dry; route to Aurora or Buckhall sanitary landfills and cover with clean soil daily	None

[1] Per “Criteria for the Identification and Approval of Landfill Sites for Solid Waste Disposal in Guyana”, Guyana Environmental Protection Agency, Special Projects Unit, No Date.

[2] Per United Nations hazardous waste system classification, as recommended in Table 7 of the PDAC “e3-Plus Excellence in Environmental Stewardship e-toolkit (EES)”, Version-01 (PDAC, 2009)

Waste Category [1]	Waste Subcategory	Lower-tier Waste Subcategory (Hazardous Waste Only)[2]	Project Wastes, by Subcategory	Disposal Actions	Comments
Sanitary Landfill Waste	**Other Solid Waste:** includes non-hazardous agricultural waste, commercial waste, debris, demolition waste, garbage, household waste, non-hazardous industrial waste, inert waste, putrescible solid waste, refuse, residential waste and rubbish	N/A	Canteen waste	Segregate clean paper and cardboard, and incinerate in controlled burn pit; bag all remaining garbage to reduce attractiveness to wild animals/insects; send to Aurora or Buckhall sanitary landfills and puncture bags immediately prior to daily clean soil cover	Investigate availability of recycling options for glass and recyclable plastics, and institute segregation and recycling program when identified.
	Other Solid Waste: includes non-hazardous agricultural waste, commercial waste, debris, demolition waste, garbage, household waste, non-hazardous industrial waste, inert waste, putrescible solid waste, refuse, residential waste and rubbish	N/A	Used tires from all vehicles;	Segregate and store in covered storage in Aurora laydown yard pending identification of recycling, reuse, or inert waste cell disposal options (see Section 10)	Covered storage is to prevent accumulation of water and creation of mosquito habitat; monitor potential for in-country recycling. Inert waste option may require discussion with Guyana EPA; permits may be required
		N/A	Used rubber composite belting from conveyor systems	Segregate and store in covered storage in Aurora laydown yard pending identification of recycling, reuse, or inert waste cell disposal options (see Section 10)	Covered storage is to prevent accumulation of water and creation of mosquito habitat; monitor potential for in-country recycling. Inert waste option may require discussion with Guyana EPA; permits may be required
		N/A	Building construction or demolition waste	Separate clean paper, cardboard, wood, and incinerate in controlled burn pit; route remaining waste to laydown yard pending completion of inert waste cell; cover with waste rock 2-3 times per week	
Special waste	**Hazardous Waste:** includes recyclable and non-recyclable dangerous wastes	**Ignitable Hazardous Waste;** includes waste grease and oil	Waste oil and grease	Accumulate in covered steel or plastic barrels on covered, bermed concrete or high-density polyethylene (HDPE) lined pad or steel intermodal container with containment modifications, pending offsite shipment for recycling or controlled disposal. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional recycling and/or hazardous waste disposal options.

Waste Category [1]	Waste Subcategory	Lower-tier Waste Subcategory (Hazardous Waste Only)[2]	Project Wastes, by Subcategory	Disposal Actions	Comments
Special waste	**Hazardous Waste (cont.):** includes recyclable and non-recyclable dangerous wastes	**Ignitable Hazardous Waste;** includes waste grease and oil	Used rags with fuel/oil contamination	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.
			Fuel/oil spill clean-up waste, from mechanical shops, drill rigs, and other sources	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.
		Corrosive hazardous waste; includes lead-acid and vehicle batteries	Used lead-acid batteries (with battery acid)	Drain and neutralize acid with sodium bicarbonate in controlled drainage barrel; accumulate drained batteries on pallet pending offsite shipment for recycling. Let neutralized acid evaporate, route residual sludge to Aurora or Buckhall sanitary landfills; daily clean soil cover.	Monitor for in-country or regional lead-acid battery recycling capabilities
		Reactive Hazardous Waste; includes explosives, compressed gases, or substances dangerous when wet	Used aerosols (paints, sprays, no insecticides or pesticides)	Remove covers and let dry; for aerosol cans, puncture in safe fixture prior to disposal; crush all containers and route to Aurora or Buckhall sanitary landfills and cover with clean soil daily	None
		Radioactive hazardous waste	None	N/A; no radioactive waste will be generated by the Project	N/A

Waste Category [1]	Waste Subcategory	Lower-tier Waste Subcategory (Hazardous Waste Only)[2]	Project Wastes, by Subcategory	Disposal Actions	Comments
Special waste	**Hazardous Waste (cont.):** includes recyclable and non-recyclable dangerous wastes	**Toxic hazardous waste;** includes all poisonous (toxic) materials[3]	Waste insecticide/ fungicide/rodenticide/ herbicide containers	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. For aerosol cans, puncture in safe fixture prior to disposal. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.
			Waste Tyvek coveralls, gloves, and used respirator cartridges from mosquito fogging	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. For aerosol cans, puncture in safe fixture prior to disposal. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.
			Used/broken fluorescent tubes	Crush in controlled fixture and accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.
			Mercury ballasts from fluorescent light fixtures	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.

[3] Cyanide wastes will be separately managed in accordance with the *Cyanide Management Plan*, which will describe the International Cyanide Management Code protocols applied to all aspects of cyanide management; the *Mill/Leach Plant Operations Plan*, which will describe the operation of the cyanide detoxification circuit in the process plant; and the *Tailings Area Management Plan*, which will describe the management of residual concentrations of cyanide in the detoxified tailings stream and as-deposited tailings.

Waste Category [1]	Waste Subcategory	Lower-tier Waste Subcategory (Hazardous Waste Only)[2]	Project Wastes, by Subcategory	Disposal Actions	Comments
Special waste	**Hazardous Waste (cont.):** includes recyclable and non-recyclable dangerous wastes	**Toxic hazardous waste;** includes all poisonous (toxic) materials	Non-lead acid batteries (all types)	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of both in-country and regional hazardous waste disposal options.
Special waste	**Hazardous Waste (cont.):** includes recyclable and non-recyclable dangerous wastes	**Toxic hazardous waste;** includes all poisonous (toxic) materials	Waste ethylene glycol coolant	Accumulate in covered steel or plastic barrels on covered, bermed concrete or HDPE lined pad or steel intermodal container with containment modifications, pending identification of approved hazardous waste disposal facility or coolant regeneration options. Control access to storage areas and provide appropriate “Hazardous/Flammable Waste” warning signs and appropriately rated fire extinguishers. Maintain documented running inventory of type and volumes of materials stored.	Monitor for development of regeneration options, or long-term options for both in-country and regional hazardous waste disposal options.
	Clinical waste	N/A	Medical waste from Project clinics (includes sharps, examination gloves, and all medical treatment waste)	Collect in dedicated medical waste containers (see Figure 11.0-1) at the camp clinics, transport to licensed medical waste incinerator at the Georgetown Public Hospital when full. Control access to storage containers and provide appropriate “Biohazardous Waste” warning signs. Maintain documented running inventory of type and volumes of materials sent for disposal.	Conduct periodic due-diligence assessments of the licensed medical waste incinerator at Georgetown Public Hospital.
	Ship-generated waste	N/A	None; no ship-generated waste will be permitted to be offloaded a Buckhall.	N/A	N/A
	Aircraft waste	N/A	None; no onsite aircraft fuelling or maintenance will be permitted at the Aurora Base airstrip.	N/A	N/A

6 Onsite Waste Management Facilities

Onsite waste management facilities associated with the Project are described in the following sections.

6.1 Waste Accumulation/Transfer

Dedicated waste collection stations will be set up at strategic locations at the Aurora and Buckhall sites. These stations will be used for waste segregation and interim waste storage prior to daily or weekly collection and transfer to the landfill or the THWSF. At facilities where only municipal solid waste is generated, dedicated skip or collection containers will be provided. Additional containers will be provided at operating areas and maintenance workshops where other types of waste are generated to facilitate segregation of recyclables (e.g., metals) from municipal waste going to the landfill. Used oil filters and machine shop metal cuttings will be drained of oil prior to being placed in waste metal drums or bins for potential recycling. Canteen food wastes will placed in covered bins suitably designed to prevent access by wildlife.

Where hazardous wastes are generated, the interim collection station will include a suitably sized roofed and bermed concrete or HDPE-lined pad for temporary storage of hazardous waste collection drums for waste oils, paints, solvents, or similar materials, as well as pallets for collection of waste lead-acid batteries. Used aerosol spray canisters will be punctured prior to disposal, and residual liquids from these canisters and from used paint containers will be drained into a waste paint collection drum dedicated for this purpose.

6.2 Municipal Solid Waste Landfills

Municipal solid waste landfills will be constructed at the Aurora Mine site and Buckhall site for disposal of municipal and other non-hazardous wastes generated by the operations. Unless other standards are established by the Guyana EPA, the designs for these landfills will be based on the Ontario (Canada) Landfill Regulation (O.Reg. 232/98) or equivalent GIIPs.

6.3 Temporary Hazardous Waste Storage Facility (THWSF)

Except for medical wastes, there are currently no facilities in Guyana licensed to accept hazardous waste. Efforts to resolve this need are expected over the next several years, however. GGI will therefore store hazardous wastes at one or more designated THWSFs located at the Aurora and Buckhall sites until a properly licensed offsite hazardous waste disposal option becomes available.

Each THWSF will be located within a compound secured by a security fence and locked gate. The facility will consist of a curbed concrete or HDPE-lined pad suitably sized to retain metal shipping containers for temporary housing the storage of the hazardous waste. The number of shipping containers will be a function of the volume of wastes generated and the requirement for separation of incompatible wastes. The pad will have a ramp to allow forklift access to the containers and a sump for collection and management of precipitation. The shipping containers will protect the waste from precipitation and will be elevated on concrete blocks to prevent potential seepage of rainwater entering base of the container. Each container will have

appropriate signage to identify the type of waste stored, and each container will be locked to prevent unauthorized access.
GGI will obtain environmental authorization to operate these two facilities, in accordance with Regulation 18, of the Environmental Protection (Authorization) Regulations 2000.

7 Waste Avoidance and Minimization

In keeping with IFC PS 3 requirements and GGI's policy to take appropriate measures to avoid the generation of waste where possible. and where not possible, to reduce, reuse, and recycle waste, the following initial waste avoidance and minimization measures have been developed.

7.1 Purchasing Considerations

To avoid or minimize potential environmental impacts, all purchased industrial products/consumables will be vetted by the environmental department and be approved for use by the Environmental Manager or Environmental Officer prior to purchase. Hazardous liquids and chemicals will be purchased in bulk size containers where practical to avoid or minimize the generation of packaging wastes. When possible, water-based paints and biodegradable solvents or lubricants will be used in preference to petroleum-based products.

The warehouse and product storage areas will be inspected as part of normal operations and the inventory maintained to ensure that the purchase of hazardous materials is optimized and best storage practices are maintained to prevent the accumulation and eventual disposal of unwanted or deteriorated goods. A "first in, first out" warehouse practice will be implemented to minimize the potential for product/container deterioration.

7.2 Reuse and Recycle

GGI will continually seek reuse and recycling opportunities to avoid or minimize wastes entering the landfill. For example, GGI will review options to clean and regenerate used coolant on site. Because of the limited opportunities currently available in Guyana for recycling wastes, initial efforts will focus on the segregation of metals from the landfill waste stream. Metal wastes from the ball mill, vehicle maintenance, and other sources will be collected and temporarily stockpiled in a designated waste lay down area. Waste piping, empty drums, tanks, vessels and other process equipment that mat be taken out of service will be decontaminated prior to transfer to the waste lay down area, and mobile equipment taken out of service will be drained of residual fuel, oil, coolant, refrigerants, and other fluids prior to transfer to the laydown area.

Waste tires will be kept out of the landfills. Until alternate recycling options become available, waste tyres will be placed along the base of waste rock stockpiles and buried in a special cell or during the next lift. Where opportunities arise, used tires may be reused to stabilize earthworks, delineation of roadways, serve as barge/boat fenders, or for other purposes.

Plastic, paper, cardboard, glass, and other potentially recyclable wastes will be disposed of as municipal wastes as noted in **Table 5.0-1** until viable recycling opportunities become available.

8 Waste Segregation, Accumulation, and Transfer

8.1 Segregation of Waste

Operations, maintenance, and warehouse personnel will be responsible for segregating wastes at source into the dedicated receptacles at the waste transfer stations and for general management and housekeeping of the waste transfer stations.

Hazardous wastes generated during maintenance activities will be placed in appropriate labelled containers within the curbed and covered storage facility at the transfer area. Hazardous liquids (waste paints, used oil, oily water pumped for workshop oil separators, used coolants etc.,) will be stored in labelled drums with caps. Waste batteries will be drained prior to being placed on pallets in the containment area. The waste acid will be neutralized or placed in plastic waste drums for transfer to the THWSF. Waste fluorescent lights contain mercury so will be placed in designated solid waste drums with lids and transferred to the THWSF.
Ferric and non-ferric metals will be segregated from other wastes where practical, decontaminated as required, and placed in a skip or similar container located at the transfer area.

Municipal wastes and other wastes will be placed in a dedicated skip or similar container. Canteen food wastes generated at the camp will be placed in covered dedicated bins suitably designed to prevent wildlife access.

8.2 Waste Transfer

Wastes will be collected on a daily or weekly basis; the frequency determined based on the rate of waste generation. Canteen wastes will be collected and taken to the landfill daily.

9 Operations – Solid Waste Landfills

9.1 Recordkeeping

9.2 Accepted Waste

The Environmental Officer will perform periodic inspections for prohibited wastes and report any infractions to the Environmental Manager. Because there are currently no recycling opportunities for paper, computer wastes, and plastics in Guyana, these wastes will be accepted into the landfill until other options become available. As Guyana does not permit burning, all wood waste will be accepted into the landfill.

9.3 Access Control and Security

The landfill sites will be fenced and access restricted to mine personnel authorized to use the site. The landfill gate will be kept locked to prevent unauthorized dumping or prohibited wastes entering the landfill when the Environmental Officer is not in attendance. In the absence of the waste management coordinator, access to the landfill will be authorized by the Environmental Manager.

9.4 Segregation of Waste

Canteen wastes will be disposed separately from other wastes received at the landfill and shall be covered daily to prevent attraction of wildlife and protect against vectors. Holes will be punched into food waste bags just prior to covering, in order to facilitate decomposition.

9.5 Landfill and Cover Method

A dedicated bulldozer or backhoe will be provided for landfill operations for construction of disposal trenches, moving and compacting waste, and applying soil cover material. Municipal waste and other non-hazardous wastes will be disposed in trenches that are constructed as required. Working from one end of the trench, waste will be dumped and covered with soil daily or at a frequency necessary to inhibit access to wildlife and potential vectors and to ensure application of adequate soil cover for compaction. The width of the trench or active face will be based on the amount of traffic and the volume of waste being brought to the site but will not be so wide as to be impractical to operate. A stockpile of clean borrow material will be maintained at the site to be used as cover material. The amount of soil required for daily cover may vary depending on waste types deposited. However, the thickness of compacted soil should not be less than 15 centimetres after compaction.

9.6 Recyclables

If recycling and reuse opportunities become available in Guyana during the operational phase of the Project, recycling bins maybe placed at each transfer station to allow separation of recyclable waste from general municipal waste. A designated laydown area will be set aside for temporary storage of recyclable materials prior to collection and transport.

9.7 Drainage and Leachate Control

Drainage channels will be constructed around the landfill perimeter and will be maintained to divert precipitation away from the landfill. Precipitation within the landfill catchment area will be channelled to a leachate collection/run-off settlement pond. Discharges from the pond will be monitored on a regular basis to ensure they meet regulatory requirements and World Bank discharge standards for protection of surface water.

9.8 Vector Control

The active front of the landfill will be covered at the end of each day to protect against vectors, odor, and the potential for windblown debris. If necessary cover will be placed at more frequent intervals to deter potential disease vectors (e.g., rodents, flies, mosquitoes, or other animals or insects).

9.9 Groundwater/Surface Water Monitoring

The Environmental Officer will periodically inspect the surface water diversion channels for the landfill on a regular basis to ensure they are kept clear of litter and debris and function as designed. The landfill may be constructed with leachate collection systems and/or surface water collection ponds designed to intercept site seepage or runoff. The Environmental Officer will periodically collect samples from the pond to check water quality prior to allowing discharge from the pond. The landfill will be designed using a low permeable synthetic or compacted clay liner to limit leachate infiltration into the natural soil. Monitoring wells will be installed downgradient of the landfill and sampled on a regular basis to ensure groundwater quality is not impacted from potential leachate infiltration.

9.10 Wildlife Management

Wildlife access will be managed through security fencing to prevent access by larger mammals and the application of soil cover over the waste to deter small animals and vectors.

9.11 Training

The Health and Safety Officer shall ensure that all employees involved in operating forklifts and heavy equipment undergo equipment safety training as per SOPs GG-15, “Forklift Safety” and GG-16, “Safe Operation of Heavy Equipment.” Training sessions shall be organized and documented as noted in GG-06, “ESMS Training Program.”

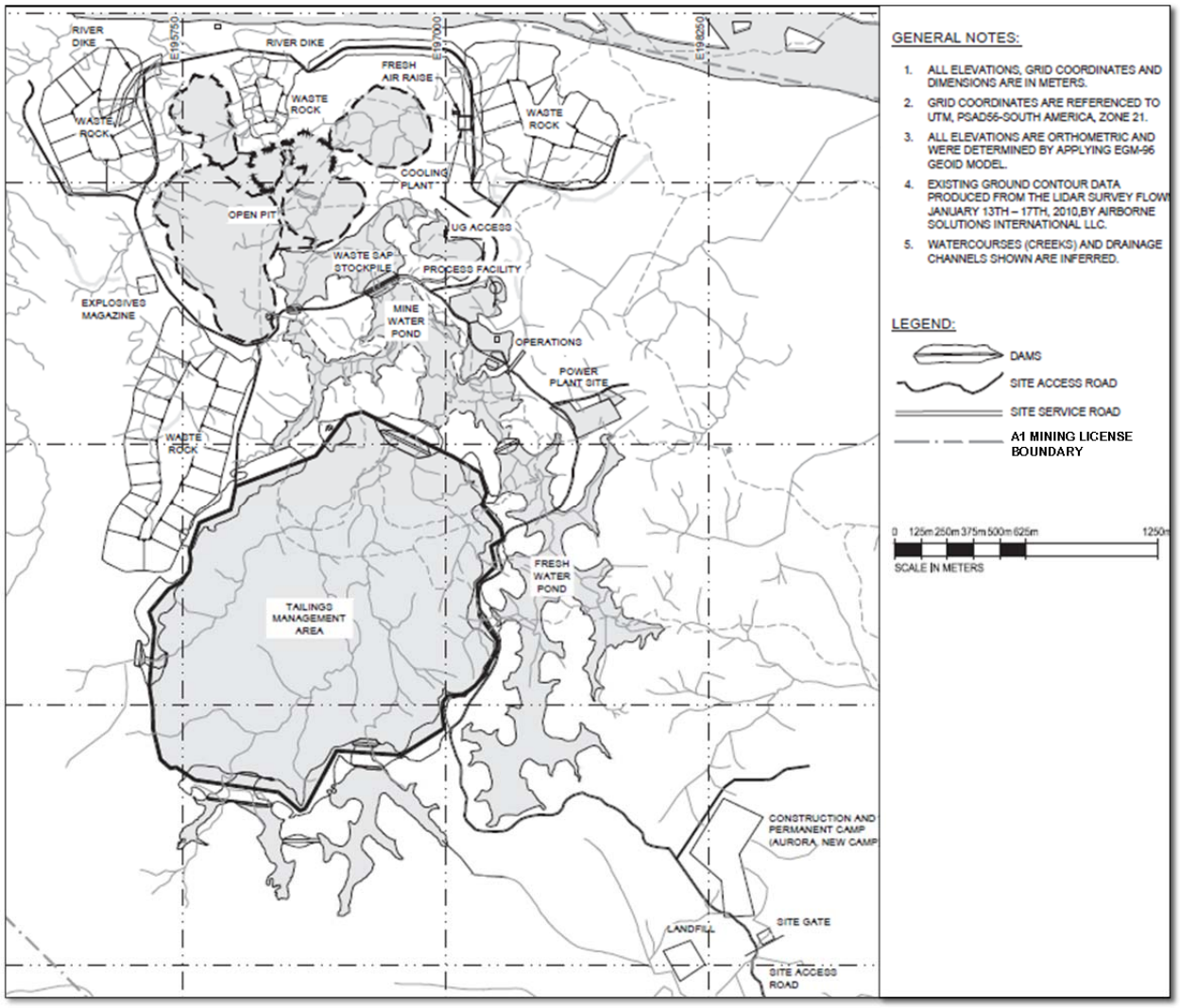
9.12 Safety and Emergency Procedures

The potential for spills, injury and other incidents at the landfill will be minimized by ensuring that all personnel are appropriately trained, equipment is in good operating condition, and repairs and/or maintenance are performed in a timely manner. All non-routine work tasks for which there is no written procedure will be reviewed as per GG-09, “Identification of Project-Related Safety Hazards and Assessment of Risks”, to evaluate the risks and put controls in place to ensure the tasks are performed safely.

10 Operation – Inert Waste Cell in Waste Rock Stockpile

In the operational phase of the Project, certain types of inert wastes (e.g., used tires or conveyor belting) may be placed in a cell constructed in one of the designated waste rock stockpiles; see Figure 10.1-1 for the predicted location and final configuration of the waste rock stockpiles.

Figure 10.0-1: Waste Rock Stockpile Locations at Closure



Actual configuration and operation of such cells will be defined in later versions of this *Waste Management Plan*; see Section 1.3.

11 Operation – Temporary Hazardous Waste Storage Facility (TWHSF)

The THWSF will be managed in accordance with the following paragraphs.

11.1 Classification of Waste

All hazardous waste to be stored at the hazardous was storage facility shall be classified, per the procedures specified below.

11.1.1 United Nations Classification

Hazardous wastes generated will be classified based on the United Nation (UN) classification of dangerous goods and assigned an appropriate four-digit UN Number (see http://www.unece.org/fileadmin/DAM/trans/danger/publi/unrec/English/part3.pdf) that identifies hazardous substances and articles in the framework of international transport.

11.1.2 Labelling

All waste containers will be clearly labelled to identify the name of waste, its hazard classification, and UN identifier.

11.1.3 Environmental Authorization

In keeping with the requirements of (Guyana EPA, 2000), Part II, Sections 3(1) and 3(3), GGI will submit a notification to the Guyana EPA advising on the nature of its predicted hazardous waste generation and onsite storage practices pending identification of a properly licensed offsite hazardous waste disposal facility, and will seek an Environmental Authorization [see Section 3(3)] to temporarily store such wastes onsite.

11.2 Storage

11.2.1 Compatibility

To prevent adverse reactions from occurring, hazardous wastes will be stored in containers that are compatible with the type of waste stored. Incompatible wastes will not be stored together or in areas where there is a potential for them to come into contact if spillage occurs. Incompatible wastes will be stored in separate shipping containers.

11.2.2 Containment

The hazardous storage facilities at the Aurora and Buckhall sites will be constructed with a bermed concrete or HDPE-lined pad suitably sized to retain the shipping containers to be used for the temporary storage of the hazardous waste. Where waste acids or other corrosive substances are stored, the pad and sump area (as needed) will be suitably protected with an epoxy coating or similar protective measures.

11.2.3 Signage

Signage will be posted on each shipping container to identify the waste stored. The signage will meet the UN class labelling system used for international transportation of dangerous goods.

11.2.4 Ventilation

Shipping containers will be adequately ventilated to prevent the build-up of toxic or flammable gases. SOPs will be followed when opening and entering storage containers to ensure that toxic or flammable gases are not present and containers are safe to enter.

11.3 Security

The THWSF will be surrounded by a high security fence and locked gate, and access will be restricted to mine employees authorized to enter the site. Each shipping container will also be kept locked when not in use.

11.4 Inspection

Documented inspections of waste in each shipping container will be conducted monthly. The waste will be stored in a manner that provides access into each shipping container to permit inspection of the integrity of each hazardous waste drum or storage pallet to identify leakage or corrosion/staining indicative of potential leakage. Any suspect drum or storage pallet will be removed and the waste repacked.

Site security personnel will conduct regular perimeter inspections to ensure that the fence has not been breached or the facility otherwise compromised.

11.5 Record Keeping and Reporting

Hazardous waste records will be retained until an appropriately licensed offsite disposal facility is identified or for a minimum of five years, whichever occurs first. Records will include an inventory of the dates and amount of hazardous wastes generated, stored, treated, transported, or disposed. In keeping with the requirements of Part III of (Guyana EPA, 2000) GGI will also submit an annual report to the Guyana EPA that:

- identifies the Aurora Gold Project as the generating facility;
- describes the types and quantities of hazardous wastes generated;
- provides data concerning any offsite shipments of waste and the location and approval status of the disposal facility;
- any applied treatment standards;
- a summary of any spills or accidents that may have occurred and the corrective action taken;
- any waste minimization efforts related to the identified wastes types;
- a description of the pollution prevention pan for the facility; and
  such other records as Guyana EPA may require.

All records shall be retained in accordance with GG-05, “Records Management.”

11.6 Shipment of Hazardous Waste

Until suitable options become available to recycle or treat hazard waste in Guyana or other country that would accept the waste, no hazardous wastes will be shipped off site. When suitable options become available, GGI will only retain approved contractors, drivers, and transporters that are trained and licensed to transport hazardous wastes. All hazardous waste shipments will follow international transportation standards and GIIPs and any applicable Guyanese regulations. Wastes will be packed in appropriate containers for the type of waste shipped, and shipments will be appropriately identified with shipping name, UN numbers, labels, placards, certification marks, and other markings or symbols. Shipping manifests will be used to identify the type, origin, and destination of the waste.

No hazardous waste will be shipped before GGI has confirmed the waste receiver is licensed or authorized by the Guyana EPA to receive the waste, and before GGI's Environmental Manager has confirmed that the waste receiver operates in an environmentally responsible and safe manner.

11.7 Groundwater/Surface Water Monitoring

The secondary containment area and any installed sumps will be inspected regularly to ensure that they are maintained free of debris and precipitation. Any water accumulated in the sump that is suspected of being contaminated will be sampled and analysed for the potential contaminants of concern before the sump water is discharged.

Groundwater monitoring wells will be installed downgradient of the THWSF and samples periodically collected and analysed to ensure that containment integrity is maintained and there is no environmental impact associated with the waste storage area.

11.8 Training

The Health and Safety Officer shall ensure that all employees involved in the use and handling of hazardous wastes also undergo training addressing the general requirements of hazardous material management, as described in SOP GG-14, "Handling and Storage of Hazardous Materials", as well as material-specific information as described in currently available international Material Safety Data Sheets (MSDSs). Training sessions shall be organized and documented as noted in GG-06, "ESMS Training Program."

12 Medical Waste Management

The Aurora site and Buckhall medical clinics will generate small quantities of medical wastes including sharps (e.g., needles, syringe, blood-test lancets), infectious waste (e.g., cotton, dressings, soiled plasters, and other materials contaminated with blood or other bodily fluids), and pharmaceutical waste (e.g., discarded medicines). This waste will be managed by the GGI medics, segregated from nonmedical waste, and placed in appropriate World Health Organization (WHO) approved rigid plastic medical waste containers, for collection and transport to the Georgetown Public Hospital for incineration. Examples of appropriate waste containers are shown in **Figure 11.0-1**.

Figure 11.0-1: Examples of WHO-approved Sharps and Medical Waste Containers



References

Internal References

- *ESMS Plan*
- *Overburden Management Plan*
- *Cyanide Management Plan*
- *Mill/Leach Plant Operations Plan*
- *Tailings Area Management Plan*
- *Hazardous Materials Management Plan*
- GG-01, “Solid Waste Management”
- GG-05, “ESMS Training Program”
- GG-09, “Identification of Project-Related Safety Hazards and Assessment of Risks”,
- GG-14, “Handing and Storage of Hazardous Materials”
- GG-15, “Forklift Safety”
- GG-16, “Safe Operation of Heavy Equipment”

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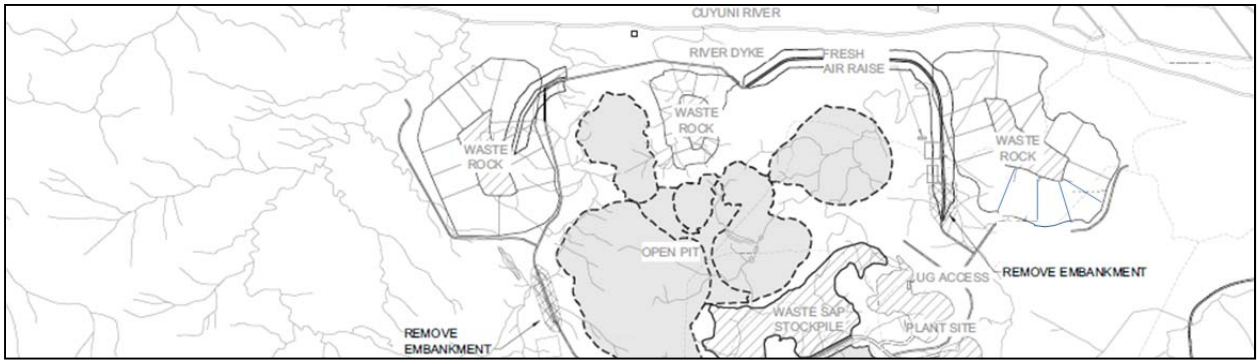
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Mine Reclamation and Closure Plan

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
Seattle, WA
Date:
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Project Number:
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Page	Section	Description of Change
All	All	First issue of *Mine Reclamation and Closure Plan*

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Appendix A: Closure Cost Document for Conceptual Mine Reclamation and Closure Plan - Aurora Mine Site, Guyana (Ajax, Ltd., November 2012)

Acronyms

ANFO	Ammonium Nitrate – Fuel Oil
ASM	Artisanal and Small Scale Mining
BFS	Bankable Feasibility Study
BMP	Best Management Practice
CIL	Carbon in Leach
DMRCP	Detailed Mine Reclamation and Closure Plan
EHS	Environmental, Health, and Safety
EPA	(Guyana) Environmental Protection Agency
ESHS	Environmental, Social, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
FWP	Fresh Water Pond
GFC	Guyana Forestry Commission
GGMC	Guyana Geology and Mines Commission
GGI	Guyana Goldfields, Inc.
HDPE	High-density polyethylene
ICMC	International Cyanide Management Code
ICMI	International Cyanide Management Institute
IFC	World Bank/International Finance Corporation
LOM	Life of Mine
MRCP	Mine Reclamation and Closure Plan
MWP	Mine Water Pond
NAG	Non-Acid Generating
NGO	Non-governmental Organization
PS	(IFC) Performance Standard
TMA	Tailings Management Area
WAD	Weak Acid Dissociable

1 Introduction

1.1 General

This *Mine Reclamation and Closure Plan* (MRCP) was prepared for the Guyana Goldfields, Inc. (GGI) Aurora Gold Project (Project to specifically address the current mine design and the areas, facilities, and Project activities described by the *Guyana Goldfields Inc. Aurora Gold Project Feasibility Study Update Report* (TetraTech *et al.*, 2013, in progress, referred to hereafter as the Bankable Feasibility Study or BFS).

The MRCP presents the overall strategy and anticipated actions required for returning the land, water, and other natural systems affected by Project activities to a close approximation of pre-Project conditions. It is designed to protect the quality of air, water, and soils; to protect human health and safety; to minimize the potential for residual socio-economic impacts; and to the extent possible in the unique ENVIRONMENTAL and social setting of the project, maximize socio-economic benefits. It also addresses the minimum requirements of the World Bank/ International Finance Corporation (IFC) "Environmental, Health and Safety Guidelines for Mining" (IFC, 2007) and Standard of Practice 5 of the *International Cyanide Management Code* (ICMI, 2012).

The MRCP will be periodically updated, in keeping with (IFC, 2007) and International Cyanide Management Code (ICMC) guidance. Closure costs will be reviewed annually in order to provide a level of guidance on reclamation and closure that is commensurate with the current state of mine development and operation. Certain aspects of this MRCP may be used to guide concurrent reclamation of impacted areas (such as those associated solely with exploration or mine construction) that may no longer be required to support ongoing mining operations. The current mine design also calls for the development and sequential closure of several waste rock/overburden stockpiles during the operational phase.

The MRCP will also be discussed with potentially impacted stakeholder groups, and in keeping with (IFC, 2007) requirements, in order to provide the specific planning and procedural details to support any temporary cessation of operations or closure. In addition, as a condition of GGI's current Environmental Permit[1], two years prior to cessation of all mining operations and the decommissioning and demolition of ore processing and support facilities, a detailed version of this MRCP (referred to hereafter as the Detailed MRCP or DMRCP) must be prepared, with appropriate input from affected stakeholders, and presented to the Guyanese Environmental Protection Agency (EPA) for review and approval. If any subsequent updates of the DMRCP are required, they shall be issued on a schedule to be negotiated with the Guyana EPA.

[1] See Environmental Permit 20090114-GGIOO, Guyana Environmental Protection Agency (EPA), September 2010.

The remaining paragraphs of Section 1 describe the role of the MRCP within the overall environmental and social management structure of the project. Other MRCP section contents are summarized as follows:

- Section 2 summarizes the overall scope and objectives for site closure;
- Section 3 presents the conceptual framework for closure, and includes conceptual procedures, task sequencing, and scheduling considerations for progressive, temporary, and final closure scenarios;
- Section 4 addresses key considerations for the management of artisanal and small-scale mining (ASM) issues that are unique to the Project;
- Section 5 provides guidance on workforce retrenchment actions that will also need to be considered as part of final closure cost estimates;
- Section 6 summarizes post-closure and site relinquishment requirements;
- Section 7 presents the estimated preliminary costs of final closure, based on a detailed, independent preliminary assessment conducted by AJAX, Ltd. (results of which are included in Appendix A); and
- Section 8 presents the financial surety or assurance options available to GGI that will be established to ensure that sufficient finalize resources are reserved to fund all required closure actions.

1.2 Relationship to Environmental and Social Management System and Environmental and Social Impact Assessment

GGI has established an Environmental and Social Management System (ESMS) for the Aurora Project, which is embodied in a Project-specific *ESMS Plan* (GGI, 2012). The *ESMS Plan* is based on the requirements of IFC Performance Standard 1, "Assessment and Management of Environmental and Social Risks and Impacts" (PS-1; see IFC, 2011a) and other internationally recognized best management practices (BMPs) for environmental and health and safety (EHS) and social program management.

This MRCP (and ultimately, the DMRCP) is one of a series of Management Plans that will be issued at appropriate phases of the mine life cycle and periodically reviewed and updated as necessary to manage and/or mitigate specific anticipated EHS and social impacts. The MRCP will support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project in accordance with IFC requirements. **Figure 1.2-1** depicts the relationship of the MRCP to the overall structure of the Project ESMS; see Section 1.2 of the *ESMS Plan* for additional details.

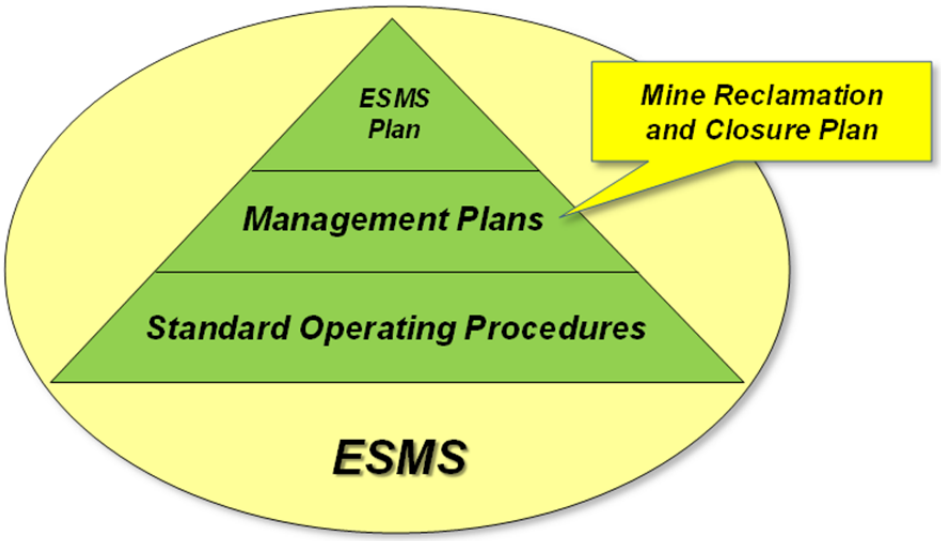


Figure 1.2-1: Position of MRCP in ESMS Document Hierarchy

1.3 Recordkeeping

Records associated with the implementation of the MRCP/DMRCP over the life of the mine will, at a minimum, include current and superseded version of the plans themselves; reclamation monitoring records, as specified therein; staff training records; plan submittal and approval correspondence; and related information. The *ESMS Plan* will define the overall records management practices for the project, including physical/electronic access control and storage requirements; organizational guidance sufficient to permit ready access to records by authorized personnel; direction on archiving and disposal; and definition of legal retention times.

1.4 Reporting

Reporting is an essential element of the Aurora Gold Project ESMS and GGI corporate policy; the monitoring observations noted in Sections 3.2 through 3.4 will likely include information on the effectiveness of MRCP/DMRCP implementation, and may be provided, at GGI management's discretion, in response to specific stakeholder inquiries, or may be included in annual financial, sustainability, or corporate social responsibility reports.

2 Scope and Objectives

2.1 Scope

The MRCP applies to all areas disturbed during the exploration, construction, and operational phases of the Aurora Gold Project, excluding only those specific elements of infrastructure required to be left in place in accordance with agreements made with the Government of Guyana. These excluded areas include:

- the Aurora site airstrip and connecting roadways;
- the road connecting the Aurora site to Tapir Crossing;
- the road from Tapir Crossing to the intersection with the existing (M-3) Barama Road; and
- the Buckhall logistics support facility, with buildings, infrastructure, wharf, fuel terminal and storage tanks, shops, and permitted solid waste landfill.

This initial iteration of the MRCP presents conceptual schedules or sequences of temporary and final closure tasks. It also identifies a range of anticipated post-closure activities, including environmental and social monitoring requirements, and provides a preliminary estimate of costs for total reclamation and closure activities, based upon the current site plans and other information derived from the BFS.

2.2 Objectives

The MRCP is conceived as a living document, to be periodically updated and distributed under the change control mechanisms to be established by the Project's *ESMS Plan*. As previously noted, the overall objective of the MRCP is to guide the reclamation and closure of the Project site to a condition which, to the extent possible:

- promotes the return of natural ecological processes and biodiversity to approximate pre-Project conditions (e.g., by creating a pit lake and by implementing a program of site restoration and revegetation);
- protects the quality of air, water, and soils (e.g., by revegetation, by instituting specific engineered erosion control measures, and, if necessary, by providing appropriate passive sediment control measures for surface water features);
- protects human health and safety (e.g., by permanent closure of underground workings, elimination of most surface structures, and by the erosional stabilization of all earthworks);

- minimizes the potential for residual socio-economic impacts [e.g., limits the attractiveness of the closed mine site with respect to potentially illegal or uncontrolled Artisanal and Small-scale Mining (ASM) and other intrusive human activities]; and

- to the extent possible, maximizes socio-economic benefits (e.g., provides the Government of Guyana certain basic infrastructure improvements, and, by minimizing the attractiveness of the mine site to uncontrolled or illegal ASM activities, minimizes an array of potential social issues associated with such activities).

The general benchmark against which the effectiveness and adequacy of site restoration activities will be evaluated will be the "Updated Environmental Baseline Report" and "Updated Social Baseline Report" [Appendices A and B, respectively, in *Feasibility Study Updated Report, Aurora Gold Project, Guyana: Volume 2, Social, Environmental, and Permitting Considerations* (TetraTech et al., 2013].

The MRCP provides a framework for the physical stabilization of mine workings; establishment of biological stability through the placement of mulch and topsoil and re-establishment of vegetation; and the protection of water resources and the receiving environment from contamination by hazardous chemicals (i.e., chemical stability). General criteria for assessing the successful achievement of these specific objectives are summarized as follows:

- **Physical stability objectives** include no loss of physical integrity in closed earthworks, including the final configuration of dikes or embankments, access closures to the underground mine, the boundaries or shoreline of the pit lake, passive settling or treatment ponds, and revegetated waste rock stockpiles, as observed throughout a two-year post-closure monitoring period;

- **Biological stability objectives** are to achieve effective revegetation and restoration, as evidenced by vegetative proliferation on at least 70% of the site areas intended for such restoration, by the end of the 2-year post-closure monitoring period; and,

- **Chemical stability objectives** are to attain similar or improved downstream water quality when compared with historic (pre-Project) data at the end of the post-closure monitoring period.

3 Conceptual Framework

3.1 General Project Description

The Aurora Gold Project is presently conceived as an open-pit and underground gold mining operation, conventional crushing and milling process, and a carbon-in-leach (CIL) cyanidation process for mineral extraction. Open pit operations are expected to initially focus on the processing of a mixture of near-surface saprolite and hard rock ore, and are expected to complete in approximately 5-6 years. Underground operations will continue for at least an additional 15 years. Actual mine life will depend on many factors, include ore grade, actual mineral recovery figures, mining and processing costs, commodity prices, potential regulatory changes or environmental or social issues, as well as the potential discovery of additional mineral resources within the footprint of the Aurora concession.

The current conceptual configuration of the Project site at final closure is presented in **Figure 3.1-1**. Residual cyanide reagent in process facility tailings will be detoxified to 5 ppm weak acid dissociable (WAD) cyanide or less, using the INCO/air process. Detoxified tailings will be deposited in a Tailings Management Area (TMA) to the immediate southwest of the process facility and Mine Water Pond (MWP). The TMA will be designed to meet IFC effluent standards[2] and ICMC[3] requirements for residual WAD cyanide and other contaminants. The TMA will be comprised of a series of engineered earth embankments, a natural (saprolite) liner system, a seepage collection and return system, a reclaim pond, tailings and reclaim water pipelines and containment trench, an emergency spillway, two downgradient diversion (dilution) ponds, piezometer installations in all embankments, and a series of downgradient monitoring wells. The MWP and Fresh Water Pond (FWP) will be located to the north and east of the TMA. These ponds will also be located in basins with natural liner characteristics, and neither will be impacted by any operations involving cyanide. The FWP will supply makeup water to the mill and process facility. The MWP is designed to manage water from open pit and underground mining operations. Because the FWP and MWP will be joined at closure, both facilities will therefore be designed to meet IFC effluent standards for metals and other potential contaminants from mining operations. The mine site will be supported by mechanical shops, warehouses, diesel-powered electrical generators, fuel storage tanks, a 400-500 (at maximum staffing) man camp, potable water and sanitary waste disposal systems, a hazardous waste accumulation area, secure explosives storage silos and magazines, administrative offices, an airstrip, a solid waste landfill, and related infrastructure. As noted in **Figure 3.1-2**, the Project also includes the Buckhall wharf and logistics faciltiy on the Essequibo River, and a ferry landing (Tapir Crossing) on the Cuyuni River. The project also includes the road from Buckhall to

[2] See (IFC, 2007), "Environmental, Health and Safety Guidelines for Mining", Table 1.

3 See (ICMI, 2012); *International Cyanide Management Code;* accessed at http://www.cyanidecode.org/pdf/thecode.pdf

Figure 3.1-1: Project Configuration at Closure

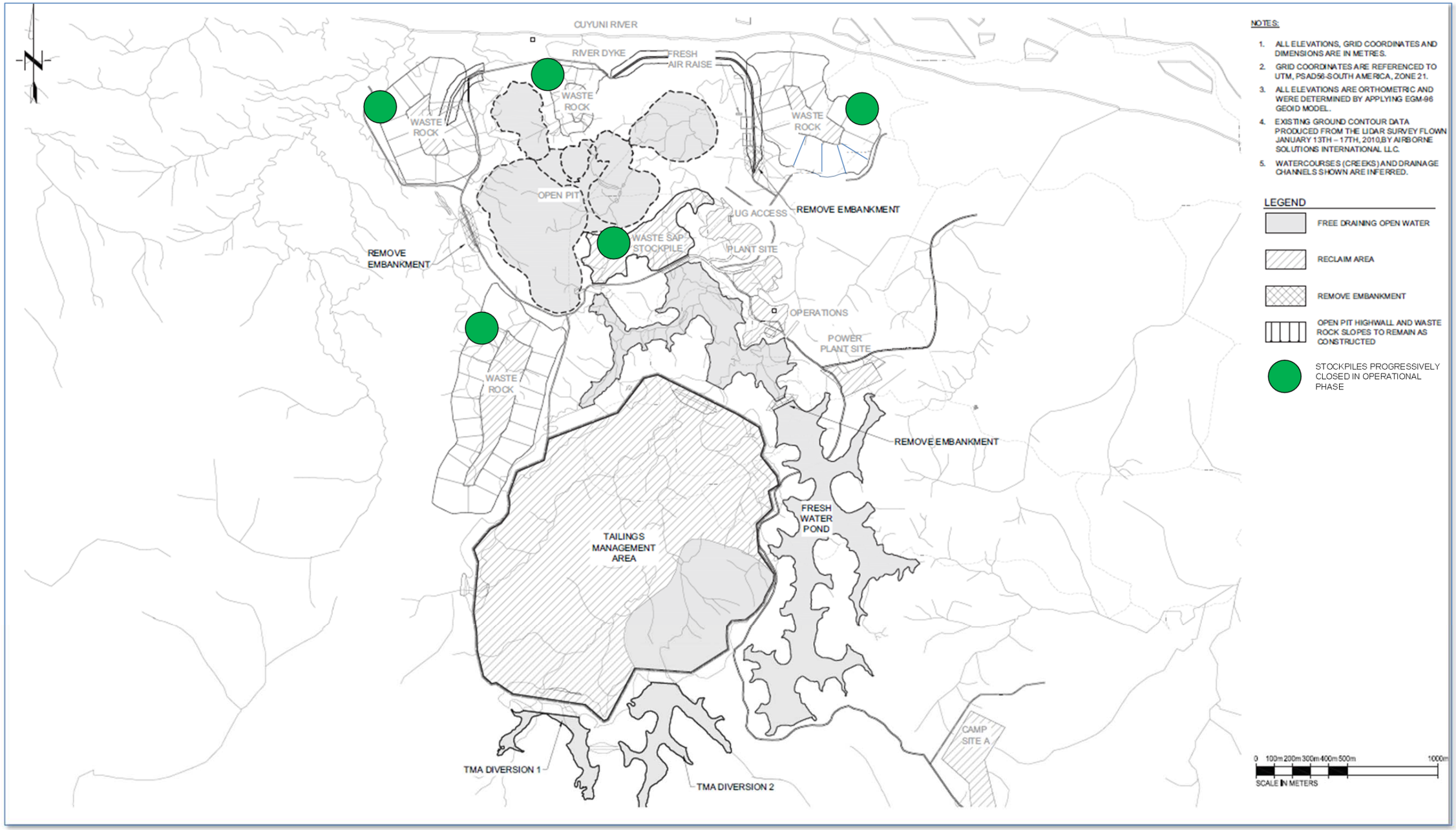
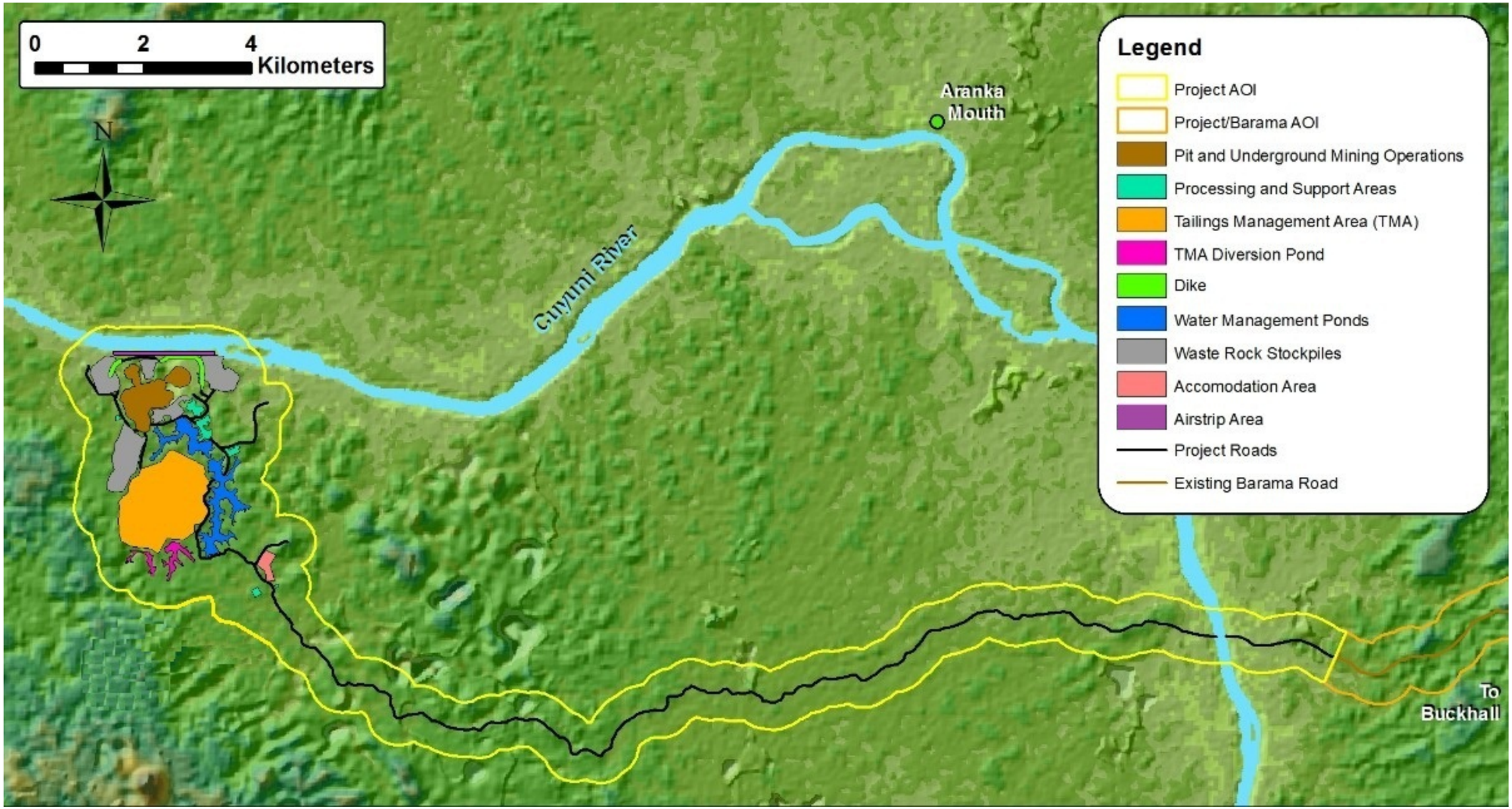


Figure 3.1-2: Aurora Project Component Locations



Aurora, the greater portion of which is shared with Barama Company Limited (Barama), the operator of a large timber concession north of the Cuyuni.

3.2 Primary Assumptions Affecting Closure

The primary assumptions that affect Project's decommissioning and closure strategy and the estimated closure costs described in Section 7 and Appendix A include the following:

- Pit lakes will be permitted to fill and interconnect (see **Figure 3.1-1**) at the cessation of underground mining. A permanent outfall will be established for the pit lake system that reports to the Cuyuni River. No regrading or contouring of pit highwalls will be required. Highwalls are expected to be non-acid generating (NAG) and (assuming that there is no unauthorized human intrusion) no water quality issues are anticipated with respect to pit lake water.

- All waste rock stockpiles are expected to be NAG, and will be progressively closed during the operational phase of the Project as also noted in **Figure 3.1-1**. All waste rock stockpile closure activities will be conducted under operational budgets (see Section 3.3).

- Waste rock stockpiles and embankments will be built at their final slope angles. No re-grading will be required at closure, and benches and top surfaces will be revegetated. Waste rock stockpiles are expected to be NAG; settling basins may be constructed downgradient from each stockpile if turbidity is an issue while the stockpiles are awaiting revegetation.

- Over the life of the mine, stockpiles will also be developed for the reservation of topsoil from cleared or exposed areas as well as for storage of organic mulch. Stockpiled material will be reserved in sufficient volumes to support all required site restoration activities. Stockpile locations will also be selected to minimize potential rehandling costs.

- As early as practicable, nurseries and/or seed banks of appropriate native species will be established for use during concurrent reclamation and closure revegetation activities. Guyanese farmers outside of the mine's area of influence will be given opportunities to develop nurseries and seed collection programs to supply GGI using native species

- Ownership of certain Project features will be turned over to the Government of Guyana in an operational condition, and will therefore be specifically excluded from the decommissioning and closure effort. These excluded features or areas are expected to include:

  - the Aurora site airstrip and access road;

  - the 29 km road connecting the Aurora site with Tapir Crossing;
  - the 1.5-2 km road from Tapir Crossing to the end of the (M3) Barama Road;
  - the Tapir Crossing ferry landings, less the two ferry barges; and
  - the Buckhall logistics support facility, with all buildings, infrastructure, wharf, fuel terminal, fuel storage tanks and fuelling station, shops, and solid waste landfill.

- A licensed offsite hazardous waste disposal facility will be operational in the Georgetown area by the time of final closure.

- Waste tire, scrap metal, paper, or plastic recycling capabilities will not be available in reasonable proximity to the site at closure. Recycling capabilities do not currently exist in Guyana. However, over the years of mine operation GGI will monitor for the potential development of such resources, and will use all available recycling resources when and if they are determined to be viable. For the purposes of this initial MRCP, however, no recycling credits will be assumed. The initial working assumption is that all such material will be disposed of in an insert waste cell in the final waste rock stockpile and/or in the adits, mined-out stopes, or ventilation shafts of the underground mine, prior to the permanent, engineered physical closure of all mine entrances. Removal and/or safe sequestration of this material is critical to reducing the attractiveness of the closed mine site to further exploitation and potential environmental and social impacts from ASM and other intrusive human activities.

- For this iteration of the MRCP, no resale credit will be assumed for major motorized equipment items at the end of mine life (e.g., shovels, dozers, haul trucks, service trucks, and drill rigs).

3.3 Progressive Closure Actions

Progressive restoration and closure actions will be conducted throughout the exploration, construction, and operational phases of the project. It is assumed that such actions will be funded from phase-specific operational budgets and are not reflected in the preliminary closure cost estimate presented in Section 7 and Appendix A. Anticipated progressive closure actions are described as follows:

- **Exploration phase closures;** site cleanup, regrading, and revegetation will be required for all exploration trenches, exploration drilling pads, exploration camp areas, and laydown/other work areas, as well as proper abandonment of boreholes; these actions will be conducted in accordance with several plans and procedures drawn from ESMS resources, including:

- the Project *Exploration Management Plan*;
- the *Construction Management Plan (Early Works);*
- the *Construction Management Plan – Major Construction;*
- the *Erosion Prevention and Control Plan*; and
- GG-37, "Control of Erosion and Sedimentation."

- **Construction phase closures;** progressive/concurrent reclamation and closure actions will be performed by the Construction Contractor and monitored by GGI staff in accordance with applicable elements of the Project ESMS, which will be integrated as performance requirements in governing contracts.

  Construction phase closure areas will typically include:

  - borrow pits for access roads;
  - road cuts and embankments
  - temporary staging and layout areas supporting the construction effort;
  - temporary camps/ portable office sites;
  - temporary workshops and waste storage areas;
  - concrete batch plant areas; and
  - temporary wastewater treatment facilities.

  Construction areas that may be scheduled for future development during operations will be cleared of refuse, waste, and safety hazards, and stabilized and revegetated as appropriate to prevent erosion and sediment transport. Temporary haul and access roads will be regraded, scarified as appropriate, revegetated, and closed, except for those specific access routes that will required in the operations phase.

  Borrow pits for embankment construction will be regraded and revegetated with appropriate non-invasive species in accordance with *Erosion Prevention and Control Plan* and GG-37, "Control of Erosion and Sedimentation. In all cases, priority will be given to sites with the greatest erosional potential for impacting surface waters or wetlands, and where slopes require stabilization to protect the safety of the workforce and ongoing transportation and construction operations.

- **Operational phase closures;** the four waste rock and one waste saprolite stockpiles noted in **Figure 3.2-1** will be sequentially closed; top surfaces will be regraded to prevent ponding, followed by the placement of mulch and topsoil and revegetation of exposed surfaces in accordance with the *Erosion Prevention and Control Plan* and GG-37, "Control of Erosion and Sedimentation."

- **ASM legacy area closures;** as part of GGI's biodiversity offset commitments, routine cleanup, regrading, placement of mulch and topsoil, and revegetation of ASM-impacted areas discovered within GGI's Aurora concession will be required in accordance with the

Project *Erosion Prevention and Control Plan*; and GG-37, "Control of Erosion and Sedimentation."

3.4 Interim or Temporary Closure Actions

Table 3.4-1 presents the actions anticipated in the event a temporary shutdown of the Project occurs after mining processes have been initiated.

Table 3.4-1: Interim or Temporary Closure Actions

Project Component	Description of Interim or Temporary Closure Actions
Pit (if in operation at the time of temporary closure)	1. Cease mining operations and move all mobile equipment except for drill rigs and primary loaders to a controlled, secure storage pad near the mechanical shop area; inspect for fuel/lubricant/coolant leaks, repair as required, and place into care and maintenance status, with periodic inspections and engine operation.
	2. Install signage and security measures (i.e., locking gate or barrier on road) to prevent unauthorized access to pit, loaders, and drill rigs.
	3. Continue to dewater pit to the MWP; monitor MWP effluent and downgradient monitoring wells to ensure continuing compliance with IFC mine effluent guidelines.
	4. Continue to monitor pit wall stability; address geotechnical issues as they may occur.
Haul roads	1. Continue to monitor condition per *Erosion Prevention and Control Plan*, and address any erosion control/geotechnical issues as they may occur.
Underground mine (if in operation at the time of temporary closure)	1. Move all mobile underground equipment to a secure parking pad near mechanical shop areas; inspect for fuel/ lubricant/ coolant leaks, repair as required, and place into care and maintenance status (i.e., periodic inspections and engine operation).

Project Component	Description of Interim or Temporary Closure Actions
Underground mine (if in operation at the time of temporary closure)	2. Continue to dewater underground mine to the MWP; monitor MWP effluent and downgradient monitoring wells to ensure continuing compliance with IFC mine effluent guidelines, per *Water Management Plan* requirements.
	3. Secure portal, air shafts, and main adit against unauthorized entry (e.g., install signage, security fencing, and locking gates).
	4. Survey for hazardous materials and wastes and remove to safe/secure storage as required, per the *Hazardous Materials Management Plan* or *Waste Management Plan,* as appropriate.
Cuyuni dikes	1. Continue to monitor piezometer levels, as well as visual condition per the *Erosion Prevention and Control Plan*; address any geotechnical issues as they may occur.
Fuel tank farm	1. Cease replenishment of diesel fuel and lubricant supplies.
	2. Assess fuel/lubricant stock on hand vs. projected usage rate during care and maintenance period; draw down stock on hand, and replenish only as necessary to support care and maintenance and reduced power generation needs.
Power plant	1. Lower power generation rate commensurate with reduced demand from care/maintenance activities.
	2. Place unused generators on care and maintenance (i.e., periodic inspection, engine starting).
Mechanical shops/ warehouses	1. Continue to operate as necessary to support maintenance functions during temporary closure period.
Solid Waste Landfill/Inert waste cells/Hazardous waste storage facility	1. Continue to operate as necessary to support maintenance functions during temporary closure period.
Explosives magazine and silo area	1. Cease replenishment of explosives stocks.

Project Component	Description of Interim or Temporary Closure Actions
Explosives magazine and silo area	2. Return all explosive materials to their respective magazines or silos [if ammonium nitrate-fuel oil (ANFO) components].
	3. Inspect security fencing, gates, and locks, replace as required.
	4. Monitor security of magazine site (daily inspections).
	5. Keep buffer zone around magazines/storage silos clear of vegetation.
Mill/process plant	1. Assess available volumes of cyanide and other reagent stocks, accept only enough additional reagents onsite to process existing run of mine ROM ore stockpile.
	2. Process ROM ore stockpile.
	3. Flush cyanide storage tank and cyanidation plant with fresh water until WAD cyanide values <0.5 mg/l at inlet to detoxification plant.
	4. Drain cyanide storage tank and CIL tanks and plant piping; block/chock agitators and other mechanical equipment to reduce weight strain on drive systems, and lock out primary drain valves on empty tanks in closed position.
	5. Lock containment drain valves in open position to permit precipitation to drain freely to MWP, per GG-36, “Lockout/Tag-out Requirements.”
	6. Lock or tag out electrical equipment to prevent inadvertent energizing, per GG-36, “Lockout/Tag-out Requirements.”
Waste rock/saprolite stockpiles	1. Close stockpiles >90% of their design height.
	2. Continue monitoring revegetation progress on closed stockpiles in accordance with the *Erosion Prevention and Control Plan* and *ESHS Monitoring Plan.*

Project Component	Description of Interim or Temporary Closure Actions
TMA	1. Continue to monitor piezometer levels, and visual condition of embankments per the *Erosion Prevention and Control Plan* and *ESHS Monitoring Plan;* address any geotechnical/erosion control issues as they may occur.
	2. Cease pumping reclaim water to process facility as soon as stockpiled ROM ore is processed and tailings flow ceases; pump residual reclaim water to Tailings Management Diversion Pond(s) as required.
	3. Continue to monitor Tailings Management Diversion Ponds 1 and 2 and downgradient seepage monitoring well network per the *Erosion Prevention and Control Plan* and *ESHS Monitoring Plan,* in order to ensure continuing compliance with IFC/ICMC effluent guidelines; activate additional downstream settling or treatment ponds as required.
FWP/MWP	1. Continue to monitor piezometer levels and visual condition of embankments per *Erosion Prevention and Control Plan* and *ESHS Monitoring Plan*; address any geotechnical/ erosion control issues as they may occur.
	2. Monitor FWP/MWP effluents to ensure continuing compliance with IFC/ICMC guidelines, per the *Water Management Plan* and *ESHS Monitoring Plan.*
Aurora man-camp/airstrip/Tapir Crossing/Buckhall logistics support facility	1. Continue to operate at reduced staffing levels as necessary to support maintenance and environmental monitoring/inspection functions during temporary closure period.

Schedules for specific interim or temporary closure actions will be developed based on the final scope of the required closure, determined just prior to shutdown, and documented in an update to this MRCP.

3.5 Final Decommissioning, Closure, and Post-closure Actions

Table 3.5-1 presents a summary of the projected decommissioning, closure, and post-closure actions for the final closure of the Aurora Project; a conceptual schedule for these actions is provided in **Table 3.5-2**.

Table 3.5-1: Final Decommissioning, Closure, and Post-closure Actions

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Mine pit	1. Cease surface mining operations in year 5 or 6; remove loaders, drill rigs, and surplus haul trucks and mobile equipment; inspect for fuel/lubricant/coolant leaks, repair as required, transport to Buckhall, and place into care and maintenance status pending resale.
	2. Survey for hazardous materials and wastes and remove to safe/secure storage as required, per the *Hazardous Materials Management Plan* or *Waste Management Plan,* as appropriate.
	3. Install signage and security measures (fencing and barriers or locking gates on roadway) to prevent unauthorized access to pit, and to discourage human intrusion at life of mine (LOM) end.
	4. Reseed any impacted areas around the edge of the pit per using native species per *Erosion Prevention and Control Plan* requirements; monitor the effectiveness of reseeding through a 2-year post-closure monitoring period in accordance with the *Erosion Prevention and Control Plan* and *ESHS Monitoring Plan.*
	5. Continue dewatering the pit to the MWP until LOM end; after adit backfilling is complete (see the following discussion for the underground mine), allow pit to fill.
	6. Monitor pit lake water quality and filling for at least a 2-year post-closure monitoring period, in order to ensure conditions will support compliance with IFC mine effluent guidelines when the pit lake is at its design height and the outflow channel is operational.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Mine pit	7. Construct an appropriately armored/vegetated outflow for the pit lake; conduct final inspections of outflow performance and water quality, and monitor performance through the end of the 2-year post-closure period in accordance with the *Erosion Prevention and Control Plan* and *ESHS Monitoring Plan.*
Underground mine	1. Remove all mobile underground equipment, inspect for fuel/lubricant/coolant leaks, repair as required, transport to Buckhall, and place into care and maintenance status pending resale.
	2. Survey for hazardous materials and wastes and remove to safe/secure storage as required, per the *Hazardous Materials Management Plan* or *Waste Management Plan,* as appropriate.
	3. Continue to dewater the underground mine to the MWP pending completion of any backfilling with decommissioning rubble and scrap metal; monitor MWP effluent and downgradient monitoring wells and/or sedimentation ponds in accordance with the *ESHS Monitoring Plan*, in order to meet continued compliance with IFC mine effluent guidelines.
	4. Continue to operate mine ventilation systems pending completion of any backfilling of mine adits with decommissioning rubble/metallic scrap.
	5. Backfill adits with inert rubble and metallic scrap from surface facility decommissioning; if necessary, use ventilation shafts for backfill disposal of additional inert rubble/scrap. Any remaining rubble or scrap metal will be disposed of in a landfill cell constructed in the final waste rock stockpile.
	6. Construct engineered caps/surface closures (concrete, polyurethane foam, or similar) for ventilation shafts after completion of all site demolition activities; place topsoil, regrade, and revegetate capped areas using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period in accordance with the *ESHS Monitoring Plan*.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Underground mine	7. Cease dewatering the pit to the MWP and allow the pit lake to fill as previously noted.
	8. Continue to monitor groundwater quality through the end of the 2-year post-closure monitoring period in accordance with the *ESHS Monitoring Plan,* in order to verify compliance with IFC mine effluent guidelines. At the end of the post-closure period, request Guyana EPA permission to abandon monitoring wells.
Haul roads (mill/mine site)	1. Reclaim by installation of water bars/other appropriate control measures and reseeding using native species per *Erosion Prevention and Control Plan*; monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
Cuyuni dykes/ diversion embankments	1. Remove designated sections of the Cuyuni dykes per final mine configuration drawings (see **Figure 2.1-1**), revegetate exposed surfaces using native species per *Erosion Prevention and Control Plan*. Abandon piezometers, and monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
	2. Remove diversion embankment due west of pit per final mine configuration drawings, revegetate exposed surfaces using native species per Erosion Prevention and Control Plan; abandon piezometers, and monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
Final waste rock stockpile	1. Close the final waste rock stockpile (i.e., the stockpile to the immediate south of the southernmost lobe of the pit lake; see **Figure 2.1-1**); regrade the top surface to prevent ponding, add mulch or topsoil as required, and revegetate slopes and top surface using native species, in accordance with the Erosion Prevention and Control Plan. Monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Final waste rock stockpile	2. Monitor stockpile runoff and downgradient monitoring wells and/or sedimentation ponds to ensure continued compliance with IFC mine effluent guidelines through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
	3. As soon as sampling data indicate consistent effluent quality below IFC guidelines, breach sedimentation pond and revegetate exposed surfaces with using native species per Erosion Prevention and Control Plan; monitor effectiveness of reseeding through the end of the 2-year post-closure monitoring period, in accordance with the ESHS Monitoring Plan.
Mill/process plant	1. Just prior to LOM end, assess available volumes of cyanide and other reagent stocks, accept only enough additional reagents onsite to process final ROM ore stockpile.
	2. Process final ROM ore stockpile.
	3. Return unused stocks of cyanide and other reagents to the supplier for credit.
	4. Flush cyanide storage tank and cyanidation plant/carbon-in-leach (CIL) facility with fresh water until WAD cyanide values are consistently $\leq$0.5 mg/l at the inlet to the detoxification plant.
	5. Drain cyanide storage tank and CIL tanks and plant piping and flush through the detoxification plant to the TMA.
	6. Survey for remaining hazardous materials or wastes and remove to safe/secure storage pending final disposal as required.
	7. Remove high-value gold room equipment, crushers, and large pumps with residual salvage value; install blank flanges or protective dunnage as appropriate and transport to Buckhall pending resale.
	8. Demolish above-ground structures and concrete berms/walls, place inert rubble and scrap metal in inert waste cell in the final waste rock stockpile or the underground mine adit or ventilation shafts.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Mill/process plant	9. Place mulch/topsoil over foundation area, regrade, and revegetate using native species per *Erosion Prevention and Control Plan*, monitor the effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
Tailings and reclaim water pipelines	1. Remove reclaim barge/pumps from TMA and transport to Buckhall pending resale.
	2. Remove large pumps with salvage value from any pumping stations, install blind flanges or dunnage as appropriate and transport to Buckhall pending resale.
	3. Remove high-density polyethylene (HDPE) tailings and reclaim pipelines and trench liner, cut into manageable sections, and dispose of in inert waste cell in final waste rock stockpile or in underground mine adit or ventilation shafts.
	4. Regrade pipeline trench and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
TMA and TMA Diversion Ponds 1 and 2	1. Add mulch/soil amendment to TMA tailings beach, as needed, and revegetate using native species per *Erosion Prevention and Control Plan*; monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan*.
	2. Assess erosional stability of embankments, regrade or repair as required, and revegetate using native species per *Erosion Prevention and Control Plan*; monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
	3. Continue to monitor embankment piezometer levels for 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan*, and then request Guyana Geology and Mines Commission (GGMC) permission to pull or abandon piezometers.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
TMA and TMA Diversion Ponds 1 and 2	4. Breach spillway structure as necessary to maintain TMA pond at final design elevation (see Figure 2.1-1); construct riprap-armored channel to TMA Diversion Pond 2 as required.
	5. Open permanent channel between TMA Diversion Ponds 1 and 2, armor with riprap as required.
	6. Continue to monitor TMA Diversion Ponds, downgradient seepage monitoring well network, and any downstream treatment ponds to ensure continuing compliance with IFC/ICMC effluent guidelines; monitor through the 2 year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan*, then request Guyana EPA permission to abandon monitoring wells.
	7. As soon as sampling data indicate consistent effluent quality in TMA Diversion Pond 2 below IFC/ICMC guidelines, request GGMC permission to breach sedimentation/ treatment ponds and revegetate exposed surfaces using native species per the *Erosion Prevention and Control Plan***;** monitor the effectiveness of reseeding through at least the end of the 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.* Monitoring of the tailings will be discontinued only after both cyanide concentrations and tailings moisture content are within acceptable limits, and only after the safety factor of embankment cross-section is determined to exceed 1.5. This safety factor is based on the soil strength gains over time due to compaction and the widened embankment footprint based on deposition of the coarse fraction of the tailings adjacent to the dam.
MWP/FWP	1. Breach embankment to allow communication between MWP and FWP (see Figure 2.1-1).
	2. Assess erosional/geotechnical stability of embankments, regrade or repair as required, and revegetate using native species per *Erosion Prevention and Control Plan*; monitor effectiveness of reseeding through the 2-year post-closure monitoring period in accordance with the *ESHS Monitoring Plan.* Continue to monitor embankment piezometer levels through the 2-year post-closure monitoring period, and then request GGMC permission to pull or abandon the piezometers.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
MWP/FWP	3. Continue to monitor downgradient monitoring well network, and any downstream sedimentation or treatment ponds to ensure continuing compliance with IFC effluent guidelines; monitor through the 2 year post-closure monitoring period in accordance with the *ESHS Monitoring Plan,* then request Guyana EPA permission to abandon monitoring wells.
	4. As soon as sampling data indicate consistent effluent quality below IFC guidelines, breach sedimentation/treatment ponds and revegetate exposed surfaces using native species per *Erosion Prevention and Control Plan*; monitor effectiveness of reseeding through the end of the 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
Fuel tanks	1. Just prior to end of mine life, cease replenishment of diesel fuel and lubricant stocks.
	2. Assess fuel/lubricant stock on hand vs. projected usage rate during closure period; draw down stock on hand, and replenish only as necessary to support closure activities and reduced power generation needs.
	3. Survey for hazardous materials and wastes and remove to safe/secure storage pending final disposal as required.
	4. Drain fuel tanks to tanker trucks and transport to Buckhall for resale; rinse tanks to lined evaporation pond (a dry season activity). Cut up rinsed tanks and associated piping systems, and dispose in an inert waste cell in final waste rock stockpile, or in underground mine adit and/or mine ventilation shaft.
	5. Demolish above-ground structures and concrete berms/walls, place inert rubble and metallic scrap in inert waste cell in waste rock stockpile or in underground mine adit or ventilation shafts; place topsoil over demolition area, regrade, and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Power plant	1. When onsite power is no longer needed, inspect generator sets for fuel/lubricant/coolant leaks, repair as required, transport to Buckhall and place into care and maintenance status pending resale.
	2. Survey power plant site for hazardous materials and wastes and remove to safe/secure storage pending final disposal as required.
	3. Demolish above-ground structures, pipelines, and concrete berms/walls, place inert rubble and metallic scrap in adit or ventilation shafts; place topsoil over demolition area, regrade, and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan*.
Mechanical shops/ warehouses	1. Continue to operate as necessary to support maintenance functions through closure period.
	2. At completion of closure period, survey for hazardous materials and wastes and remove to safe/secure storage pending final disposal as required.
	3. Demolish above-ground structures and concrete berms/walls, place inert rubble and metallic scrap in inert waste cell in final waste rock stockpile or underground mine adit or ventilation shafts; place topsoil over demolition area, regrade, and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period.
Aurora solid waste landfill	1. Cap and close onsite solid (non-hazardous) waste landfill and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan*.
	2. Test leachate water quality; if required, install bioreactor pond, monitor water quality for 2-year post-closure period in accordance with the *ESHS Monitoring Plan*, and breach and abandon pond when water quality goals have been achieved.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Hazardous waste storage facility	1. After collection of all residual hazardous waste at the end of mine life, remove intermodal containers of accumulated wastes to Georgetown and dispose in permitted hazardous waste landfill per *Waste Management Plan* requirements.
	2. Remove security fencing and gates from the former hazardous waste container laydown area, cut up as required, and dispose in inert waste cell in final waste rock stockpile or underground mine adit and/or ventilation shaft.
	3. Revegetate laydown area using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
Explosives magazine	1. Cease replenishment of explosives stocks as necessary to minimize onsite stocks remaining when underground mining operations cease.
	2. Return unused explosive materials to their respective vendors for credit.
	3. Remove security fencing and gates, cut up as required, and dispose in inert waste cell in final waste rock stockpile, or in underground mine adit and/or ventilation shaft.
	4. Demolish magazine to ground surface, place inert rubble in waste cell in final waste rock stockpile, adit or ventilation shafts; place topsoil over demolition area, regrade, and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period, in accordance with the *ESHS Monitoring Plan.*
Aurora man-camp	1. Survey for hazardous materials and wastes and remove to safe/secure storage as required, per the *Hazardous Materials Management Plan* or *Waste Management Plan,* as appropriate.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Aurora man-camp	2. Demolish all surface structures and above-ground concrete berms or walls; place inert rubble in mine adit or ventilation shafts. Leave concrete foundations in place; place topsoil over demolition area, regrade, and revegetate using native species per *Erosion Prevention and Control Plan*, monitor effectiveness of reseeding through a 2-year post-closure monitoring period in accordance with the *ESHS Monitoring Plan.*
	3. Dispose of scrap metal in inert waste cell in final waste rock stockpile, or the underground mine adit or ventilation shafts.
	4. Abandon (grout and cap) water supply wells and septic system.
Airstrip	1. Survey for hazardous materials and wastes and remove to safe/secure storage as required, per the *Hazardous Materials Management Plan* or *Waste Management Plan,* as appropriate*.*
	2. Turn ownership of the facility (and the road from the Aurora site to the end of the Barama Road) over to the Government of Guyana.
Tapir Crossing	1. Survey for hazardous materials and wastes and remove to safe/secure storage as required, per the *Hazardous Materials Management Plan* or *Waste Management Plan,* as appropriate*.*
	2. Transport the ferries to Buckhall pending resale.
	3. Turn ownership of support facilities over to the Government of Guyana.
Buckhall logistics support facility	1. Continue to operate at reduced staffing levels as necessary to support maintenance and environmental monitoring/inspection functions and equipment salvage/resale activity during closure period.
	2. When salvaged equipment and vehicles have been removed, survey for hazardous materials and wastes and remove to safe/secure storage or disposal as required, in accordance with *Hazardous Materials Management Plan* or *Waste Management Plan* requirements.

Project Component	Description of Decommissioning, Closure, and Post-closure Actions
Buckhall logistics support facility	3. Turn ownership of the Buckhall wharf, fuelling terminal, permitted solid (non-hazardous) waste landfill, and other support facilities over to the Government of Guyana.

Table 3.5-3 presents a conceptual schedule for the final decommissioning and closure actions anticipated for the Aurora Project at the end of its project mine life.

It should be noted that within the context of subsequent iterations of the MRCP and the final DMRCP, decommissioning and post closure planning will be designed to provide assurance that the closure goals have been met. Examples of environmental goals include continuing retention, re-establishment, or enhancement of topsoil on post closure landforms; protection and enhancement of biodiversity; maintenance or enhancement of water quality,; and, in dry seasons, management of airborne dust. Examples of socioeconomic or community relations goals typically include support for the development of small to medium-sized local enterprises, minimization of local unemployment rates, and provision of educational and health care resources. However, due to the remote location of the Project, the level of control GGI will have over site access, governmental policies discouraging illegal immigration and/or ASM, and the practice of preferential recruiting of the workforce from the urban center of the country (Georgetown), it is unlikely that any community of appreciable size will develop around the mine site over the period of mine operation. Were this to occur, however, GGI will consider the social impacts of mine closure on the local community and affected social groups, as it develops the final DMRCP.

4 ASM Site Considerations

Any significant ASM legacy issues encountered within the Aurora concession remaining from previous exploration or exploitation activities at the Aurora Project site (e.g., any areas with mercury, petroleum, or cyanide contamination; abandoned vehicles or equipment; unfilled test pits; improperly abandoned boreholes, or open workings; or remnants of access roads or constructed infrastructure) will be evaluated and prioritized for reclamation and closure, in conjunction with exploration activities or during the construction and operations phases, as appropriate to the situation. ASM-constructed roads and trails will be scarified and re-vegetated in accordance with the *Erosion Prevention and Control Plan.* Areas with a potential for erosion will be provided with surface water diversion or control structures and revegetated as needed for physical stabilization. Ponds or wetland areas created by legacy exploration activities maybe left in place where these are observed to have any potential wildlife habitat value.

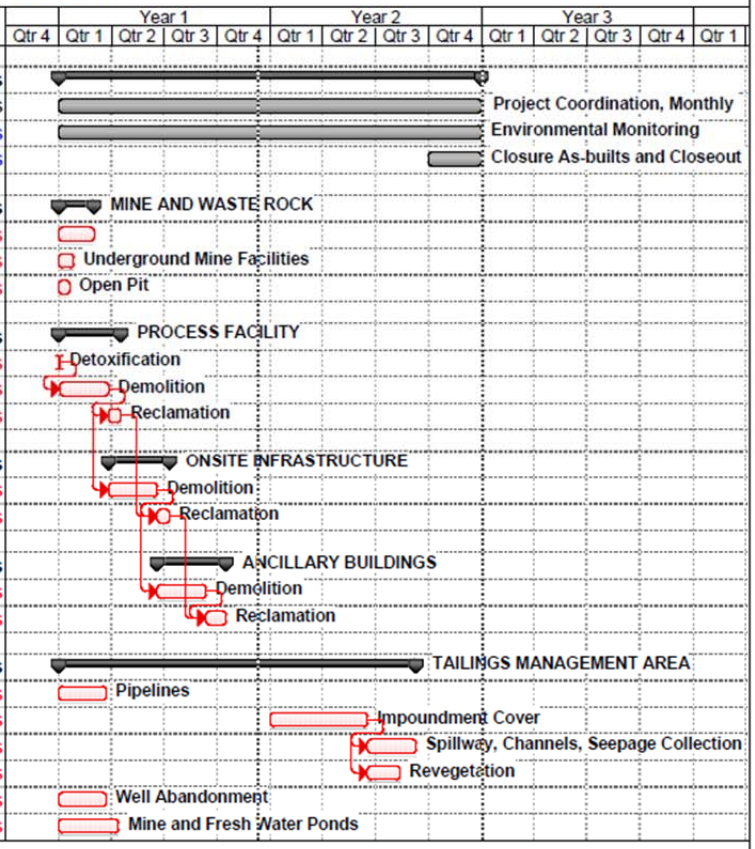
Table 3.5-3: Conceptual Schedule for Final Decommissioning, Closure, and Post-closure Actions

ENVIRON

Project Schedule
GGI / AURORA PROJECT
CONCEPTUAL CLOSURE

AJAX

ID	Task Name	Duration
1		
2	**PROJECT COORDINATION / MONITORING / REPORTS**	**522 days**
3	Project Coordination, Monthly Status Reports	522 days
4	Environmental Monitoring	522 days
5	Closure As-builts and Closeout Report	66 days
6		
7	**MINE AND WASTE ROCK**	**45 days**
8	Cuyuni River Dykes 1 and 2	45 days
9	Underground Mine Facilities	20 days
10	Open Pit	15 days
11		
12	**PROCESS FACILITY**	**77 days**
13	Detoxification	2 days
14	Demolition	60 days
15	Reclamation	15 days
16		
17	**ONSITE INFRASTRUCTURE**	**75 days**
18	Demolition	60 days
19	Reclamation	15 days
20		
21	**ANCILLARY BUILDINGS**	**85 days**
22	Demolition	60 days
23	Reclamation	25 days
24		
25	**TAILINGS MANAGEMENT AREA**	**441 days**
26	Pipelines	60 days
27	Impoundment Cover	120 days
28	Spillway, Channels, Seepage Collection	60 days
29	Revegetation	40 days
30	Well Abandonment	60 days
31	Mine and Fresh Water Ponds	75 days



Date: Sun 12/9/12

Task	Rolled Up Task	External Tasks	
Progress	Rolled Up Milestone ◇	Project Summary	
Milestone ◆	Rolled Up Progress	External Milestone ◆	
Summary	Split	Deadline ⇩	

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5 Retrenchment Considerations

5.1 Retrenchment of Project Workforce

Due to the finite nature of the ore deposits at the Aurora Project site, retrenchment of the Project workforce will likely be required at the end of mining operations; associated costs are reflected in the overall estimate of final closure costs.

The closure of the Project is expected to represent a significant socioeconomic impact to workers, their families, and their home communities, if the affected workers are left without employment options that will allow them to maintain reasonable levels of income and lifestyle. The most desirable outcome will be to move Project workers that wish to continue their employment to other jobs at other GGI mining operations. The potential for such re-employment is potentially substantial if demand and prices for gold remain high, and GGI continues to develop its concessions in Guyana. There is also potential beyond GGI operations if the mining industry continues to grow in Guyana.

The key steps in planning and managing retrenchment are:

- evaluating voluntary worker resignations during operations to understand why they are leaving (especially to determine what percentage are leaving to pursue other job opportunities) and developing and maintaining a database on alternative employment opportunities in Guyana based on voluntary resignations;

- prior to final closure, conducting an open consultation process with the workforce, responsible governmental officials, and other stakeholders; and

- developing and implementing a documented Retrenchment Plan (as part of an updated Project *Community Relations Management Plan*) that fairly represents the interests of all parties.

5.2 IFC Performance Standard and other BMP Considerations

The subject of retrenchment is addressed by IFC Performance Standard (PS) 2, “Labor and Working Conditions” (IFC, 2012). PS-2 requires a borrower to develop a Retrenchment Mitigation Plan to mitigate the adverse impacts of retrenchment on employees if it anticipates the elimination of a significant number of jobs or a layoff of a significant number of employees. The retrenchment mitigation considerations included in the *Community Relations Management Plan* will be designed to:

- help ensure legal compliance;
- be based on the principle of non-discrimination;
- reflect consultation with relevant stakeholders;
- maintain worker morale and productivity;

- guard against reputational risks to GGI;
- avoid misinformation about mine decommissioning and closure; and
- promote effectiveness in MRCP/DMRCP implementation.

5.3 National Requirements

The following are national requirements concerning termination of employees, according to the *Termination of Employment and Severance Pay Act* (Act No. 19 of 1997).

5.3.1 Grounds for Termination

A contract of employment for an unspecified period of time may be terminated:

- by mutual consent of the parties,
- by redundancy,
- for good and sufficient cause, or
- by notice given to or served upon the other party.

The following reasons do not constitute good or sufficient cause for termination:

- an employee's race, sex, religion, color, ethnic origin, national extraction, political opinion, family responsibilities, and/or marital status;
- age, subject to retirement law or agreement;
- pregnancy or reasons connected with pregnancy;
- certified sick leave; or
- compulsory military service.

5.3.2 Severance Payments

Severance must be paid when employees are terminated without just cause or made redundant. Workers are considered “redundant” when their termination is a direct result of the employer’s discontinuing all or part of the business (e.g., mine closure). During Project decommissioning, it may be expected that most terminations will be made for redundancy; employees are consequently entitled to severance payments.

5.3.3 Remedies in Case of Unjustified Dismissal

Although a grievance mechanism has been established (see the GGI Labour Grievance Procedure) to allow workers to lodge complaints directly to GGI (in the hopes of resolving the issue without legal action), legal complaints of unfair dismissal may be made to the High Court in Georgetown. Reinstatement can only be secured through union representation or arbitration award.

5.3.4 Selection Criteria

Although all employees will eventually be retrenched when the mine closes, there will likely be a staged draw-down of manpower during the closure process which will entail selecting both specific job categories and specific employees for retrenchment. The most important aspect of this process is creating selection criteria that are based on the principle of non-discrimination.

Non-Discrimination

When selecting criteria for the retrenchment of workers, attention should be paid to the impact of the criteria and the overall retrenchment process on defined groups. Particular attention should be paid to:

- gender;
- trade union membership;
- race or color;
- national origin or ethnicity;
- religion;
- disability; or
- age.

5.3.5 Community Impacts

In order to fully understand the potential impacts of retrenchment, the current ESIA considers the likely characteristics of the Project workforce and the communities represented. Issues to be considered in the ESIA include:

- the range and severity of retrenchment or closure impacts on local communities;
- impacts on vulnerable groups, including women, older workers, and migrant workers;
- the impact of a sudden and large injection of cash into the local community as a result of severance payments; and
- level of dependency of the community on social infrastructure and services provided by GGI.

5.3.6 Consultation

Consultation with stakeholders will be carried out throughout the design and implementation of the retrenchment process, and is considered critical to ensuring that GGI does not inadvertently breach any collective agreements or alienate workers and the community. Additionally, it is recognized that stakeholders can provide important insights and propose alternative ways for

carrying out the retrenchment process that may potentially help minimize the impacts on workers and the community.

Stakeholders

Determining which stakeholders to inform and consult will be the first step in the consultation process. Key stakeholders include workers, worker representatives, community leaders, and government authorities.

Content of Information Disclosed

Information to be disclosed to workers includes:

- number of workers and particular categories of workers to be dismissed,
- total number of workers and the number in each category,
- proposed timeframe for retrenchment,
- reason for the retrenchment,
- proposed severance package, and
- alternatives to retrenchment that have been considered.

Information to be made available to other stakeholders includes:

- timeframe for retrenchment,
- anticipated impacts of retrenchment on the community, and
- mitigation measures that GGI anticipates implementing to address the adverse socioeconomic effects of retrenchment on the local community.

5.3.7 Grievance Mechanism

GGI has established an effective and fair grievance procedure for the retrenchment process as part of the Project ESMS (see *ESMS Plan* Appendix A, “Labour Grievance Procedure”). Among its other features, the procedure is designed to:

- promote transparency and communication of all relevant information to workers, in writing and other culturally appropriate ways;

- allow all affected workers to initiate the grievance procedure;

- address grievances in a prompt manner; and

- deal with grievances in a fair and impartial way.

5.3.8 Severance Package

Under Guyanese law, severance or redundancy payments must be paid when employees are terminated without just cause or made redundant. Because Project workers will be made redundant, they are therefore entitled to a severance package. The minimum severance payments are:

- one week's wages per year for the first five years worked;
- two weeks wages for each of the second five years worked;
- three weeks wages for each year after the tenth year worked up to a maximum of 52 weeks

Therefore, any workers employed for more than 23 years are entitled to a full year's salary upon retrenchment. Industry BMP is to ensure that any outstanding payments (including payments for unused leave, wages or salary in arrears, and pension benefits) are received by the employee on his/her last day of work.

5.3.9 Assistance for Retrenched Workers

Besides severance payments and complying with national legal requirements, GGI will assist retrenched workers in a number of other ways as follows:

- If at all possible, GGI will try to re-employ retrenched workers in other jobs for which they are qualified.
- If employees are not retained and moved to another project, GGI may choose to mitigate the adverse effects of retrenchment by offering vocational, entrepreneurial, or skills training to improve employees' prospects in the local and regional job market. This requires not only an understanding of the job market workers face and the skills they possess, but an understanding of the types of training and assistance that the workers themselves want most. This information will be obtained through the stakeholder consultation process documented in the Project *Community Relations Management Plan.*
- If a severance is paid, GGI will provide access to financial counselling to help workers plan how best to spend or invest the payment.

6 Post-Closure and Relinquishment

For the purposes of this BFS, a nominal 2-year post-closure period was defined and is reflected in the initial closure cost estimate. In actual practice, the predicted length of the post-closure

monitoring period will be refined in periodic updates of the MRCP (and ultimately, the final DRMCP) as GGI gains experience with progressive closure and develops monitoring data that can be used to assess the effectiveness of selected reclamation, revegetation, and erosion prevention strategies. It is expected that these data will permit identification of the most successful reclamation, revegetation, and erosion prevention strategies that can be applied in final closure. The final DMRCP submitted to the Guyana EPA may also include additional negotiated post closure monitoring actions that supplement the actions proposed in Section 3.5. These actions will be designed to facilitate final relinquishment of the Aurora Gold Project property, and may include the inspection and monitoring requirements listed in the following paragraphs.

6.1 Post-Closure Inspection and Maintenance of Permanent Works

The maintenance of spillways, drains, settling ponds, and surface water diversion channels after closure will be performed as needed, as they can potentially become choked by debris and sediment after storm events. Embankments and other geotechnical structures for erosion control and stabilization will be inspected to detect erosional damage or potential movement under extreme events or from chronic disruptive forces (e.g., seasonal rains, Cuyuni River flooding).

6.2 Post-Closure Monitoring of Environmental Indicators

Closed facilities will be inspected and annual reports provided to evaluate the success of final reclamation for at least a nominal two-year period. Reclamation monitoring will be coordinated with the Guyana EPA as requested. Monitoring requirements may be will be modified to address final reclamation needs as the closure process proceeds.

6.2.1 Surface Waters and Groundwater

The existing monitoring programs for surface and groundwater may be continued in accordance with the Project *Water Management Plan* and *ESHS Monitoring Plan*.

6.2.2 Revegetation and Stabilization

Reclamation success will be evaluated both in terms of vegetation rebound and prevention of erosion, as note in the Project *Erosion Prevention and Control Plan.*

6.2.3 Fauna

The colonization of reclaimed areas by native fauna will be an important measure of success, as well as an element of the restoration process via the natural dispersal of seeds by vertebrates. Aquatic fauna may also be monitored in both natural and created water bodies, including bioassays, if warranted for the detection of bioaccumulation of metals. Representative species monitoring may be continued in accordance with the Project *Biodiversity Management Plan.*

7 Estimated Costs

A detailed, independently prepared preliminary estimate of the costs associated with the decommissioning, closure and post-closure activities described above is presented in Appendix A, and forms the basis for the estimate summarized in Table 7.0-1 The total cost estimate is **US $9,283,757**, based on best available information from the BFS and other appropriate Project sources as of the issue date of this document. Appendix A presents a cost summary, a detailed list of assumptions that is consistent with the general assumptions presented in Section 3.3, and additional assumptions related to personnel retrenchment costs, as discussed in Section 5.

Table 7.0-1: Estimated End of Mine Life Closure Costs

PROJECT TASK AREA	COST
PROJECT TASK AREA	**COST**
MINE AND WASTE ROCK	424,539
Cuyuni River Dike 1	161,985
Cuyuni River Dike 2	97,191
Underground Mine / Facilities	52,000
Open Pit	113,363
Waste Rock Stockpiles	0
PROCESS FACILITY	518,082
ONSITE INFRASTRUCTURE	464,762
Power Plant and Distribution	438,614
Onsite Roads	25,984
Services and Utilities	0
ANCILLARY BUILDINGS	1,381,862
Mine Buildings (Mechanical Shops and Warehouse)	196,110
Permanent Accommodations (Aurora Man Camp)	670,126
Other Facilities (Explosives Magazine, Hazardous Waste Facility, Fuel Farm)	511,928
Air Strip	0
TAILINGS	1,033,813
Tailings Management Area (TMA, Diversion Ponds 1 and 2, Tailings Pipeline, Reclaim Pipeline)	825,068
Fresh (Storm) Water Pond	0
Mine (Process) Water Pond	88,745
OFFSITE INFRASTRUCTURE	0
Access Road	0
Buckhall Port	0
Tapir Crossing	0
TOTAL PROJECTED DIRECT COSTS	**$3,823,058**

PROJECT TASK AREA	COST
INDIRECT COSTS	
Engineering / Design (5% of directs)	191,153
Contingency (15% of directs)	573,459
Unlisted Items (10% of directs)	382,306
Mobilization / Demobilization / Preparatory Work (10% of directs)	382,306
Construction Engineering / Construction Management	212,846
Monitoring and Maintenance (2 years)	478,514
Equipment Salvage	0
Retrenchment	3,201,885
Permitting (1% of directs)	38,231
TOTAL PROJECTED INDIRECT COSTS	**$5,460,700**
9,283757	**$9,283,757**

8 Financial Assurance

GGI will ensure the availability of all necessary funds, by appropriate financial surety or assurance instruments, to cover the estimated cost of closure at any stage in the mine life, including provisions for early or temporary closure. In addition, as the IFC "Environmental, Health, and Safety Guidelines for Mining" (IFC 2007) invokes the International Cyanide Management Code (ICMC) as a BMP, the selected financial assurance instrument must, at a minimum, be capable of fully funding the decommissioning of all cyanide facilities in accordance with Standard of Practice 5.2 of the ICMC, assuming third-party costs. Cyanide facilities are defined as "storage, production, waste management or regeneration units for managing cyanide or cyanide-containing process solution," or "a pollution control device, equipment or installation used to prevent, control or minimize the risk of a cyanide release." The ICMC further defines "process solution" as any solution > 0.5 mg/L WAD cyanide. This means that the financial assurance instrument must provide a credible source of funding for third-party decommissioning and closure of at least the following facilities:

- cyanide mixing facility, storage tank, and associated secondary containments;
- leaching facilities, including CIL tanks, containments, pumps and piping system components, and any associated emergency ponds;
- carbon washing, stripping, and handling facilities;
- cyanide detoxification plant (INCO/air plant);
- tailings pipeline and containment trench;

- the TMA and its seepage collection/return and reclaim water pumpback systems;
- most milling equipment in areas where tailings reclaim water is used, with associated reclaim water pumps and pipelines; and
- TMA diversion ponds 1 and 2, and any other surface water diversion structures that protect the aforementioned facilities from run-on .

Guyanese mining regulations also required GGI to lodge an Environmental Bond in favor of the GGMC, for an amount to be determined by the GGMC Commissioner.

Pursuant to (IFC, 2007) requirements, funding for these purposes may be provided by either a cash accrual system or a financial guarantee provided by a reputable financial institution. The two acceptable cash accrual systems are fully funded escrow accounts (including government managed arrangements) or sinking funds. GGI will select an appropriate mechanism that is consistent with these options. Mine reclamation and closure cost estimates will be reviewed annually, in keeping with (IFC, 2007) guidance, and the closure funding arrangements adjusted to reflect any changes.

9 References

General References:

ENVIRON, 2010; *Conceptual Mine Reclamation and Closure Plan – Aurora Project* (ENVIRON, 2010); ENVIRON International Corp, Seattle Washington/Washington DC, November 2010.

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EHSGuidelines2007_Mining/$FILE/Final+-+Mining.pdf ; World Bank Group/International Finance Corporation, Washington, DC. 2007.

IFC, 2011a; Performance Standard 1, "Assessment and Management of Environmental and Social Risks and Impacts", Version January 1, 2012; accessed online at http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/pol_PerformanceStandards2006_full/$FILE/IFC+Performance+Standards.pdf ; World Bank Group/International Finance Corporation, Washington, DC. 2011.

IFC, 2011b; Performance Standard 2, "Labor and Working Conditions", Version January 1, 2012; accessed online at http://www.ifc.org/ ifcext/sustainability.nsf/AttachmentsByTitle/pol_PerformanceStandards2006_full/$FILE/IFC+Performance+Standards.pdf ; World Bank Group/International Finance Corporation, Washington, DC. 2011.

TetraTech *et al*, 2013 (work in progress); *Guyana Goldfields Inc. Aurora Gold Project Feasibility Study Update Report*; TetraTech, Inc., Golden, Colorado, January 2013.

GGI ESMS References:

- *ESMS Plan*
- *Biodiversity Management Plan*
- *Exploration Management Plan*
- *Construction Management Plan (Early Works)*
- *Construction Management Plan – Major Construction*
- *Erosion Prevention and Control Plan*
- GG-36, "Lockout/Tag-out Requirements"
- GG-37, "Control of Erosion and Sedimentation"
- GGI "Labour Grievance Procedure"

Appendix A

Closure Cost Document
for Conceptual Mine Reclamation and Closure Plan
Aurora Mine Site, Guyana
(Ajax. Ltd., December 2012)

CLOSURE COST

For Conceptual Mine Reclamation and Closure Plan,
Aurora Mine Site, Guyana

February 2013

Prepared for
ENVIRON
901 5TH Street, Suite 2820
Seattle, Washington 98164

Prepared by
AJAX LTD
28828 Cedar Circle
Evergreen, Colorado 80439

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SUMMARY PROJECT OVERVIEW

Guyana Goldfields Inc. (GGI) proposes to develop the Aurora Gold Project in northwest Guyana. GGI will be extracting the ore by open pit methods followed by underground mining, and will use cyanide-based processes for the extraction of mineral from crushed and milled run-of-mine ore. At completion, the project will have developed an open pit, underground mine workings, six waste rock/overburden stockpiles, a Tailings Management Area (TMA), several process and fresh water collection ponds and diversion structures, and related support facilities. The latter will include a power plant, an open-air (process) plant site, office and maintenance facilities, haul roads, and an airstrip, a fuel storage area, mechanical shops, explosives storage, a 400-500 -person man-camp, and other infrastructure. Total disturbance associated with the Aurora mine areas including the support facilities will be approximately 620 hectares. Two other smaller logistics support areas will be separately located at Tapir Crossing (on the Cuyuni River) and Buckhall (on the Essequibo River).

The following is a brief description of the major aspects and components of the GGI operations for mining, milling, and reclamation:

MINING: At full production, the Aurora operation will produce approximately 5,000,000 ounces of gold over a 20-year period. Ore will be initially mined by open pit techniques, such as the drill and blast method that uses traditional loading and truck hauling of ore to the processing facilities. The open pits will be accessed by roads that slope from the surface into the mineralized zones at the bottom of the pits. As part of mining, topsoil, waste (non-ore) rock and overburden will be removed to gain access to the ore; as the pit deepens, waste rock will be hauled to the surface placed in one of six sequentially developed surface stockpiles. Mining will proceed underground once the open pit mine plan is complete. Ore and waste rock hauling will proceed in a similar manner to the processing facilities and to the Waste Rock Stockpiles, respectively.

MILLING: Ore will be brought to the surface for milling and gold extraction. Run-of-mine ore will be transported form the open pit and underground workings and taken directly to the plant site for processing. Tailings from the cyanide-based ore processing will be piped by gravity to the TMA. Much of the water to be used in the milling process will be recovered from the TMA decant pond and re-cycled in an effort to conserve water and maximize recovery.

ANCILLARY AND SUPPORT FACILITIES: A variety of ancillary and support facilities will be needed for the Aurora Project; these include the following:

- Power Generation Plant
- Metallurgical Laboratory
- Man-camp, Administrative Offices, Workshops, Warehouses, Mechanical Shops
- Security barriers and Guard Houses
- Airstrip
- Wastewater Treatment Plant and
- Solid Waste Landfill
- Explosives Storage Facility
- River Dyke(s)

EMPLOYMENT: Final reclamation and closure activities including plant decommissioning, mine closure, and revegetation procedures will require a local labor force of up to 250 in the operational and later phases

PROJECT DURATION: According to the Mine Reclamation and Closure Plan (MRCP) (ENVIRON, 2012a), "… reclamation and closure activities are intended to ensure the return to the approximate pre-mining conditions of the site." The Aurora mining operation has a projected life of approximately 20 years. The anticipated project life may be expanded as exploration continues, and if additional gold reserves are delineated.

CLOSURE: Reclamation is an integral and progressive component of mining and milling activities. As part of construction activities, GGI will continue to remove and stockpile topsoil and mulch material as potential growth medium, where available, as well as implement interim stabilization and revegetation programs, most specifically for the waste rock stockpiles. At the time of final and permanent mine closure, the following reclamation steps will occur:

- Open Pit reclamation
- Waste Rock Stockpile (1) reclamation
- Underground Facilities reclamation
- Decommissioning of Plant, Power, Camp Sites, and reclamation
- TMA reclamation
- Mine (Process) Water Pond reclamation
- Storm Water Pond/Diversions reclamation
- Construction of site wide drainage and sediment control structures
- Haul and Access Roads reclamation
- Permanent Revegetation
- Well Abandonment

Certain reclamation and closure activities will be using GGI resources and others by third-party specialty contractors (GGI 2012a). Some facilities and infrastructure will be left in place for future use at the Government's request. The cyanide processing facilities or components thereof will require specialized detoxification and disposal considerations during closure.

At the conclusion of the closure process, no buildings or supporting infrastructure or facilities will remain at the site, except for those that may specifically be agreed upon (e.g., Airstrip and supporting infrastructure including permanent mine buildings, wharf structures, wastewater treatment plant) with Guyanese authorities and local communities or social groups. Modified land (e.g., water management areas, waste rock stockpiles, borrow areas) will be managed to promote the approximation of original ecosystems while simultaneously preserving the physical and chemical integrity of the site.

1.0 CLOSURE COST ESTIMATE

1.1 INTRODUCTION

The purpose of this closure cost section is to develop a cost estimate for both an independent third-party contractor and for mine resources to complete final site reclamation in the unlikely event that mining and milling operations cease and the operator is unable to fulfill reclamation obligations. The closure cost estimate presented in this section is based on the planned project decommissioning and the final reclamation procedures presented in the MRCP.

The non-cyanide related disturbance includes the following facilities and areas:

• Open Pit	149 hectares	WBS Code 8100[1]
• SAP Stockpile (1)	14 hectares	WBS Code 8100
• Waste Rock Stockpiles (5)	111 hectares	WBS Code 8100
• Underground Facilities	6 hectares	WBS Code 8100
• Plant, Power, Camp Sites	25 hectares	WBS Codes 8300, 8410, 8500
• TMA	218 hectares	WBS Code 8610
• Mine (Process) Water Pond	29 hectares	WBS Code 8640
• Storm Water Pond/Diversions	68 hectares	WBS Code 8630
TOTAL	620 hectares	

TMA and Waste Rock reclamation will generally include limited regrading, covering with a 4-inch growth medium cap, revegetation with native species, and/or construction of storm water diversions. Demolition of structures will include building, equipment, piping, scrap, reagent, and hazardous material removal. Open pit reclamation shall be restricted to public safety and pit wall stability protection (berms, signs) and some cover and revegetation at the perimeter. Underground mine reclamation shall include sealing of the ventilation shaft and main portal. Drill holes and some monitoring installations shall be plugged and sealed.

Presented in Appendix A is documentation regarding the calculation of the costs of closure for the Aurora Mine Site. A series of tables are included to provide the necessary detail to present the closure requirements and associated direct costs, organized by the primary areas of the site (WBS Codes) requiring closure. All costs, including labor and equipment and material unit rates, are based on the most current reference information and cost indices available. Each detailed cost sheet, presented for each primary area, provides a list of assumptions and the major tasks associated with the reclamation of the specific area, and material quantities, production rates, and unit cost information is provided in the tables.

[1] Work Breakdown Structure (WBS) codes were specified by GGI's Bankable Feasibility Study (BFS) consultant.

The following reclamation cost estimate reflects the estimated cost to reclaim approximately 620 hectares.

1.2 CLOSURE COST SUMMARY

WBS Code[1]	PROJECT TASK AREA		COST
8100	MINE AND WASTE ROCK	$	424,539
	Cuyuni River Dike 1	$	161,985
	Cuyuni River Dike 2	$	97,191
	Underground Mine / Facilities	$	52,000
	Open Pit	$	113,363
	Waste Rock Stockpiles	$	-
8300	PROCESS FACILITY	$	518,082
8400	ONSITE INFRASTRUCTURE	$	464,762
8410	Power Plant and Distribution	$	438,614
8420	Onsite Roads	$	25,984
8430	Services and Utilities	$	-
8500	ANCILLARY BUILDINGS	$	1,381,862
8520	Mine Buildings (Mechanical Shops and Warehouse)	$	196,110
8530	Permanent Accommodations (Aurora Man Camp)	$	670,126
8540	Other Facilities (Explosives Magazine, Hazardous Waste Facility, Fuel Farm)	$	511,928
8580	Air Strip	$	-
8600	TAILINGS	$	1,033,813
8610	Tailings Management Area (TMA, Diversion Ponds 1 and 2, Tailings Pipeline, Reclaim Pipeline)	$	825,068
8630	Fresh (Storm) Water Pond	$	-
8640	Mine (Process) Water Pond	$	88,745
8700	OFFSITE INFRASTRUCTURE	$	-
8710	Access Road	$	-
8720	Buckhall Port	$	-
8730	Tapir Crossing	$	-
	TOTAL PROJECTED DIRECT COSTS	$	3,823,058
	INDIRECT COSTS		
	Engineering / Design (5% of directs)	$	191,153
	Contingency (15% of directs)	$	573,459
	Unlisted Items (10% of directs)	$	382,306
	Mobilization / Demobilization / Preparatory Work (10% of directs)	$	382,306
	Construction Engineering / Construction Management	$	212,846
	Monitoring and Maintenance (2 years)	$	478,514
	Retrenchment	$	3,201,885
	Permitting (1% of directs)	$	38,231
	TOTAL PROJECTED INDIRECT COSTS	$	5,460,700
	TOTAL PROJECTED PROJECT COSTS	$	9,283,757

1.3 GENERAL METHODOLOGIES AND ASSUMPTIONS

The following methods and assumptions were considered in completing the reclamation calculations necessary to estimate total reclamation costs for the Aurora Mine Site:

- The maximum disturbance configuration as shown on Drawing No. N0102, Closure Plan (Tetra Tech 2012a), was used to calculate volumes and costs.

- Per GGI (2012a), land will be returned to the approximate pre-mining condition.

- Per GGI (2012a), major facilities will be "designed and constructed for closure." As such, side slopes, containment dams, and other features will be constructed with final grades proven to be stable in the long term (TMA dam slopes will be 3H:1V), thereby requiring no significant regrading upon cessation of mining operations.

- Per GGI (2012a), waste rock will not have acid generation potential. Per ENVIRON (2012e), all waste rock stockpiles will have been reclaimed prior to cessation of mining operations. Costs for their closure have therefore been excluded from this estimate.

- Per GGI (2012a), there will be no lighting at the TMA.

- Per GGI (2012a), the tailings material in the TMA will be neutral and non- acid generating (NAG).

- Per GGI (2012a), there will be a requirement during closure to regrade and revegetate haul roads.

- Per GGI (2012a), there will be underdrains designed for the Mine Water Pond which may require removal and closure, costs for which have not been included in light of preliminary design status.

- Per GGI (2012a), Indirect Cost percentages have been established as 5% for Engineering Design and 15% for Contingency. Construction engineering oversight is included as a burdened labor rate over the period of construction (assumed to be 2 years).

- Equipment requirements were determined using the expected reclamation areas/volumes and productivity estimates developed using standard methods presented in the Caterpillar Performance Handbook, Edition 39 (Caterpillar, 2009).

- Equipment, labor, and other costs have been calculated using published references where available. Heavy Construction Cost Data 2012, published by R.S. Means (RS Means, 2012), was the primary cost reference. Hourly labor costs are based on current Guyanese wage rates, obtained from GGI (2012b). The objective in developing specific cost data has been to identify unit costs which are representative of those which would be incurred for final reclamation, given site conditions.

- Required reclamation functions were identified based on the nature and extent of disturbance, and reclamation commitments included in the MRCP.

- Decommissioning is defined as those activities requiring decontamination of equipment and structures (mill, CIL and detox circuits, tailings thickener, tailings delivery pipeline, mill reclaim

pipeline), removal of residual cyanide reagents, and rinsing of mineralized material. As such, costs have been based on a 3-week total decommissioning period (GGI 2012a).

- The only activities assumed to be undertaken by third-party specialty contractors includes demolition and disposal. Following structure demolition, building slabs will remain in place and covered with 4-inches of growth medium and revegetated (GGI 2012a). Third party activities shall include the minimum items addressed under Standard of Practice 5.2 of the ICMC (http://www.cyanidecode.org/pdf/RevisedAuditorGuidance.pdf , page 53).

- According to the MRCP, facilities to be turned over to the government for include the Tapir Crossing site (WBS Code 8730), Buckhall site facilities (WBS Code 8720), the Aurora airstrip (WBS Code 8580) and some support buildings (WBS Code 8520), main access roads from Aurora Mine Site to Tapir Crossing and from Tapir Crossing to the end of the Barama Road (WBS Code 8710).

- Surplus mining equipment from the open pit operation will be resold after Year 5; cost estimates for resale have not been included.

- The Aurora solid waste landfill will be closed upon cessation of mining and milling operations. However, it has been assumed that the solid waste landfill at the Buckhall site will be turned over to the government. Further, disposal of accumulated hazardous waste will be hauled to a future permitted facility near Georgetown reportedly to be constructed and operated by the local government.

- Effective drainage will be reestablished at the conclusion of operations. Drainage reestablishment will involve grading to establish a suitable channel, slope reduction, and establishment of transitional slopes to tie into the existing natural channel.

- Growth medium quantities were determined using disturbed area acreage and replacement depth of 4-inches (GGI 2012a) over all disturbed areas except the Waste Rock Stockpiles and the SAP Stockpile assumed to be already reclaimed during ongoing mine operations (GGI 2012a and ENVIRON 2012e). The proposed cover material is reportedly clay based with little or no granular component. An average haul distance of 1,000 meters was assumed.

- Equipment productivities for each specific function were determined using standard references and representative grades and haulage distances. All productivity calculations for various equipment units are included in the individual cost detail calculations.

- The tailing delivery pipeline (TDL) and reclaim pipeline will reportedly be designed for placement in the same HDPE lined ditch. As such, closure activities will include removal of the pipelines and liner, and regrading and revegetation of the ditch.

- Per Tetra Tech (2012c), the following construction unit rate costs have been provided:
  - Fill placement: \$5/m^3 (includes short hauls (<1km) of many different material types and includes fine grading).

- Excavation: $3/m^3 (for structures like channels, etc.). Assumed to also be pertinent for pipeline/liner removal.
- Riprap Placement: $40/m^3 (includes generation and placement of several rock sizes).

- Post closure monitoring costs are provided for a 2-year period (GGI 2012a).

1.4 LABOR RATES

The manpower costs have been calculated on rates stipulated in the labor rates provided by GGI (2012b).

Maintenance General Foreman (supervision):
Total Wage = $14.76/hr

Mining Engineer (general):
Total Wage = $12.11/hr

Equipment Operator (general):
Total Wage = $9.21/hr

Driller (rotary rig for well abandonment):
Total Wage = $9.21/hr

Truck Driver (general):
Total Wage = $9.21/hr

Mechanic (heavy equipment-Open Pit):
Total Wage = $9.21/hr

Equipment Operator (heavy equipment-Open Pit):
Total Wage = $9.21/hr

Miner 1 (general):
Total Wage = $9.10/hr

Electrician (general):
Total Wage = $7.55/hr

Environmental Technician (post-closure monitoring):
Total Wage = $7.24/hr

General Laborer (general):
Total Wage = $5.29/hr

1.5 EQUIPMENT RATES

The following equipment has been estimated for use in reclamation at the Aurora project. Total hourly equipment costs have been obtained from the Caterpillar Performance Handbook (Caterpillar 2009).

Equipment	**Total Hourly Cost (US$)**
Caterpillar 966 F Front End Loader	= 86.00

Caterpillar D8R Bulldozer	= 143.75
Caterpillar D6 Bulldozer	= 39.00
Caterpillar 436 Series II Backhoe/Loader	= 17.88
Caterpillar 14H Motor Grader	= 95.25
Caterpillar Water Truck (5,000 gal)	= 76.25
Caterpillar 330B Excavator	= 91.00
Volvo Dump Truck (10 m^3)	= 171.00
Disc (pulled by John Deere 2755 Tractor)	= 10.00

Note: Total hourly costs for John Deere 2755 tractor is $10.02; add $10.00/hr for various farm attachments including tooth harrow and seed broadcaster. Unit rates are fueled but not operated.

1.6 MATERIAL COSTS

As part of the reclamation work, it can be expected that various materials will be required; these materials will include seed [native grasses only (GGI 2012a)]) and fertilizer, bagged concrete and bentonite, grout for drill hole plugging, and pipe for pump back systems. The costs for materials are included as part of the sections and not itemized here. Unless otherwise noted, material and supply prices were conservatively estimated based on costs associated with previous mine closure projects in the western USA.

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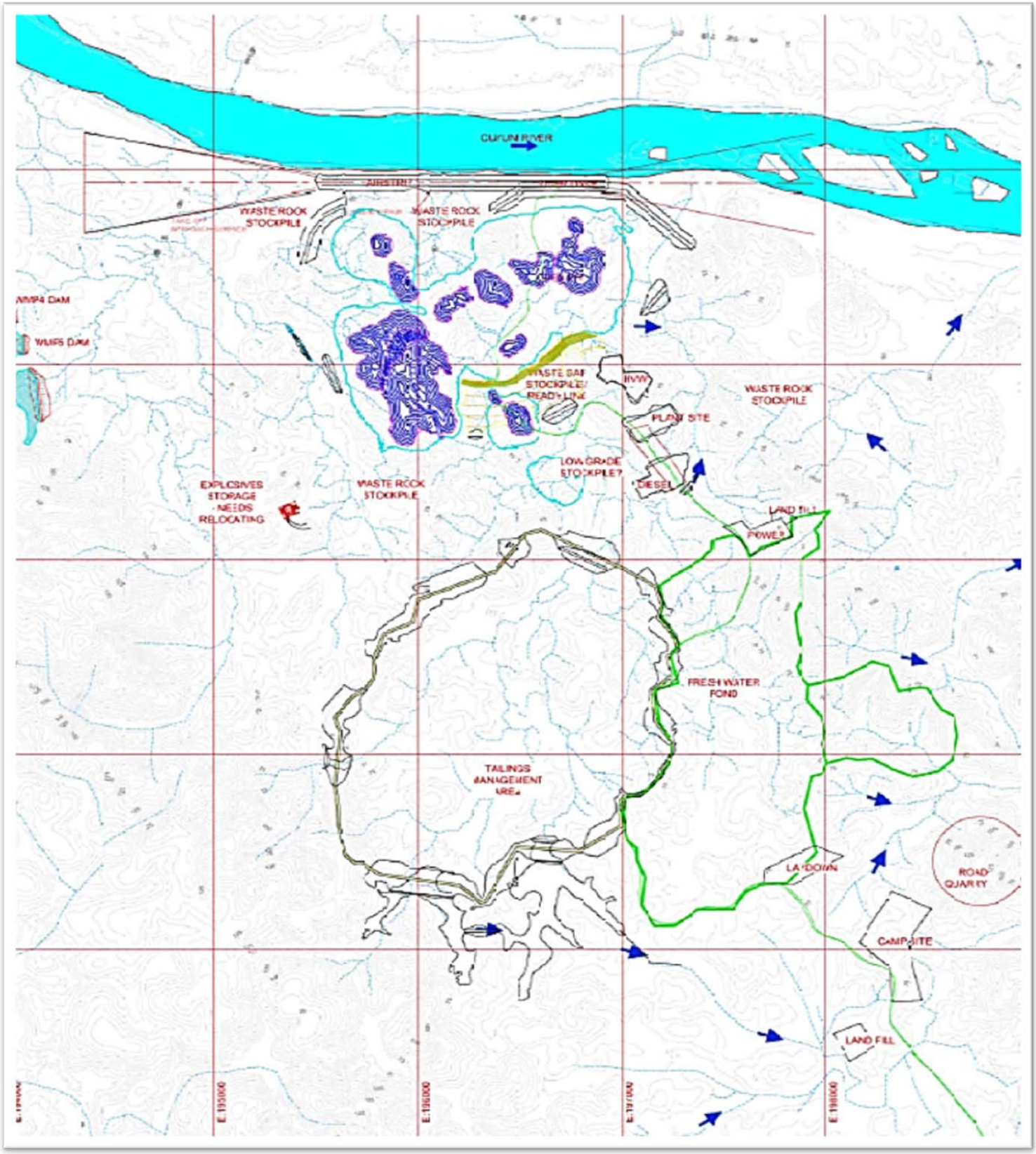
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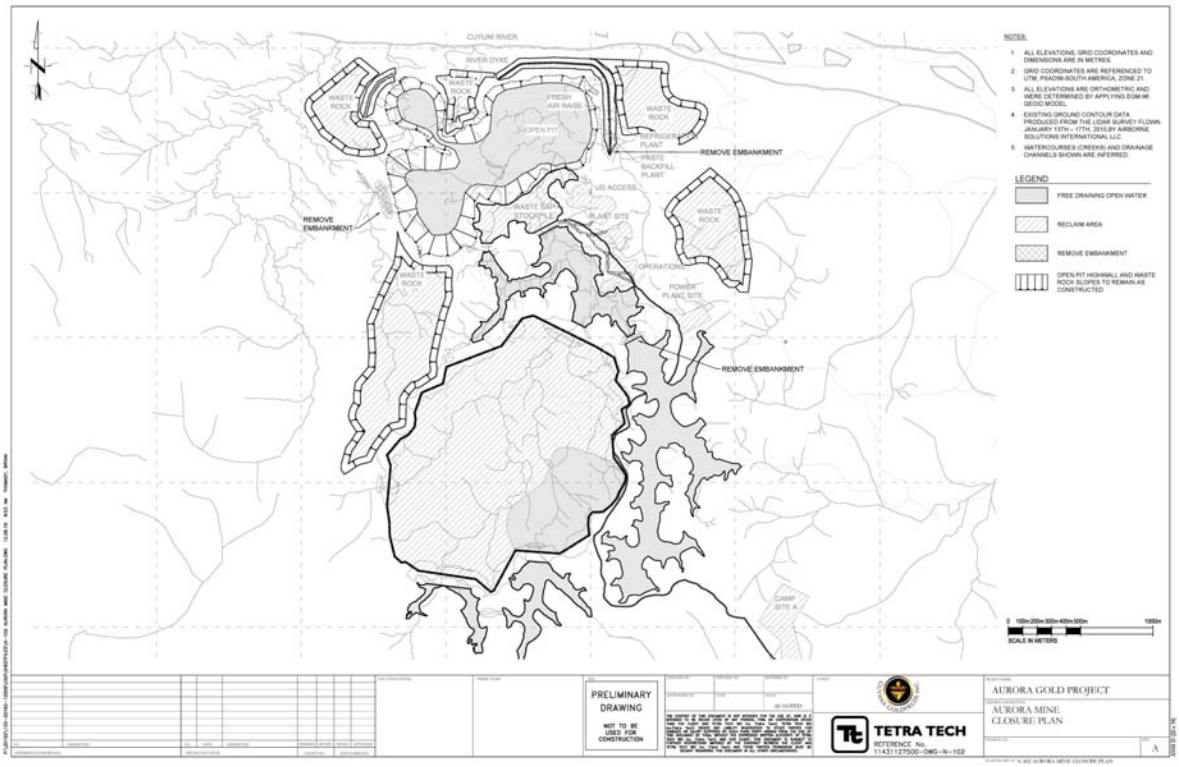
Tetra Tech, 2012b, Site Infrastructure Capital Costs, Aurora Gold Project, Guyana: Golden, Colorado, USA. August.

Tetra Tech, 2012c, Personal or electronic communication. October.

Guyana Goldfields, Inc.
Aurora Gold Project
Guyana Goldfields, Inc.
Guyana Goldfields, Inc.
Guyana Goldfields, Inc.
Guyana Goldfields, Inc.
Guyana Goldfields, Inc.
Guyana Goldfields, Inc.

Owner:	Guyana Goldfields, Inc.
Location:	Aurora Gold Project
Project:	Conceptual Closure Cost Model
Prepared by:	ENVIRON
Prepared by:	AJAX
Date:	7/30/2013


CUFUN RIVER
WASTE ROCK STOCKPILE
WASTE ROCK STOCKPILE
WMP4 DAM
WMP5 DAM
WASTE ROCK STOCKPILE
PLANT SITE
LOW GRADE STOCKPILE?
DIESEL
EXPLOSIVES STORAGE - NEEDS RELOCATING
WASTE ROCK STOCKPILE
POWER
FRESH WATER POND
TAILINGS MANAGEMENT ARE
LAYDOWN
ROAD QUARRY
CAMP SITE
LAND FILL
E 195000
E 196000
E 197000
E 198000



PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION

AS NOTED

TETRA TECH
REFERENCE No.
1143112750O-DWG-N-102

AURORA GOLD PROJECT

AURORA MINE
CLOSURE PLAN

A

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TABLE 1.1
PROJECT TASKS & ASSUMPTIONS

WBS CODE	DESCRIPTION	ASSUMPTIONS
N/A	**GENERAL ASSUMPTIONS**	
		(1) Maximum disturbance configuration as shown on Drawing No. N0102, Closure Plan was used to calculate volumes and costs.
		(2) Post-closure land use is to return the site to its pre-project state.
		(3) Major waste facilities (waste rock, tailings, dams, channels, etc.) will be "designed and constructed for closure."
		(4) There will only be a requirement during closure to regrade and revegetate haul roads.
		(5) Construction oversight is included as a burdened labor rate over the period of construction.
		(6) Equipment requirements were determined using the expected reclamation areas/volumes and productivity estimates developed using standard methods presented in the Caterpillar Performance Handbook, Edition 39 (Caterpillar, 2009).
		(7) Required reclamation functions were identified based on the nature and extent of disturbance and reclamation commitments included in the Mine Reclamation and Closure Plan (Environ, 2012).
		(8) Decommissioning costs (those activities requiring decontamination of equipment and structures - mill, CIL and detox circuits, tailings thickener, tailings delivery pipeline, mill reclaim pipeline; removal of residual cyanide reagents; rinsing of mineralize material) are included per ICMC 5.1.
		(9) Following structure demolition, building slabs will remain in place and will be covered with 4 inches of growth medium and revegetated.
8100	**MINE AND WASTE ROCK**	
	Cuyuni River Dike 1	
	Cuyuni River Dike 2	
	Diversion Embankment	
	Underground Mine / Facilities	
	Open Pit	
	Waste Rock Stockpiles	
		(1) Waste rock will not have acid generation potential.
	Waste SAP Stockpile	
8300	**PROCESS FACILITY**	
	Mill / Process Plant	
8400	**ONSITE INFRASTRUCTURE**	
8410	**Power Plant and Distribution**	
8420	**Onsite Roads**	
8430	**Services and Utilities**	
8500	**ANCILLARY BUILDINGS**	
8520	**Mine Buildings**	
8530	**Permanent Accommodations (Worker Camp)**	
8540	**Other Facilities**	
8580	**Air Strip**	
8600	**TAILINGS**	
8610	**Tailings Management Area (TMA)**	
		(1) There will be no lighting at the TMA.
		(2) The tailings material in the TMA will be neutral and not acid generating.
8630	**Fresh (Storm) Water Pond**	
8640	**Mine (Process) Water Pond**	
		(1) There will be underdrains designed for the Mine Water Pond which require removal and closure.
8650	**Emergency Discharge Pond**	
8700	**OFF-SITE INFRASTRUCTURE**	
8710	**Access Road**	
8720	**Buckhall Port**	
8730	**Tapir Crossing**	

(1) From Tetra Tech email, August 21, 2012, *114311275: Coordination of environmental and closure for the Aurora Gold Project*
(2) From *Conceptual Mine Reclamation and Closure Plan* , ENVIRON International Corporation, November 2010

TABLE 1.2
CLOSURE COSTS BY PROJECT AREA

WBS Code[1]	PROJECT TASK AREA		COST
8100	**MINE AND WASTE ROCK**	**$**	**424,539**
	Cuyuni River Dike 1	$	161,985
	Cuyuni River Dike 2	$	97,191
	Underground Mine / Facilities	$	52,000
	Open Pit	$	113,363
	Waste Rock Stockpiles	$	-
8300	**PROCESS FACILITY**	**$**	**518,082**
8400	**ONSITE INFRASTRUCTURE**	**$**	**464,762**
8410	**Power Plant and Distribution**	$	438,614
8420	**Onsite Roads**	$	25,984
8430	**Services and Utilities**	$	-
8500	**ANCILLARY BUILDINGS**	**$**	**1,381,862**
8520	**Mine Buildings (Mechanical Shops and Warehouse)**	$	196,110
8530	**Permanent Accommodations (Aurora Man Camp)**	$	670,126
8540	**Other Facilities (Explosives Magazine, Hazardous Waste Facility, Fuel Farm)**	$	511,928
8580	**Air Strip**	$	-
8600	**TAILINGS**	**$**	**1,033,813**
8610	**Tailings Management Area (TMA, Diversion Ponds 1 and 2, Tailings Pipeline, Reclaim Pipeline)**	$	825,068
8630	**Fresh (Storm) Water Pond**	$	-
8640	**Mine (Process) Water Pond**	$	88,745
8700	**OFFSITE INFRASTRUCTURE**	**$**	**-**
8710	**Access Road**	$	-
8720	**Buckhall Port**	$	-
8730	**Tapir Crossing**	$	-
	TOTAL PROJECTED DIRECT COSTS	**$**	**3,823,058**
	INDIRECT COSTS		
	Engineering / Design (5% of directs)	$	191,153
	Contingency (15% of directs)	$	573,459
	Unlisted Items (10% of directs)	$	382,306
	Mobilization / Demobilization / Preparatory Work (10% of directs)	$	382,306
	Construction Engineering / Construction Management	$	212,846
	Monitoring and Maintenance (2 years)	$	478,514
	Retrenchment	$	3,201,885
	Permitting (1% of directs)	$	38,231
	TOTAL PROJECTED INDIRECT COSTS	$	5,460,700
	TOTAL PROJECTED PROJECT COSTS	**$**	**9,283,757**

Assumptions:

(1) Assume Construction Engineering/Construction Management consists of Maintenance General Foreman, Mining Engineer, Environmental Technici

(2) Assume Water Quality Monitoring consists of one (1) Environmental Technician for 40 hrs/week, 52 weeks/yr, 2 years for sitewide monitoring and m

TABLE 2.1
LABOR RATES[(1)]

TYPE OF EQUIPMENT	TOTAL HOURLY RATE	
Maintenance General Foreman (supervision)	$	14.76
Mining Engineer (general)	$	12.11
Equipment Operator (general)	$	9.21
Driller (rotary rig for well abandonment)	$	9.21
Truck Driver (general)	$	9.21
Mechanic (heavy equipment - open pit)	$	9.21
Equipment Operator (heavy equipment - open pit)	$	9.21
Miner 1 (general)	$	9.10
Electrician (general)	$	7.55
Environmental Technician (post-closure monitoring)	$	7.24
General Laborer (general)	$	5.29

Assumptions:

(1) Manpower rates stipulated in the labor rates provided by Guyana Gold, Inc. (2012b).

TABLE 2.2
EQUIPMENT RATES

TYPE OF EQUIPMENT	TOTAL HOURLY RATE	
Caterpillar 966F Front End Loader	$	86.00
Caterpillar D8R Bulldozer	$	143.75
Caterpillar D6 Bulldozer	$	39.00
Caterpillar 436 Series II Backhoe/Loader	$	17.88
Caterpillar 14H Motor Grader	$	95.25
Caterpillar Water Truck (5,000 gallons)	$	76.25
Caterpillar 330B Excavator	$	91.00
Volvo Dump Truck (10 m^3)	$	171.00
1/2-ton Pickup Truck	$	9.00
Disc (pulled by John Deere 2755 Tractor)	$	10.00

(1) Total hourly equipment costs (fueled, not operated) have been obtained from the Caterpillar.

TABLE 2.3
CONSTRUCTION UNIT RATES

TYPE OF EQUIPMENT	UNIT	RATE
Fill Placement[2]	m^3	$ 5.00
Excavation[3]	m^3	$ 3.00
Riprap Placement[4]	m^3	$ 40.00
Demolition[5]	m^2	$ 6.75

(1) (2,3,4) Provided by Tetra Tech, 2012c.
(2) Includes short hauls (<1km) of many different material types. Includes fine grading.
(3) For hydraulic structures (channels, spillways, etc.).
(4) Includes generation and placement of several different rock sizes.
(5) All-inclusive demolition of steel, concrete, office materials, etc. Unit rate from Colorado hard rock mine closure cost estimate, 2012.

TABLE 3.1
8100 MINE AND WASTE ROCK

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
CUYUNI RIVER DYKE 1 (west)						
1	Excavation	Remove designated sections	52,200	m^3	$3.00	$156,600
2	Revegetation	Revegetate footprint	10,600	m^2	$0.51	$5,385
CUYUNI RIVER DYKE 2 (east)						
1	Excavation	Remove designated sections	31,320	m^3	$3.00	$93,960
2	Revegetation	Revegetate footprint	6,360	m^2	$0.51	$3,231
UNDERGROUND MINE / FACILITIES						
1	Full plug	Seal ventilation shaft (1), portal (1)	2	ea.	$25,000	$50,000
2	Security	Install signage and security measures	10	ea.	$200.00	$2,000
OPEN PIT						
1	Growth Media	Open Pit, Impacted Areas - 4-inches	11,048	m^2	$5.00	$55,240
2	Revegetation	Open Pit, Impacted Areas	110,479	m^2	$0.51	$56,123
3	Security	Install signage	10	ea.	$200.00	$2,000
WASTE ROCK STOCKPILE						
					OPINION OF PROBABLE COST	**$424,539**

Assumptions

(1) Security berm to prevent vehicles entering pit to be constructed by mine operations towards cessation of operations.

(2) Impacted areas surrounding Open Pit equal 10% of Open Pit area.

(3) See Dwg. C0119 for Mine Water Pond dam typical section.

(4) See Dwg. C0115 for River Dyke typical section.

(5) $500/ha for revegetation (broadcast seeding and transplanting), ERM 2012.

(6) Slope angles not taken into account for stockpile surface area.

(7) Average diameter of underground opening 8m x 8m. Quote from Colorado hard rock mine closure, 2012.

(8) Waste Rock Stockpiles will all be reclaimed prior to cessation of mine operations (Tetra Tech communication to ENVIRON, Dec 2012).

TABLE 3.2
8300 PROCESS FACILITY

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
MILL / PROCESS PLANT						
1	Detox	See Table 1.1, Gen. Assumption. 8	1	ea.	$22,741.20	$22,741
2	Demolition	Plant Site	72,840	m^3	$6.75	$491,670
3	Growth Media	Plant Site - 4-inches	364	m^3	$5.00	$1,821
4	Revegetation	Plant Site	3,642	m^2	$0.51	$1,850
8650 EMERGENCY DISCHARGE POND						
					OPINION OF PROBABLE COST	**$518,082**

Assumptions

(1) Plant building(s) 20m high.

(2) Demolition quantities unknown (cm concrete, tonnes steel). Unit rate from Colorado hard rock mine closure cost estimate, 2012.

(3) Decommissioning cost based on 3-weeks per GGI, 2012a.

(4) Detoxification process assumed to involve an 8-hour flush and clean of CN-related facilities per GGI, 2012.

This cost is negligible. Activity will be conducted by mine personnel immediately upon cessation of mining.

Items	Quantity	Units	Unit Cost	Total (annual)
Equipment Operator	4	HR	$ 9.21	$4,421
Environmental Technician	1	HR	$ 7.24	$869
1/2-ton Pickup Truck	4	HR	$ 9.00	$4,320
Mechanic (heavy equipment - open pit)	2	HR	$ 9.21	$2,210
Caterpillar Water Truck (5,000 gallons)	1	HR	$ 76.25	$9,150
Maintenance General Foreman (supervision)	1	HR	$ 14.76	$1,771
				$22,741

TABLE 3.3
8400 ONSITE INFRASTRUCTURE

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
8410 POWER PLANT AND DISTRIBUTION						
1	Demolition	Power Plant	64,740	m^3	$6.75	$436,995
2	Growth Media	Power Plant - 4-inches	324	m^2	$5.00	$1,619
3	Revegetation	Power Plant	324	m^2	$0.51	$164
8420 ONSITE ROADS						
1	Revegetation	Haul Roads	30,480	m^2	$0.51	$15,484
2	Excavation	Haul Roads, Water Bars	1,500	m^3	$3.00	$4,500
3	Riprap Placement	Haul Roads, Water Bars	1,500	m^3	$4.00	$6,000
8430 SERVICES AND UTILITIES						
					OPINION OF PROBABLE COST	**$464,762**

Assumptions

(1) Assume total length of haul roads to be 10 km throughout site, width of 30 m each, 10 water bars per kilometer, 0.5 m deep.

(2) Power Plant building(s) 20m high.

8500 ANCILLARY BUILDINGS

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
8520 MINE BUILDINGS (MECHANICAL SHOPS AND WAREHOUSE)						
1	Demolition	Mechanic Shops	12,000	m^3	$6.75	$81,000
2	Growth Media	Mechanic Shops - 4-inches	1,200	m^2	$5.00	$6,000
3	Revegetation	Mechanic Shops	1,200	m^2	$0.51	$610
4	Demolition	Operations and Maintenance Building	14,000	m^3	$6.75	$94,500
5	Growth Media	Warehouse - 4-inches	2,800	m^2	$5.00	$14,000
6	Revegetation	Operations and Maintenance Building	2,800	m^2	$0.51	$1,422
8530 PERMANENT ACCOMMODATIONS (AURORA MAN CAMP)						
1	Demolition	Aurora Man Camp	87,408	m^3	$6.75	$590,004
2	Growth Media	Aurora Man Camp - 4-inches	9,712	m^2	$5.00	$48,560
3	Revegetation	Aurora Man Camp	9,712	m^2	$0.51	$4,934
4	Demolition	Camp Support	3,645	m^3	$6.75	$24,604
5	Growth Media	Camp Support - 4-inches	405	m^2	$5.00	$2,025
6	Revegetation	Camp Support	405	m^2	$0.51	$206
8540 OTHER FACILITIES (EXPLOSIVES MAGAZINE, HAZARDOUS WASTE STORAGE FACILITY, FUEL FARM)						
1	Demolition	Operations Building	40,059	m^3	$6.75	$270,398
2	Growth Media	Operations Building - 4-inches	4,451	m^2	$5.00	$22,255
3	Revegetation	Operations Building	4,451	m^2	$0.51	$2,261
4	Demolition	Explosives Magazine	300	m^3	$6.75	$2,025
5	Growth Media	Explosives Magazine - 4-inches	100	m^2	$5.00	$500
6	Revegetation	Explosives Magazine	100	m^2	$0.51	$51
7	Demolition	Ready Line/Fueling Site	28,750	m^3	$6.75	$194,063
8	Growth Media	Ready Line/Fueling Site - 4-inches	4,075	m^2	$5.00	$20,375
9	Revegetation	Ready Line/Fueling Site	4,075	m^2	$0.51	$2,070
8580 AIR STRIP						
Ownership to be transferred to Government of Guyana.						$0
					OPINION OF PROBABLE COST	**$1,381,862**

Assumptions

(1) Demolition costs provide for steel and concrete demolition. Unit cost taken from previous mine closure project in western USA.
(2) Growth media unit rate cost provided by Tetra Tech (2012c) = $5/$m^3$. Assume 4-inch (0.1016 m) thick growth media cap
(3) Building demolition volumes estimated by multiplying building footprint by assumed building height of 9m.
(4) Building footprint to be approximately equal to 10% of the area of each separate site, unless footprint was given or easily determined.
(5) Ready Line, Fueling Site, Heavy Vehicle Maintenance Facility demolition and area reclamation at LOM.

TABLE 3.5
8600 TAILINGS

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
8610 TAILINGS MANAGEMENT AREA (TMA, DIVERSION PONDS 1 &2, TAILINGS PIPELINE, RECLAIM PIPELINE)						
1	Removal	Tailings Pipeline and HDPE Liner	1,525	m	$3.00	$4,575
2	Riprap Placement	Tailings Pipeline, Channel	3,050	m^3	$40.00	$122,000
3	Removal	Reclaim Pipeline	1,525	m	$3.00	$4,575
4	Riprap Placement	Reclaim Pipeline, Channel	3,050	m^3	$40.00	$122,000
5	Growth Media	Tailings Management Area, Beach	718,410	m^2	$0.51	$364,952
6	Excavation	Breach spillway structure (TMA & DP#2)	81	m^3	$3.00	$243
7	Riprap Placement	Spillway channel (TMA & DP#2)	81	m^3	$40.00	$3,240
8	Excavation	Permanent Channel (DP #1 & #2)	81	m^3	$3.00	$243
9	Riprap Placement	Permanent Channel	81	m^3	$40.00	$3,240
10	Install pumpback systems	Seepage collection systems at each dam to incl. pumpback pipelines and collection ponds	4	ea.	$50,000.00	$200,000
11	Well abandonment	Plug drill holes and monitoring installations	3,000	m	$40.00	$120,000
8630 & 8640 MINE (PROCESS) and FRESH (STORM) WATER PONDS						
1	Excavation	Remove designated sections	28,420	m^3	$3.00	$85,260
2	Revegetation	Revegetate footprint	6,860	m^2	$0.51	$3,485
				OPINION OF PROBABLE COST		**$1,033,813**

Assumptions

(1) Tailing Management Area (TMA) beach is approximately 1/3 the area of TMA.

(2) Breach of Spillway Structure between TMA and Diversion Pond #2 is 9 m long, 3 m deep, 3 m wide.

(3) Permanent Channel between Diversion Ponds #1 and #2 is 9 m long, 3 m deep, 3 m wide.

(4) Breach of Dike between DP#1 and DP#2 is 9 m long, 3 m wide, 3 m deep.

(5) Tailings Pipeline and Reclaim Pipeline are each 1,525 m long, in a channel 1 m deep, 2 m wide.

(6) Drill holes and monitoring installations: assume total of 100, each 0.1016 m diameter, 30 m deep. Assume cement grout completion $40/m, Boart Longyear, October 2012 quote.

TABLE 3.6
8700 OFFSITE INFRASTRUCTURE

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
8710 ACCESS ROAD						
Ownership to be transferred to Government of Guyana.						$0
8720 BUCKHALL PORT						
Ownership to be transferred to Government of Guyana.						$0
8730 TAPIR CROSSING						
Ownership to be transferred to Government of Guyana.						$0
					OPINION OF PROBABLE COST	**$0**

Assumptions

(1) All ownership/transfer decisions provided by GGI 2012a.

TABLE 3.7
MONITORING AND MAINTENANCE

Items	Quantity	Units	Unit Cost	Total (annual)	Comments
Equipment Operator	1	HR	$ 9.21	$ 19,156.80	Assumes 1 individual for all environmental maintenance and repairs
Environmental Technician	1	HR	$ 7.24	$ 15,059.20	Assumes 1 individual for all environmental monitoring activities
1/2-ton Pickup Truck	1	HR	$ 9.00	$ 18,720.00	Pickup truck for Enviro. Tech.
Caterpillar 436 Series II Backhoe/Loader	1	HR	$ 27.09	$ 14,086.80	Assumes 1 day/week for drainage maintenance, incl. Operator
Mechanic (heavy equipment - open pit)	1	HR	$ 9.21	$ 19,156.80	Regular PM schedule for service of installed pumps
Caterpillar 14H Motor Grader	1	HR	$ 104.46	$ 108,638.40	Assumes 2 day/week for road maintenance, incl. Operator
Caterpillar Water Truck (5,000 gallons)	1	HR	$ 85.46	$ 44,439.20	Assumes 1 day/week for dust control, incl. Operator
OPINION OF PROBABLE COST				**$ 239,257.20**	

$ 478,514.40 Assume 2 years

TABLE 3.8
MAJOR EQUIPMENT SALVAGE

ITEM NO.	TASK DESCRIPTION	ITEM DESCRIPTION	AREA/ VOLUME/ QUANTITY	UNIT	UNIT COST	EXTENDED TOTAL COST
8300 PROCESS FACILITY						
1	Re-sale	Crusher	1	ea.	$100,000.00	$100,000
8600 TAILINGS						
1	Re-sale	Reclaim Barge	1	ea.	$25,000.00	$25,000
8720 BUCKHALL PORT						
Ownership to be transferred to Government of Guyana.						$0
8730 TAPIR CROSSING						
1	Re-sale	200-ton Barge	1	ea.	$140,000.00	$140,000
2	Re-sale	150-ton Barge	1	ea.	$80,000.00	$80,000
Ownership of facility to be transferred to Government of Guyana.						
					OPINION OF PROBABLE COST	**$345,000**

Assumptions

(1) Salvage credits provided by Guyana Gold, Inc., October 23, 2012.

TABLE 3.9
RETRENCHMENT COSTS

Items	Quantity	Units	Unit Cost	Total (annual)
Grade L0	5	workers	$ 26,341.00	$ 131,705.00
Grade L1	10	workers	$ 16,358.00	$ 163,580.00
Grade L2	15	workers	$ 11,690.00	$ 175,350.00
Grade L3	25	workers	$ 9,832.00	$ 245,800.00
Grade L4	50	workers	$ 8,333.00	$ 416,650.00
Grade L5	100	workers	$ 5,198.00	$ 519,800.00
Grade L6	150	workers	$ 4,490.00	$ 673,500.00
Grade L7	250	workers	$ 3,502.00	$ 875,500.00
			OPINION OF PROBABLE COST	**$ 3,201,885.00**

Assumptions

(1) All Retrenchment data provided by GGI, 2012.



Community Relations Management Plan

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Georgetown, Guyana
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
Seattle, WA

Date:
June 2013

Project Number:
01-29301A1

Record of Revisions

Revision Level -0-

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All	All	First issue of *Community Relations Management Plan*

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Acronyms

ASM	Artisanal/Small-Scale Mining
CI	Conservation International
CRO	Community Relations Officer
CSR	Corporate Social Responsibility
EJCR	Essequibo Joint Community Relations Committee
EPA	(Guyana) Environmental Protection Agency
EHS	Environmental, Health, and Safety
EJCR	Essequibo Joint Community Relations Committee
ESAR	Environmental and Social Aspects Register
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GCAA	Guyana Civil Aviation Authority
GGI	Guyana Goldfields, Inc.
GGMC	Guyana and Geology Mines Commission
GIIP	Good International Industry Practice
GPF	Guyana Police Force
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
IFC	International Finance Corporation
km	kilometer(s)
MOAA	Ministry of Amerindian Affairs (MOAA).
NGO	Non-Governmental Organization
PDAC	Prospectors & Developers Association of Canada
SOP	Standard Operating Procedure
STD	Sexually Transmitted Disease
VP	Vice President

1 Introduction

1.1 Purpose and Scope of the *Community Relations Management Plan*

The *Community Relations Management Plan* is a key component of the Aurora Gold Project Environmental and Social Management System (ESMS; see Section 1.2), and as such is conceived as part of *a "*…dynamic and continuous process initiated and supported by management, which involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders." The *Community Relations Management Plan* provides a mechanism "… to promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated." [1]

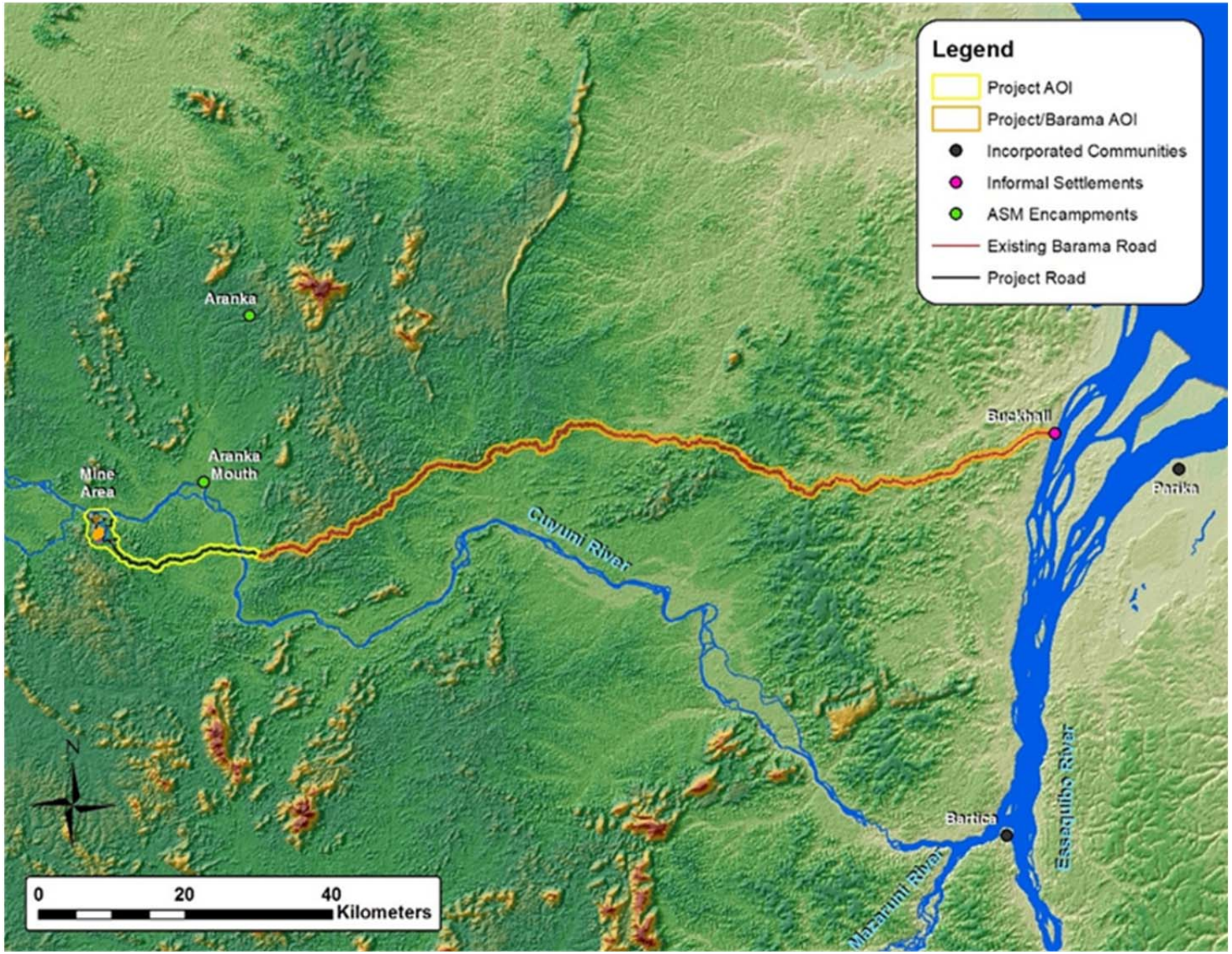
Baseline socioeconomic assessments and community engagement exercises performed in 2006, 2009, and 2012 were summarized in the updated Environmental and Social Impact Assessment (ESIA) for the Project (ENVIRON, 2013), and revealed that there are few, if any, formal or established communities or settlements (Amerindian or otherwise) in the immediate vicinity of the Aurora Mine Project (Project) site. Very few true communities exist in proximity to associated Project components. As noted in Section 5 of (ENVIRON, 2013), only two "communities" are considered to be within the Project's direct (social) area of influence: **Buckhall**, located on the Essequibo River immediately north of the Guyana Goldfields, Inc. (GGI) logistics support facility and river port of the same name; and **Aranka Mouth**, an informal artisanal and small-scale mining (ASM) settlement 16 km downriver from the Aurora Gold Project; see **Figure 1.1-1** for a location map.

The Project is located in a largely undeveloped frontier area of northwestern Guyana that has the second lowest population density in the nation of Guyana, with just 0.4 persons per square kilometre (km) (ERM, 2010a). Due to its remote location and the transient characteristics of most of the population , who for the most part are engaged in traditional ASM activities, the Project does not involve or generate the types of direct socioeconomic effects that often characterize mining projects in more developed areas with larger and more permanent communities. Consequently, the type of stakeholder engagement frameworks, participatory processes, and management tools typically used in more developed settings may not be appropriate for the Project, at least not in the construction phase or the initial years of mine operations.

It also should be noted that as a condition of the Environmental Permit for the Project (Guyana EPA, 2010), the Government of Guyana has expressed concern about uncontrolled influx to the Project area, and requires Guyana Goldfields, Inc. (GGI) to take systematic measures to prevent or minimize such influx. GGI has therefore developed a Project *Influx Management Plan*, the purpose of which is to minimize the attractiveness of the project, detect potential influx trends, and to coordinate with the government to prevent or minimize the social and

[1] See (IFC 2012), "IFC Performance Standards on Environmental and Social Sustainability."

Figure 1.1-2: Aurora Gold Project Location and Buckhall to Aurora Site Transportation Corridor



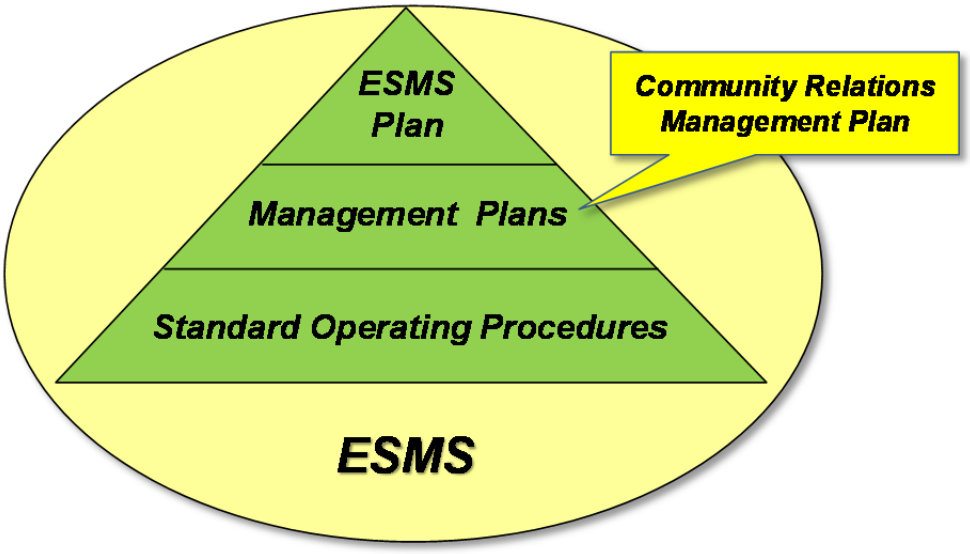
environmental issues that may arise from such influx. Influx management considerations notwithstanding, and although the area within or adjacent to the boundaries of the concession may not currently have significant population density or display other characteristics of community organization and social structures, experience has shown that once mine operations begin in earnest there is a reasonable expectation that certain communities will be affected by the Project, and some may experience expansion and growth, along with community desires for improved infrastructure and services, commensurate with the expansion of economic activity.

The challenge for GGI is to identify where growth is most likely to occur and to begin building relations with the Affected Communities (i.e., Buckhall and Aranka Mouth) in the earliest phases of Project activity, in advance of any predicted growth and expansion. GGI is committed to build appropriate networks and establish mechanisms for communication and collaboration so that stakeholder engagement is proactive and responsive rather than reactive and reactionary. The rationale for this approach is explained further in Section 1.4.

1.2 Relationship of *Community Relations Management Plan* to Environmental and Social Management System

GGI has established an ESMS for the Project, which is embodied in a Project-specific *ESMS Plan*. The ESMS Plan is based on the requirements of IFC Performance Standard 1 (PS 1), "Assessment and Management of Environmental and Social Risks and Impacts" and other good international industrial practices (GIIPs) for environmental, health, and safety (EHS) and social program management. This *Community Relations Management 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 EHS and social impacts, and supports (and is supported by) the updated ESIA for the Project (Environ, 2013). **Figure 1.2-1** depicts the relationship of the *Community Relations Management Plan* to the overall structure of the Project ESMS (see Section 1.2 of the ESMS Plan for additional details).

Figure 1.2-1: Position of Community Relations Management Plan in ESMS Document Hierarchy



1.3 Change Management

The *Community Relations Management Plan* will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing EHS and social management needs, in accordance with Section 1.3 of the *ESMS Plan.*

1.4 Rationale for Proactive Management Approach

Consultation and informed participation are two of the hallmarks of the IFC approach to stakeholder engagement:

> "Consultation is a two way process of dialogues...it is really about initiating and sustaining constructive external relationships over time. Companies that start the process early and take a long term, strategic view are, in essence, developing their local "social license" to operate. Consultation will not be a single conversation, but a series of opportunities." (IFC, 2007).

Companies in the early stages of the project life cycle may sometimes be tempted to devote limited resources (human or otherwise) to stakeholder and community engagement. The tendency is to designate junior staff members to reactively address all issues, opportunities, grievances, and concerns. At the same time, there is also a tendency to default to one or two high profile social investments (e.g., the building a school or a health clinic) which may or may not have been identified through a participatory consultation process. As noted in (International Alert 2005), this approach commonly results in negative outcomes, which include the following:

- Negative Reinforcement: When companies respond only to acts of obstruction, stakeholders experience negative reinforcement (i.e., are encouraged in negative activities). In other words, if a company responds only to negative or obstructive triggers, those triggers are almost certain to occur. For example, focusing only on those stakeholders who align themselves with illegal or obstructionist behaviour serves to legitimize those actions and has the potential to reinforce drivers for social conflicts.

- Exacerbation of Local Tensions: It is natural to a company to gravitate to those community members who are educated, appear to know local laws or customs, and physically present themselves as community leaders. However, these individuals may not be representative of the majority nor always have the best interests of the majority in mind.

- Reactive Engagement: Waiting to engage with communities until compelled to respond to a problem or to an issue that impacts company operations only damages the company's reputation and fosters the perception that the company is not interested in the long-term welfare of the community.

Over the long term, the process is often more important than individual outcomes. Processes that are perceived as lacking in transparency, regularity, effectiveness, and respect lack credibility and fail to build trust. As a result, outcomes and actions may fuel tensions, create conflicts, and increase mistrust. Over time, this may result in increased direct, indirect, and

operational costs to the company as stakeholders may become hostile, work stoppages occur, negative press or threats of violence increase, and political and reputational damage is incurred.

GGI understands the pitfalls of a reactive approach to community relations, and will therefore adopt a proactive approach. The company is committed to building relationships and developing management approaches and problem solving structures well in advance of their need. It is expected that a proactive approach will help build trust between GGI and the Affected Communities, and will help create a “social license” to operate in the area of the Project concession.

2 Formal and Informal Institutional Capabilities

The structures that GGI will create to manage stakeholder engagement will be influenced by the strengths and skills displayed by the Affected Communities, as well as the identified needs and areas of concern that are important to those communities. In order to effectively manage those engagements, GGI will assign specific staff responsibilities. This section provides a general profile of the staff positions that GGI will establish and the communities they will most likely seek to engage.

2.1 Management Organization and Responsibilities

The initial ESIA for the Project (ERM 2010) recommended the creation of a dedicated community relations team within the context of the Project *ESMS Plan*, with qualified community relations and/or EHS officers responsible for both the Buckhall and Aurora sites.

While a more complex staffing approach may eventually be necessary, in the early stages of the project GGI will assign community relations responsibilities to three staff members: a Corporate Social Responsibility (CSR Manager) Manager located at the corporate headquarters in Georgetown and eventually two Community Relations Officers (CROs), one in Buckhall, and one at the Aurora site who will be responsible for the settlement at Aranka Mouth and other less organized artisanal and small-scale mining (ASM) encampments near the Aurora concession. These staffing recommendations are in line with the staffing needs to support the IFC-approved grievance redress process (see *ESMS Plan* Appendix B, “Community and Environmental Grievance Procedure and provide general ongoing support for social and community engagement. The roles and responsibilities for these key staff members are outlined in Sections 2.1.1 and 2.1.2. Their roles in a larger stakeholder-driven engagement process are presented in Sections 5 and 6.

2.1.1 Corporate Social Responsibility (CSR) Manager

The CSR Manager will have overall responsibility for corporate social relations, stakeholder engagement, and community engagement. The CSR Manager will have primary responsibilities for maintaining the *Community Relations Management Plan* and will be responsible for its effective implementation and periodic update.

The CSR Manager will engage with the CROs and will participate in the stakeholder committees created for the Aranka Mouth and Buckhall communities (see Sections 5 and 6) when appropriate. The CSR Manager will also be the primary point of engagement with all other external stakeholders, including national and international stakeholders, external and national Non-Governmental Organizations (NGOs), and representatives from the government of the Republic of Guyana. The CSR Manager should report to the Vice President (VP), Aurora Project and GGI management on all matters related to the community relations team and the social aspects of the Project.

2.1.2 Community Relations Officer (CRO)

As the Project progresses, and if the populations in the vicinity are observed to be increasing, GGI will work toward having two CROs, one stationed in the Aurora camp and a second at Buckhall. The CROs will be responsible for the formation and maintenance of Stakeholder

Committees at these sites (see Section 5.2). These responsibilities will include the oversight, monitoring, approval and evaluation of any initiatives suggested by the Stakeholder Committees.

Each CRO will report to the CSR Manager and will facilitate the flow of information from the Stakeholder Committees to GGI management. The CROs will serve as the primary contact and face of the company to the Affected Communities and other stakeholder groups, including transient groups or individuals engaged in ASM. The CROs will be responsible for managing the grievance process as outlined in *ESMS Plan* Appendix B, "Community and Environmental Grievance Procedure."

2.2 Stakeholder Profiles

Although the Project concession is located in a largely unsettled frontier area, and few settlements are located near Project components, stakeholders are present who may influence or are influenced by the Project are present. The first step in developing a relationship with the communities is the identification or mapping of potential stakeholders; see (IFC 2007), "Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets," Figure 2: Key Components of Stakeholder Engagement." Stakeholders may include local communities, local government authorities, NGOs, community-based organizations, ASM groups or individuals, or other interested parties. Stakeholders also may include local businesses and business partners affected by or able to influence the Project (e.g., the Barama Logging Company, with whom GGI shares a major section of access road as shown in **Figure 1.1-1**).

While the initial expectation is that stakeholder issues and concerns will be managed on a case by case basis, it is anticipated that within at least a year after work begins on the Project, CROs will have worked with at least one Affected Community (Buckhall; see Section 2.2.1) and will have established a Stakeholder Committee.

The expectation is that over time, the Buckhall Stakeholder Committee will develop sufficient capacity through training and experience and will be empowered to assume the bulk of the responsibility for community engagement, under the guidance of the Buckhall CRO and overall supervision by the CSR Manager.

A detailed description of stakeholder roles and responsibilities associated with the various proposed management and grievance structures is provided in Sections 5 and 6. The communities identified in the following Sections 2.2.1 to 2.2.6 are the primary communities with whom GGI will engage during the early Project stages. These are the communities where a mature stakeholder engagement structure is likely to prove valuable as the Project develops through time.

2.2.1 Village Stakeholder Profiles

As noted in Section 5 of (ENVIRON, 2013), Buckhall and Aranka Mouth are predicted to be the most affected by the Project. Buckhall is the primary river port for the receipt and transhipment of materials, equipment, and personnel to the mine site. Buckhall is an area in which increased influx of people seeking to develop legitimate economic support activities as well as those

seeking to engage in illegal and illicit trading are likely to become problematic. Buckhall is the highest priority area for GGI to engage as they begin their stakeholder outreach efforts, which should include the establishment of a Stakeholder Committee. Aranka Mouth has also grown rapidly due to increased ASM activity driven by historically high gold prices, and may be thought of as a potential hub or centre of ASM interests in the area immediately adjacent to the Project; see also the ASM discussion in Section 2.2.3 below. A formal Stakeholder Committee should also be established for this site.

There are several other villages in Region 3 and Region 7 that, over time, may also be affected by the Project, and although not necessarily meriting the establishment of Stakeholder Committees early in the Project lifetime, they should be monitored by the CRO Manager via periodic visits, communications with community leaders, and other appropriate means. Brief descriptions of these villages and the potential for influence by the Project are provided in the following paragraphs.

- **Itaballi** is located on the west bank of the Mazaruni River and holds a GGI camp which is used to house employees or project personnel on their way to interior locations. According to the latest available (2002) census figures, the population of Itaballi was nearly 300 and was comprised of nearly 90 households, with a large proportion of young and working age persons noted. There is limited economic and commercial activity in Itaballi. Subsistence farming appears to be the main non-income household activity.

  While Itaballi is not directly within the Project's direct area of influence (DAI), the (ERM 2010) and (ENVIRON 2013) ESIAs revealed several characteristics which suggest that Itaballi would be an appropriate community for GGI to begin proactively building stakeholder relationships. It is noteworthy that

  - since 2002, increases in population have been attributed to growth in the mining and logging industries and expansion of GGI efforts may exacerbate this trend;
  - while they comprise only about 13% of Itaballi's population, Amerindians are the largest single ethnic group in the community, and early engagement of this segment of the population could be beneficial; and
  - Itaballi is a fuel distribution centre and includes automotive repair and other related businesses, which may also contribute to its popularity once GGI efforts are underway.

  A number of economic activities related to increase interest in ASM and logging, have been observed, such as fruit stands and the increased presence of sex workers.

  Itaballi currently has no secondary school. However, children from the community can and have, over the years, accessed secondary education in Bartica. Also, a recently constructed health facility provides the community with basic health services.

- **Bartika,** also in Region 7, most likely will not ever be directly impacted by Project activities. However, since it is the headquarters of the Regional Democratic Council and

the location of the regional hospital and several regional administrative government offices, GGI should also begin to develop stakeholder relationships in Bartika.

- **Kamarang** is another community located in Region 7. Since there is no direct road or viable river access to the Project site, Kamarang has not been included in any of the previous baseline or ESIA studies; however, it is the district administrative centre for the Middle Mazaruni Sub Region of Region 7, and difficult access notwithstanding, is geographically closest to the Aurora site. For this reason, GGI should potentially consider developing stakeholder relationships in Kamarang.

- **Parika,** also in Region 3, has been identified as an area that is expected to grow in importance as a transportation and supply hub through the life of the Project. Although such growth will be attributable to many factors other than the Aurora Gold Project, GGI should still consider developing stakeholder relationships in Parika. Parika is a busy port town and has seven villages located within its administrative borders. As a port, it is a source of goods (especially fuel) and services for the interior. Parika could be impacted by the Project as it forms an important part of the transportation corridor between the Project site and Georgetown and was therefore included in the area of indirect influence.

2.2.2 Amerindian Communities – Stakeholder Profiles

Although as noted in Sections 5 and 13 of the updated ESIA (ENVIRON, 2013) there are no Amerindian communities in or near the Project concession, and although no direct impact by Project operations is envisioned, it still should be noted Region 7 has the highest concentration of Amerindian communities in all of Guyana. Based on information obtained from the Ministry of Amerindian Affairs, there are 23 Amerindian communities (mainly Akawaios and Arecuna groups) scattered throughout the three Upper, Middle and Lower Mazaruni sub-regions.

These interior Amerindian communities have traditionally been dependent on agricultural production, hunting, and fishing. The advent of mining, particularly ASM in the interior regions, has disrupted traditional Amerindian life. Amerindian males are increasingly being hired as labourers for mining operations. This has had impacts on agriculture and subsistence farming, leaving women to tend to plantations in the villages. High migration of males also has resulted in an increase in women-headed families in these villages. Also, the increase of wealth from remittances in the Amerindian economies has led to increased consumerism. Items such as televisions, radios, and imported food and beverages are increasingly seen in these villages. Despite these symbols of greater affluence, lack of education and technical skills are significant barriers preventing Amerindians from participating in the advancing economy.

Overall, the constraints faced by Amerindians in Region 7 include access to land, lack of physical and social infrastructure, income poverty, limited sustainable livelihood alternatives, low literacy level, and lack of capacity to monitor activities taking place adjacent to their communities.

The closest Amerindian community to the Project is **Kurutuku**, a titled community of roughly 120 persons located on the upper Cuyuni River, approximately 50 km upstream from the Aurora Mine Project. Due to its remote location upstream from the Project site, as well as the natural

barrier to river traffic afforded by the rapids at Devil's Hole in some seasonal situations, it is unlikely to suffer any direct impacts as a result of the Project. However, given its importance as the titled Amerindian community which is closest to the Project, Kurutuku should be considered for specific stakeholder relationship development and appropriate community investment actions.

2.2.3 Artisanal and Small Scale Mining (ASM)

ASM is a significant activity in the Project region, in particular in the immediate vicinity of the Project and along the Cuyuni River. Small and seasonal mining camps represented the main habitations in the immediate Project area. The miners move frequently and establish small exploration camps wherever they go. They were not included in the government's census and very little data and very few records are available to document their presence. Significant potential exists for illegal or minimally regulated ASM to drive influx to the Project area. As significant environmental and social issues have historically been directly attributable to illegal or poorly managed ASM, GGI's Environmental Permit specifically requires that GGI systematically discourage influx to the project [see (Guyana EPA, 2010)]. GGI's challenge will be to not to directly encroach on ASM activities, while preventing ASM impacts or incursions to the Project concession, and at the same time finding ways to encourage more responsible environmental and social practices on the part of the ASM community.

Aranka has been an informal ASM community for over 100 years and sometimes contains large encampments of transient miners and significant commercial activity. Aranka is located north of the Cuyuni River on a stream of the same name, with its mouth approximately 30 km downstream from the Project. An informal community has also been established at Aranka Mouth that has grown rapidly over the last several years; see Section 2.2.1.

No official demographic surveys have been conducted at Aranka, since it is not an incorporated village. However, it has been estimated that the total population may range between 500 to 1,000 persons. The population is approximately 75% male and 25% female, with the larger proportion of male inhabitants attributable to the high proportion of ASM-related activities. Observations and community responses indicate the age of the population is generally lower than 40 years. The area predominantly consists of Black African-Guyanese (90%), Brazilians (9%), and other ethnicities (1%).

Mercury amalgamation is the primary means of beneficiation used in ASM operations in the vicinity of Aranka. The common use of mercury combined with frequent discharges to streams in the area is certain to negatively impact the water quality of the area. Nevertheless, the river is still used for bathing and, when rain water is insufficient, is at times still used as a source of drinking water. This poses a serious health risk to the residents of the community. There is also a lack of latrines, with only about 10 to 15 personal latrines within the entire community.

There is no health post or medics to support Aranka. In the event of a medical emergency, those in need of treatment have typically used boat transportation and have travelled to the Aurora site for assistance.

Basic consumer goods and supplies are transported from Georgetown and sold at increased prices due to the high cost of transportation and infrequent replenishment of goods.

Women employed in Aranka are mostly service workers. They run shops, food services, laundry services, and some participate in the sex trade. Petty trade also exists among the residents of the community. There are very few, if any, traditional households.

The only official sign of infrastructure is the presence of a small Guyana and Geology Mines Commission (GGMC) office. The GGMC is the lead institution in charge of providing reconnaissance, exploration, prospecting guidelines, and mining licenses. Despite the presence of the office, the GGMC representative is not always on site and a majority of the artisanal miners in the community do not possess licenses to undertake mining activities. The remainder of the infrastructure is very basic and consists of a few bars, shops, and an overnight facility. Housing and living conditions are basic and similar to that of transient ASM camps.

2.2.4 Non-Governmental Organizations (NGOs)

The (ERM 2010) ESIA identified and engaged a number of national as well as international NGOs, including the Amerindian Action Movement of Guyana, Guyana Organisation of Indigenous Peoples, Amerindian Peoples Association (APA), Conservation International (CI), and the Iwokrama Rainforest Programme. In 2012, additional follow-on contacts were made with the APA (ENVIRON, 2013). Representatives from these and other similar organizations should be encouraged to participate in the community relations process by engaging the Stakeholder Committees at the appropriate levels.

2.2.5 Government Organizations

Government organizations with regulatory or oversight roles relative to Project operations should be considered for engagement in individual Stakeholder Committee meetings, depending on circumstances and current topical issues; these organizations include (but are not limited to):

- Guyana Geology and Mines Commission (GGMC);
- Guyana Environmental Protection Agency (Guyana EPA);
- Guyana Ministry of Public Works;
- Guyana Police Force (GPF);
- Ministry of Health (Central Board of Health);
- Ministry of Housing and Water (Central Housing and Planning Authority);
- Guyana Civil Aviation Authority (GCAA; for airstrip certification and safety issues); and
- Ministry of Amerindian Affairs (MOAA).

2.2.6 Barama Company Limited

Barama Company Limited (Barama) is a wholly-owned subsidiary of Samling Global Limited and has been working in Guyana since 1991. Barama employs over 1,000 people across their business enterprises, which includes the operation of two sawmills and kiln dryers and moulders in Buckhall, which allow for the production of finished lumber products.

As part of their corporate stakeholder engagement strategy, Barama has formed the Essequibo Joint Community Relations Committee (EJCR), which includes representatives from the Buckhall community. According to their corporate web site[2], the EJCR is scheduled to meet quarterly. This stakeholder committee has the potential to serve as an excellent resource for GGI as they establish their own stakeholder relationships, particularly within the Buckhall area.

In addition to having a longstanding presence in the area and an established stakeholder engagement strategy, Barama maintains a key road (the M3 or "Barama" Road) runs roughly east to west from the lower Essequibo River through forested uplands to a few km north of the Cuyuni River. The Barama Road will serve as the primary access route for goods and supplies being transported from Buckhall to the Aurora site. GGI built a new 33 km extension of the M3 road in 2011-2012, which connects the end of the original Barama road with Tapir Crossing (a vehicle barge ferry landing on the Cuyuni River), and extends from Tapir Crossing due west to the Aurora mine site. Consequently, GGI will seek to establish a shared usage agreement for the Barama road and a collaborative working relationship with Barama as early as possible in the Project

Barama and GGI will need to work together to establish daily usage schedules and to ensure the maintenance of safe passage for the movement of GGI goods and personnel. The two parties also will need to collaborate to address issues and incidents, including accidents and damages, which may occur as a result of GGI's use of the road. The Barama-formed and -managed Road Users Committee, which is comprised of representatives from the mining industry including truck drivers, truck owners, shop owners, and small and large-scale miners, was formed specifically to address these types of issues. In 2011, several committee meetings were held in which issues relating to road usage and safety were discussed and addressed. The GGI CSR Manager and the Buckhall CRO will engage with this committee and will endeavour to establish a collaborative working relationship.

2.3 Education and Training

Descriptions of stakeholder education and skill levels suggest that training and mentoring may be necessary if the various Stakeholder Committees proposed in Sections 5 and 6 are to function effectively. Training needs may include sessions in meeting facilitation, conflict resolution, effective participatory processes, and record keeping and reporting. All training activities led by the CRO, CSR Manager, or other GGI Stakeholder Committee members will be documented as noted in procedure GG-05, "ESMS Training Program."

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[2] See http://www.baramaguyana.com/eng/about/overview.htm .

3 Review of Outputs and Recommendations from the ESIA Process

During development of the ESIA (ERM 2010), a series of initial ranking and scoring exercises were undertaken with various stakeholders and stakeholder groups in order to identify areas and issues that might become sources of opportunity during the course of the Project. The significant priorities deriving from this exercise were updated in (TetraTech, 2013) and the updated ESIA (ENVIRON, 2013). Collectively, these sources form the basis of the priorities presented in this section, and, as noted in Section 3.2 of the *ESMS Plan*, will be considered in the development a project-specific Environmental and Social Aspects Register (ESAR). The latter will be evaluated on at least an annual basis in accordance with GG-29, "Determination of Environmental and Social Aspects and Significant Impacts." GG-29 is designed to address the identification of new impacts or any subsequent additions or modifications to the results of the updated ESIA that may be prompted by changes in environmental or operational conditions, lender requirements or other stakeholder interests, regulatory requirements, or other important considerations. The input provided by local/external stakeholders will also be identified and specifically considered in the evaluation of social and environmental aspects and impacts. Any necessary changes in the aspects/impacts register will be reflected in appropriate modifications or additions to the Project's Management Plans or other performance improvement measures, as discussed in *ESMS Plan* Section 4.3 and GG-30, "Environmental and Social Objectives, Targets, and Performance Improvement Program."

3.1 Matrix of Issues and Proposed Management/Mitigation Measures

Table 3.1-1 is an initial list of key social issues that GGI will need to manage from the outset of the next phase of the Project, pending full implementation of the processes described in GG-29, "Determination of Environmental and Social Aspects and Significant Impacts" and GG-30, "Environmental and Social Objectives, Targets, and Performance Improvement Program." The latter processes are meant to apply over the life of the Project.

Table 3.1-1: Summary of Potential Issues Identified During Stakeholder Scoping

Project Component/ Phase	***Issue/Topic***	***Relative Significance****	***Residual Impact****	***Proposed Mitigation Measures***
Mine and Mill-Construction Phase	#12 Increased human population and activity in the area of influence	Moderate	Minor	Monitoring and minimization of the potential influx of unauthorized personnel via implementation of strict hiring and controlled workforce transportation policies, as defined in the *Community Relations Management Plan*, and the appropriate engagement of governmental agencies and other preventive measures as defined in the *Influx Management Plan*.

Table 3.1-1: Summary of Potential Issues Identified During Stakeholder Scoping

Project Component/ Phase	*Issue/Topic*	*Relative Significance**	*Residual Impact**	*Proposed Mitigation Measures*
				Strict prohibitions on hunting, fishing, the harbouring of wild animals as pets, and disturbance of native fauna on the part of employees, visitors, and contractors, as defined by the Project *Biodiversity Management Plan*
Buckhall-Aurora Access Road-Operations Phase	#56 Inadvertent facilitation of commercial logging activity to the south of the Cuyuni River	Moderate	Moderate	GGI has no control over activities in legal logging concessions, but will advise proper authorities if potential illegal logging operations are observed along the access corridor.
Buckhall-Aurora Access Road-Operations Phase	#58 Increased pressure on forest resources and wildlife	Moderate	Minor	GGI has no control over activities in legal logging concessions, but will advise proper authorities if potential illegal logging operations are observed along the access corridor. GGI will prohibit all entry into forest areas along the corridor by GGI staff except for environmental or biodiversity monitoring purposes
Overall Macro	#77 Impact on socio-economic conditions of the nation after completion of the operations phase, especially in areas such as Parika, Aranka Mouth, Buckhall, and Georgetown	Major	Moderate	Implement the Project *Community Relations Plan* and final iteration of the Mine Reclamation, and *Closure Plan*; key actions include: • Diversification of skills/training, and building capacities of former workers and service providers to find economic opportunities with other industries in Guyana; • Target worker's families and Amerindian communities for income generation projects; and • Implement selected public/community development projects.

Table 3.1-1: Summary of Potential Issues Identified During Stakeholder Scoping

Project Component/ Phase	*Issue/Topic*	*Relative Significance**	*Residual Impact**	*Proposed Mitigation Measures*
Overall Macro	#78 Impact on socio-economic conditions of the nation due to closure	Major	Moderate	Implement those sections of the final iteration of the M*ine Reclamation and Closure Plan* that address socio-economic impacts of project closure
Mine-Construction Phase	#79 Potential influx into the Aurora concession leading to health, security and conflict related risks	Major	Minor	Hiring advertised and controlled through Georgetown office Control of employee travel to and from site using GGI vehicles Prohibition of economic or social contacts by workforce or contractors with transients or local communities Partner with Barama and the Government to monitor and manage influx issues in accordance with the Project Influx Management Plan. Consult with the government on issues such as promotion of planned regional development Promote and implement health awareness campaigns [especially malaria suppression and human immunodeficiency virus / acquired immunodeficiency syndrome (HIV/AIDs) and sexually transmitted disease (STD)] among workers and contractors, as well as local communities upstream and downstream of project site

Table 3.1-1: Summary of Potential Issues Identified During Stakeholder Scoping

Project Component/ Phase	*Issue/Topic*	*Relative Significance**	*Residual Impact**	*Proposed Mitigation Measures*
Mine-Construction Phase	#80 Increase in river traffic creating risks of accidents and incidents	Moderate	Minor	Address transportation planning, timing of movement of river traffic to and from the site, and identification of accident risk areas in accordance with *Transportation Management Plan* requirements. Address boating safety requirements as specified in the Project *Occupational Health and Safety/Accident Prevention Plan*
Mine-Construction Phase	#81 Expectation of employment and economic opportunities	Moderate	Minor	Engage with the local communities to better understand their expectations for economic benefits, in accordance with the C*ommunity Relations Management Plan* Create strategies to generate local employment upstream/downstream of Aurora site in accordance with the *Community Relations Management Plan* Promote community development projects that enhance local benefits and create skills, capacities Collaborate with local communities to improve education, health, and infrastructure in accordance with the *Community Relations Management Plan*

Table 3.1-1: Summary of Potential Issues Identified During Stakeholder Scoping

Project Component/ Phase	*Issue/Topic*	*Relative Significance**	*Residual Impact**	*Proposed Mitigation Measures*
Mine-Construction Phase	#82 Potential issues with artisanal mining	Major	Minor	Consult and engage with illegal/artisanal miners who come into the concession, in accordance with the Project *Influx Management Plan* and *Community Relations Management Plan*
Barama Road/Access Roads-Construction Phase	#83 Potential influx due to easier access to interior regions	Major	Minor	Partner with Barama and the Government to monitor and manage influx issues in accordance with the Project *Influx Management Plan.* Consult with the government on issues such as promotion of planned regional development
Barama Road/Access Roads-Construction Phase	#84 Increased traffic and safety risks	Moderate	Minor	Develop and implement the Project Transportation Management Plan*, including* measures such as driver safety training, identification of risk zones, and the timing of movement of traffic. Partner with government and other companies like Barama that use the road to promote safety and reduce risks
Buckhall Port-Construction Phase	#85 Potential influx into Buckhall due to wharf development and related risks	Major	Minor	Train the security forces on site to monitor potential influx, and to handle influx sensitively without conflict or security issues, in accordance with *Influx Management Plan.* Partner with the Government and/or Barama to plan sustainable development/ growth of the Buckhall community, in accordance with *Influx*

Table 3.1-1: Summary of Potential Issues Identified During Stakeholder Scoping

Project Component/ Phase	*Issue/Topic*	*Relative Significance**	*Residual Impact**	*Proposed Mitigation Measures*
				Management Plan requirements. Consult with the Government on issues such as promotion of planned regional development. Hiring advertised and controlled through Georgetown office Control of employee travel to and from site using GGI vehicles Promote and implement health awareness campaigns (especially malaria suppression and HIV/AIDs and STD among workers and contractors, as well as local communities upstream and downstream of the project site
* Red, orange, and yellow shading represents major, moderate, and minor significance/impacts, respectively.				

3.2 Summary of Stakeholder-Identified Issues

In addition to the impacts listed in **Table 3.1-1** and the ESAR that will ultimately be developed pursuant to Section 3.2 of the *ESMS Plan,* a number of specific issues and concerns were identified by the stakeholder groups and are described in the original (ERM 2010) and updated (ENVIRON, 2013) social baseline studies. A summary of the most pressing issues and concerns identified during stakeholder consultations conducted in multiple settlements is provided below.

- Among Amerindians:
  - Siphoning of Amerindian male agricultural labour to mine related activities;
  - Shift to female labour in agricultural activities (as a result of male migration to mine related work); and
  - Lack of education and higher skills hinder participation in advancing economy.

- Among all segments of the population
    - Lack of infrastructure (roads in particular)
    - Lack of health facilities: The interior communities report health problems and the need for health facilities to be of upmost priority. In Region 7 there is only one hospital, which is located in Bartica and is not easily accessible by residents throughout the region;
    - High rates of malaria and HIV/AIDS (related to lack of health services);
    - Influx of Brazilian and Venezuelan miners which is perceived to create conflict with local communities and security issues associated with alleged drug trafficking or smuggling;
    - Better education, better staffed schools: There is only one secondary school in Region 7, located in Bartica, and no tertiary level institutions;
    - Job opportunities; and
    - Concerns about environmental damages (cyanide poisoning, deforestation, silting of rivers) and potential for accidents.

These are issues that should be carefully considered as Stakeholder Committees are formed, as they have already been identified by local stakeholders. The CSR Manager and the CROs should investigate the possibility of using these issues to build Stakeholder Committee capacity and to establish routines and protocols for Stakeholder Committee operation.

With respect to health services, in order to decrease potential pressure on the project's own onsite medical facilities, GGI will investigate the potential for conducing periodic medical/dental campaigns into specific locations or community areas, and look for opportunities to build and expand such programs into other communities, as appropriate.

4 Current Response

As has been previously stated in this *Community Relations Management Plan*, the area around the GGI concession is somewhat atypical from other developing mine projects. There are few formal or informal communities within the region around the concession area, and those that do exist are sparsely populated.

Nonetheless, ESIA-related studies from 2006, 2009, and 2010 all indicate that there are Amerindian and non-Amerindian settlements in the region of the concession that are recognized by the government of the Republic of Guyana. These documents also make reference to observed growth in several communities (Aranka in particular) over the last six years, which may in part be in response to real and perceived opportunities with and around the concession area.

Historical experience with other projects of this nature suggests that for every direct job that is created as a result of mine activities, anywhere from 100 to 450 additional opportunities (legitimate or otherwise) may be created. Consequently, it is important that GGI leadership and management begin now to plan for the creation of relationships and structures to minimize and properly respond to this influx and the associated pressures and needs. It is important to note that the Government of Guyana has expressed significant concerns on the subject of influx, and as a part of GGI's environmental Permit (Guyana EPA, 2010) specifically requires GGI to work to minimize influx into the concession area.

GGI has developed a set of Standard Operating Procedures (SOPs) to address hiring, workforce conduct, workforce transportation, workforce engagement with locals, and grievances. These SOPs are identified and referenced in Section 4.2. The SOPs have been sufficient for the early stages of the Project and will function effectively in the early stages of the upcoming Project phases. However, these SOPs alone will not be sufficient to address and manage community engagement over the expected 20 year life of the Project. In addition, while a more detailed protocol for influx response and management is presented in the Influx Management Plan, the expectation is that the structures and relationships created and maintained as part of the *Community Relations Management Plan* will form the backbone of influx control and management.

4.1 Relevant Management Plans, Procedures, and Guidance

Table 4.1-1 provides a listing of resources offering relevant information for stakeholder engagement, education and training, communications, grievance response, and management and administrative functions associated with community relations.

Table 4-1. Relevant Guidance Documents and ESMS Management Plans/SOPs

External Guidance
IFC Performance Standards 1,4, 7, 8 (IFC, (2012)
IFC Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets: • Grievance mechanism (Pg. 69-77) • Information disclosure (Pg. 27-31) • Informed participation (Pg. 44-46) • Good faith negotiation (Pg. 64-65)
Government of Guyana Small Miner Policy and Support Plan (under development by GGMC)
Section 20, "Environmental Studies, Permitting, and Social or Community Impact" (TetraTech 2013)
"Preventing Conflict in Exploration: A Toolkit for Explorers and Developers" (e3Plus Guidance and Toolkit) (PDAC, 2013): • 4.0 Community Development • 5.0 Ethical Conduct • 6.0 Boundaries in Responsibility • #.0 Community Engagement (under development)
Annex 1, Social and Environmental Impact Assessment (SEIA) of the Aurora Mine Project in Guyana (ERM, 2010b)
Section 5, Updated Social Baseline, Updated Environmental and Social Impact Assessment, Aurora Gold Project (ENVIRON, 2013)
Conflict-Sensitive Business Practice: Guidance for Extractive Industries (International Alert. 2005)
ESMS - Management Plans
Exploration Management Plan
Emergency Preparedness and Response Plan
Transportation Management Plan
Spill Prevention, Control, and Contingency Plan (Aurora Site)
Biodiversity Management Plan

Table 4-1. Relevant Guidance Documents and ESMS Management Plans/SOPs

Erosion Prevention and Control Plan
Influx Management Plan
Mine Reclamation, and Closure Plan
ESMS - SOPs[3]
ESMS Plan, Appendix A: "Labour Grievance Procedure"
ESMS Plan, Appendix B: "Community and Environmental Grievance Procedure"
GG-02: Preparation, Review, Approval, and Update of Standard Operating Procedures
GG-03: Field Inspections
GG-05: Records Management
GG-06: ESMS Training Program
GG-07: Identification of Project-related Safety hazards and Assessment of Risks
GG-10: Prevention and Monitoring of Communicable Diseases
GG-12: First Aid and Emergency Medical Response
GG-25: Chance Archaeological Finds
GG-29: Determination of Environmental and Social Aspects and Significant Impacts
GG-30: Environmental and Social Objectives, Targets, and Performance Improvement Program
GG-33: Internal ESMS Audits
GG-34: Management Reviews
GG-35: Community Health and Safety Awareness Meetings

4.2 Tools for Committee Use (SOPs)

Specific tools available to the CRO and CSR Manager to implement the *Community Relations Management Plan* include items listed in **Table 4.1-1**. In addition, practical tools to assist in stakeholder communications include:

- Educational materials consisting of posters, frequently asked questions and fact sheets, communications devices, and other response materials. for the following:
  - health and safety awareness specific to ASMs (for improving their own practices) and villages (for protection of the villages);

[3] Additional SOPs may be developed over time in accordance with *ESMS Plan* Section 1.3; check the latest issued *ESMS Plan*, Table 1-3 for a current complete SOP listing.

  - emergency response for protection of the villages;
  - influx management for protection of villages; and
  - issue, concern, or opportunity reporting.

- issue or grievance reporting and monitoring forms (for use by individual stakeholders, Stakeholder Committees, CRO, CSR Manager) and accompanying database for monitoring and tracking issues (for use by CRO and CSR Manager)
- incident reporting forms (for use by CRO, CSR Manager)
- hiring information / materials (e.g., schedule for job fairs, tips on obtaining employment fact sheet)
- opportunity planning and development tool (including cost estimating tool); and
- meeting logs / minutes forms (for use by the CRO).

4.3 Going Forward

As Project work begins in earnest at the site, it will be critical to have an onsite presence in addition to the presence in Georgetown. GGI will augment the current CSR Manager with a new CRO who will be based at the Aurora site. The CRO will begin the process of community engagement with identified stakeholder groups.

Within 90 days of hire, the CRO will have developed a stakeholder engagement timeline which will identify the key stakeholders in each of the relevant communities and set a meeting schedule for initiating contact with those key leaders. Within 180 days of hire, the CRO will have held initial meetings with representatives from those communities.

Initial meetings will accomplish the following:

1. Introduce the CRO to the community
2. Review existing SOPs related to hiring, workforce conduct, workforce transportation, and other relevant SOPs as determined by GGI
3. Review work plans and time lines for the Project
4. Explain the stakeholder process and the roles for Stakeholder Committees (Sections 5 and 6)
5. Identify key issues and areas of concern for the affiliated community and stakeholder groups
6. Set a date for the next meeting and identified additional participants for subsequent meetings.

At the end of the second set of stakeholder meetings, the CRO will have evaluated committee viability based on number of participants, willingness to engage in the process, degree of

urgency of identified issues, and demonstrated skill levels of participants. Together with the committee, a regular meeting schedule will be established for the Stakeholder Committees. Stakeholder Committees may meet more frequently, but they must meet with the CRO at least quarterly. The CRO and the CSR Managers also will identify relevant training needed by the Stakeholder Committees and will have developed a schedule for initiating that training.

For communities that are unwilling to, or not yet capable of, forming and functioning as a formal Stakeholder Committee, the CRO will continue to make quarterly visits with those key leaders and will continue to offer and assess community willingness and ability to function as a formal Stakeholder Committee. When the community determines that they are interested in functioning as a formal Stakeholder Committee, the CRO will initiate the development of a formal meeting schedule and will initiate training and skills development.

During this timeframe, the CSR Manager will engage representatives from relevant government agencies, potential corporate partners (Barama) and international NGOs to introduce them to the community relations process and to invite their support and engagement at the appropriate level(s).

5 Community Engagement Process Development

Development of collaborative relationships with stakeholders is essential to successful business operation but first requires thoughtful definition of roles, responsibilities, and rules of engagement for all participants. This section focuses on defining the roles and responsibilities for the stakeholders of the Project, describing the relationships between stakeholders and GGI, and outlining a process through which the stakeholders and GGI may engage and support one another. Commitment to developing relationships with stakeholders will build capacity in both Project staff and stakeholders, ultimately resulting in the creation of a network for managing issues related to personal or community-level conflict and influx and identification of opportunities for community investment.

5.1 Stakeholder Roles and Responsibilities

It is the responsibility of GGI to establish a clearly defined framework for stakeholder engagement. It is the responsibility of each stakeholder to assert themselves in the engagement process. The burden of organizing and identifying priorities specific to each stakeholder is placed on the stakeholders themselves. However, as internal GGI capabilities grow, GGI will work initially with each community to prioritize issues or concerns, define their identity and organize by common issue or concern, establish methods and rules for internal communications, and identify representatives for focused communications with GGI. It is important that these activities take place in each respective community and that the community members select their own representatives.

Preliminary community-based stakeholders identified for the Project include the following (see Section 2.2 for descriptions):

- Communities of Buckhall, Bartica, and Aranka Mouth: Individual residents as well as formal and informal community groups and local government representatives.
- Amerindian communities: Kurutuku is the closest Amerindian community to the project site though Amerindians from other communities also may be considered stakeholders.
- Artisanal and small scale miners (ASMs): ASMs in Aranka Mouth as well as transient ASMs found throughout the region.

Preliminary non-community-based or external stakeholders identified for the Project include (see Section 2.2 for descriptions):

- NGOs: Local, national, and international organizations with interests within the area of influence, may or may not have a relationship with local communities.
- Federal government representatives: Guyana Geology and Mines Commission, Ministry of Natural Resources and the Environment, and other bodies with interest in labour, transportation, infrastructure development, mining, and natural resources.
- Corporate partners: Barama and other corporate partners involved in business processes.

As these non-community based/external stakeholder groups are assumed to be established organizations, GGI will not assist with their organization. Although it is the responsibility of GGI to establish a framework for stakeholder engagement, it is the responsibility of these active stakeholder groups to assert themselves in the process. It is expected that, when possible, representatives from these groups will engage the process in and through the established Stakeholder Committees at the village level.

During the initial stages of the next phase of the Project, population densities are not expected to be at a level that will support the development and operation of the full scale stakeholder process outlined in Section 6. However, the GGI CSR Manager and CROs will engage representatives from the above stakeholder groups to begin to develop relationships in support of the formation of Stakeholder Committees. Further discussion of roles and responsibilities for each stakeholder is presented in the following sections.

5.2 Stakeholder Committees

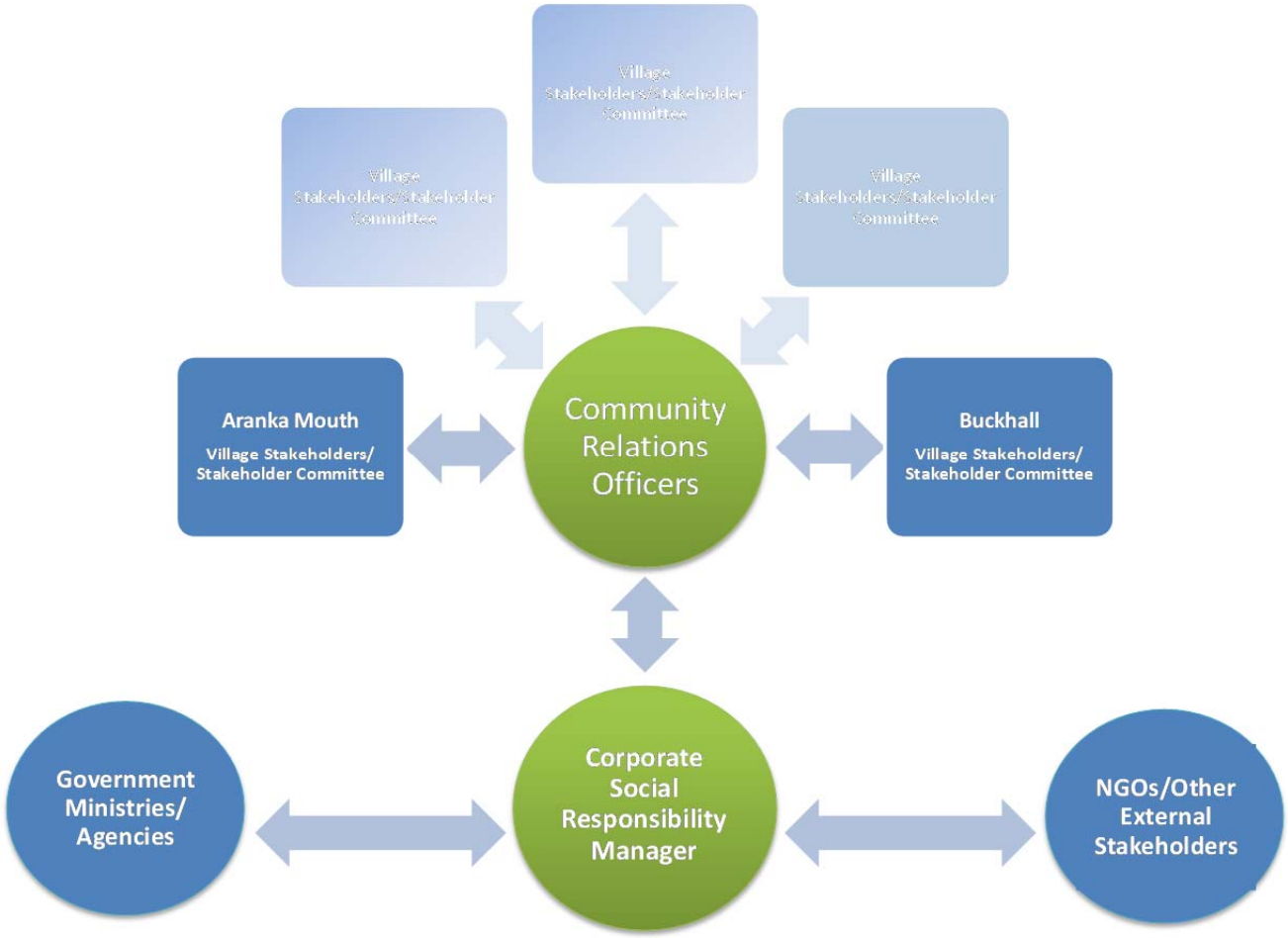
To facilitate communications and establish productive, working relationships, several committees will be formed reflecting various levels of community engagement. As shown in **Figure 5.2-1**, the CRO functions at the ground level with direct communications with stakeholders. The CRO is the conduit between the stakeholders at the Project location and affected areas and the CSR Manager based in Georgetown. As the settlements surrounding the Project experience growth, there will likely be a need for formation of Stakeholder Committees within each village (Buckhall, Bartica, Aranka Mouth, and Kurutuku). Ultimately, the Stakeholder Committees will communicate regularly with the CRO.

The role of each committee is summarized below.

- Stakeholder Committee (potential future development): The Stakeholder Committees will consist of community-selected representatives and will meet with their community on a regular basis, determined by the community. The Stakeholder Committee role is to engage the community and identify and resolve issues or concerns raised by community members. Issues may be grievances related directly to the Project or other stakeholder groups or concerns regarding influx or other indirect effects of the Project. The Stakeholder Committees will assess the issue or concern and may resolve the matter or agree to raise the issue or concern with the CRO. In some cases, resolution may take the form of an opportunity for community improvement or development.

- Community Relations Officer: The CRO will consist of representative(s) of the Aurora Mine Project and will initially meet with individual stakeholders, and later the Stakeholder Committees, on a regular basis to be informed of community issues and concerns and to pass down relevant news from corporate GGI staff to the stakeholders. Meetings also may consist of additional training provided to stakeholders and/or Stakeholder Committee members, who in turn will share the information with their respective communities. The CRO will work with stakeholders (later, Stakeholder Committees) to resolve issues and concerns, including identifying opportunities for community improvement.

Figure 5.2-1. Relationships between Corporate Stakeholder Management and Stakeholders



- Corporate Social Responsibility Manager: The CSR Manager will consist of representative(s) of GGI and will meet with the CROs on a regular basis to be informed of community issues and concerns. The CSR Manager and CROs will identify issues and concerns that warrant further action. Recommendations and resolutions will be shared with the individual stakeholders (later, Stakeholder Committees) who, in turn, will implement the resolution to the maximum extent possible.

Amerindians within Kurutuku will engage with the CROs through their self-identified representatives. If there is interest in regular engagement with GGI by the Kurutuku residents, then the CROs will work with residents to establish an Stakeholder Committee to facilitate communications and interactions. If Amerindians from other parts of Guyana not represented by an existing stakeholder group present themselves to Project staff, they will be encouraged to contact the CRO for assistance.

5.3 Relationship Between Committees, External Stakeholders, and General Public

The level of engagement between the committees, stakeholders, and the general public will vary depending on level of interest or concern and likely will change over time. As described in Section 5.2, interactions will occur through committees, and while information will flow in both directions, interactions (i.e., issue resolution) will be focused at the community level. With CRO assistance, stakeholders (Stakeholder Committees) will be encouraged to manage issues and concerns to the greatest extent possible.

Modifications to the approach described above will be necessary when responding to issues or concerns from non-community-based stakeholder groups, such as NGOs, government agencies, corporate partners, and the general public. For example, if GGI is approached by a government agency or corporate partner (i.e., Barama), the CSR Manager will work directly with the agency or partner. Initially, the CRO will respond to inquiries by NGOs and ASMs and will determine if and how local stakeholders should be consulted in responding to external inquiries.

Once Stakeholder Committees are established, NGOs or ASMs wishing to engage GGI will be referred to the Stakeholder Committees who will then determine if the issue or concern will be raised with the CRO. Similarly, if members of the general public approach GGI with an issue or concern, they will be referred to Stakeholder Committees to engage in the established process for all other stakeholders.

5.4 Public Awareness / Public Information Campaign

A critical component of the community relations program is public education and awareness. It will be necessary to educate stakeholders on the life cycle of the Project and begin training proximal villages on relevant health, safety, and influx management practices.

Initial engagement with stakeholders should be consistent with the Communications with Stakeholders SOP and IFC guidance on Stakeholder Engagement (IFC 2007).

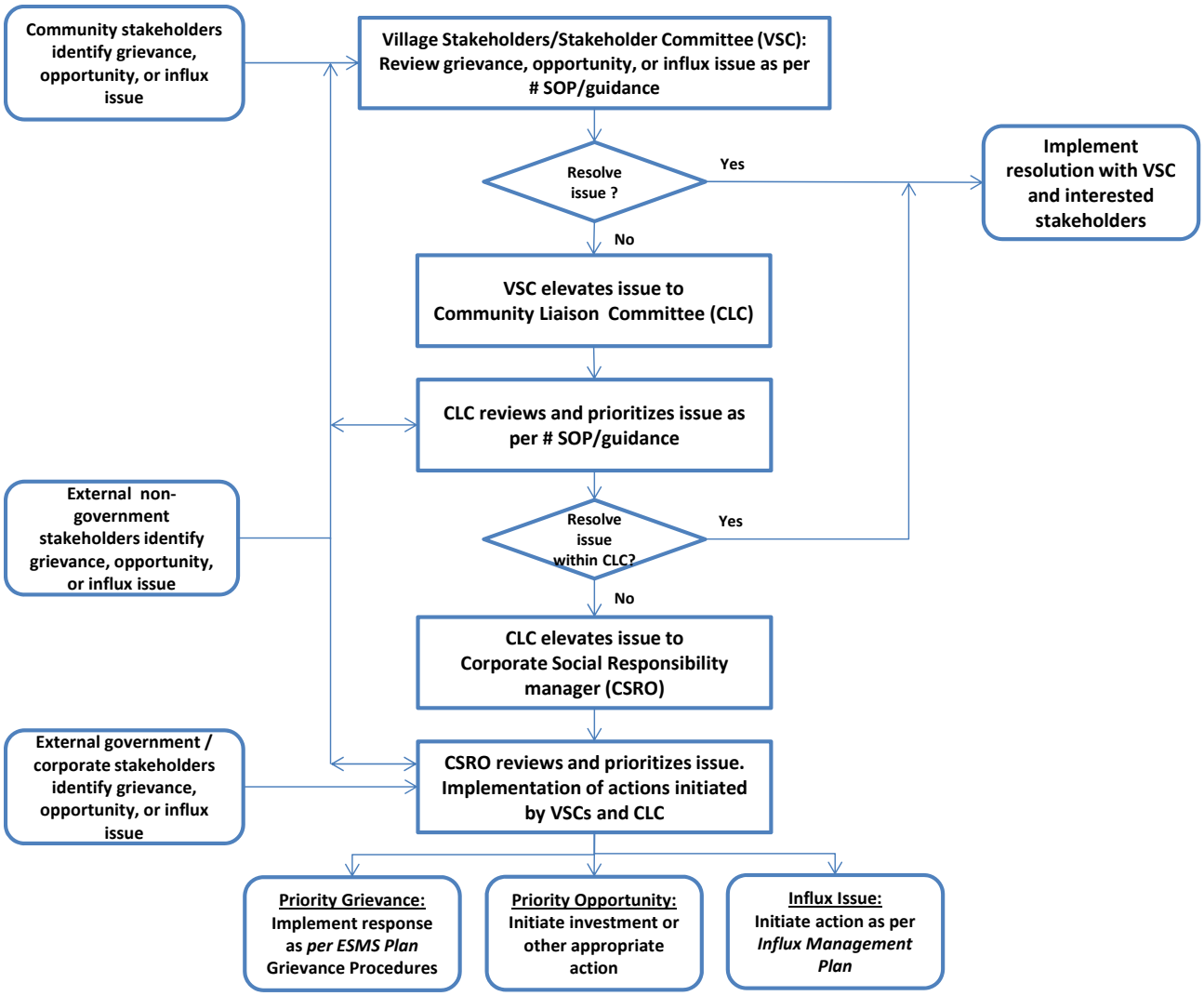
6 Community Engagement

The process for community engagement is generally described in Sections 5.2 and 5.3 and will be discussed further in this section.

6.1 Engagement Process / Sequence

Engagement of stakeholders will be initiated within 90 days of the start of the next phase of the Project (as outlined in Section 4.4); engagements focused on specific health and safety topics will follow the general guidance of GG-35, "Community Health and Safety Awareness Meetings." Stakeholder mapping initially occurred as part of the (ERM 2010) ESIA and as part of the NewFields health analysis in 2009 (IFC, 2009). Subsequent steps will build on these mapping results to establish the framework for engagement within and between the stakeholder groups, CRO, and CSR Manager. The overall process for engagement is presented in the following paragraphs and outlined in **Figure 6.1-1**.

Figure 6.1-1: Process for Stakeholder Engagement.



6.1.1 Engagement Process - Individual Stakeholders and Stakeholder Committees

At a minimum, Stakeholder Committees will be established for Buckhall and Aranka Mouth, as described in Section 5.2; however, if growth of other settlements or other circumstances warrants more formal interactions, the CSR Manager and designated CROs will work with other individual stakeholders to establish additional Stakeholder Committees. Following establishment of the Stakeholder Committees, communications with individual stakeholders by the Stakeholder Committees will occur on a relatively frequent basis, as the Stakeholder Committees are intended to include members of the community. In this way, the Stakeholder Committees should be able to monitor activities and sentiments within their respective villages or settlements and will be able to identify and be responsive to issues and concerns at the earliest possible time.

The Stakeholder Committees will represent their village, and in addition to informal communications will be encouraged to hold regularly scheduled meetings at least twice annually (or more frequently as needed). At this time, individuals may present the Stakeholder Committees with issues and concerns or opportunities for community development (see **Figure 6.1-1**). During the regularly scheduled meetings, the Stakeholder Committees will rank, and when possible resolve, issues or concerns according to the priorities established by the village and will communicate the issues to the CRO.

Meetings also may be used as an opportunity for training and skills development. The CROs will work with the leadership of the Stakeholder Committees to prioritize training needs and will arrange for skills development and leadership training, to be documented in accordance with GG-06, “ESMS Training Program.” Initial training likely will focus on the meeting process and the use of various organizational tools and techniques for prioritizing proposals or action items.

6.1.2 Engagement Process - Village Stakeholders and CROs

Village stakeholders will be invited to meet with the CROs at regularly scheduled biannual meetings to share specific issues and concerns from the villages. The CROs will work with the stakeholders and the Stakeholder Committee to arrive at a resolution that can be practically implemented. Issues that cannot be resolved between the villagers (Stakeholder Committees) and CROs will be raised with the CSR Manager and grievances will be addressed by company representatives in accordance with GGI’s established grievance procedures (see *ESMS Plan* Appendix B; see also **Figure 6.1-1** and Section 6.1.3).

Such meetings may include education and training, particularly regarding health, safety, and influx management. Education and training services will be provided by the CROs to the village Stakeholder Committees, who in turn, will be charged with training others in their villages. Village stakeholders and Stakeholder Committees may also provide feedback on the engagement process, and protocols for engagement may be revised and refined, as necessary.

6.1.3 Engagement Process - CROs and CSR Manager

Following each meeting with the village stakeholders and Stakeholder Committees, the CROs will generate a written meeting summary, which will be transmitted to the CSR Manager and discussed, generally within two weeks’ time. During the meeting, the CRO and CSR Manager

will prioritize issues and concerns and assess opportunities for development. High priority, time-critical issues or concerns will be acted upon immediately.

When time-critical issues or concerns are raised either at the time of occurrence or as a result of a meeting between the village stakeholders/ Stakeholder Committees and CROs, the CROs and CSR Manager will meet immediately to discuss a resolution and initiate action, as necessary. To the maximum extent possible, resolutions will be implemented by the village stakeholders/ Stakeholder Committees with support from the CROs (see **Figure 6.1-1**).

In the absence of any issues requiring a time-critical response, the CROs and CSR Manager will meet in-person on at least a quarterly basis. During these meetings, the CROs are encouraged to share suggestions for modification or improvement to the engagement process based on Project and stakeholder needs.

The CROs may also share pertinent information obtained from other sources, including issues or concerns shared by Project operations, maintenance, exploration, and administrative staff, as well as transporters, and any external stakeholder group. The CRO position is critical to the early identification and response to issues and concerns that may affect Project operations, and as such, must be provided sufficient resources to maintain and document communications with village stakeholders and the Stakeholder Committees.

6.2 External Stakeholders

External stakeholders (e.g., ASMs, NGOs, government agencies) also may wish to engage with the Project. To the greatest extent possible, the process for communications will be handled as shown in **Figure 6.1-1**. Initially, external stakeholder queries or complaints will be address via the grievance process documented in **Appendix B** of the *ESMS Plan.*

6.2.1 Groups or Individuals Engaged in ASM

The CROs will work with individuals or groups engaged in ASM who may approach Project staff with specific issues or concerns. The CROs will offer information about the Project and will encourage the ASMs to work within the existing engagement process (i.e., consult with the village stakeholders or Stakeholder Committees) to obtain further information, education, and training, or to address issues or concerns.

ASMs seeking employment will initially be directed to GGI's Georgetown office and will be advised with respect to GGI's hiring policies.. In future, GGI may consider working with the Stakeholder Committees to develop periodic job fairs or job training events. These events would be developed and presented by the Stakeholder Committees and would potentially focus on preparation for the hiring process, guidance on how to complete application paperwork, tips on how to present oneself for an interview, and other useful information.

6.2.2 External NGOs

External NGOs may include the Amerindian Action Movement of Guyana, Guyana Organization of Indigenous Peoples, APA, CI, Iwokrama Rainforest Programme, The National Trust of Guyana, and others. While NGOs may represent stakeholders at every level from local villages to international communities, they will be provided information on the existing communication

framework and encouraged to engage with the Project on the same terms as other stakeholders.

Initially, external NGO enquiries will be addressed by the CROs and/or CSR Manager, who will provide information on the Project and process shown in **Figure 6.1-1**. Specific grievances will be processed as noted in GGI's grievance procedures (see *ESMS Plan* Appendix B). Depending on the nature of the issue and associate regulatory considerations, the CSR Manager may coordinate an introduction to local stakeholders and permit the NGOs to raise their issues and concerns directly with villagers. At that point, the issues and concerns will be evaluated by the village stakeholders/Stakeholder Committees. In this way, it will be the NGO's responsibility to convince the village stakeholders/Stakeholder Committees of the merit of their issues or concerns and the village stakeholders/Stakeholder Committees will be empowered to play a role in activities exerted by external stakeholders that may directly or indirectly affect their community.

6.2.3 Other External Stakeholders (e.g., Ministries of Government, Corporate Partners)

Other external stakeholders, including government ministries and corporate partners, will be engaged at the level of the CSR Manager. Issues or concerns raised by these groups may directly affect business conduct or may have broad-scale impacts and will be addressed by the CSR Manager and other corporate managers.

When issues or concerns are raised that will directly or indirectly affect individual village stakeholders, then the external stakeholders will be encouraged to engage the village stakeholders/Stakeholder Committees according to the process shown in **Figure 6.1-1**. Again, there will be an emphasis on empowering individual village stakeholders/Stakeholder Committees to make decisions and take action on matters that will directly affect them.

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Influx Management Plan

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Guyana Goldfields, Inc.
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Prepared by:
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Washington, DC
Seattle, WA

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Page	Section	Description of Change
All	All	First issue of *Influx Management Plan*

*Note: Cover photo from (Duplaix, 2009); see **Appendix 4A**, (ENVIRON, 2013)

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Acronyms

ASM	Artisanal/Small-scale Mining
EPA	(Guyana) Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GGI	Guyana Goldfields, Inc.
GGMC	Guyana Geology and Mines Commission
HIV/AIDS	Human Immunodeficiency Virus Infection / Acquired Immunodeficiency Syndrome
IFC	International Finance Corporation
PDAC	Prospectors and Developers Association of Canada
SOP	Standard Operating Procedure

1 Introduction

1.1 Purpose and Scope of *Influx Management Plan*

As a matter of policy[1] , Guyana Goldfields, Inc. (GGI) is committed to taking proactive measures to minimize the environmental and social impacts associated with the Aurora Gold Project (the Project) , especially where such impacts could affect the safety and well-being of the Project workforce or its external stakeholders. In addition, the Environmental Permit (Guyana EPA, 2010) for the Project specifically requires that GGI endeavor to restrict human influx to the Project area. This request is understood to be based on governmental concerns over the environmental and social impacts that historically have typically been associated with such influx. This *Influx Management Plan* is designed to address these concerns, in conjunction with the Project's *Community Relations Management Plan*, standard operating procedure (SOP) GG-40, "Site Security", and other Project Environmental and Social Management System (ESMS) elements. Collectively, these documents will help identify actions and procedures that GGI can reasonably implement in the near term as well as in the future, as influx patterns, associated opportunities and potential social strains become more evident.

The *Influx Management Plan* considers the general guidance provided by "Projects and People: A Handbook for Addressing Project-Induced In-Migration" (IFC, 2009) and other widely accepted principles that support the proactive, participatory engagement of the communities directly affected by the Project in developing appropriate management approaches and specific response actions. By proactively engaging members of the community, involving them in decision processes, and allowing them to share the responsibilities of implementation and response, GGI hopes to create a participatory "team" dynamic, which should enhance its "social license to operate." The *Influx Management Plan* also builds on GGI's existing capacity and many years of experience in dealing with influx issues in the area of the Project, and is designed to ensure that capably trained individuals are in place and appropriate planning conducted prior to the onset of specific or increased levels of influx.

The initial environmental and social impact assessment (ESIA) for the Project (ERM, 2010) concluded that "*the main potential social risks include the influx of people to the mine site and wharf areas, in search of employment or other economic opportunities, leading to the establishment of squatter camps or informal settlements."* Additional studies performed in 2010 and 2012 confirmed these conclusions, as documented in Section 6 of the updated ESIA for the Project (ENVIRON, 2013). For the purposes of this *Influx Management Plan*, influx is therefore understood to include:

- in-migration in response to perceived legitimate economic opportunities associated with the construction and operation of the Project and the presence of the Project workforce (e.g., shops selling food or consumer goods);

- increased interest by transient or semi-transient individuals or groups involved in artisanal and small-scale mining (ASM), who may be prompted by the level of activity at

[1] See Section 2 of the GGI *Environmental and Social Management System Plan (ESMS Plan).*

the Aurora, Tapir Crossing, and Buckhall sites to undertake ASM activities in or adjacent to GGI's licensed concession; and

- potentially, criminal elements who may be drawn to the Project area, hoping to prey on local residents or migrants and engage in illegal activities, such as drug dealing, prostitution, arms smuggling, poaching of wild animals, and other potentially dangerous and undesirable activities.

Each of these influx constituencies is motivated by a different objective, poses a different threat or opportunity to the Project's operating environment, and requires different management or response strategies that recognize the practical and legal limitations of GGI's resources and capabilities.

1.2 Relationship to ESMS and ESIA Process

GGI has established an ESMS for the Project, which is embodied in a Project-specific *ESMS Plan*. The *ESMS Plan* is based on the requirements of the International Finance Corporation (IFC) Performance Standard 1 (PS 1, "Assessment and Management of Environmental and Social Risks and Impacts")[2], and other internationally recognized best management practices for environmental and health and safety (EHS) and social program management. The *ESMS Plan* will be periodically updated at specific points or phases in the mine life cycle in response to changing Project conditions and management needs.

This *Influx Management 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 EHS and social impacts, and will support the final ESIA prepared for the Project in accordance with IFC requirements (ENVIRON, 2013). **Figure 1.2-1** depicts the relationship of the *Influx Management Plan* to the overall structure of the Project ESMS; see Section 1.2 of the *ESMS* Plan for additional details.

1.3 Change Management

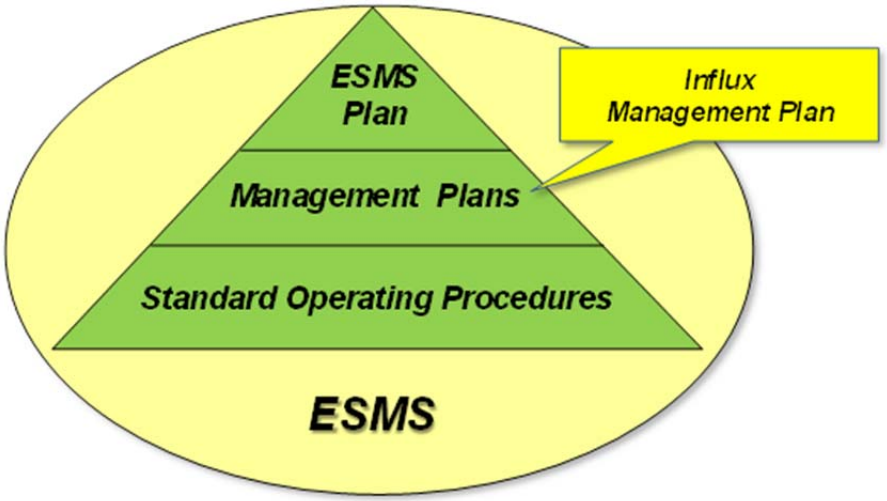
The *Influx Management Plan* will be periodically evaluated, updated, and re-issued in response to changing Project conditions and changing EHS and social management needs, in accordance with Section 1.3 of the *ESMS Plan*.

1.4 Plan Structure

Section 2 of this *Influx Management Plan* summarizes the potential influx-related risks that are associated with the major physical components of the Project, i.e., the Aurora Mine site, the Buckhall river port and logistics support facility, the Barama (M3) road and Aurora M3 road extension, and the barge ferry at Tapir Crossing. Section 3 presents the strategy for addressing in-migration in response to perceived legitimate economic opportunities. Section 4 discusses strategy for responding to increased interest by groups or individuals engaged in ASM. Section

[2] See (IFC, 2012), "IFC Performance Standards on Environmental and Social Sustainability"

Figure 1.2-1. Position of Influx Management Plan in ESMS Document Hierarchy



5 discusses the necessarily limited actions that may be taken GGI staff in response to influx that involves firearms possession or observations of potentially illegal activities. Section 6 summarizes an array of resources materials that may be considered in future iterations of this *Influx Management Plan.*

2 Influx-related Risks and Impacts

2.1 Background

The government of Guyana, in granting the initial environmental permit for the Project, specifically stated in the terms and conditions that GGI will "*actively discourage the influx of people into the mining concession and not allow outsiders to settle on its periphery.*" The results of the (ERM, 2010) and (ENVIRON, 2013) ESIA studies suggest that the following are the primary concerns underlying the terms included in the permit:

- lack of public infrastructure and services that would be capable of supporting a large influx;
- associated health/disease risk, e.g., waterborne diseases, malaria, Human Immunodeficiency Virus Infection / Acquired Immunodeficiency Syndrome (HIV/AIDS), and other sexually transmitted diseases (STDs);
- threat of criminal in-migration from Venezuela and Brazil; and
- potential for environmental damage and contamination associated with increased ASM.

In response to these concerns, and in accordance with suggested responses provided by the International Finance Corporation (IFC) review of (ERM, 2010), GGI has already initiated the following actions and procedures:

- Project hiring activities are strictly confined to GGI's headquarters office in Georgetown. Applications will not be accepted at the Aurora or Buckhall sites or by any GGI personnel working outside of the Georgetown offices.
- Project workers will:
  - live in company-designated housing;
  - eat at company-designated mess halls;
  - travel in company or company-chartered vehicles to and from the worksites and living areas;
  - be prohibited from regular interactions with the affected communities, with the exception of specific interactions that may be authorized at Buckhall under the Project *Community Relations Management Plan*; and
  - adhere to an IFC-approved corporate conduct policy, as documented in the "Labour Grievance Procedure" appended to the Project *ESMS Plan*.

The final updated ESIA (ENVIRON 2013) determined that only two areas (the Buckhall community, immediately north of GGI's Buckhall logistics support facility, and the informal ASM community at Aranka Mouth) will be directly affected by the current scope of the project, with respect to potential social impacts.

While near term efforts will focus on building stakeholder relationships in these communities, it should expected that during the course of the 20 year life of the Project, additional influx may occur in other areas close to the Project's geographical components as noted in Section 1.4, and as a consequence, changes to this *Influx Management Plan* may be required.

2.2 Influx Characteristics, Potential Severity and Probability of Impacts, and General Considerations for Management/Mitigation

The general characteristics of the types of influx anticipated at each of the major geographical components of the project are summarized in Table 2.2-1, along with a general ranking of the impact (major or moderate), its severity and likelihood (high, medium, or low), and general considerations for managing or mitigating the impact.

Table 2.2-1: Influx Characteristics, Potential Severity and Probability of Impacts, and General Considerations for Management/Mitigation

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
Aurora Site	Increased resource pressure from ASM or squatter activities (biodiversity, land, water, forest use)	**Major (high severity)**	medium	• Report to Security Manager per GG-40 for evaluation and referral to Guyana Police Force (GPF) as appropriate • Prohibit commercial and social interactions by workforce, and advise ASM/squatter groups • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan* • Advise ASM groups on hiring policy restrictions, as appropriate
	ASM or squatter-related surface/groundwater contamination (TSS/turbidity, Hg, petroleum hydrocarbons)	**Major (high severity)**	medium	• Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Prohibit public access to the Aurora Solid Waste Landfill • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan*

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
Aurora Site	Creation of health/sanitation issues from ASM or squatter encampments	**Major (high severity)**	medium	• Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Prohibit public access to the Municipal Solid Waste Landfill • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan*
	Direct endangerment of Project staff or contractors from armed individuals or groups or armed conflicts	**Major (high severity)**	low	• Report observations of firearms and/or illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate
	Increased potential for use of drugs and alcohol, prostitution, potential increase in HIV/AIDS or other sexually transmitted diseases (STDs) from ASM or squatter encampments	Moderate (medium severity)	medium	• Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Prohibit commercial and social interactions by workforce, and advise ASM/squatter groups on policy • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan* • Promote and implement health awareness campaigns among workers and contractors, as well as Aranka Mouth community

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
M3 Road and Extension to Aurora Site	Increased resource pressure from ASM or squatter activities (biodiversity, land, water, forest use)	**Major (high severity)**	medium	• Report to Security Manager per GG-40 for evaluation and referral to Guyana Police Force (GPF) as appropriate • Prohibit commercial and social interactions by workforce, and advise ASM/squatter groups • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan* • Advise ASM groups on hiring policy restrictions, as appropriate
	ASM or squatter-related surface/groundwater contamination (TSS/turbidity, Hg, petroleum hydrocarbons)	**Major (high severity)**	medium	• Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan*
	Direct endangerment of Project staff or contractors from armed individuals or groups, or from armed conflicts	**Major (high severity)**	low	• Report observations of firearms and/or illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate
	Increased potential for use of drugs and alcohol, prostitution, potential increase in HIV/AIDS or other sexually transmitted diseases (STDs) from ASM or squatter encampments	Moderate (medium severity)	medium	• Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Prohibit all commercial and social interactions by workforce in transit, in accordance with *Transportation Management Plan*

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
	Increased potential for traffic accidents and traffic-related noise, dust, petroleum hydrocarbon spills	Moderate (medium severity)	medium	• Prohibit unauthorized non-Project use of M3 road extension • Report unauthorized vehicles to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Manage road traffic per *Transportation Management Plan*
Tapir Crossing	Potential river traffic issues form operation of Tapir Crossing barge (increased potential for boating accidents, or usage/service demands)	Moderate (medium severity)	medium	• Prohibit use of ferry except in medical or humanitarian emergencies • Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Prohibit all commercial and social interactions by workforce in transit, in accordance with *Transportation Management Plan* • Suggest participation in Aranka Mouth Stakeholder Committee per *Community Relations Management Plan*

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
Barama (M3) Road	Increased resource pressure from ASM or squatter activities (biodiversity, land, water, forest use)	**Major (high severity)**	medium	• Report to Barama security • Report illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate
	ASM or squatter-related surface/groundwater contamination (TSS/turbidity, Hg, petroleum hydrocarbons)	**Major (high severity)**	medium	• Report to Barama security • Report illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate
	Increased potential for use of drugs and alcohol, prostitution, potential increase in HIV/AIDS or other sexually transmitted diseases (STDs) from ASM or squatter encampments	**Major (high severity)**	medium	• Report to Barama security • Report illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Prohibit all commercial and social interactions by workforce in transit, in accordance with *Transportation Management Plan*
	Direct endangerment of Project staff or contractors from armed individuals or groups, or from armed conflicts	**Major (high severity)**	low	• Report to Barama security • Report observations of firearms and/or illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
Barama (M3) Road	Increase in opportunistic economic activities (shops, lodging, roadside eateries, bars, brothels)	Moderate (medium severity)	medium	• Report to Barama security • Report to Security Manager per GG-40 for evaluation, and referral to GPF as appropriate • Prohibit all commercial and social interactions by workforce in transit, in accordance with *Transportation Management Plan*
	Increased potential for traffic accidents and traffic-related noise, dust, petroleum hydrocarbon spills	Moderate (medium severity)	medium	• Manage transportation to Aurora site in accordance with *Transportation Management Plan*

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
Buckhall area	Increased potential for use of drugs and alcohol, prostitution, potential increase in HIV/AIDS or other STDs	**Major (high severity)**	medium	• Report illegal activities to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Restrict commercial and social interactions by workforce to those activities or enterprises specifically agreed upon by Stakeholder Committee and CRO, per *Community Relations Management Plan*
	Direct endangerment of Project staff or contractors from armed individuals or groups, or from armed conflicts	**Major (high severity)**	low	• Report to Security Manager per GG-40 for evaluation and referral to GPF as appropriate • Report to CRO and Camp Manager for further action or discussion with Stakeholder Committee, per *Community Relations Management Plan*
	Increase in opportunistic economic activities (shops, lodging, roadside eateries, bars, brothels)	**Major (high severity)**	medium	• Restrict commercial and social interactions by workforce to those activities or enterprises specifically agreed upon by Stakeholder Committee, CRO, and Camp Manager, per *Community Relations Management Plan*

Project Area	*Influx-affected Event/Activity*	*Potential Impacts on Project*		*Management/Mitigation Considerations*
		Impact and Severity	*Likelihood*	
Buckhall area	Deterioration of health/sanitation	**Major (high severity)**	medium	• Promote and implement health awareness campaigns among workers and contractors, as well as Buckhall community • Prohibit direct access to Buckhall landfill, except as authorized by Stakeholder Committee and CRO, per *Community Relations Management Plan*
	Increased potential for traffic accidents and traffic-related noise, dust, petroleum hydrocarbon spills	Moderate (medium severity)	medium	• Promote and implement traffic safety awareness campaigns among workers and contractors, as well as Buckhall community • Manage transportation to Aurora site in accordance with *Transport*ation Management Plan

3 Opportunistic Economic Influx

For the purposes of this *Influx Management Plan*, two types of economic in-migration are considered. The first is characterized by individuals in search of direct employment. The second is characterized by individuals or groups who come to establish legitimate businesses to support or respond to the perceived needs of the Project workforce. Illegitimate enterprises by definition may endanger the health and well-being of the Project workforce or community residents. They will not be encouraged in any manner, and are addressed separately in Section 5 below.

For those seeking work with GGI, uniform hiring practices have already been established. All interviews and hiring actions are conducted in the GGI Georgetown office. All employment applications must be originated in Georgetown, with no exceptions.

The final updated ESIA (ENVIRON 2013) determined that only two areas (the Buckhall logistics support facility and the informal ASM community at Aranka Mouth) will be directly impacted by the current scope of the project. In this iteration of the *Influx Management Plan*, GGI does not anticipate supporting the development of any opportunistic economic activity associated with the Aranka Mouth ASM community, as in keeping with the terms of the Environmental Permit, it is in GGI's interest to minimize the attractiveness of the Project with respect to ASM or any other influx. GGI will only support economic development in and around the Buckhall logistics support facility, and only to the extent that those activities that have been determined by the Camp Manager, in conjunction with the CRO and the Stakeholder Committee, as being beneficial to the Project and GGI employees, as well as the members of the Buckhall community. Individuals seeking to establish legitimate business activities for which GGI or GGI employees might be a potential customer shall be advised that GGI employees are not permitted to engage in any commerce at the Aurora site, at any point along the M3 corridor, or at Tapir Crossing. Commercial activity at Buckhall is limited to those activities specifically agreed upon by the Buckhall Camp Manager, Community Relations Officer (CRO), and Stakeholder Committee members, within the context of the Project's *Community Relations Management Plan*. The concept of the CRO and Stakeholder Committees allows for GGI to establish relationships and build capacity with existing stakeholders before any further influx occurs. As the CROs reach out to individuals, establishing linkages and creating relationships in the Buckhall and Aranka Mouth communities through various means, GGI will be building a network that can assist with influx monitoring and management.

All encounters with individuals seeking economic opportunities at the Aurora site, Tapir Crossing, or Buckhall will be documented on the form shown in **Figure 3.0-1**. The form will be submitted to the Camp Manager for review, with copies provided to the Security Manager, Health and Safety Officer, and CRO for their appropriate action. A copy shall also be retained on file in accordance with GG-05, "Records Management." Copies of encounters occurring in transit to Buckhall or to the Aurora site will be documented on the trip log described in the Project *Transportation Management Plan.*

4 ASM Influx

ASM has occurred in Guyana and in or near the footprint of the Project for well over a hundred years. Legal and illegal ASM activities are known to occur along the Cuyuni River and its tributaries in the general area around Project operations, and have had a profound negative impact on the environment and have exacerbated a range of social issues. As the Project progresses, there is a potential for additional ASM influx that may be stimulated by (and could potentially conflict with or negatively impact) the Project. ASM may also be expected to continue in and around established ASM communities outside the Project's direct area of influence for the life of the mine.

The government of Guyana, in granting the initial environmental permit for the Project, specifically stated in the terms and conditions that GGI will "*actively discourage the influx of people into the mining concession and not allow outsiders to settle on its periphery*" Guyana EPA, 2010). These terms are clear as to the required response when new ASM activities are discovered in or near the mining concession: these activities may be illegal, should be discouraged if possible, and should be reported to the GPF and/or other Guyanese governmental authorities. It should be noted, however, that the Guyana Geology and Mines Commission (GGMC) (the lead institution in charge of providing reconnaissance, exploration, prospecting guidelines and mining licenses) has adopted a position that all "significant" ASM activities are based on legal claims. In January 2012, the Minister of Natural Resources and Environment met with an ASM groups in Bartica (Regions 7) to discuss the initiation of the "Small Miner Policy Support Plan" as a way to create a "nexus between large and small scale mining" and the beginning of a national exercise of "interfacing and interacting with stakeholders of the natural resource sector." As this initiative introduces some uncertainty into what can be considered legal or illegal ASM, GGI will monitor the scope of this initiative to determine how and to what extent the Project should participate. In the meantime, however, the conditions of GGI's Environmental Permit should be considered to take precedence.

Figure 3.0-1: Influx Observation Report Form

Influx Observation Report

This form is to be completed in order to document any observed artisanal mining or squatter activity either on or near the Aurora Site. The form is to be completed by the Site Security Manager and maintained in accordance with guidance outlined in GG- 40, "Site Security Management." Copies of the report are to be provided to the Community Relations Officer, Health and Safety Officer, and to the Camp Manager.

Date of Report:_____ **Date of Observation:** _____

Describe the location where influx was observed. Please provide any distinguishing features (e.g., crossroads, major land marks, proximity to shops or known camps)

_____

_____

_____

Describe the People You Observed

Number of Males _____

Names/Ages/Distinguishing Features_____

Number of Females _____

Names/Ages/Distinguishing Features_____

Did you see any vehicles or equipment (e.g., boats, tractors, ATVs, front loaders) YES NO
If YES, what type? _____

Was anyone armed, or did you observe weapons at the site? YES NO
If YES, what type and how many?

_____

Did speak with any individual(s) YES NO

If yes, please summarize the conversation

_____

_____

RECOMMENDATIONS FOR FOLLOW UP:

_____

_____

_____

Received By: _____ **cc:** Community Relations Officer
Camp Manager Health and Safety Officer
Security Manager

Increased ASM activity near the geographical components of the Project may be observed by CROs, members of the Aranka Mouth or Buckhall Stakeholder Committees (as noted in the *Community Relations Management Plan*, or the GGI or contractor workforce as they go about their daily routines. Stakeholder Committee members should actively encourage all residents who observe new ASM activity to immediately report such observations to the CRO or to a Stakeholder Committee representative. The CRO should then report the incident to the Security Manager (as per GG-40 "Site Security") and to the responsible Camp Manager and Health and Safety Officer.

GGI employees who observe new ASM incursions near the Aurora, Tapir Crossing, or Buckhall sites should report the activity immediately. Contacts shall be documented on the Influx Observation Report form (see **Figure 3.0-1**). The form will be submitted to the Aurora Camp Manager for review, with copies provided to the Security Manager, Health and Safety Officer, and CRO for their appropriate action. A copy shall also be retained on file in accordance with GG-05, "Records Management." Copies of encounters occurring in transit to Buckhall or to the Aurora site will be documented on the trip log described in the Project *Transportation Management Plan.*

The CRO, the Camp Manager or the Site Security Manager may engage individuals, or groups of individuals who are observed conducting ASM activities. If such activities are being conducted within the boundaries of GGI's A1 Mining License at Aurora, they will be advised that the are encroaching on GGI's license and will be requested to cease activities. If they express an interest in employment, they may be advised to make an application through GGI's Georgetown office. They will be advised with respect to the activities of the Stakeholder Committee at Aranka Mouth and may be invited to participate in the activities of the Committee. Finally, they will be informed that any continued activity within the Mining License area may be illegal and will be referred to the GPF for resolution.

5 Observations of Criminal Activity

Any observations of criminal activity constitutes a potential security breach as well as a health and safety risk, and shall be immediately reported to the Security Manager in accordance with GG-40, "Site Security." If armed individuals are observed, leave the area immediately without any attempts to engage in conversation. The Security Manager shall in turn inform the responsible Camp Manager, Health and Safety Officer, and other GGI management representatives in order to determine the most appropriate course of action. The GPF or other Guyanese Government representatives should also be contacted as appropriate for the situation. Criminal activities may include: drug dealing or smuggling; prostitution; arms smuggling; poaching of wild animals; illegal logging; theft of fuel, equipment, or materials; and other potentially dangerous and undesirable activities.

The Site Security Manager will also complete an Influx Observation Report Form (Figure 3.0-1) which will be distributed to the Camp Manager, the CRO and corporate as well as Guyanese officials. Copies of the Activity Observation Report will be maintained on file in accordance with GG-05, "Records Management."

6 Additional Resources for Future Plan Refinements

The IFC and other international organizations concerned with mining-related social issues [e.g. Prospectors and Developers Association of Canada (PDAC), United Nations Global Compact, World Vision-Canada, and International Alert] all recognize influx as a natural component of any mine project, and have developed an array of resources to help companies manage the associated environmental and social risks and impacts. The following resources may be considered, as appropriate, in the development of further updates to this *Influx Management Plan:*

- "Projects and People: A Handbook for Addressing Project-Induced In-Migration" (IFC, 2009);
- "Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocols I and II)" (International Committee of the Red Cross, 1977);
- "Code of Conduct for Law Enforcement Officials and Basic Principles on the Use of Force and Firearms by Law Enforcement Officials", accessed at www.uncjin.org/ Standards/Conduct/conduct.html (UN, 1997);
- "Voluntary Principles on Security and Human Rights", accessed at http://www.voluntaryprinciples.org/files/voluntary_principles_english.pdf (Foley Hoag, 2013),

- “Draft Norms on the Responsibilities of Transnational Corporations and Other Business Enterprises with Regard to Human Rights”; accessed at http://www1.umn.edu/humanrts/links/NormsApril2003.html (UNHCR, 2003);

- “International Convention for the Suppression of the Financing of Terrorism”; accessed at http://www.un.org/law/cod/finterr.htm (UN, 1999);

- **“**Natural Resources Minister meets with Region 7 mines officers and rangers”; accessed at http://www.gina.gov.gy archive/ daily/b120123.html (Guyana Government Information Agency, 2012);

- “Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets”; accessed at http://www.scribd.com/doc/16903354/Stakeholder-Engagement-A-Good-Practice-Handbook-for-Companies-Doing-Business-in-Emerging-Markets-May-2007-#fullscreen. (IFC. 2007); and

- “Conflict-Sensitive Business Practice: Guidance for Extractive Industries”; accessed at: http://www.iisd.org/pdf/2005/security_conflict_sensitive_business.pdf. (International Alert, 2005).

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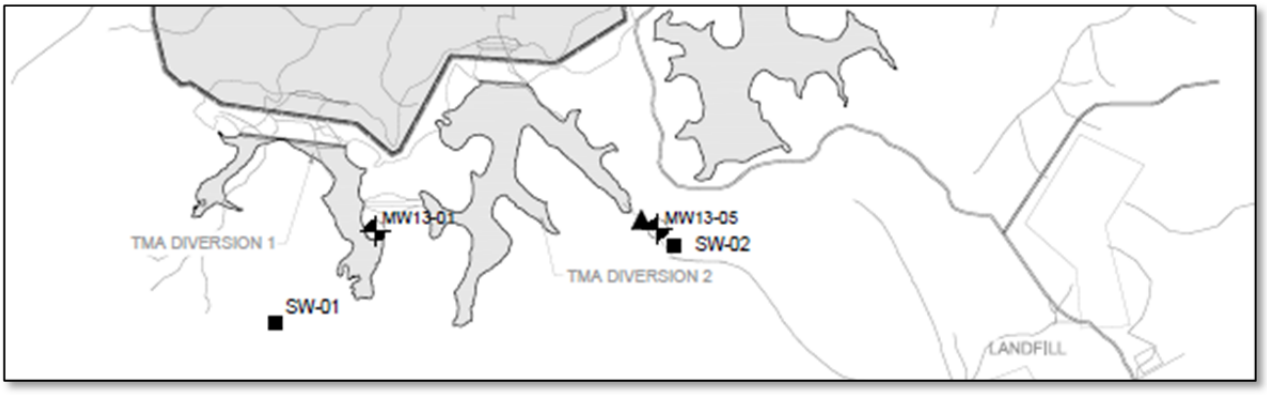
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Environmental, Social, Health, and Safety Monitoring Plan

Aurora Gold Project

Prepared for

Guyana Goldfields, Inc.
Toronto, ON

Prepared by:
ENVIRON International Corporation
Washington, DC
Seattle, WA
Date:
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Project Number:
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All	All	First issue of *Environmental, Social, Health, and Safety Monitoring Plan*

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Acronyms

ARD	Acid Rock Drainage
CIL	Carbon in Leach
CSR	Corporate Social Responsibility
EHS	Environmental, Health, and Safety
EPA	(Guyana) Environmental Protection Agency
ESHS	Environmental, Social, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
FWP	Fresh Water Pond
GIIP	Good International Industrial Practice
GGI	Guyana Goldfields, Inc.
ICMC	International Cyanide Management Code
ICMI	International Cyanide Management Institute
IFC	International Finance Corporation
MWP	Mine Water Pond
NGO	Non-governmental Organization
PS	(IFC) Performance Standard
ROW	Right of Way
TMA	Tailings Management Area
WAD	Weak Acid Dissociable

1 Introduction

1.1 General Background

This *Environmental, Social, Health, and Safety (ESHS) Monitoring Plan has been* established to guide the ongoing monitoring of the performance of the Guyana Goldfields, Inc. (GGI) Aurora Gold Project (Project) with respect to all applicable voluntary or regulation-based ESHS management requirements. The *ESHS Monitoring Plan* is therefore designed to capture the specific monitoring needs identified in all applicable permits and regulations and individual management plans and supporting SOPs, as well as the Project's updated ESIA (ENVIRON, 2013). It provides for the development and maintenance of the Aurora Gold Project ESHS Monitoring Spreadsheet (see **Table 4.4-1 below**), which will document the planning, execution, and reporting actions associated with the various environmental and social monitoring requirements that will apply over the construction, operation, decommissioning/closure, and post-closure phases of the Project.

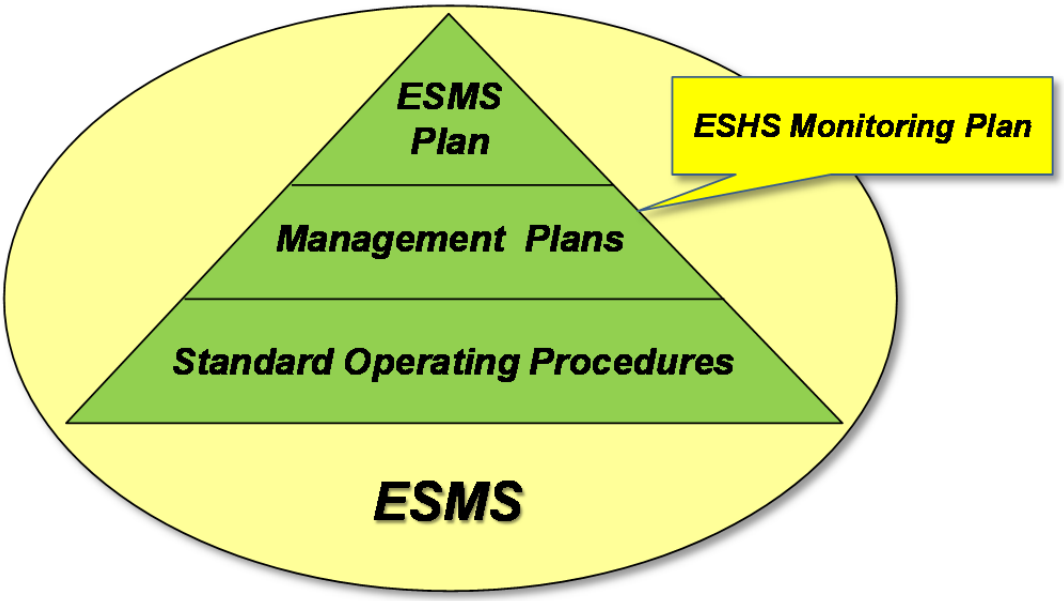
The *ESHS Monitoring Plan* is conceived as a living document, to be periodically updated and distributed under the change control mechanisms to be established by the Project's Environmental and Social Management System (ESMS), as discussed in Sections 1.2 and 1.3.

1.2 Relationship to ESMS and Environmental and Social Impact Assessment

In keeping with the requirements of IFC Performance Standard No. 1 (PS 1) "Assessment and Management of Environmental and Social Risks and Impacts" (IFC, 2012), GGI has established an ESMS for the Project. The ESMS is supported by the management/mitigation plans noted in Section 1.1 and a suite of Standard Operating Procedures (SOPs; see *ESMS Plan* Section 1.2) addressing a variety of day-to-day ESHS management issues. These documents that will be periodically updated at specific points in the mine life cycle to ensure that the ESMS remains responsive and contains a level of detail that is commensurate with available resources and the activities being conducted. The ESMS and its component documents will also support the final Environmental and Social Impact Assessment (ESIA) prepared for the Project.

Figure 1.2-1 presents the relationship of the *ESHS Monitoring Plan* to the overall structure of the Project ESMS. The *ESHS Monitoring Plan* will apply over the life of the Project, and is designed to support Section 7.2 ("Monitoring and Measurement") of the *ESMS Plan,* and other GGI management plans and SOPs when specified.

Figure 1.2-1: Position of *ESHS Monitoring Plan* in ESMS Document Hierarchy



1.3 Change Management

The *ESHS Monitoring Plan* will be subject to periodic review and update in response to potential regulatory changes, physical changes in mining operations, stakeholder communications, internal auditing and management review results, and other sources of specific monitoring requirements. Review and update protocols are described in Section 1.3 of the *ESMS Plan.*

1.4 Recordkeeping

Records associated with the implementation of the *ESHS Monitoring Plan* over the life of the mine will, at a minimum, include current and superseded versions of relevant management plans or SOPs; monitoring records, as specified in their governing plans or SOPs; associated workforce training records; and related correspondence and other information. Section 7.1 of the *ESMS Plan* and GG-05, "Records Management" define the overall records management practices for the Project.

1.5 Reporting

The results of the Project's environmental and social monitoring activities will be compiled, evaluated, and summarized in the Project's *Annual Environmental, Social, Health, and Safety Monitoring Repor*t. Among its other purposes, the *Annual Environmental, Social, Health, and Safety Monitoring Repor*t is one of the performance documents finalized as part of the annual management review process described in Section 7.5 of the *ESMS Plan*, and may be published or externally released at the discretion of GGI management. Monitoring data acquired under the controls established by this *ESHS Monitoring Plan* may be used to support other types of monitoring reports that may be required by specific regulations or permit conditions.

2 Project Description

As noted in the latest available feasibility study (TetraTech, 2013), the Project is presently conceived as an open-pit and underground gold mining operation, using a conventional ore crushing and milling process, and employing a carbon-in-leach (CIL) based cyanidation process for mineral extraction. The Project is comprised of four major physical components:

- the ***Aurora mine site***, located at latitude 6°45′N, longitude 59°45′W, on the southern bank of the Cuyuni River approximately 170 km due west of Georgetown;
- the ***Buckhall*** river port and logistics support facility, on the west bank of the Essequibo River;
- the 140 km long ***Barama (M3) road***, which was built in the 1990s to provide access to a large hardwood timber concession north of the Cuyuni River owned by Barama Company Ltd., and for which GGI has negotiated a shared usage arrangement; and
- the ***Aurora M3 road extension***, built in 2011-2012, a new 33 km road constructed by GGI which connects the end of the Barama road with Tapir Crossing (a vehicle barge ferry landing on the Cuyuni River) and extends from Tapir crossing due west to the Aurora mine site.

The current conceptual layout of the Aurora mine site (along with proposed surface water/groundwater monitoring locations) is presented in **Figure 4.1-1**; all features are shown at full development, prior to closure. As currently conceived, residual cyanide reagent in process facility tailings will be routinely detoxified to values at or below the effluent standards set by Table 1 of (IFC, 2007) using the INCO/air process. Detoxified tailings will be deposited in a Tailings Management Area (TMA) to the immediate south of the process facility and Mine Water Pond (MWP). The TMA will be designed to meet ICMC[1] requirements and IFC effluent standards[2] for residual cyanide and other contaminants. It will be comprised of a series of engineered earthen embankments, a natural (saprolite) liner system, a seepage collection and return system, a reclaim pond, tailings and reclaim water pipelines and containment trench, an emergency spillway, two downgradient diversion (dilution) ponds, piezometer installations in all embankments, and a series of downgradient monitoring wells and surface water monitoring points. The MWP and Fresh Water Pond (FWP) will be located to the north and east of the TMA. These ponds will also be located in basins with natural liner characteristics, and neither will be impacted by any operations involving cyanide. The FWP will supply makeup water to the mill and process facility and additional dilution in the MWP. The MWP is designed to manage

[1] See (ICMI, 2012); *International Cyanide Management Code;* accessed at http://www.cyanidecode.org/pdf/thecode.pdf

[2] See (IFC, 2007), "Environmental, Health and Safety Guidelines for Mining", Table 1.

Figure 4.1-1: Aurora Project Layout and Surface Water/Groundwater Monitoring Locations (Source: TetraTech DWG N-0100 Rev A)



water from open pit and underground mining operations. Because the FWP and MWP will be joined at closure, both facilities will therefore be designed to meet IFC effluent standards for metals and other potential contaminants from mining operations.

The mine site will also be supported by mechanical shops, warehouses, diesel-powered electrical generators, fuel storage tanks, camp, potable water and sanitary waste disposal systems, a hazardous waste accumulation area, secure explosives storage silos and magazines, administrative offices, an airstrip, a solid waste landfill, and related infrastructure.

3 Organizational Responsibilities

ESHS monitoring responsibilities are generally shared by the Environmental Manager, the Health and Safety and Environmental Officers, the Corporate Social Responsibility (CSR) Manager, and other senior management staff, as noted in the specific management plans that govern monitoring activities as well relevant sections of the *ESMS Plan* (e.g., Sections 3.1, “Legal Requirements”; 7.2, “Monitoring and Measurement”; 7.4, “Internal ESMS Audits”; and 7.5, “Management Review.” Monitoring personnel will be trained in all applicable planning and procedural requirements, in accordance with Section 5.2 of the *ESMS Plan* and GG-06, "ESMS Training Program.”

4 Environmental, Social, Health, and Safety Monitoring Program

4.1 ESHS Monitoring Program – General Description

As noted in Section 1.2, this *ESHS Monitoring Plan* is one of a suite of management plans that support the Project's ESMS. Along with the specific requirements of GGI's governing Environmental Permit (Guyana EPA, 2010), this suite of plans is the source of the greater portion of the monitoring requirements managed by this *ESHS Monitoring Plan*. These plans will be issued and updated as necessary to support the major phases of the Project life-cycle, and will include:

- *Exploration Management Plan;*
- *Construction Management Plan – Early Works;*
- *Construction Management Plan – Major Construction;*
- *Blasting Management Plan;*
- *Overburden Management Plan;*
- *Erosion Prevention and Control Plan;*
- *Water Management Plan;*
- *Annual Mining Plan;*
- *Mill/Leach Plant Operations Plan;*
- *Tailings Area Management Plan;*
- *Occupational Health and Safety/Accident Prevention Plan;*
- *Emergency Preparedness and Response Plan;*
- *Cyanide Management Plan;*
- *Hazardous Materials Management Plan;*
- *Spill Prevention, Control, and Contingency Plan (Aurora Project Area);*
- *Buckhall Spill Contingency Plan;*
- *Transportation Management Plan;*
- *Waste Management Plan;*
- *Air Quality Management Plan;*
- *Noise & Vibration Management Plan;*
- *Biodiversity Management Plan;*
- *Mine Reclamation and Closure Plan;*
- *Community Relations Management Plan;* and
- *Influx Management Plan.*

Monitoring inputs from these and other sources of monitoring requirements will be captured in a controlled spreadsheet (referred to hereafter as the "Aurora Gold Project ESHS Monitoring Spreadsheet"; see **Table 5.0-1**) that will be used as a primary reference or management tool to support the planning and timely execution of required monitoring and reporting or other actions. Updates to the spreadsheet will be performed on a regular basis to ensure that the ESHS

monitoring program remains accurate, comprehensive, and commensurate with Project needs and resources.

The *environmental* monitoring elements of the ESHS Monitoring Plan are intended to support the determination of the potential effects on specific resources resulting from exploration activities, as well as the actual environmental impacts associated with the construction, operation, decommissioning, and closure of mining facilities. More specifically, the environmental monitoring elements are designed to generate defensible data that can:

- serve as supplemental baseline data;
- demonstrate the relative effectiveness of impact prevention or mitigation measures;
- support comparisons of changes in environmental or social conditions against existing baseline conditions, and the distinguishing of project-related impacts from natural (including seasonal) changes;
- help identify unacceptable ESHS trends or impacts, thereby permitting implementation of supplementary mitigation measures and/or corrective and preventive actions in a timely manner;
- demonstrate the actual performance of various reclamation schemes for final closure purposes;
- demonstrate continued compliance with applicable environmental legislation, policies, and guidelines as well as specific permit/license requirements;
- ensure accountability through a system of routine management reports and reviews, with summary reports prepared for external stakeholders;
- support the investigation of ESHS incidents and the determination of appropriate corrective and preventive actions; and
- support appropriate responses to specific complaints or requests for information from the general public, regulatory agencies, or other external stakeholders.

ESHS monitoring will be conducted during the pre-construction, construction, operation, decommissioning, and closure phases of the project. These phases are described further in the following sections.

4.2 Overview of ESHS Monitoring by Phase

4.2.1 Pre-Construction/Construction Phase Monitoring

Pre-construction/construction phase monitoring activities include the collection of data to assist in managing the ESHS issues specifically associated with construction activities. Activities will also include Construction Quality Assurance (CQA) inspection during construction and the collection and analysis of associated geotechnical and water quality data, along with the monitoring of stakeholder concerns and considerations via the processes identified in **Table 5.0-1.** Such inspections, analyses, and monitoring are required in order to ensure:

- appropriate construction management techniques are being employed, particularly as they relate to erosion and sediment control for activities adjacent to existing watercourses;
- continued compliance with regulatory requirements and approved construction practices; and,
- ensuring that any required mitigation measures are specified, implemented, and function properly.

Monitoring during the pre-construction and construction phase could also include supplemental baseline surveys to obtain streamflow, rainfall, surface and groundwater quality, biological, and any other environmental data deemed necessary for future use, as well as surveys deemed necessary to update the social baseline Technical requirements for any such surveys and routing requirements that ensure that survey data are captured in the Aurora Gold Project ESHS Monitoring Spreadsheet will be issued in directives to internal staff, or as procurement conditions to qualified contractors per Section 4.3.3 of the Project *ESMS Plan.*

4.2.2 Operational Phase Monitoring

ESHS monitoring activities for the operational phase of the Project will include the monitoring of staff training obligations; employee accident and injury rates; complaints and requests for information from local communities/external stakeholders; air quality; surface water, groundwater, and potable water quantity and quality; noise and vibration; biota; soil, tailings, and waste rock chemistry; and water treatment plant influents and effluents, as necessary to address the potential impacts of mine/process plant operation. Ongoing inspections will be conducted, and associated environmental monitoring and social performance data will be collected in order to:

- identify changes or potential impacts to the environment and/or adjacent communities resulting from the daily operation of the mine;
- provide the basis for predicting potential environmental, social, health, and safety impacts;
- prompt appropriate corrective and preventive actions to avoid or mitigate potentially adverse ESHS impacts;
- ensure that GGI maintains continuing compliance with currently applicable legal and regulatory requirements, permits, and licenses; and
- ensure that proper procedures, management systems, and training are in place to prevent or respond to spills or other emergencies, as required by the *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas*) and *Buckhall Spill Contingency Plan*; the *Occupational Health and Safety/Accident Prevention Plan;* the *Emergency Preparedness and Response Plan;* the *Community Relations Management Plan* and *Influx Management Plan;* and their supporting SOPs.

Water quality monitoring, including surface and ground water monitoring, will also be conducted during the operational phase to:

- ensure continuing compliance with Environmental Permit and (IFC, 2007) requirements; and

- determine the effectiveness of design and mitigation measures intended to collect potentially contaminated water for dilution and/or other treatment prior to release to the environment.

4.2.3 Closure/Post-closure Phase Monitoring

ESHS monitoring during the closure/post closure phase will be required to confirm that the remediation measures have been properly implemented and are effective. The *Mine Reclamation and Closure Plan* summarizes an initial iteration of the location, parameters, methods, and frequency of closure/post-closure monitoring requirements. When the phase of mine life is reached in which specific closure/post-closure actions are initiated, the requirements of the final iteration of the *Mine Reclamation and Closure Plan* (i.e., the *Detailed Mine Reclamation and Closure Plan)* will be integrated into Table 5.0-1 and the Aurora Gold Project ESHS Monitoring Spreadsheet via the review and update process previously described in Section 1.3.

4.3 Management Plan Monitoring Requirements - Summary

Project monitoring requirements will be managed within the context of a documented ESMS for the Project that is designed to comply with the requirements of IFC PS-1, as previously noted. The continuous monitoring of environmental performance is a key component of ESMS design, and forms the basis for managing or mitigating the environmental, occupational health and safety, and social impacts identified by the ESIA process, over the entire Project life cycle. Many of the management plans included in GGI's ESMS are designed specifically for this purpose, and will contain or reference specific environmental (and environmentally-linked social) monitoring practices and SOPs. Major components of the ESHS monitoring program collectively represented in these documents are summarized in the following paragraphs.

- *Construction Management Plan – Major Construction;* GGI's engineering/procurement/ construction (EPC) contractor will be required to develop a comprehensive Construction *Management Plan* that describes the CQA protocols that will apply to all earthworks, concrete, facility construction, machinery installations, connection with electrical and water utilities, and other actions leading up to final commissioning inspections and turnover/acceptance of all constructed aspects of the Project.

- *Overburden Management Plan;* the *Overburden Management Plan* will include requirements for weekly inspections of the geotechnical stability of waste

rock/overburden stockpiles, as well as pH in toe drain water in order to detect the potential development of ARD conditions. The *Overburden Management Plan* will also contain a section that addresses the stockpiling and management of topsoil and mulch to support progressive and final site reclamation activities.

- *Tailings Area Management Plan;* the *Tailings Area Management Plan* will require weekly inspections of the integrity of the tailings and reclaim water return pipelines, as well as the geotechnical stability of all embankments, dams, diversionary and/or spillway structures, and other related earthworks. Reclaim water quality will also be monitored on a weekly basis, as well as seepage, and controlled discharge water quality as previously noted. The purpose of such monitoring is to ensure that any seepage or routine discharge from the TMA remains within the effluent discharge guidelines and/or water quality standards defined by the Guyana EPA and (IFC, 2007). Any direct discharges from the TMA at closure will also be subject to the $\leq$0.022 mg/l free cyanide limit recommended by the ICMC for protection of aquatic life. Indications of negative water quality trends in seepage or discharge may prompt detoxification process changes, the installation or activation of additional settling/ clarification ponds, treatment and/or polishing systems, or additional biotoxicity testing studies to demonstrate that aquatic species in any receiving waterways are adequately protected.

- *Occupational Health and Safety/Accident Prevention Plan;* environmentally-linked monitoring requirements in the *Occupational Health and Safety/Accident Prevention Plan* will include monthly sampling and analysis to maintain the quality of the potable water supply system at the man-camp; periodic physical inspections to ensure the proper function of the septic system drain fields and vaults; and monitoring of mosquito-borne disease statistics to verify the effectiveness of the mosquito suppression program.

- *Erosion Prevention and Control Plan;* the *Erosion Prevention and Control Plan* will be applied to all areas that are disturbed by mining operations and that are susceptible to erosion. This will include periodic monitoring of the Cuyuni River dikes and other diversionary structures, access and haul road rights of way (ROWs), the Project airstrip, and other recently reclaimed or disturbed areas, for erosional conditions or turbid runoff that could impact local streams or tributaries of the Cuyuni River, and the ongoing implementation of various appropriate mitigation measures or good international industrial practices (GIIPs) as the situation may require.

- *Water Management Plan;* GGI will develop and maintain a probabilistic water balance and supporting monitoring program for the TMA, MWP, FWP, and associated water management structures. Pond water levels, associated flowrates, bathymetric data, and site precipitation and other weather conditions will be monitored and input to the water balance model in order to ensure the maintenance of adequate freeboard in all seasonal conditions. Water quality in the TMA, MWP, and FWP will also be monitored to ensure that any seepage and controlled discharges will be within the effluent discharge guidelines and/water quality standards defined by the Guyana EPA and (IFC, 2007).

Indications of any negative water quality trends may prompt the installation or activation of additional clarification ponds, treatment and/or polishing systems, or other studies to demonstrate that aquatic species in any receiving waterways are adequately protected.

- *Cyanide Management Plan;* GGI will develop and maintain a comprehensive *Cyanide Management Plan* based on the ICMC standards of practice[3] that addresses all aspects of cyanide procurement, transportation, and management. In the operational phase of the project, the *Cyanide Management Plan* will reference applicable operations and maintenance manuals and other operational SOPs and inspection and preventive maintenance protocols that will apply to the monitoring of physical integrity and routine operation of: the cyanide receiving/mixing area; cyanide storage and carbon-in-leach (CIL) tanks and secondary containment structures; all process and detoxification plant areas containing cyanide solution ≥0.5 mg/l Weak Acid Dissociable (WAD) cyanide; and the tailings and reclaim pipelines. The *Cyanide Management Plan* will cross-reference the *Tailings Area Management Plan* for the routine physical inspection of the integrity of all TMA earthworks and the proper function of the seepage collection system, reclaim water barge, and reclaim water pumpback system. It will also cross-reference procedures in the *Water Management Plan* for the ongoing monitoring of water quality and water levels in the TMA reclaim pond, as well as downgradient monitoring well and surface water sampling against the 0.5 mg/l WAD cyanide limits set by (IFC, 2007) and the ICMC. The *Cyanide Management Plan* will also include procedures for monitoring and reporting any wildlife mortalities, the condition of emergency eyewashes/showers and cyanide signage, antidote kit storage temperatures, workforce personal protective equipment (PPE) adequacy and condition, and other specific monitoring issues typical of an ICMC-compliant facility.

- *Hazardous Materials Management Plan;* the Project *Hazardous Materials Management Plan* will contain requirements for periodic inspections of containment integrity, management of accumulated precipitation, segregation of incompatible and materials, the condition of warning or access control signage, and the functionality or readiness of PPE and fire suppression and other emergency systems.

- *Spill Prevention, Control, and Contingency Plan (Aurora Project Areas)* and *Buckhall Spill Contingency Plan;* both of these management plans will contain requirements for periodic inspections of containment integrity, management of accumulated precipitation, and the functionality or readiness of PPE, fire suppression systems or equipment, and other emergency systems.

- *Air Quality Management Plan;* the *Air Quality Management Plan* will require visual monitoring of roadway dust generation (at the Aurora and Buckhall sites and the Tapir crossing) in dry seasons, as the basis for a dust suppression program using water

3 See http://www.cyanidecode.org/pdf/9_GoldMiningProtocol.pdf.

and/or appropriate non-toxic surfactants. The *Air Quality Management Plan* will also establish minimum requirements for an initial ambient workplace air quality survey in the vicinity of the pit and process plant, as well as the underground mine in later phases of mine operation. Results of this survey will be used to establish a respiratory protection baseline for work areas containing potential respiratory hazards.

- *Noise & Vibration Management Plan;* GGI will monitor the noise and vibration associated with routine blasting operations and provide data back to the Project Blasting Engineer for use in improving the efficiency of blasting operations. Ambient workplace noise will be monitored near drilling and loading operations, heavy vehicles, the mill/process plant, power plant, and other noise-generating areas of operation, as the basis for designation of hearing protection zones for workers. Additional workplace testing will be conducted as the basis for establishing hearing protection requirements for specific job assignments (e.g., chainsaw operators, heavy equipment operators, drill rig workers).

- *Biodiversity Management Plan;* the *Biodiversity Management Plan* will require a rapid survey of flora and fauna (dry season and wet season) at least every five years to monitor potential changes to the biodiversity profile of the Project. The *Biodiversity Management Plan* will also require ongoing monitoring for the presence of key indicator/potentially endangered species (e.g., harpy eagles or giant river otters) which may require adjustment in operating practices or other measures to protect affected habitat or otherwise minimize potential species impacts. The *Biodiversity Management Plan* will also incorporate the *Erosion Prevention and Control Plan* by reference for the detection and mitigation of conditions that could reduce or degrade specific habitats.

- *Waste Management Plan;* the *Waste Management Plan* will contain provisions to monitor the accumulation and disposal of containerized hazardous waste and medical waste; the accumulation and disposal of nonhazardous waste; daily cover of the municipal landfills constructed at the Aurora Project and Buckhall sites; and monthly sampling for landfill leachate quality. Requirements for monitoring for the development of any landfill drainage problems, as well the condition of access control signage and security fencing (and any evidence of animal or human intrusion) will also be included. The *Waste Management Plan* will also cross-reference the *Erosion Prevention and Control Plan for* monthly inspections to ensure the stability of the landfill earthworks.

- *Detailed Mine Reclamation, and Closure Plan;* two years before final closure, a detailed version of the *Mine Reclamation and Closure Plan* will be prepared submitted to Guyana EPA for review and approval. The *Detailed Mine Reclamation and Closure Plan* will include specific requirements for monitoring pit lake filling, as well as the completeness of required demolition or removal actions and the overall effectiveness of the restoration and re-vegetation of the reclaimed overburden stockpiles, solid waste landfill areas, the

- TMA, the MWP and FWP, the Cuyuni dike areas, roadway ROWs, and other reclaimed areas of the project. Specific erosional issues associate with closed areas will be monitored (and if necessary, remediated) in compliance with the *Erosion Prevention and Control Plan,* which will be incorporated by reference.

5 Development and Maintenance of *ESHS Monitoring Plan* and Monitoring Spreadsheet

The following paragraphs and **Figure 5.0-1** described the overall process by which this *ESHS Monitoring Plan* and the Aurora Project Environmental and Social Monitoring Spreadsheet (see **Table 5.0-1**) will be kept current.

5.1 Identification/Review of Mandatory Monitoring Requirements

On at least an annual basis, the Environmental Manager will evaluate the Project's current Regulatory Requirements Register (see Section 3.2 of the *ESMS Plan* and procedure GG-31, "Development and Maintenance of Legal and Regulatory Requirements Register"). Mandatory ESHS monitoring and reporting requirements from the current Environmental Permit (Guyana EPA, 2010) and other regulatory sources will be identified and entered into the spreadsheet or updated as appropriate.

5.2 Evaluation and Update of Monitoring Requirements in Current Management Plans

The monitoring requirements in current versions of the management plans listed in Section 1.1 will be identified and entered into the spreadsheet or updated as necessary. Any required changes or modifications to this *ESHS Monitoring Plan* or any affected management plans that may be required as a result of this review will be initiated as appropriate, in accordance with Section 4.3.2 of the *ESMS Plan.*

5.3 Update of *ESHS Monitoring Plan*

The mandatory monitoring requirements noted in Section 5.1 and the other monitoring requirements noted in individual Aurora Project Management Plans will be summarized in **Table 5.0-1** of this document. This table identifies the minimum information fields that must be included in the Aurora Gold Project ESHS Monitoring Spreadsheet, along with minimum monitoring and reporting requirements based on the reviews described in Sections 5.1 and 5.2. For each general category of monitoring, **Table 5.0-1** will identify, as appropriate:

- the operational areas of the mine site that are affected;
- the specific source(s) of the monitoring requirement;
- references to the specific locations and frequencies in which each monitoring event will be performed;
- references to applicable monitoring methods or procedures;
- responsible personnel;
- references to specific reporting requirements; and the
- due date for the next monitoring event

Data field requirements are also noted to accommodate entry of monitoring results or data, as well as a field to accommodate free-text commentary.

Figure 5.0-1: ESHS Monitoring and Reporting Process

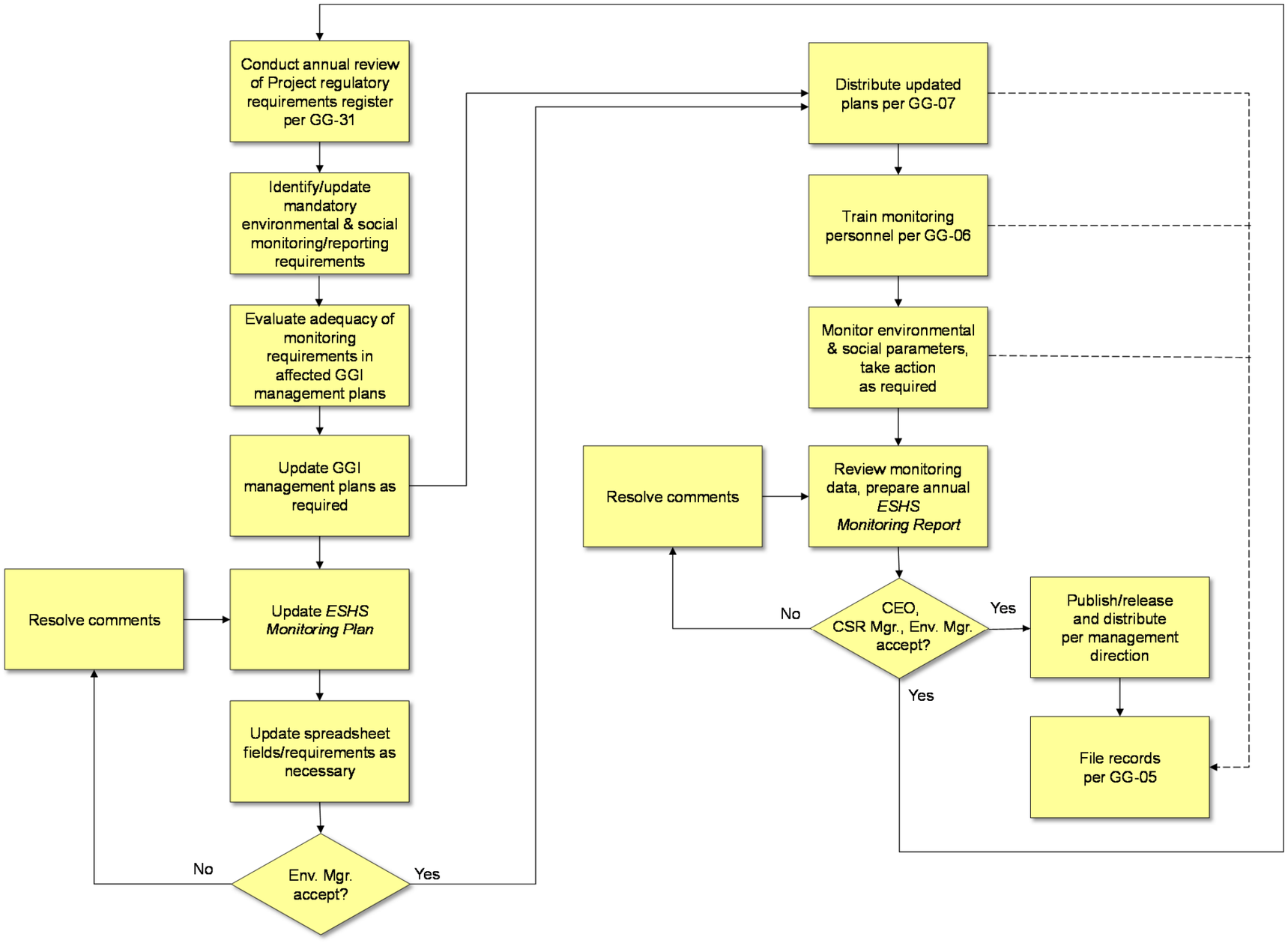


Table 5.0-1: Minimum Database Fields/ESHS Monitoring Information Requirements (Preliminary)

Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due Date, Next Event	Results Field	Comments Field
Aurora mine site	Environmental Permit (Guyana EPA, 2010), 3.4	Monitoring of Cuyuni River level to provide adequate evacuation alarm	Aurora mine site	Daily	TBD	Environmental Officer or Camp Manager	TBD	TBD	TBD	TBD
Aurora mine site	Environmental Permit (Guyana EPA, 2010), 3.11 and 8.3; *Blasting Management Plan* and *Air Quality Management Plan*	Monitoring underground air quality (especially prior to re-entry after blasting)	Underground mine	Post blasting	TBD	Health and Safety Officer or designee	TBD	TBD	TBD	TBD
Aurora mine site	Environmental Permit (Guyana EPA, 2010), 8.4 and *Noise & Vibration Management Plan*	Monitoring of ambient workplace noise as the basis for designation of hearing protection zones for workers	Near drilling and loading operations, heavy vehicles, the mill/process plant, power plant, and other noise-generating areas of operation	TBD	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD
Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	Environmental Permit (Guyana EPA, 2010), 12.1	Monitor Environmental Permit implementation	Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	Annual	GG-32, "Regulatory Compliance Verification Audits"	Environmental Manager or designee	TBD	TBD	TBD	TBD
Aurora mine site	Environmental Permit (Guyana EPA, 2010), 12.3	Quarterly surface water, groundwater, and terrestrial monitoring report	Aurora mine site	Quarterly	TBD	Environmental Manager or designee	TBD	TBD	TBD	TBD
Aurora mine site	Environmental Permit (Guyana EPA, 2010), 12.8	Biodiversity sampling	Aurora mine site	Biannually	TBD	Environmental Manager or designee	TBD	TBD	TBD	TBD
Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	Environmental Permit (Guyana EPA, 2010), 12.12	Environmental management report (includes project stats, ESMS implementation, monitoring results, and Permit compliance status)	Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	Annual	TBD	Environmental Manager or designee	TBD	TBD	TBD	TBD
Aurora mine site	*Overburden Management Plan*	Inspections of the geotechnical stability of waste rock/overburden stockpiles	Stockpiles	Weekly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site	*Overburden Management Plan*	Inspections for pH in toe drain water	Stockpile toe drains/settling ponds	Monthly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site	*Tailings Area Management Plan*	Inspections of the integrity of the tailings and reclaim water return pipelines	Tailings/reclaim pipeline	Weekly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site	Construction QA contract	Routine CQA inspections of the geotechnical properties and erosional stability of all embankments, dams, diversionary and/or spillway structures, and other related earthworks during construction and on commissioning	TMA	Weekly	TBD	CQA Contractor	TBD	TBD	TBD	TBD

Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due Date, Next Event	Results Field	Comments Field
Aurora mine site	*Tailings Area Management Plan*	Routine inspections of the geotechnical stability of all embankments, dams, diversionary and/or spillway structures, and other related earthworks during operations	TMA	Weekly	TBD	TMA Operators	TBD	TBD	TBD	TBD
Aurora mine site	*Tailings Area Management Plan*	Routine inspections of TMA and diversion pond freeboard	TMA	Weekly	TBD	TMA Operators	TBD	TBD	TBD	TBD
Aurora mine site	*Tailings Area Management Plan*	Monitoring of reclaim water quality	TMA	Quarterly	TBD	TMA Operators	TBD	TBD	TBD	TBD
Aurora mine site	*Tailings Area Management Plan*	Monitoring of seepage and controlled discharge water quality	TMA discharge point/ settling ponds	Quarterly	TBD	TMA Operators	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Monitoring of detoxification plant effluent for compliance with (IFC, 2007) WAD cyanide limits	Detoxification plant discharge line	Daily	TBD	Detox plant operator	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Monitoring of WAD cyanide values in reclaim water	Reclaim water deed box	Daily	TBD	Mill operator	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Monitoring for animal mortality	Mill/mineral processing plant/detoxification plant and TMA	Daily	TBD	All personnel	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Visual integrity of staged ISO tanks, pre-mix	Mill/mineral processing plant	Daily	TBD	All personnel	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Visual inspection of interior of ISO tanks for mix completeness, post mix	Mill/mineral processing plant	Daily, post mix	TBD	Mix plant operator	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Visual inspection of CIL/detox unit containments for integrity, accumulated precipitation	Mill/mineral processing plant	Daily	TBD	Plant operator	TBD	TBD	TBD	TBD
Project site; road from Buckhall to Aurora	*Erosion Prevention and Control Plan*	Monitoring for erosion (visual examination)	Diversionary structures, haul road ROWs, the Project airstrip, and other recently reclaimed or disturbed areas	Monthly	TBD	Site operators and all GGI vehicle operators	TBD	TBD	TBD	TBD
Barama/Aurora (M3) extension road ROWs	*Erosion Prevention and Control Plan*	Monitoring of the ongoing implementation of various erosion mitigation/control measures or GIIP as the situation may require	Barama/Aurora (M3) extension road ROWs	Monthly	TBD	Convoy Leaders, and all GGI vehicle operators	TBD	TBD	TBD	TBD

Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due Date, Next Event	Results Field	Comments Field
Aurora mine site	Convoy Leaders, and all GGI vehicle operators	Monitoring of site precipitation and other weather conditions	Aurora meteorological station	Daily	TBD	Environmental Officer	TBD	TBD	TBD	TBD
Aurora mine site	*Water Management Plan*	Monitoring of pond water levels, associated flowrates, bathymetric data	TMA, MWP, FWP, and associated water management structures	Monthly	TBD	TMA and MWP/FWP Operators	TBD	TBD	TBD	TBD
Aurora mine site	*Water Management Plan*	Monitoring of water quality in the MWP, and FWP	TMA, MWP, FWP, and associated water management structures	Quarterly	TBD	TBD	TBD	TBD	TBD	TBD
Buckhall logistics support facility	*Cyanide Management Plan*	Monitoring of barge offloading and staging of ISO containers for road transport	Buckhall logistics support facility	Daily	TBD	Cyanide Transporter (Camp Manager or Buckhall Dispatcher oversight)	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Monitoring and reporting of the condition of emergency eyewashes/showers and cyanide signage	Mill/mineral processing plan/detoxification plant	Monthly	TBD	Mill/Plant operators	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Monitoring and reporting of antidote kit storage temperatures	Mill/mineral processing plan/detoxification plant	Monthly	TBD	Mill/Plant operators	TBD	TBD	TBD	TBD
Aurora mine site	*Cyanide Management Plan*	Monitoring and reporting of workforce personal protective equipment (PPE) adequacy and condition	Mill/mineral processing plan/detoxification plant	Monthly	TBD	Mill/Plant operators	TBD	TBD	TBD	TBD
Project site; Buckhall logistics support facility	*Hazardous Materials Management Plan*	Inspections of containment integrity	Fuel and hazardous materials warehouse areas	Daily	TBD	Warehousemen	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Hazardous Materials Management Plan*	Management of accumulated precipitation in containments	Fuel storage tanks and hazardous materials warehouses	Daily	TBD	Warehousemen	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Hazardous Materials Management Plan*	Segregation of incompatible and materials	Aurora mine site; Buckhall logistics support facility warehouses	Monthly	TBD	Warehousemen	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Hazardous Materials Management Plan*	Inspections of the condition of warning or access control signage	Aurora mine site; Buckhall logistics support facility warehouses	Monthly	TBD	Warehousemen	TBD	TBD	TBD	TBD

Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due Date, Next Event	Results Field	Comments Field
Aurora mine site; Buckhall logistics support facility	*Hazardous Materials Management Plan*	Inspections of the functionality or readiness of PPE and fire suppression and other emergency systems	Fuel storage tanks, hazardous material warehouse areas	Monthly	TBD	Warehousemen	TBD	TBD	TBD	TBD
Aurora mine site	*Spill Prevention, Control, and Contingency Plan(Aurora Project Areas)*	Inspections of containment integrity	Fuel storage tanks, hazardous material warehouse areas	Daily	TBD	Warehousemen	TBD	TBD	TBD	TBD
Aurora mine site	*Spill Prevention, Control, and Contingency Plan(Aurora Project Areas)*	Management of accumulated precipitation	Fuel storage tanks, hazardous material warehouse areas	Daily	TBD	Warehousemen	TBD	TBD	TBD	TBD
Aurora mine site	*Spill Prevention, Control, and Contingency Plan(Aurora Project Areas)*	Inspections of the functionality or readiness of PPE, fire suppression systems or equipment, and other emergency systems.	Fuel storage tanks, hazardous material warehouse areas	Monthly	TBD	Warehousemen	TBD	TBD	TBD	TBD
Buckhall logistics support facility	*Buckhall Spill Contingency Plan*	Inspections of containment integrity	Fuel storage tanks, hazardous material warehouse areas	Daily	TBD	Warehousemen	TBD	TBD	TBD	TBD
Buckhall logistics support facility	*Buckhall Spill Contingency Plan*	Management of accumulated precipitation	Fuel storage tanks, hazardous material warehouse areas	Daily	TBD	Warehousemen	TBD	TBD	TBD	TBD
Buckhall logistics support facility	*Buckhall Spill Contingency Plan*	Inspections of the functionality or readiness of PPE, fire suppression systems or equipment, and other emergency systems.	Fuel storage tanks, hazardous material warehouse areas	Monthly	TBD	Warehousemen	TBD	TBD	TBD	TBD
Buckhall logistics support facility and Aurora mine site	*Air Quality Management Plan*	Visual monitoring of roadway dust generation in dry seasons	Aurora and Buckhall sites and the Tapir crossing	Weekly (in dry season)	TBD	All GGI drivers	TBD	TBD	TBD	TBD
Aurora mine site	*Air Quality Management Plan*	Establishment of minimum requirements for an initial ambient workplace air quality survey	Vicinity of the pit and process plant, as well as the underground mine in later phases of mine operation	TBD	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD
Aurora mine site	*Noise & Vibration Management Plan*	Monitoring of the noise and vibration associated with routine blasting operations	Pit and underground mine operational areas	TBD	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD
Aurora mine site	*Noise & Vibration Management Plan*	Conducting additional workplace testing as the basis for establishing hearing protection requirements for specific job assignments	Mill/mineral processing plant	TBD	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD

Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due Date, Next Event	Results Field	Comments Field
Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	*Biodiversity Management Plan*	Monitoring of potential changes to the biodiversity profile of the Project	Environmental Area of Influence	At least once every five years	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	*Biodiversity Management Plan*	Monitoring for the presence of key indicator/potentially endangered species (e.g., harpy eagles or giant river otters)	Environmental Area of Influence	Ongoing	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Monitoring of the accumulation and disposal of containerized hazardous waste and medical waste	Medical clinics at Aurora mine site; Buckhall logistics support facility	Monthly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Monitoring of the accumulation and disposal of nonhazardous waste	Aurora mine site and Buckhall logistics support facility hazardous waste storage areas	Monthly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Monitoring of the daily cover of the municipal landfills constructed at the Aurora Project and Buckhall sites	Aurora mine site and Buckhall logistics support facility landfills	Monthly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Sampling for landfill leachate quality	Aurora mine site and Buckhall logistics support facility landfills	Quarterly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Monitoring for the development of any landfill drainage problems	Aurora mine site and Buckhall logistics support facility landfills	Monthly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Monitoring for the condition of access control signage and security fencing (and any evidence of animal or human intrusion)	Aurora mine site and Buckhall logistics support facility landfills	Monthly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Waste Management Plan*	Inspections to ensure the stability of the landfill earthworks	Aurora mine site and Buckhall logistics support facility landfills	Quarterly	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	*Occupational Health and Safety/Accident Prevention Plan*	Monitor accidents, illnesses, and lost time injuries	Aurora mine site; Barama/Aurora (M3) extension road; Buckhall logistics support facility	Weekly	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Occupational Health and Safety/Accident Prevention Plan*	Sampling and analysis to maintain the quality of the potable water supply system at the man-camp	Aurora mine site; Buckhall logistics support facility	Quarterly	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD

Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due Date, Next Event	Results Field	Comments Field
Aurora mine site; Buckhall logistics support facility	*Occupational Health and Safety/Accident Prevention Plan*	Physical inspections to ensure the proper function of the septic system drain fields and vaults	Aurora mine site; Buckhall logistics support facility	TBD	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Occupational Health and Safety/Accident Prevention Plan*	Monitoring of mosquito-borne disease statistics (to verify the effectiveness of the mosquito suppression program)	Aurora mine site; Buckhall logistics support facility	TBD	TBD	Health and Safety Officer	TBD	TBD	TBD	TBD
Aurora mine site	*Detailed Mine Reclamation, and Closure Plan*	Monitoring of pit lake filling	Pit lakes	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Detailed Mine Reclamation, and Closure Plan*	Monitoring of the completeness of required demolition or removal actions	Aurora mine site; Buckhall logistics support facility	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Detailed Mine Reclamation, and Closure Plan*	Monitoring of the overall effectiveness of the restoration and re-vegetation of the reclaimed overburden stockpiles, solid waste landfill areas, the TMA, the MWP and FWP, the Cuyuni dike areas, roadway ROWs, and other reclaimed areas	Aurora mine site; Buckhall logistics support facility	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Aurora mine site; Buckhall logistics support facility	*Detailed Mine Reclamation, and Closure Plan*	Monitoring (and remediating, if necessary) specific erosional issues associated with closed areas in compliance with the *Erosion Prevention and Control Plan*	Buckhall logistics support facility	TBD	TBD	TBD	TBD	TBD	TBD	TBD

5.4 Evaluation of Monitoring Results in Management Preview Process

Monitoring results will be summarized in and annual *ESHS Monitoring Report* and included in the package of performance information prepared by the Environmental Manager that forms the basis of the annual management review conducted by GGI' s senior management pursuant to the requirements of Section 7.5 of the *ESMS Plan* and SOP GG-34, "Management Reviews." The *ESHS Monitoring Report* may be shared with external stakeholders at management's discretion in accordance with requirements of governing permits or actions taken under the Project *Community Relations Management Plan.* Information presented in this report will typically include compiled results and/or monitoring analyses, summaries of the conclusions that can be drawn from the data, highlights of any noted trends or specific issues that will need to be addressed through management action, and other information potentially required by regulation. A specific course of action will be proposed for the mitigation of elimination of negative trends or issues. Details of any rehabilitation work carried out over the past year and any proposed for the coming year will also be discussed, along with any project changes that may result in revisions to the ESHS Monitoring Plan or proposed rehabilitation work.

5.5 Records Management Considerations

Records resulting from of the implementation of this ESHS Monitoring Plan will include historical files of currently approved and superseded versions of this plan and the other management plans and Standard Operating Procedures that carry specific monitoring requirements; training records; monitoring records; and monitoring data, results, or commentaries, as entered into the Aurora Gold Project ESHS Monitoring Spreadsheet for a specific monitoring event. Records will be maintained in accordance with GG-05, "Records Management."

References

Internal References

- *ESMS Plan*
- GG-05, “Records Management”;
- GG-06, “ESMS Training Program”;
- GG-34, “Management Reviews”;
- *Exploration Management Plan;*
- *Construction Management Plan – Early Works;*
- *Construction Management Plan – Major Construction;*
- *Blasting Management Plan;*
- *Overburden Management Plan;*
- *Erosion Prevention and Control Plan;*
- *Water Management Plan;*
- *Annual Mining Plan;*
- *Mill/Leach Plant Operations Plan;*
- *Tailings Area Management Plan;*
- *Occupational Health and Safety/Accident Prevention Plan;*
- *Emergency Preparedness and Response Plan;*
- *Cyanide Management Plan;*
- *Hazardous Materials Management Plan;*
- *Spill Prevention, Control, and Contingency Plan (Aurora Project Area);*
- *Buckhall Spill Contingency Plan;*
- *Transportation Management Plan;*
- *Waste Management Plan;*
- *Air Quality Management Plan;*
- *Noise & Vibration Management Plan;*
- *Biodiversity Management Plan;*
- *Mine Reclamation and Closure Plan;*
- *Community Relations Management Plan;* and
- *Influx Management Plan..*

External References

Guyana EPA, 2010. Environmental Permit 20090114-GGIOO, issued by Guyana Environmental Protection Agency, September 28, 2010.

ICMC, 2013. International Cyanide Management Code; accessed at http://www.cyanidecode.org/ about-cyanide-code/cyanide-code. International Cyanide Management Institute, Washington, DC. 2013.

IFC, 2007. Environmental, Health and Safety Guidelines for Mining, World Bank/International Finance Corporation, Washington, D.C. December 10, 2007.

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TetraTech, 2013. NI 43-101 Technical Report: Updated Feasibility Study, Aurora Gold Project, Guyana, South America. TetraTech, Inc., Golden, Colorado. January 29, 2013.