APPENDIX 3-A

SUMMARY OF IMPACTS AND MITIGATION MEASURES

(20 Pages)

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TABLE 3A.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - AIR QUALITY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Particulate matter (PM_{10} and $PM_{2.5}$) concentrations at receptors exceeding thresholds	Mine operations (mining, hauling, stockpiling)	Mine Site, Transport Route and Port Site	C, O, CL	Dust suppression measures: • Speed limits for mine trucks and other Heavy Good Vehicles (HGVs) on unpaved road surfaces • Dust suppression on unpaved roads and stockpiles • Application of stabilizing agents (such as calcium chloride or magnesium chloride hexahydrate) on areas of high fugitive dust emissions • Enclosing the conveyor over the River Cacheu • Covering (not enclosing) other mine and port conveyors • Use of wind screens • Progressive revegetation	Low to Major	• Continuous particulate matter monitoring at representative stations in each direction of the mine Develop additional mitigation measures to further reduce participate matter air quality impacts
Gaseous emissions exceeding thresholds at fishing beach adjacent Port Site	Port and shiploading operations, including bulk carrier and tugs	Fishing beach adjacent Port Site	O	• Regular maintenance of all vehicles, equipment and machinery • Use of clean, high efficiency mining equipment • Use of low sulfur content diesel when available • Avoid unnecessary travel or operation of engines	Moderate to Major	• Short-term monitoring of SO_2 and NO_2 at the fishing beach to verify impact predictions
Gaseous emissions exceeding thresholds at receptors near the Mine Site	Mine operations (mining, hauling, processing)	Bani, Nema, Farim, Sara Ioba	O		Major	• Continuous particulate matter monitoring at representative stations in each direction of the mine

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	15SEP'15	ISSUED WITH REPORT NB301-520/3-1	AMH	RAC

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TABLE 3A.2

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - GREENHOUSE GASES

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Change in greenhouse gas concentrations	Mine and port operations	All Project Areas	C, O, CL	• Minimize combustible emissions • Continuous maintenance of equipment by following manufacturer's specifications • Optimize the number of trips to reduce fuel consumption • No unnecessary idling of vehicles • Promote energy conservation • Revegetation to aid in carbon sequestration	Not Assessed	Annual calculations and reporting of Project GHG emissions

REV	DATE	DESCRIPTION	PREP'D	RVW'D
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TABLE 3A.3

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - GROUNDWATER

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Decrease in groundwater availability within Group 1 Wells	Pit dewatering	W06, W17, W19, W20, W21, W22, W23, W32, W36, W46, W49, W51. Ufude, Snajalo, Canico Tumane, Sitchan Sidi, Berendinto, Farim	C, O, CL	• Update the groundwater model to improve impact predictions and optimize dewatering well performance • Dewatering will be conducted in a staged manner to minimize groundwater abstraction • Provision of adequate quality water to affected communities • Augment groundwater dependent surface watercourses as required • Monitor the recovery of groundwater levels and post-mining groundwater quality until conditions stabilize and meet pre-mining conditions • Compensate for any unexpected long-term impairment of off-site water supplies • In the event groundwater contamination related to mining activities is established, an analysis will be performed to determine the sources of pollution. Remediation measures will be developed and implemented.	Moderate	• Provide an improved geological model • Conduct additional pumping tests in the south pit • Investigate alteration of the mine plan to improve dewatering efficiencies • Develop a preliminary borefield operating strategy to determine likely monitoring, equipment recycling and maintenance requirements • Conduct additional studies to understand and mitigate the risk of surface water flooding of the southern pit and marshland inflows over the mangrove marshy area • Conduct groundwater monitoring program to monitor the extent of drawdown and potential changes in groundwater quality at off-site receptor locations
Decrease in groundwater availability within Group 2 Wells	Pit dewatering	W24, W31, W34, W35, W37, W39, Farim, Sare Yoba, Bissari	C, O, CL		Moderate	
Decrease in groundwater availability within Group 3 Wells	Pit dewatering	W05, W07, W18, W25, W27, W29, W30, W33, W38, W41, W45, W47, W48, W50, W52, W53, W54, Farim, Sare Yoba	C, O, CL		Moderate	
Reduction of baseflow in River Cacheu	Pit dewatering	River Cacheu	C, O, CL		Low	
Reduction of baseflow in local tributaries (Rio de Bunja, Rio de Banim, Reio de Caur, and Rio de Cavaras Marinhos)	Pit dewatering	Rio de Bunja	C, O, CL		Low	

TABLE 3A.3

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - GROUNDWATER

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Metal leaching from Open Pit Area, WD-3B, IWL, and ROM pad	Mine operations	Rio de Bunja, Rio de Cavaras, Rio de Caur, River Cacheu	C, O, CL	• Prevention: Planning and engineering design to prevent ARD/ML, limit radioactivity doses, landfill leachate and accidental spills and releases. • Containment: Potentially leachable materials will be stored within properly engineered facilities designed to isolate and contain waste materials and any potentially impacted leachate that could seep into and contaminate the groundwater. • Collection: Seepage is collected using an engineered collection system. • Water Treatment: Seepage containing contaminates is set to a water treatment facility prior to discharge. • Engineering Measures: Incorporated into the design of the Open Pits, Ex-Pit Waste Dumps, IWL, ROM Pad and Landfill.	Moderate	• Monitoring to verify compliance with the management plans and the applicable international guidance • Implementation of discipline-specific management plans
Leachate seepage from the landfill	Mine operations	River Cacheu, Rio de Bunja, Rio de Cavaras Marinhos	C, O, CL		Moderate	

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TABLE 3A.4

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - RIVER MORPHOLOGY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Scour related to piers and piles	Truck loading and shiploading	River Cacheu, River Geba	C, O, CL, PC	n/a	Negligible	n/a
Effluent discharge into the River Cacheu impacting hydrodynamics	Mine operations	River Cacheu	O	Use of appropriately sized diffuser on outfall	Negligible	n/a
Scour related to mine effluent discharge into the River Cacheu	Mine operations	River Cacheu	O	Use of appropriately sized diffuser	Negligible	n/a

REV	DATE	DESCRIPTION	PREP'D	RVW'D
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TABLE 3A.5

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - SURFACE WATER QUALITY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Change in Hydrological Inflows to the River Cacheu	Mine Operations	Mine Site	C, O	• No mitigation required	Negligible	• Implement WAMP • Monitoring to verify compliance with management plans
Diversion of the Upper Rio de Cavaras Marinhos into the Rio de Bunja	Mine Operations	Mine Site	O	• Construct diversion channel to discharge into the lower reaches of Rio de Bunja to avoid more	Moderate	
Diversion of the Rio de Cavaras Marinhos into the Rio de Bunja resulting in changes (an increase) in Rio de Bunja flows	Mine Operations	Mine Site	O	• Size channel to 1:100 flood event • Provide appropriate armouring of channel to minimize erosion • Construct diversion channel to discharge into the lower reaches of Rio de Bunja to avoid more sensitive upper reaches	Low	
Catchment Modifications to the Rio de Bunja and Rio de Caur	Mine Operations	Mine Site	O	• Minimize footprint and catchment modifications to the extent possible	Moderate	
Sediment-laden waters	Mine Operations	Mine Site	O	• Collect and settle out solids from stockpiles and areas of ground disturbance • Design settling ponds to achieve required performance (+10% of background TSS)	Low	
Discharge of groundwater during the dry season	Mine Operations	Mine Site	C, O	• Minimize holding time of groundwater seepage that collects in pits to minimize contact time with ore and waste	Low	
Discharge of Contact Water (Mine Effluent) during the wet season	Mine Operations	Mine Site	O	• Conduct additional geochemical evaluation of waste materials before construction and during the LOM to improve geochemical understanding • Revise waste management plans to minimize and manage adverse water quality from waste overburden stockpiles and the TSF	Moderate	• Additional geochemical evaluation • Revise waste management plans according to geochemical results Monitoring to verify compliance with management plans • Implement WAMP
Post-Closure North Pit Pond (acceptability for future use)	Mine Operations	Mine Site	PC	• Complete a comprehensive water quality sampling program in the box cut and additional groundwater sampling • Develop a detailed post-closure pit pond water balance • Update the MRCP based on additional information • Consider options to address long-term degradation of pond water quality, if necessary	Low	• See mitigation measures • Implement WAMP and MRCP

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TABLE 3A.6

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - SOILS AND LAND CAPABILITY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Soil loss	Land clearing and grubbing, soil salvage, handling and storage, and closure and reclamation of project	Mine and Port Sites	C, O, CL	• Minimize project footprint • Undertake stripping and grubbing activities immediately prior to bulk earthworks • Minimize the size of the active construction area at any given time • Salvage all suitable topsoil and stockpile in designated areas. Keep appropriate records. • Stockpiles will be designed to be physically stable, and will be stabilized with vegetative cover or other measures • Implement the erosion and sediment control measures outlined in the Erosion and Sediment Control Plan (ESCP) • Provide full-time onsite supervision of soil handling and management activities • Provide basic training in the protection of soil resources and erosion and sediment control to mine operators and contractors	Low	• Implement discipline-specific management plans presented in Volume 3: ESCP, AQMP, EPRP, Mine Reclamation and Closure Plan (MRCP) • Develop a detailed standalone Soil Salvage Management Plan prior to construction which includes the various commitments and best practices identified in this impact assessment • Monitor to verify compliance with the management plans and the applicable international guidance
Soil disturbance	Soil salvage, handling and storage	Mine and Port Sites	C, O, CL	• As above for soil loss • Segregate and store individual soil horizons separately. Keep appropriate records.	Low	
Soil contamination	Land clearing and grubbing and soil salvage, handling and storage	Mine and Port Sites	C, O, CL	• Follow procedures identified in the Emergency Preparedness and Response Plan (EPRP) • Employ dust suppression measures identified in the Air Quality Management Plan (AQMP)	Low	

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - SOILS AND LAND CAPABILITY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Soil degradation	Soil salvage, handling and storage, closure and reclamation of project, mine and process plant operations, and fuel handling and storage	Mine and Port Sites	C, O, CL	• As above for soil loss • Limit traffic on disturbed and reclaimed areas • Limit amount of re-handling of soils • Limit time of soil storage • Keep soil stockpile depth to a minimum • Use of fertilizers, agricultural lime and organic materials as may be required to improve quality	Low	
Reduction in land capability	Development of new landforms and soil salvage, handing and storage		C, O, CL, PC	• As above for soil loss • Minimize project footprint • Maximize the capacity of the Project affected lands by effective implementation of relevant management plans	Moderate	

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TABLE 3A.7

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - TERRESTRIAL ECOLOGY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Habitat loss - mangroves	Mine and port operations	Mine and Port Sites	C, O, CL	• Minimize area to be cleared • Careful removal and replanting of plants and trees of conservation importance • Seed collection, propagation and re-planting of saplings to make up for lost species • Develop a nursery community project	Moderate	• Monitor keys vegetative groups and species throughout the Project life to validate impact assessment and to apply additional mitigation measures as may be necessary • Conduct flowering plant survey in October 2015
Habitat loss - natural forest	Mine operations	Mine Site	C, O, CL		Low	
Habitat loss - secondary forest	Mine operations	Mine Site	C, O, CL		Low	
Habitat loss - floodplain	Mine and port operations	Mine and Port Site	C, O, CL		Moderate	
Habitat loss - rice paddies	Mine and port operations	Mine and Port Site	C, O, CL		Moderate	
Habitat loss - costal woodland	Port operations	Port Site	C, O, CL		Low	
Habitat loss - wet grassland	Port operations	Port Site	C, O, CL		Low	
Spillage of harmful substances in mangroves	Mine and port operations	Mine and Port Site	C, O, CL	• Immediate response to a spill of harmful or toxic substances in accordance to the Emergency Preparedness and Response Plan (EPRP)	Moderate	
Spillage - natural forest	Mine operations	Mine Site	C, O, CL		Low	
Spillage - secondary forest	Mine operations	Mine Site	C, O, CL		Negligible	
Spillage - floodplain	Mine and port operations	Mine and Port Site	C, O, CL		Negligible	
Spillage - rice paddies	Mine and port operations	Mine and Port Site	C, O, CL		Negligible	
Spillage - costal woodland	Port operations	Port Site	C, O, CL		Negligible	
Spillage - wet grassland	Port operations	Port Site	C, O, CL		Negligible	
Noise disturbance - mangroves	Mine and port operations	Mine and Port Site	C, O, CL	• Application of noise mitigation measures identified in the Noise Management Plan (NMP)	Moderate	
Noise disturbance - natural forest	Mine operations	Mine Site	C, O, CL		Low	
Noise disturbance - secondary forest	Mine operations	Mine Site	C, O, CL		Negligible	

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - TERRESTRIAL ECOLOGY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Noise disturbance - floodplains	Mine and port operations	Mine and Port Site	C, O, CL		Low	
Noise disturbance - rice paddies	Mine and port operations	Mine and Port Site	C, O, CL		Low	
Noise disturbance - coastal woodlands	Port operations	Port Site	C, O, CL		Low	
Noise disturbance - wet grasslands	Port operations	Port Site	C, O, CL		Low	
Habitat degradation due to dust - mangroves	Mine and port operations	Mine and Port Site	C, O, CL	• Construction activities conducted using methods that minimize dust generation • Dust suppression on roads by water trucks • Short-term dust suppression measures using water for temporary exposed excavations, disturbed ground surfaces, and unpaved traffic areas • Revegetation of stockpiles and disturbed ground surfaces as part of progressive reclamation measures • Onsite traffic restricted to designated roads • Imposed speed limits	Moderate	
Habitat degradation due to dust - natural forest	Mine operations	Mine Site	C, O, CL		Low	
Habitat degradation due to dust - secondary forest	Mine operations	Mine Site	C, O, CL		Negligible	
Habitat degradation due to dust - floodplain	Mine and port operations	Mine and Port Site	C, O, CL		Low	
Habitat degradation due to dust - rice paddies	Mine and port operations	Mine and Port Site	C, O, CL		Low	
Habitat degradation due to dust - coastal woodland	Port operations	Port Site	C, O, CL		Low	
Habitat degradation due to dust - wet grassland	Port operations	Port Site	C, O, CL		Negligible	

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - TERRESTRIAL ECOLOGY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Effects on local migrations in mangroves	Mine and port operations	Mine and Port Site	C, O, CL	• Both the Mine and Port Sites will be isolated by means of a fence to prevent larger animals from entering the Project areas • Although these methods may not eliminate the mortalities among migrating animals, they should greatly reduce the number of animals killed on haul roads • A low speed limit can be strictly enforced in order to reduce collisions with animals on the roads	Moderate	
Effects on local migrations in natural forests	Mine operations	Mine Site	C, O, CL		Low	
Effects on local migrations in secondary forests	Mine operations	Mine Site	C, O, CL		Negligible	
Effects on local migrations in floodplains	Mine and port operations	Mine and Port Site	C, O, CL		Low	
Effects on local migrations in rice paddies	Mine and port operations	Mine and Port Site	C, O, CL		Low	
Effects on local migrations in costal woodlands	Port operations	Port Site	C, O, CL		Low	
Effects on local migrations in wet grasslands	Port operations	Port Site	C, O, CL		Low	

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TABLE 3A.8

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - AQUATIC ECOLOGY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program Monitoring)
Disturbance and spillage during construction of the conveyor system across/in River Cacheu	Conveyor construction	Mine Site (River Cacheu)	C	• Adherence to construction best practices • Implementation of Emergency Preparedness and Response Plan (EPRP)	Negligible	• Construction monitoring
Disturbance and spillage during construction of the wharf in River Geba	Wharf construction	Port Site (River Geba)	C	• Adherence to construction best practices • Implementation of EPRP	Negligible	
Loss of mangrove nursery habitat due to vegetation clearing	Mine operations	Mine Site (River Cacheu)	C, O, CL	• Minimize the extent of mangrove removal and disturbance	Moderate	• Construct project as proposed; implement mitigation measures and monitoring outlined in the Biodiversity Management Plan (BMP)
Aquatic ecology impacts from the discharge of mine effluent to the River Cacheu	Mine operations	Mine Site (River Cacheu)	O	• Mine effluent will be required to meet IFC mine effluent guidelines and site-specific water quality benchmarks established for the Project • Active monitoring of all mine effluent streams	Low	• Implement mitigation measures and monitoring outlined in the Water Management Plan (WMP)
Ballast water discharges at Port resulting in the introduction of invasive aquatic organisms	Unplanned event due to shipping	Port Site (River Geba)	O	• Best efforts to enforce compliance by vessel operators	Moderate	• Company ability to monitor compliance of ship operators to be determined
Catastrophic shipping accident (no fuel spill)	Unplanned event due to shipping	Port Site (River Geba)	C, O, CL	• Limit the size of vessel to those with appropriate draft to navigate to Ponta Chugue under all tide and flow conditions • Provide dedicated pilotage • Vessels will be berthed bow west (facing upstream) with tug assistance, and will undergo draft survey once berthed • Following loading, the vessel will undergo another draft survey before deberthing under tug assistance	Negligible	• EPRP
Catastrophic shipping accident causing fuel spill	Unplanned event due to shipping	Port Site (River Geba)	C, O, CL	• As above for no fuel spill • Store and dispense fuel in accordance with specified standards • Adhere to fuel handling procedures in the EPRP • Provide spill response equipment, conduct adequate training, and (if required) implement response measures in the EPRP	Low	• EPRP

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TABLE 3A.9

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - NOISE

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Increased noise levels along the Transport Route	Route operations (hauling)	Dugal (R53), R54, R56, Cunteda (R61)	C, O, CL	• Maintain mobile equipment, including regular inspection of silencers/mufflers • Limit certain construction activities to normal working hours • Operate mobile equipment within respective specifications and capacity • Maintain road surfaces • Limit transportation to daytime hours • Use noise screens	Moderate to Major	• Monitoring of daytime noise levels on a quarterly basis
Increased noise levels at the fishing beach adjacent to the Port Site	Port and shiploading operations	Fishing Beach (R70)	C, O, CL	• Maintain mobile and stationary equipment, including regular inspection of silencers/mufflers • Operate stationary equipment properly and within respective specifications and capacity • Use noise screens	Moderate	• Monitoring of daytime noise levels on a quarterly basis

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TABLE 3A.10

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - ARCHAEOLOGY AND CULTURAL HERITAGE

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Direct loss of high sensitivity cemetery at Saliquinhe Ba	Mine operations	Mine Site	C, O, CL, PC	• Develop a Cemetery Relocation Plan (CRP) • Disclose project impacts on cemeteries to impacted communities and consult with village chief, religious and community elders and relatives of the deceased • Treatment of the remains during and following exhumation to be undertaken in consultation with stakeholders and utilizing best available practices to limit any damage to the remains • The provision of new burial locations and grave markers to be agreed with the village chief/elders and, where possible, the direct relatives of the deceased. The timing and structure of the ceremony for re-interment to be discussed and agreed with the relatives and/or community.	Moderate	• Described under mitigation measures
Direct loss of low sensitivity cemeteries at Tambato and Saliquinhe Porto, and any cemeteries discovered during construction (chance finds)	Mine operations	Mine Site	C, O, CL, PC		Low	
Damage caused by the Project's activities to known medium sensitivity archaeological sites	Mine operations	Mine Site	C, O, CL, PC	• Conduct data recovery or rescue excavations of known medium sensitivity archaeological sites prior to the start of construction • Provide training to all employees and sub-contractors on identifying/ recognizing cultural heritage resources; the Chance Find Procedure (CFP) notification requirements and procedures; and subsequent handling of any archaeological remains that are identified during construction activities • Low sensitivity archaeological sites do not need to be subjected to data recover or rescue excavations, but should be managed through an archaeological site monitoring program developed before construction activity begins	Low	• Described under mitigation measures
Damage caused by the Project's activities to known low sensitivity archaeological sites	Mine operations	Mine Site	C, O, CL, PC		Low	
Damage to unknown archaeological sites discovered during construction (chance finds)	Mine operations	Mine Site, Port Site	C, O, CL, PC		Low	
Direct impacts caused by the Project's construction activities to the high sensitivity sacred forest near Saliquinhe Ba	Mine operations	Mine Site	C, O, CL, PC	• Develop a Sacred Site Relocation Plan (SSRP). The relocation processes and rituals should be undertaken by the local community and religious leaders. • Sympathetic and full disclosure of the Project's impacts on the high sensitivity	Moderate	• Described under mitigation measures

TABLE 3A.10

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SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - ARCHAEOLOGY AND CULTURAL HERITAGE

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Direct impacts caused by the Project's construction activities to low sensitivity sacred forests	Mine operations	Mine Site	C, O, CL, PC	sacred site to the community of Saliquinhe Ba • Consultation to take place between the village chief/religious and community elders to determine the full extent of the sacred forests; establish the area to be lost as a result of the Project; and agree on the most appropriate means, areas and timing for the relocation of the sacred forests	Low	
Direct impact caused by the Project's construction activities to two high sensitivity mosques at Saliquinhe Ba and Tambato	Mine Operations	MSQ-1, MSQ-2	C, O, CL, PC	• Develop a Mosque Relocation Plan (MRP). The actual mosque relocation processes and rituals should be undertaken by the local community and religious leaders with support from GB Minerals. • Sympathetic and full disclosure of the Project's impacts on the mosques at Saliquinhe Ba and Tambato • Consultation to take place between the village chief/religious and community elders to agree on the most appropriate means, location and timing for the relocation of the mosques	Moderate	• Described under mitigation measures

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TABLE 3A.11

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - LANDSCAPE AND VISUAL AMENITY

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Change in landscape quality	Mine and port operations	North Pit, South Pit, Ex-Pit Waste Dumps, IWL, Port Site	C, O, CL, PC	• Minimize the Project footprint and resultant landscape conversion to the extent possible • Prioritize the avoidance of higher sensitivity landscapes • Backfill and revegetate the open pits • The waste dumps, IWL will be designed with a natural appearance sympathetic to the surrounding topography to facilitate the successful establishment of vegetation on the restored areas • Mining infrastructure will be removed and the land will be contoured, covered in topsoil and revegetated • Biodiversity off-set program to establish or re-establish mangroves at an alternate location • Compensation if above mitigation measures are unsuccessful	Low to Major	• Ensure Project is constructed applying the identified mitigation measures • Adaptive management measures include erecting visual barriers such as earthen screening berms
Change in visual amenity at the Mine Site	Mine operations	Observation Points 1 through 6	C, O, CL, PC	• As above • 20 m buffer of mangroves along the River Cacheu with 4 m high berm inside buffer	Low to Major	
Change in visual amenity at the Port Site	Port operations	Ancone, Aroté, Rucoto, Cunteda and Chugue	C, O, CL, PC	• As above • Natural mangrove buffer maintained as facility are set back	Low to Major	

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	15SEP'15	ISSUED WITH REPORT NB301-520/3-1	AMH	RAC

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TABLE 3A.12

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - TRAFFIC

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Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Traffic flow	Mine operations (hauling of ore, equipment and supplies)	Transport Route	C, O, CL	• Use of private project ferry and bridge at Sao Vincente • Transport ore and goods during daylight hours • Inform fishermen of ore ship schedules • Provide information on safe passage routes for fishermen • Develop and enforce driver rules of the road • Implement other traffic safety measures contained in the Community, Health, Safety and Security Management Plan (CHSSMP)	Moderate	• Implement CHSSMP • Data collection of traffic accidents and project-related accidents • Monitoring the number of grievances initiated about traffic safety, disturbance, infrastructure or against project drivers
Infrastructure deterioration	Mine operations (hauling of ore, equipment and supplies)	Transport Route	C, O, CL	• Monitor road conditions through annual road condition survey	Low to Moderate	
Traffic safety	Mine operations (hauling of ore, equipment and supplies)	Transport Route	C, O, CL	• Vehicle movements during daylight hours • Rules of the road will be established and enforced including speed limits for project related traffic • Drivers will be educated on proper vehicle operation • A public safety awareness campaign will be implemented • A procedure will be developed to compensate for damages to property including livestock • Suitable points will be identified for refuelling, rest, and overnight parking • The rules of the road, traffic safety measures and emergency preparedness and response plans will be shared with these stakeholders	Low to Moderate	• Data collection of traffic accidents and project-related accidents • Monitoring the number of grievances initiated about traffic safety, disturbance, infrastructure or against project drivers • Additional road signage may be identified during the course of the project
Environmental disturbance	Mine operations (hauling of ore, equipment and supplies)	Transport Route	C, O, CL	• Regular maintenance of vehicles and roads • Ensure product loads are secure	Low	• Data collection of traffic accidents and project-related accidents • Monitoring the number of grievances initiated about traffic safety, disturbance, infrastructure or against project drivers

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - SOCIOECONOMICS

Print 17/09/2015 1:33 PM

Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Land Use and Livelihoods						
Physical and economic displacement	Mine Operations	Saliquenhe, Cabisseki/Ponta Caspec, Saliquenhe Porto/ Ponta Zeca, Tambato Mandinka, Canico	C, O, CL, PC	• Develop and implement a detailed RAP consistent with the RPF that also meets IFC requirements	Moderate	• RAP
Economic displacement	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL		Moderate	• RAP
Community Resources and Infrastructure						
Strain on community resources and infrastructure due to population influx	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Implement local hiring procedures in the HRMP prioritizing hiring of long-term local residents to discourage influx of job-seekers; optionally provide transportation to workers from outside the immediate area if necessary • Further develop and implement influx management measures in consultation with local authorities, as part of the CHSS Plan • Provide workers with medical services to reduce burden on existing services • Develop and implement a CDP in consultation and partnership with local and regional authorities	Moderate	• Community Development Plan (to be developed)
Improvement of community resources and infrastructure due to investment	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL, PC	• Pay royalties and taxes to Government • Develop and implement a CDP in consultation and partnership with local and regional authorities	Moderate (Positive)	• Community Development Plan (to be developed)
Community Health and Safety						
Increase in communicable diseases including sexually transmitted infections and vector-borne disease	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Conduct health education and awareness campaigns in collaboration with government agencies and NGOs • Provide medical services to workers and encourage workers to implement protection measures (i.e., use of ITNs) • Implement Employee Code of Conduct Policy (in CHSS Plan)	Moderate	• Health monitoring system

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - SOCIOECONOMICS

Print 17/09/2015 1:33 PM

Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Exposure to occupational health and safety issues	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Implement and regularly update OHS Plan, including updated risk assessment	Moderate	• Maintain incident reports • Health monitoring system
Public Safety Hazards	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Restrict public access including regular monitoring; implement and regularly update CHSS Plan	Moderate	• Maintain incident reports
Increase in crime and other social ailments	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Further develop and implement influx management measures in consultation with local authorities, as part of the CHSS Plan	Moderate	• Monitor population influx • Review of employee performance
Social disruption caused by gap between the haves and the have-nots	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Establish fair compensation mechanism • Developing publicly available Hiring Policy • Continue stakeholder engagement	Moderate	• Continued stakeholder engagement
Improved health of local communities	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL, PC	• Conduct health education and awareness campaigns in local communities in collaboration with government agencies and NGOs • Maximize local employment, which in turn leads to better health outcomes	High (Positive)	• Health monitoring system
Local Economic Development and Employment						
Local price inflation	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Implement procurement policies to minimize impacts on local markets and pricing • Monitor price inflation on a quarterly basis	Moderate	• Monitor price inflation on a quarterly basis
Loss of Employment and Regional Economic Depression at Closure	Mine and Port Operations	Mine Site, Transport Route, Port Site	CL, PC	• Plan worker and supplier demobilization, where feasible • Improve employability of workers through training • Prepare employees for job losses at closure through employee education programs • Develop and implement a CDP in consultation and partnership with local and regional authorities	Moderate	• Maintain employee records to determine extent of local employment
Increase in government revenues	Mine and Port Operations	Government	C, O, CL	• Pay royalties and taxes to Government (mitigation is required by law)	High (Positive)	
Increase in business opportunities	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Develop and implement a CDP in consultation and partnership with local and regional authorities • Maximize local sourcing and assist entrepreneurs	High (Positive)	

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SUMMARY OF RESIDUAL IMPACTS AND FOLLOW UP - SOCIOECONOMICS

Print 17/09/2015 1:33 PM

Residual Impacts	Source Activity(s)	Location/ Receptor	Project Phase C - Construction O - Operation CL - Closure PC - Post-closure	Mitigation Measures/Relevant Management Plan(s)	Significance of Residual Impacts	Follow Up Program(s) (Monitoring)
Employment and Income	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL	• Implement HRMP including training programs and a workforce localization plan to maximize local employment at all levels of the organization	High (Positive)	• Maintain employee records to determine extent of local employment
Long-term improvement in employability	Mine and Port Operations	Mine Site, Transport Route, Port Site	C, O, CL, PC		High (Positive)	• Maintain employee records to determine extent of local employment

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	15SEP'15	ISSUED WITH REPORT NB301-520/3-1	AMH	RAC

APPENDIX 3-B

COMMITMENTS REGISTER

(16 Pages)

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TABLE 3B.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-1	ESIA Section 2.4.2	**Additional Geochemical Evaluation** Based on the limited scope of testing relative to the proposed waste volumes, additional testing is required prior to operations to estimate the amount of leachable waste to be mined and the need for additional management measures beyond what is currently proposed. Operational testing may then be required to delineate leaching and non-leaching materials to allow segregation during mining.	Prior to and during mining
CN-2	ESIA Section 2.4.10	**Open Pit Monitoring** Due to the variability in the extent and types of soils, the excavations will require a high degree of visual inspection and monitoring of ground conditions. A monitoring and action plan will be developed before mining begins to define the monitoring goals, activities, and frequencies and actions to be taken at specific reading levels. This is anticipated to include the following: • Regular inspections of slope conditions • Installation and regular inspection of monitoring piezometers to confirm groundwater conditions • Regular surveying to monitor settlement • Installation and measurement of slip indicators (inclinometers) in areas of suspected slope instability and to verify design assumptions, particularly in high slopes consisting primarily of clay units • Undertaking and monitoring the timely remediation of identified unstable areas	Prior to mining
CN-3	ESIA Section 2.18.4	**Human Resource Management Plan** GB Minerals will develop and implement a localization plan to transfer knowledge and utilize local talent, as part of a larger Human Resources Management Plan	Prior to mining
CN-4	ESIA Section 7, ESIA Section 13.4.2, 22, AQMP	**Dust Mitigation** Implement dust mitigation measures including: • Enforce appropriate speed limits for heavy equipment on unpaved road surfaces • Use appropriate emissions control equipment • Spray water on unpaved roads and other traffic areas to decrease dust emissions and/or the use of other agents such as calcium chloride or magnesium chloride hexahydrate • Maintain gravel/laterite cover on unpaved roads and traffic surfaces • Apply stabilizing agents on areas of high fugitive dust emissions • Spray bulk material stockpiles with water or stabilizing agents as needed during the dry season to reduce fugitive dust emissions • Enclose the conveyor over River Cacheu • Cover (not enclose) all other of the mine and port conveyors • Use wind screens • EPCM contractor to supply adequate equipment and personnel to stabilize road surfaces to control dust on main internal roads	All Phases
CN-5	ESIA Section 7, AQMP	**Air Quality Mitigation** Implement air quality mitigation measures including: • Regular maintenance of all vehicles, equipment and machinery • Use of clean, high efficiency diesel mining equipment, using low sulfur content diesel when available • Minimizing combustible emissions by avoiding unnecessary travel or operation of engines	All Phases
CN-6	ESIA Section 7, AQMP, HHERA Section 21.10	**Air Quality Monitoring** Implement the following monitoring activities: • Visually monitor dust during all phases of the Project • Monitor key air quality parameters (PM, dustfall, SO2, and NO2) to validate impact predictions and confirm that ambient air quality at nearby receptors meet WHO guidelines • Establish Permanent monitoring stations at receptors located in each cardinal direction from the Mine Site, including: o Bani (R2) o Farim (R10) o Cancenha (R13) o Sara Loba (R15) o Mandinga (R23) • Conduct short-term monitoring of SO2 and NO2 at the fishing beach location • Collect representative dustfall samples at the Mine Site to test for radionuclides	All Phases

TABLE 3B.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-7	ESIA Section 8, AQMP	**Greenhouse Gas Monitoring** Complete annual monitoring of GHG emissions relying on mass balance, stoichiometric calculations and internationally accepted factors, and GHG emissions calculation methodologies. The following data will be collected on an annual basis to support the GHG assessment: diesel consumption by mobile and stationary equipment for both the mining and non-mining fleet; and emissions due to employee transportation and travel; transportation and distribution of goods sold by GB Minerals; purchase of goods, services, and fuel; and land use changes.	All Phases
CN-8	ESIA Section 9	**Dewatering Mitigation** Implement dewatering mitigation measures including: • Conduct dewatering in a staged manner • Provide water of adequate quality to affected communities as may be required • Commission a study to assess alternative water supplies as part of the detailed design • Augment streamflow in the River Cacheu • Update the groundwater model every 5 years, or sooner if required • Monitor the recovery of groundwater levels and post-mining groundwater quality until conditions (levels) stabilize and meet pre-mining conditions • Compensate for any unexpected long-term impairment of off-site water supplies • Decommission and seal boreholes • In the event groundwater contamination relating to mining activities is established, an analysis will be performed to determine the possible sources of pollution. Once the source has been established remediation measures will be developed and implemented.	O
CN-9	ESIA Section 9	**South Pit Pumping Tests** Carry out additional pumping tests in the south pit prior to initiating pit dewatering.	C
CN-10	ESIA Section 9	**Groundwater Quality Mitigation** Implement groundwater quality mitigation measures including: • Return contaminated water to the process plant for re-use or to the water treatment plant prior to discharge • Update the cover design of WD-3b based on ongoing geochemical testing results and onsite surface and groundwater monitoring programs • Construct embankments around the IWL in stages over the life of the facility to suit the storage capacity requirements	O
CN-11	ESIA Section 9	**Groundwater Follow-Up** Implement the following follow-up measures: • Provide an improved geological model to allow a refinement of the hydrogeological model domain • Develop a preliminary borefield operating strategy to determine likely monitoring, equipment recycling and maintenance requirements • Conduct additional studies to understand and mitigate the risk of surface water flooding of the southern pit and marshland inflows over the mangrove marshy area	O
CN-12	WAMP	**Waste Overburden Management** Implement Waste Overburden Management as described in the Water Management Plan	C, O, CL
CN-13	WAMP	**Tailings Management** Implement Tailings Management as described in the Water Management Plan	O, CL
CN-14	WAMP	**Geochemical Analysis** Conduct ongoing periodic geochemical analysis of the waste overburden to assess metals content and leaching potential	C, O, CL
CN-15	WAMP	**Waste Overburden Management** Implement Waste Overburden Management as described in the Water Management Plan.	C, O, CL
CN-16	WAMP	**Tailings Management** Implement Tailings Management as described in the Water Management Plan	O, CL

TABLE 3B.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-17	WAMP	**Management Measures for Water** • Implement management measures for non-contact water • Implement management measures for sediment-laden water • Implement management measures for contact water	O
CN-18	WAMP	**Water Balance** Develop a site-wide water balance during the detailed engineering design stage	During detailed engineering
CN-19	WAMP	**Effluent Treatment System** Implement and use effluent treatment system.	C, O, CL
CN-20	WAMP, ESIA Section 11.4.9	**Construction Surface Water Mitigation Measures** Implement surface water quality measures including: • Vehicle maintenance and washing of vehicles will be conducted in appropriate maintenance facilities equipped with oil/water separators and sediment traps • Suitable clean-up of areas where spillage of soil contaminants occurs and adherence to appropriate disposal policies • Operation of sewage treatment systems, with zero discharge of raw sewage to the environment • All employees and contractors will be trained regarding proper methods for transporting, transferring and handling hazardous substances • Collect surface runoff in ponds SCPs for controlled discharge • Water management infrastructure (e.g., sediment control ponds SCPs and; flood protection berms) will be designed and constructed to meet best engineering practices and commitments within WAMP and ESMP • Engineering measures to reduce the potential for surface water quality impacts will be implemented at the Ex-Pit Waste Dumps, the IWL, ROM Pad and Surface Water Management System • Regular maintenance of water management facilities, as well as roads and culverts • Meet effluent discharge criteria identified in this Plan (treat effluent if required) • Design and construct ECPs SCP-1 to meet best engineering practices and commitments within this Plan and other ESMP management plans	C
CN-21	WAMP	**Operation Surface Water Mitigation Measures** Implement surface water quality measures including: • Mitigation as described in the construction phase • Engineering measures to reduce the potential for surface water quality impacts will be implemented at the Ex-Pit Waste Dumps, the IWL, ROM Pad and Surface Water Management System • Collection of mine effluents (groundwater from dewatering wells and in-pit sumps, TSF/IWL and process plant discharges) in SCP-1 and ECP-1 for controlled discharge following effluent quality sampling • Update mine site water balance and water quality model every 5 years • Discharge from port site stormwater ponds will only occur after sampling verifies effluent meets criteria identified in this Plan • Adherence to the mine waste management plans • Adherence to the Waste Management Plan	O
CN-22	WAMP	**Closure Surface Water Mitigation Measures** Implement surface water quality measures including: • Implement construction and operation phase mitigation measures through active mine reclamation • Implement the ESCP; construct temporary SCPs as necessary to manage erosion and sediment issues specific to closure • Execute the final Mine Reclamation and Closure Plan	CL, PC
CN-23	ESIA Section 11.4.9	**Hydrology Mitigation** The following mitigation measures will be implemented to minimize impacts to hydrology: • Minimize the project footprint to reduce the potential impacts to local drainage patterns and catchment areas • Minimize in-water works to the greatest extent possible • Design water management facilities (i.e., diversion and collection ditches) to handle the expected peak flows with consideration given to the requirement for long-term stability. Consideration will need to be given in the detailed design to the outlet designs to prevent erosion • Reinstate natural flow patterns to the greatest extent possible in accordance with the MRCP • The flood protect berms will be designed to minimize potential impacts to hydrology	C, O, CL, PC

TABLE 3B.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-24	ESIA Section 11	**Tributary Diversion** The upper portions of the Rio de Cavaras Marinhos tributary will be diverted through the backfilled portion of the North Pit by Year 20 to facilitate mining of the western portions of the North Pit. The primary mitigation measures include sizing of the diversion to an appropriate return period (1:100 year storm) and providing suitable armouring of the diversion channel to resist erosion.	O
CN-25	ESIA Section 11	**Follow-up Surface Water Assessment** The follow-up program for surface water includes: • Additional Geochemical Evaluation - Conduct additional geochemical evaluation of tailings and waste overburden to improve the certainty of the impact predictions presented in this assessment, and to confirm the assumptions in the feasibility study regarding waste and water management during the detailed engineering design phase. In addition to improving the confidence level of the current work through increased sampling, additional testing will seek to establish the means to distinguish and segregate ARD/ML waste overburden, which will allow for selective disposal of these materials in waste dump WD-3b. • Seek Improved Laboratory MDLs for Nitrite and Nitrogen - Modelling identified MDLs for these parameters that are above the applicable target water quality standards. As part of the additional water quality sampling described above, improved laboratory MDLs for nitrite and nitrogen will be sought. • Implement Relevant Management Plans - Implement the relevant discipline-specific management plans presented in Volume 3: WAMP, ESCP, EPRP, and MRCP. • Monitor Effluent and Receiving Water Quality - Effluent and receiving water quality will be monitored as specified in the WAMP, to verify effluent discharge quality and compliance with the management plans. • Implement Adaptive Management - An adaptive management approach will be utilized, incorporating additional geochemical and water quality information into waste and water management planning as the Project moves forward.	All Phases
CN-26		**Follow-up Assessment of Post-closure Pit Pond Water Quality** • Collect Additional Surface Water Quality Data - Follow up study will be conducted to further evaluate the long-term water quality in the future pit pond, as follows: o Additional sampling of deep groundwater in the vicinity of the north pit, prior to mining o Completion of temperature-dissolved oxygen-conductivity (TDC) profiles through the water column within the central area of the box cut, and the collection of near-surface and deep (near bottom) water quality samples over 3 years in both the dry and rainy season, to better characterize water quality in the box cut o Development of a detailed post-closure pit pond water balance Conclusions about post-closure water quality in the pit pond can be incorporated into future updates of the MRCP.	First 3 years (construction/operation)
CN-27	ESIA Section 12	**Soil Loss Mitigation** Implemented the following to minimize soil losses: • Minimizing the project footprint reduces the amount of soils that will be disturbed and potentially lost to future use due to erosion • Topsoil will be salvaged for use during reclamation, and will not be utilized as general fill material • Undertake stripping and grubbing activities immediately prior to bulk earthworks to minimize opportunity for erosion to occur • Minimize the size of the active construction area at any given time • Salvage all suitable topsoil irrespective of depth to ensure that there is a sufficient quantity of soils available for reclamation • Salvaged soil will be stockpiled in designated areas and records will be maintained on soil type, salvage location, date and future intended uses • Stockpiles will be designed to be physically stable, and will be stabilized with vegetative cover or other measures as soon as practicably possible to minimize soil loss due to wind and water erosion • Implement the erosion and sediment control measures, outlined in the Sediment and Erosion Control Plan (ESCP; Volume 3) • Revise the conceptual soil salvage plan presented as Section 3 of the ESCP • Provide full-time onsite supervision of soil handling and management activities to ensure compliance with the ESCP and Soil Salvage Management Plan (SSMP) • Provide basic training in the protection of soil resources and erosion and sediment control to mine operators and contractors, and specialized training to mine and contractor management	All Phases

TABLE 3B.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-28	ESIA Section 12, ESCP	**Soil Handling and Management** Prior to construction develop a detailed SSMP by a qualified professional with experience in soil handling and management for reclamation purposes. The SSMP will include a material balance that will track the amount of soil available versus the amount required for rehabilitation. Material balance will be updated on an annual basis.	Prior to Construction
CN-29	ESIA Section 12	**Monitoring of Soil Salvage** A construction monitor will be used to direct crew for soil salvaging, soil identification and to minimize impacts to soils. In addition, employees will be provided with training in the protection of soil resources, erosion and sediment control.	C
CN-30	ESIA Section 12	**Soil Sorting** Segregate and sort the individual soil horizons separately with the help of on-site supervision	C, O
CN-31	ESIA Section 12	**Contaminated Soils** Remediate contaminated soils and if necessary dispose of soils off-site in accordance with the Waste Management Plan	C, O, CL
CN-32	ESIA Section 12	**Travel on Disturbed and Reclaimed Areas** Limit traffic travel on disturbed and reclaimed areas	C, O, CL
CN-33	ESIA Section 12	**Stockpiling** Avoid long term stockpiling of soils to the greatest extent possible	C, O
CN-34	ESIA Section 12	**Land Capability Preservation** Implement the following to preserve land capability: • Minimize the Project footprint and therefore the conversion of land • Maximize the capacity of the Project affected lands to support future uses by effective implementation of the relevant discipline-specific management plans: the SSMP, ESCP and MRCP	Prior to Construction
CN-35	ESIA Section 12	**Compliance** Monitor to verify compliance with the management plans and the applicable international guidance	Prior to Construction
CN-36	ESCP	**ESCP Revisions** Update ESCP prior to undertaking the proposed works as part of the next phase of engineering	Prior to Construction
CN-37	ESCP	**Erosion and Sediment Transport** Implement the following general mitigation measures: • Armouring • Riprap • Geotextile • Silt fences • Silt barriers • Silt curtain • Filter dam • Diversion Channel • Containment berm • Portable containment sump • Flocculent	C, O
CN-38	ESCP	**Soil Protection and Erosion Control during Construction** The following mitigation measures are proposed to ensure the protection of soils and the control of erosion during construction. • Mitigation by Design - Mitigation by design will be employed by: o Minimizing the Project footprint to limit surface disturbance o Grouping buildings and project facilities wherever possible o Using existing roads to access the Project site • Soil Segregation and Stockpiling - Impacts to soil quality will be minimized by segregating soils and stockpiling the different soils for future use in reclamation activities. • Erosion Control Structures - Erosion control techniques, such as silt fences, interceptor ditches, diversion bunds, riprap, check dams and settling ponds will be utilized. Construction monitors will be present during construction to direct the construction crews for soil salvaging and to minimize the impact on area soils.	C

TABLE 3B.1

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FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-39	ESCP	**Soil and Landform Protection during Operations** The following mitigation measures are proposed to ensure the protection of soils and landforms during operations: • Utilizing Previously Disturbed Areas - Activities during operations will favour areas that have been previously disturbed. This will avoid disturbing new areas. • Designated Transportation Routes - The operation of vehicles and machinery will be restricted to designated roads inside the Mine's property line. This will minimize the zone of influence on surface vegetation and soil. • Erosion Control Structures - Erosion control techniques, such as silt fences, interceptor ditches, diversion berms, riprap, check dams and settling ponds, will be utilized in areas on an as-needed basis to minimize soil loss in disturbed areas. It is anticipated that these techniques will be required more often during the rainy season. • Soil and Water Conservation - Soil and water conservation measures such as terracing and tree planting will be carried out around the major infrastructure and any other areas near waterbodies to minimize soil loss. • Soil segregation and stockpiling - Soil will continue to be segregated and stockpiled for later use. Topsoil management procedures are described in Section 2.5. During operations, all structures will be monitored for slope stability. The temporary establishment of vegetation may be recommended at this time to enhance stability and to minimize erosion. Routine inspections after significant rain and flooding events will be conducted. Any observed deficiencies to any structure will be recorded and reported immediately for remedial action. Where applicable, progressive reclamation of areas to be vegetated may be facilitated by fertilization and irrigation. This may aid in the early establishment of vegetation following soil disturbance. Details regarding progressive reclamation are provided in the Preliminary Mine Reclamation and Closure Plan (MRCP).	O
CN-40	ESCP	**Soil and Landform Protection during Closure** At closure, the following measures are proposed for the Project to ensure the protection of soils and landforms. • Closure Planning - The MRCP was developed to ensure: o Restoration and stabilization of disturbed areas o Long-term sustenance of seeded and planted vegetation cover on disturbed lands o Long-term geotechnical and chemical stability of tailings o Maintenance of drainage and sediment control structures such that they remain effective post-closure o Monitoring of the Tailings Storage Facility (TSF) embankment stability is routinely conducted • Reclamation of Disturbed Areas - Disturbed areas including the Process Plant site, waste rock storage areas, and a portion of the TSF will be reclaimed with the soil salvaged during construction to reclaim the area to rangeland and agricultural uses. • Monitoring - Waste rock storage areas will be visually monitored for signs of erosion. The soil will generally be monitored for its ability to sustain the intended future use.	CL
CN-41	ESCP	**ESCP Review** Management reviews of the ESCP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented when required. The reviews will also provide a formal mechanism to assess the effectiveness of the management plan in achieving design objectives and maintaining ongoing compliance with the Project's regulatory authorizations.	All Phases
CN-42	ESIA Section 13	**Removal and Replanting of Plants and Trees** Careful removal and replanting of plants and trees of conservation importance. Seed collection, propagation and re-planting of saplings to make up for lost species should also be applied. A nursery should be started as a community project.	Prior to Construction
CN-43	ESIA Section 13	**Local Migration** Implement the following to limit effects on local migrations: • Both the Mine and Port Sites will be isolated by means of a fence to prevent larger animals from entering the Project areas • A low speed limit can be strictly enforced in order to reduce collisions with animals on the roads	Prior to Construction

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-44	ESIA Section 13, BMP	**Biodiversity Offsets** Implement biodiversity offsets as may be appropriate in accordance to the Biodiversity Management Plan. The details of offsetting options will be determined by GB Minerals in the future, prior to construction.	Prior to Construction
CN-45	ESIA Section 13.6	**Follow-up Plant Survey** Conduct a follow-up plant survey in October 2015 to determine if two species of concern (*Floscopa axillaris* and *Digitaria patagiata*) are present. Additionally investigate areas to be affected for another Red Data listed species *Raphia palma-pinus* .	Oct-15
CN-46	ESIA Section 13.6, BMP	**Biodiversity Management Plan** Implement the Biodiversity Management Plan prior to construction and update the Plan based on feedback received during the ESIA review phase, including through stakeholder feedback. Once implemented, review the Plan within 5 years of its adoption.	Prior to Construction
CN-47	BMP	**BMP Implementation** Follow the biodiversity management implementation plan as detailed in Table 6 of the BMP	All Phases
CN-48	ESIA Section 14.4.4	**Mangrove Removal** Ensure that removal of mangroves is minimized to the extent possible and consistent with the losses predicted in this ESIA	All Phases
CN-49	ESIA Section 14.4.6, 14.4.7, 22	**International Shipping Standards** Shipping at the Port Site will comply with international standards regarding waste water discharge and ballast water discharge. GB Minerals commits to investigating and implementing what measures it can to confirm vessels calling on port are complying with the regulations.	O
CN-50	ESIA Section 14.4.8	**Shipping Accident Mitigation** Implement the following mitigation to minimize the potential for a shipping accident: • Limiting the size of vessel that calls on port to those with appropriate draft to navigate to Ponta Chugue under all tide and flow conditions • Providing dedicated pilotage; pilots will board the pilot boat at Ponte Chugue and sail to the pilot boarding location near Ciao. The ocean going vessel will then be piloted 60 nm to and from Ponta Chugue. • Vessels will be berthed bow west (facing upstream) with tug assistance, and will undergo draft survey once berthed • Following loading, the vessel will undergo another draft survey before deberthing under tug assist	O
CN-51	ESIA Section 14.5	**Engagement with Fishermen** Careful active dialogue will be required with the Geba and Cacheu fishermen during construction and operation of the conveyor and wharf to adequately mitigate Project related impacts to fish and fisheries within both estuaries	C, O
CN-52	ESIA Section 15.4.4, CHSSP Section 2.7	**Noise Mitigation** Measures to mitigate noise from the Project will include: • Adhering to appropriate maintenance for mobile and stationary equipment, including regular inspection of silencers/mufflers • Limiting certain construction activities to normal working hours as much as possible • Operating mobile and stationary equipment properly and within respective specifications and capacity • Maintaining road surfaces • Limiting transportation to daytime hours • Applying an adequate buffer between the mine site and local residents	All Phases
CN-53	ESIA Section 15.4.4	**Additional Mitigation** Noise screens (walls or berms) could be used to further reduce noise levels at select receptors if noise levels are determined to be unacceptable	C, O
CN-54	ESIA Section 15.5, NMP Section 3.0	**Noise Monitoring** Specific monitoring activities at the following three sites: • R61 Cunteda - Monitoring of daytime noise levels between the hours of 06:00 and 20:00 on a quarterly basis. • R69 Village Chief - Monitoring of daytime noise levels between the hours of 06:00 and 20:00 on a quarterly basis. • R2 Bani - 24-hour monitoring on a quarterly basis. Noise monitoring should be carried out using a Type 1 or 2 sound level meter.	C, O, CL

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-55	ESIA Section 15.5	Any grievances raised by Project stakeholders will be investigated through additional monitoring and adaptive management as may be required	All Phases
CN-56	NMP Section 1.4	**NMP Revisions** Update Noise Management Plan prior to initiating construction. Conduct management reviews of the NMP on a regular basis	Prior to Construction
CN-57	NMP Section 2.2.1, CHSSP Section 2.7	**Transportation-related Noise Mitigation** Implemented the following to minimize transportation-related noise impacts: • All haul trucks will be subject to a thorough manufacturer's recommended periodical maintenance program to ensure vehicles are operating in good condition • Speed limits will be enforced in relation to road conditions and on-route communities • Truck drivers will be educated about the characteristics of diesel engines and braking systems on the equipment (for example, that the flat torque characteristic allows ascending an incline in a higher gear, which is a less noisy operation) • Road surfaces will be maintained in good repair to reduce tire noise and facilitate continuous traffic flow to avoid prolonged idling • Transportation will be scheduled for daytime hours whenever possible. Product will be transported from the mine to the port between 6 a.m. and dusk. Resupply activities will be constrained by the timing of operation of the ferry crossing over the River Cacheu at Farim.	All Phases
CN-58	NMP Section 2.2.2, CHSSP Section 2.7	**Construction Phase Noise Mitigation** During the construction phase of the Project to mitigate noise levels: • Schedule noisy construction activities at normal working hours to the extent possible • Operate equipment within specification and capacity • Perform regular inspection and maintenance of construction equipment • Use newer and more efficient construction equipment to the extent possible • Turn off construction equipment when not in use • Avoid trucking operations during night-time when possible • During routine maintenance of vehicles, check that noise abatement devices are in good order (e.g., brakes, exhaust mufflers, engine hoods	C
CN-59	NMP Section 2.2.3, CHSSP Section 2.7	**Operation Phase Noise Mitigation** Implement the following additional mitigation measures during operation of the Project: • The process plant components and material handling equipment at the mine and port will use equipment conforming to noise standards • The process plant components and material handling equipment at the mine and port will be maintained on a regular basis and worn parts replaced or lubricated as required • Rubber linings will be used on chutes and transfer points to minimize noise and vibration • The height which material drops from the plant, loading facilities and machinery will be minimized • An adequate buffer between the mine site and local residences is proposed	O
CN-60	ESIA Section 16.4.4, CHMP Section 2.2, 3.3, 3.4 and 3.5	**Prepare and Implement Additional Cultural Heritage Management Plans** • Develop and implement a Cemetery Relocation Plan • Develop and implement a Sacred Site Relocation Plan • Develop and implement a Mosque Relocation Plan	Prior to Construction
CN-61	ESIA Section 16.4.4, CHMP Section 2.2 and 3.2.3	**Chance Finds Procedure** Develop and implement a Chance Finds Procedure (update and build upon the Chance Find Procedure included in the Cultural Heritage Management Plan)	Prior to Construction
CN-62	ESIA Section 16.4.4 , CHMP Section 2.2 and 3.2	**Management of Medium Sensitivity Archaeological Sites** Conduct data recovery or rescue excavations of known medium sensitivity archaeological sites prior to the start of construction. These excavations to be conducted by a professional archaeologist(s).	Prior to Construction

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-63	ESIA Section 16.4.4, CHMP Section 2.2 and 3.2	**Cultural Heritage Training** Provide training to all employees and subcontractors on identifying/recognizing cultural heritage resources; the CFP notification requirements and procedures; and subsequent handling of any archaeological remains that are identified during construction activities	Prior to Construction
CN-64	ESIA Section 16.4.4, CHMP Section 2.2 and 3.2	**Management of Low Sensitivity Archaeological Sites** Low sensitivity archaeological sites do not need to be subjected to data recover or rescue excavations, but should be managed through an archaeological site monitoring program developed before construction activity begins	Prior to Construction
CN-65	ESIA Section 16.6	**Field Confirmation** Conduct field confirmation and reassessment of all living heritage sites identified by Eco Progresso	Prior to Construction
CN-66	CHMP Section 1.4	**CHMP Revisions** Implement and update the Cultural Heritage Management Plan prior to initiating construction, based on consultation undertaken with stakeholders during the ESIA review phase. Conduct management reviews of the CHMP on a regular basis	Prior to Construction
CN-67	ESIA Section 17.4.1	**Avoidance of Landscape and Visual Impacts** To avoid some landscape and visual impacts GB Minerals will: • Minimizing the Project footprint and resultant landscape conversion to the extent possible • Prioritizing the avoidance of higher sensitivity landscapes	Prior to Construction
CN-68	ESIA Section 17.4.1	**Reduction of Landscape and Visual Impacts** To reduce landscape effects post closure: • Open pits will be mostly backfilled and revegetated (except for the final two years of mining in the western edge of the north pit) • The post mining landforms (waste dumps, IWL) will be designed with a natural appearance which is sympathetic to the surrounding topography and facilitates the successful establishment of vegetation on the restored areas • Mining infrastructure will be removed and the land will be contoured, covered in topsoil and revegetated • The Biodiversity Management Plan (Volume 3) identifies the mangroves as critical biodiversity vegetation community, and a biodiversity off-set program has been proposed to establish or re establish mangroves at an alternate location nearby	O, CL, PC
CN-69	ESIA Section 17.5.1	**Visual Barrier** At the Mine Site, a 20 m buffer of mangroves will be maintained along the River Cacheu and a 4 m high flood protection berm will be located inside this buffer, providing a visual barrier from canoes on the River Cacheu. At the Port Site, facilities have been set back from the mangroves to maintain a vegetative buffer, except where the wharf connects to land.	C, O
CN-70	ESIA Section 18.4.1, CHSSP Section 2.4	**Traffic Flow Impact Reduction** To reduce impacts of traffic flow GB Minerals commits to: • Use of private project ferry and bridge at Sao Vincente • Transport ore and goods during daylight hours • Inform fishermen of ore ship schedules • Provide information on safe passage routes for fishermen • Develop and enforce driver rules of the road • Implement other traffic safety measures contained in the Community, Health, Safety and Security Plan (CHSSP)	All Phases
CN-71	ESIA Section 18.4.2	**Infrastructure Deterioration Impact Reduction** To reduce impacts of infrastructure deterioration GB Minerals commits to: • Monitor road conditions through annual road condition survey	All Phases

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-72	ESIA Section 18.4.3, 22.3.6, CHSSP Section 2.4, 2.7	**Traffic Safety Impact Reduction** To reduce impacts of traffic safety GB Minerals commits to: • Vehicle movements during daylight hours • Rules of the road will be established and enforced including speed limits for project related traffic • Drivers will be educated on proper vehicle operation • A public safety awareness campaign will be implemented • A procedure will be developed to compensate for damages to property including livestock • Suitable points will be identified for refuelling, rest, and overnight parking • The rules of the road, traffic safety measures and emergency preparedness and response plans will be shared with these stakeholders • Additional signage as may be required • Proper navigational aids and adherence to exclusion zones and times	All Phases
CN-73	ESIA Section 18.4.4, CHSSP Section 2.9.2	**Environmental Disturbance Impact Reduction** To reduce impacts of environmental disturbance GB Minerals commits to: • Regular maintenance of vehicles and roads • Ensure product loads are secure	All Phases
CN-74	ESIA Section 18.5	**Traffic Monitoring** GB Minerals will monitor traffic related impacts through: • Data collection of traffic accidents and Project-related accidents • Monitoring the number of grievances initiated about traffic safety, disturbance, infrastructure or against Project drivers	All Phases
CN-75	ESIA Section 19.4.3, 19.4.4, 19.4.7 and 22.3.3, RFP	**Resettlement Action Plan** • Develop and implement a detailed RAP consistent with the RPF that also meets IFC requirements • Incorporate considerations of land tenure in the RAP • Replace displaced community resources and infrastructure as part of the RAP; which should lead to an overall improvement to community infrastructure	Prior to Construction
CN-76	ESIA Section 19.4.4, 19.4.5, 19.4.6 and 19.4.7	**Human Resource Management Plan** • Implement HRMP including: o Training programs o A workforce localization plan to maximize local employment at all levels of the organization o Implement local hiring procedures in the HRMP prioritizing hiring of long-term local residents to discourage influx of job-seekers o Establish fair compensation mechanism o Plan worker and supplier demobilization, where feasible • Provide transportation to workers from outside the immediate area if necessary • Developing publicly available Hiring Policy • Improve employability of workers through training • Prepare employees for job losses at closure through employee education programs	Prior to Construction
CN-77	ESIA Section 19.4.4, 19.4.5 and 19.4.7, CHSSP Section 2.6	**Population Influx Management** Develop population influx management measures in consultation with appropriate government authorities. GB Minerals will engage in proper, organized planning with local administrators and regional and national government agencies to plan for controlled in-migration in order to reduce the potentially adverse effects of population influx.	Prior to Construction
CN-78	ESIA Section 19.4.4, 19.4.5 and 19.4.7, CHSSP Section 2.7	**Promoting Health** • Conduct health education training and awareness for employees and local residents • Conduct health education and awareness campaigns in collaboration with government agencies and NGOs on communicable diseases and vector-borne diseases • Provide workers with on-site medical services and encourage workers to implement protective measures	All Phases

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-79	ESIA Section 19.4.6 and 19.4.7	**Economic Development and Monitoring** • Implement procurement policies to minimize impacts on local markets and pricing • Monitor price inflation on a quarterly basis • Maximize local sources and assist entrepreneurs	All Phases
CN-80	ESIA Section 19.4.6 and 19.4.7	**Royalties and Taxes** Pay royalties and taxes to the Government of Guinea-Bissau	All Phases
CN-81	ESIA Section 19.5	**Socioeconomic Data Collection** Supplemental socioeconomic data collection including: • Employability survey • Additional community health baseline data	Prior to Construction
CN-82	ESIA Section 19.4.5 and CHSSP Section 2.2, 2.8	**Public Access** Restrict public access to Project Sites by erecting fencing and signage and hiring security personnel	All Phases
CN-83	ESIA Section 22	**Invasion Species and Alien Plants** Invasive species management plan and develop and implement alien plant eradication program	Prior to Construction
CN-84	CHSSP Section 1.4	**CHSSP Revisions** Update Community Health, Safety and Security Plan prior to construction and conduct management reviews of the CHSSP on a regular basis	Prior to Construction
CN-85	CHSSP Section 2.2	**Detour Travel Route** Construct a ring-road around the northern extent of the Mine Site linking communities west of the Mine with Farim. Alternatively, provide a shuttle service between Farim and select key communities around the Mine Site to help reduce the risk of accidents or injury and limited unwarranted access to the Mine Site.	Prior to Construction
CN-86	CHSSP Section 2.3, ESIA Section 19.4.5	**Employee Code of Conduct** Further develop and implement the Employee Code of Conduct	Prior to Construction
CN-87	CHSSP Section 2.5	**Hazardous Materials Transport** Implement general procedures for the transportation of hazardous materials as outline in the CHSSP	All Phases
CN-88	CHSSP Section 2.8	**Security** • GB Minerals will develop and adopt a policy describing the requirements for all personnel, contractors and sub-contractors related to security arrangements and GB Minerals' policy on the use of force • GB Minerals will adhere to national laws as well as international standards on law enforcement in securing project operations, particularly those that relate to the use of force • GB Minerals will carry out risk assessments in relation to security issues at each of its project sites. • A Security Plan will be developed for each project site in order to prevent and mitigate any threats identified in its risk assessment. • GB Minerals will investigate any credible allegations of unlawful or abusive acts of its security personnel, take action to prevent recurrence, and report unlawful and abusive acts to public authorities when appropriate. • GB Minerals will never place or pressure employees to work in areas of high risk to personal security.	All Phases
CN-89	CHSSP Section 2.9.1	**Community Health Monitoring** GB Minerals will monitor activities to ensure that community health and safety are protected during construction and operation	All Phases
CN-90	CHSSP Section 3.2	**Employee Training** All employees and contractors will be provided with training on health, safety and security. Additional specialist training will be provided to key personnel involved in activities that are conducted off-site and along the transport route, including driver training.	All Phases

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-91	OHSP Section 1.4	**OHSP Revisions** Update Occupational Health and Safety Plan prior to construction and conduct management reviews of the OHSP on a regular basis	Prior to Construction
CN-92	OHSP Section 2.2, 3	**Risk Assessment** GB Minerals (and the EPCM Contractor, during the construction phase) shall conduct a risk assessment following key steps and develop a risk register. This will be completed prior to the start of construction. Revision of the OHSP will include the outcome of completed pre-construction risk assessment.	Prior to Construction
CN-93	OHSP Section 4	**Occupational Health and Safety** GB Minerals will develop and implement OHS measure to ensure the health and safety of workers including: • Standard Operating Procedures • Use of appropriate PPE • Maintaining a safe work environment • Appropriate first aid and emergency response	Prior to Construction
CN-94	OHSP Section 5.7	**Communication of OHS** OHS will be communicated to all employees on a regular basis to ensure employees and sub-contractors are informed of new technical, operational, safety, health and environmental information	All Phases
CN-95	OHSP Section 6, ESIA Section 19.4.5	**OHS Training** All personnel and visitors will undergo formal training and basic induction training on relevant aspects and safe working practice before starting employment. Employees will undergo OHS training and site specific training.	All Phases
CN-96	OHSP Section 7.2	**OHS Record Management** GB Minerals will be report and maintain records of incidents and hazards that occur at Project Sites or involving Project employees	All Phases
CN-97	OHSP Section 7.3.2, ESIA Section 19.4.5	**Health Monitoring** To assess and monitor the health of employees and the effect of the work environment on the health of GB Minerals and the EPCM Contractor will develop, implement and maintain a health monitoring procedure	All Phases
CN-98	EPRP Section 1.4	**EPRP Revisions** The plan is expected to be revised prior to the start of project construction, in consultation with local communities, applicable government agencies and GB Minerals' Engineering, Procurement and Construction Management (EPCM) contractor. The construction-ready EPRP will include the following additional information: • Updates (if any) to the hazard identification/risk assessment (Section 2 of this plan) • Facility evacuation plans and diagrams that include the location of key response resources (i.e., spill kits) • Emergency Response Team (ERT) contact information • Evacuation Plan including muster points • Checklists The emergency preparedness and response activities will be periodically reviewed and revised, as necessary, to reflect changing conditions.	Prior to Construction
CN-99	EPRP Section 3.1	**Prevention of Emergencies** GB Minerals is committed to a prevention strategy of ongoing maintenance, inventory control, staff training, site security and vigilance of all aspects of the work. It is the responsibility of all health, social, safety and environmental (HSSE) staff to follow the emergency preparedness and prevention requirements.	All Phases
CN-100	EPRP Section 3.2, 3.3 and 3.4	**Emergency Preparedness and Response Procedures** Implement and follow general emergency response procedures, specific response procedures and community emergency preparedness and response procedures as outlined in the EPRP	All Phases
CN-101	EPRP Section 4.3	**Employee Training** All employees will be trained on all aspects of the EPRP to ensure their preparedness for an emergency situation	All Phases

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-102	EPRP Section 5	**Monitoring and Reporting** Regular EPRP monitoring and monthly reporting will be undertaken in addition to emergency incident investigations and reporting as incidents arise	All Phases
CN-103	SEP Section 1.4	**SEP Revisions** The plan is expected to be further revised prior to initiating construction of the Project. Management reviews of the SEP will be conducted and documented on a regular basis.	Prior to Construction
CN-104	SEP Section 3.2	**Engaging Vulnerable Groups** During construction and operations, GB Minerals will increase its efforts to engage potentially vulnerable or disadvantaged groups that may be affected by the Farim Project and encourage their full participation in engagement activities	C, O
CN-105	SEP Section 5.1	**Meeting Records** GB Minerals will continue to complete Meeting Records for all stakeholder engagement activities it conducts for the Farim Project. Records of stakeholder interactions shall be managed and held by GB Minerals.	All Phases
CN-106	SEP Section 5.1	**Stakeholder Tracking System** • Implementing a stakeholder tracking system to record and document all engagement activities and relevant information about national, regional and local stakeholders, including comments, issues, project responses and outcomes • Circulating key stakeholder information to project teams, including the EPCM Contractor • Designated Community Relations Specialist (or other appropriate candidate) responsible for developing and implementing the stakeholder tracking system. • The Project stakeholder engagement record will be updated to track changes as they occur.	All Phases
CN-107	SEP Section 5.2	**Coordination of Engagement Activities** GB Minerals recognizes the importance of coordinating its stakeholder engagement activities with stakeholders from local, regional and national governments. GB Minerals will continue its engagement with government authorities with regular updates on engagement activities, by coordinately engagement activities with government authorities, providing engagement records upon request and providing regular reports to government on stakeholder complaints and actions taken to resolve issues.	All Phases
CN-108	SEP Section 5.3	**Engagement Language** Consultation at the regional and national levels with government is conducted in Portuguese, and written public disclosure materials are also presented in Portuguese. Community meetings in the vicinity of the Project areas, however, are conducted in Creole and Mandinga. A number of engagement methods and disclosure materials are being or will be used for the Project.	All Phases
CN-109	SEP Section 5.4	**ESIA Review by Stakeholders** The ESIA and associated Management Plans will be made available to local, regional, national and international stakeholders	ESIA Review Phase
CN-110	SEP Section 5.4.2	**Community Information Committee** GB Minerals intends to re-establish the village committee or establish a new Community Information Committee (CIC) with the assistance of local administrators and village chiefs.	Prior to Construction
CN-111	SEP Section 5.4.3	**Community Liaison Officers** GB Minerals intends to continue to employ Community Liaison Officers (CLOs) for the Project to support engagement activities	All Phases
CN-112	SEP Section 5.4.4	**Project Information Centre** GB Minerals will establish a Project Information Centre (PIC) at its office in Farim. Consideration will be given to establishing a similar centre in the vicinity of the port site. The PICs will be staffed part or full-time by one or more CLOs, who can provide written and oral information on the Project, record visitors and comments received, and other relevant information.	Prior to Construction
CN-113	SEP Section 5.4.5	**Community Outreach** GB Minerals intends to host community outreach and education events during the construction and operation of the Farim Project, at the local levels through a variety of activities. The company will consult further with community stakeholders on how to best conduct the outreach.	C, O
CN-114	SEP Section 5.4.6	**Engagement Methods** GB Minerals intends to utilize open houses and site tours, as required	All Phases

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-115	SEP Section 5.4.7	**Information Disclosure** GB Minerals shall disclose regular information to stakeholders involving the following: • Prepare and disseminate relevant printed information about the Project and in particular, construction and operations activities (for example, brochures to explain how to use the complaints procedure, or pamphlets outlining recruitment procedures) • Materials will be provided in Portuguese and designed to provide details in a format readily understandable by local people • Particular attention will be given to ensuring that people with low literacy levels and other vulnerable groups receive printed information in formats that are appropriate for them • During construction and operations, materials may be prepared and disclosed on various topics	All Phases
CN-116	SEP Section 5.4.9	**Women's Engagement** GB Minerals proposes to develop relevant measures to help to fully integrate women's perspectives into its engagement activities	All Phases
CN-117	SEP Section 6	**Grievance Mechanism** GB Minerals will implement a Grievance Mechanism and will follow the procedures identified in the SEP	All Phases
CN-118	SEP Section 7.2	**Employee Training** The HSSE Manager and Community Liaison Specialist will provide introductory training to all staff regarding interaction with communities, individuals and co-workers. All employees and contractors will be made aware of key community issues, as well as expectations on employees and contractors when interacting with fellow employees or stakeholders from nearby communities.	All Phases
CN-119	CDP Section 1.4	**CDP Revisions** The plan is expected to be further revised prior to initiating construction of the Project, in consultation with local stakeholders. Management reviews of the CDP Plan will be conducted and documented on a regular basis.	Prior to Construction
CN-120	CDP Section 2.3, ESIA Section 19.4.4, 19.4.5 and 19.4.6	**CDP Projects** Develop appropriate community development projects in collaboration with community leaders, organizations and government authorities	All Phases
CN-121	RPF Section 10	**Resettlement Action Plan** Conduct RAP development and implementation programme, as well as a preliminary costing and schedule for resettlement based on the initial implementation plan provided in the RFP	Prior to Construction
CN-122	WMP Section 1.4	**WMP Revisions** The Waste Management Plan is expected to be further revised prior to initiating construction of the Project. Management reviews of the WMP will be conducted and documented on a regular basis.	Prior to Construction
CN-123	WMP Section 3.3	**Waste Management Mitigation Measures** GB Minerals will implement the following primary mitigation measures for waste management: • Application of the waste management hierarchy to reduce, reuse, recycle, reclaim (the "4Rs"), followed by disposal as the least preferred option • Reduce the amount of waste produced by procuring materials in bulk, thus reducing packaging requiring management or disposal • Implementation of containment measures to protect soil, surface water and groundwater from contamination • Restricting public and untrained worker access to waste management and disposal facilities • Application of best management practices with respect to the final disposal of each waste type • Development of standard operating procedures for the safe segregation, handling and disposal of the different waste types • Adherence to this management plan through the proper allocation of resources, training, auditing of plan implementation, and the application of corrective actions	All Phases
CN-124	WMP Section 4.1	**Waste Management Facilities** GB Minerals will construct, operate or contract waste management facilities including waste segregation/ management facilities, non-hazardous solid waste landfill and sewage treatment facilities	All Phases

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

Print Sep/18/15 10:29:04

Commitment Number	Referenced Source	Description	Timeline
CN-125	WMP Section 4.2, 6.2.2	**Waste Management Facility** The Waste Management Facility will receive all wastes (hazardous and non-hazardous) generated onsite, where they will be sorted and managed as appropriate, either for reuse, recycling or disposal by outside contractors or in the onsite landfill. All waste movement will be recorded in a register by the Waste Management Contractor at the Facility. The WMF will be installed with an apron and appropriate perimeter drainage. Areas used for loading and unloading will also have suitable drainage, spill containment and other controls. The area will be protected from inclement weather to avoid risk of contamination.	All Phases
CN-126	WMP Section 4.4, 4.5, 4.6 and 4.7	**Waste Management Procedures** • GB Minerals will follow non-hazardous waste management procedures as outlined in the WMP • GB Minerals will follow hazardous waste management procedures as outlined in the WMP • GB Minerals will follow petroleum and oil management procedures as outlined in the WMP • GB Minerals will follow other liquid hazard (solvents, reagents, etc.) waste management procedures as outlined in the WMP	All Phases
CN-127	WMP Section 4.8	**Ship Waste** GB Minerals will not accept any type of waste originating from a ship. The vessels will be expected to manage their own wastes	O
CN-128	WMP Section 5.1.1	**Employee Training** All employees and contractors shall be provided with basic training in waste management	All Phases
CN-129	WMP Section 6.2.1	**Inspections** Regular site inspections and formal documented audits will be undertaken in order to verify performance of personnel and implementation of this WMP. The Project site will be divided into sections, with each section being inspected on a monthly basis.	C, O, CL
CN-130	WMP Section 6.2.3	**Audits** After a year of operation (and annually thereafter), waste audits will be undertaken to ensure waste streams are properly following the Waste Segregation System	C, O, CL
CN-131	WMP Section 6.2.4 and 6.2.5	**Monitoring of Landfill and Hazardous Materials** GB Minerals will conduct monitoring of the landfill and of hazardous materials	All Phases
CN-132	MRCP Section 1.1	**MRCP Revisions** The MRCP is an integral part of the Project and acting as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, the results of additional studies, and monitoring	All Phases
CN-133	MRCP Section 4.1	**Progressive Reclamation** Throughout operations progressive reclamation will be carried out to the greatest extent practical. Progressive reclamation is implemented during the operation phase with the following objectives: • Minimize physical safety concerns • Reduce environmental impacts such as erosion and sedimentation, and corresponding water management requirements • Reduce environmental liabilities and the corresponding amount of financial assurance required • Provide insight for future reclamation activities The main progressive reclamation measure to be undertaken will be the progressive backfilling of the open pits.	O
CN-134	MRCP Section 4.1	**Progressive Reclamation of Waste Dumps** The following progressive reclamation opportunities can be realized for the waste overburden: • WD-1 and WD-2 can be reclaimed in Years 2 and 3 • WD-3a and WD-3b can be reclaimed as of Year 18 • WD-4 can be reclaimed followings Years 3 and 4 and between Years 8 through 15 • WD-5 and WD-6 can be reclaimed between Years 10 and 17	O

TABLE 3B.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
VOLUME 3 - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

COMMITMENTS REGISTER

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Commitment Number	Referenced Source	Description	Timeline
CN-135	MRCP Section 4.1	**End of Operation Closure Objectives** By the end of the operation phase: • All waste dumps will have been reclaimed • The filled portions of the landfill will have been reclaimed • South pit will have been completely reclaimed (covered by reclaimed waste dump WD-4) • Approximately 80% of the north pit will have been backfilled and reclaimed • Dewatering wells will be decommissioned once they are no longer required	O
CN-136	MRCP Section 4.2	**Closure Research Programs** GB Minerals will conduct closure research programs and further studies as defined in the MRCP	O, CL
CN-137	MRCP Section 5	**Temporary Suspension** In the event of temporary suspension, GB Minerals will implement Temporary Suspension of Operations Procedures as identified in the MRCP	O
CN-138	MRCP Section 6	**Final Reclamation Measures Implementation** GB Minerals will follow and implement Final Reclamation Measures as identified in the MRCP upon Project closure	CL
CN-139	MRCP Section 7	**Monitoring and Maintenance** GB Minerals will conduct the following closure and post-closure monitoring and maintenance activities: • Reclamation Monitoring and Auditing • Physical Stability Monitoring • Revegetation Monitoring • Water Monitoring • Biodiversity Monitoring • Human Resources, Community and Socioeconomic Monitoring	CL, PC
CN-140	HHERA Section 21.10	**Monitoring for Human Health and Ecological Risk** Monitoring of NO2, SO2, PM10, and PM2.5 levels during the operational phases of the Mine and Port Sites in order to better evaluate risks associated with ground-level ambient air and multi-pathway oral/dermal exposures. If monitoring indicates elevated levels, that is, the measured concentrations were greater than the exposure limits utilized in the HHERA, then mitigation to minimize chemical releases from the Mine and Port Sites should be considered.	O
CN-141	HHERA Section 21.11	**Radiological Monitoring and Follow-up** • Develop targeted plans to monitor radioactivity in key environmental components: surface soil samples and a limited number of plants and animals, particularly those that might be harvested by the local communities. • Conduct radon measurements in storage areas during initial mine operations and, if deemed necessary, continued monitoring of radon to ensure that concentrations do not exceed 1000 Bq/m3. Control measures may be required (e.g., improved ventilation, restrictions worker time in the area, etc.). • Include monitoring to assess the radiological impact of dust inhalation to workers on the site, and fugitive dust depositing outside the mine proper. Initial monitoring of radionuclides in particulate matter will validate that dust inhalation does not represent a meaningful exposure pathway to workers. • Conduct monitoring of human exposures during transportation or shipping using simple hand held gamma counters and, possibly, radon detectors. • Confirm laboratory detection limits are sufficiently low in future radiological analyses. • Conduct a more advanced probabilistic assessment (Tier 3) if monitoring confirms exposure doses greater than assessed. • The diet used in the human health assessment was essentially a western diet using Farim-specific site data. Any future modelling should incorporate a more appropriate diet for the local inhabitants.	O

REV	DATE	DESCRIPTION	PREP'D	RVW'D
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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3C
AIR QUALITY MANAGEMENT PLAN

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NB301-520/2-4
Rev 0
August 28, 2015

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FARIM PHOSPHATE PROJECT

AIR QUALITY MANAGEMENT PLAN
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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE AND OBJECTIVES 2
1.3 REGULATORY REQUIREMENTS 3
1.3.1 Greenhouse Gases 3
1.3.2 Air Contaminants 3
1.4 PLAN UPDATES 4

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES 5
2.1 POTENTIAL AIR QUALITY IMPACTS 5
2.2 GENERAL MITIGATION MEASURES FOR EMISSIONS CONTROL 5
2.3 MINIMIZING GHG EMISSIONS 6
2.4 MINIMIZING AIR CONTAMINANT EMISSIONS AT RECEPTOR LOCATIONS 6
2.4.1 Construction Phase 6
2.4.2 Operation Phase 6
2.4.3 Closure and Post-Closure Phases 7

3 – MONITORING PROGRAM 8
3.1 AMBIENT AIR QUALITY 8
3.2 RADIOLOGICAL MONITORING 8
3.3 GREENHOUSE GASES 8

4 – ROLES AND RESPONSIBILITIES 9
4.1 KEY PERSONNEL 9
4.2 TRAINING 10

5 – REFERENCES 11

6 – CERTIFICATION 12

TABLES

Table 1.1 Project Air Quality Standards 4
Table 2.1 Air Quality Impact Summary 5
Table 4.1 Roles and Responsibilities for AQMP Implementation 9

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

Farim Phosphate Project ..... the Project
AQMP ..... Air Quality Management Plan
AQS ..... Air Quality Standards
CO ..... Carbon Monoxide
EPCM ..... Engineering, Procurement and Construction Management
ESIA ..... Environmental and Social Impact Assessment
ESMP ..... Environmental and Social Management Plan
GHG ..... Greenhouse Gas
HHERA ..... Human Health and Ecological Risk Assessment
IFC ..... International Finance Corporation
NO_x ..... Nitrogen Oxides
PM ..... Particulate Matter
$PM_{2.5}$ ..... Respirable PM (less than 2.5 microns in size)
PM_{10} ..... Inhalable PM (less than 10 microns in size) and Respirable PM
SANS ..... South African National Standard
SO_2 ..... Sulphur Dioxide
SOP ..... Standard Operating Procedure
UNFCCC ..... United Nations Framework Convention on Climate Change
WHO ..... World Health Organization

1 – INTRODUCTION

1.1 BACKGROUND

This Air Quality Management Plan (AQMP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau in West Africa (Figure 1.1).

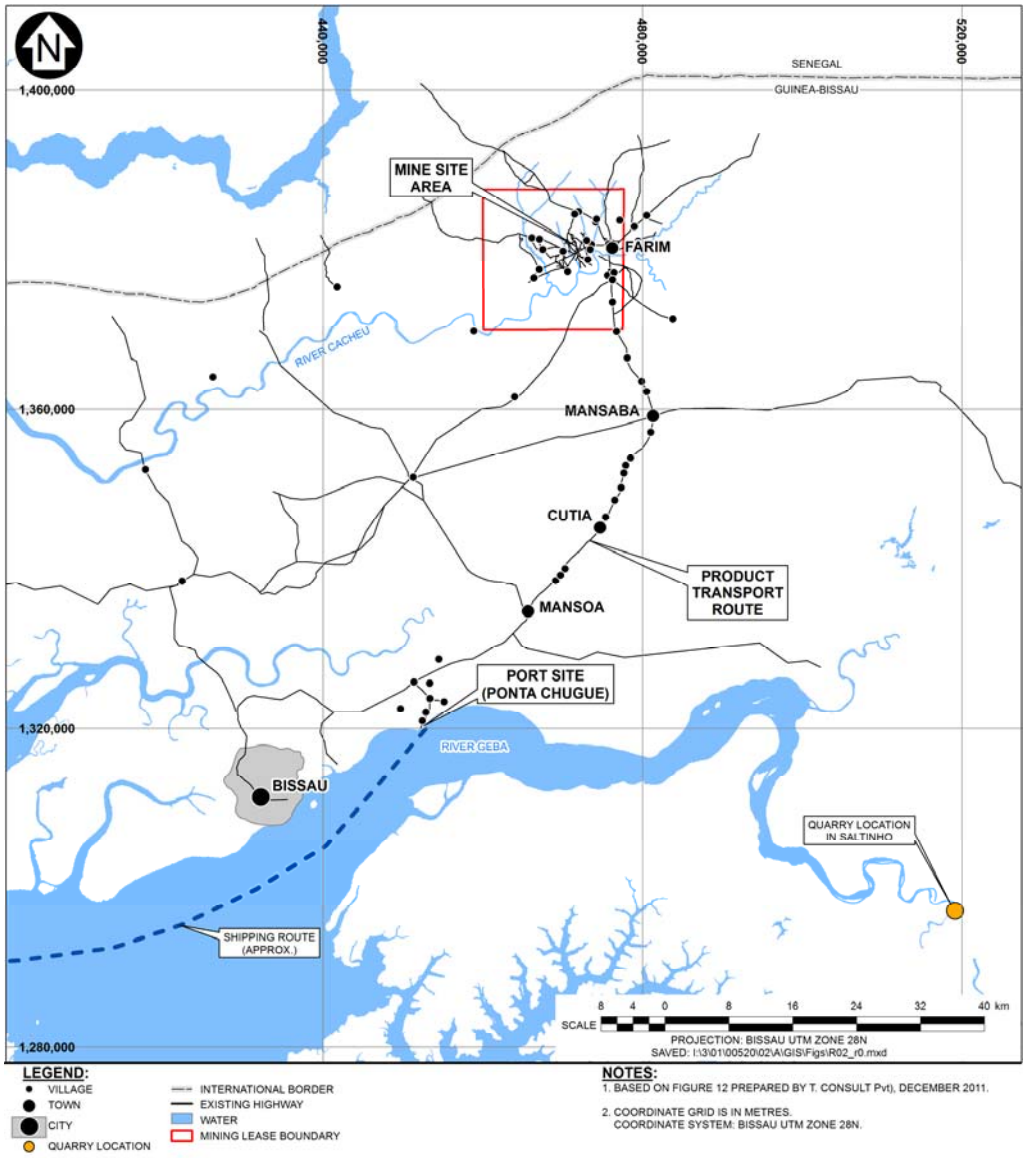

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared that evaluates and addresses the Project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA, but will also act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The AQMP is a Level 2 discipline-specific management plan. The Plan outlines the goals, strategies, and actions for the minimization of greenhouse gas (GHG) emissions and air quality impacts related to the Project during the construction, operations and closure phases. GB Minerals will work to minimize air quality impacts at nearby receptors as a result of the Project.

A receptor may be defined as any point on the premises occupied by persons who may be exposed to project-related emissions of air contaminants. Examples of receptor locations may include permanent or seasonal residences, hotels, schools and daycares, hospitals and nursing homes, places of worship, and parks and campgrounds.

Key receptors for air quality contaminants include 17 villages in the mine site area and 48 receptors points along the transport route and at the port site. The beach area adjacent to the port site is used by local residents for fishing, trading and prayer.

The AQMP establishes air quality targets, proposed mitigation measures, monitoring, training, reporting and adaptive management. The targets of the AQMP are to:

- Maintain ambient air quality within appropriate regulatory guidelines and standards
- Protect workers, local communities, livestock, wildlife and vegetation from adverse impacts due to dust emissions
- Avoid nuisance from odour and dust

Other related management plans, include the Noise Management Plan, Community Health, Safety and Security Management Plan, and the Sediment and Erosion Control Plan. Potential for complaints related to the Project's air emissions (mainly dust) will be managed through the grievance mechanism in the Stakeholder Engagement Plan.

Worker exposure to air quality contaminants is addressed in the Occupational Health and Safety Plan.

1.3 REGULATORY REQUIREMENTS

1.3.1 Greenhouse Gases

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty formed under the observance of United Nations. The treaty does not set any mandatory limits on GHG emissions for individual countries and does not involve any enforcement mechanisms and is not legally binding. The treaty provides protocols that set emission limits. The principal protocol is the Kyoto Protocol. Guinea-Bissau is party to this protocol, but the country has not committed to reduce GHG gas emissions under the protocol. Although, there is no applicable limit or guideline for GHG gas emissions, Guinea-Bissau has committed to implementing best environmental management practices to minimize greenhouse gas emissions.

1.3.2 Air Contaminants

Both gaseous and particulate emissions generated by the Project can result in air contaminants (PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO). National air quality standards (AQS) have not been developed for Guinea-Bissau. As such, applicable international standards have been adopted by the Project, see Table 1.1.

The International Finance Corporation (IFC) General Environmental, Health and Safety (EHS) Guideline establishes recommended thresholds for assessing air quality emissions arising from major industrial projects such as mining. The General EHS Guideline recommends the use of the World Health Organization (WHO) Ambient Air Quality Guidelines for projects with significant sources of air emissions and potential for significant impacts to ambient air quality (IFC, 2007).

There are no internationally agreed standards for assessing the effects of deposited dust. However, mean rates of dust deposition (based upon gravimetric values) are generally used to indicate any potential loss of amenity. The South Africa National Dust Control Regulations (2004) suggest an average deposited dust rate of 600 mg/m^2/day for residential and light commercial areas and a maximum of 1,200 mg/m^2/day for all other areas (Republic of South Africa, 2004). This guidance is considered the most appropriate regional criteria to apply to the Project. Dust particles are not expected to travel significant distances from the generated source and dust is generally considered as contributing to reduced quality of life (when a deposit accumulates and rapidly soils a surface), rather than being considered a significant risk to human health. However, the level at which soiling becomes a nuisance is highly subjective and can depend on the sensitivity of surrounding receptors. Further to this, a South African National Standard (SANS) for dust deposition was also adopted for this assessment to quantify the impact of deposited dust on nearby settlements (Republic of South Africa, 2011). This standard was considered to be the most appropriate for the region in the absence of international AQS.

Table 1.1 Project Air Quality Standards

Air Contaminant	Period	Air Quality Standards		
		Limit (µg/m^3)		Format
Sulphur Dioxide (SO_2)	Annual	50 [1]		Annual Mean
	24-hr	Interim Target 1	125	24 hour average
		Interim Target 2	50	
		Guideline	20	
Nitrogen Dioxide (NO_2)	Annual	40		Annual Mean
	1-hr	200		1 hour average
Carbon Monoxide (CO)	8-hr	10,000		1 hour average
	1-hr	30,000		8 hour average
Particulate Matter, less than 10 microns, inhalable (PM_{10})	Annual	Interim Target 1	70	Annual Mean
		Interim Target 2	50	
		Interim Target 3	30	
		Guideline	20	
	24-hr	Interim Target 1	150	24 hour average
		Interim Target 2	100	
		Interim Target 3	75	
		Guideline	50	
Particulate Matter, less than 2.5 microns, respirable ($PM_{2.5}$ [2])	Annual	Interim Target 1	35	Annual Mean
		Interim Target 2	25	
		Interim Target 3	15	
		Guideline	10	
	24-hr	Interim Target 1	75	24 hour average
		Interim Target 2	50	
		Interim Target 3	37.5	
		Guideline	25	
Dustfall [3]	24-hr	Residential	6 mg/dm^2/day	Daily mean from 30-day collected sample
		Industrial	12 mg/dm^2/day	
		Alert Level	24 mg/dm^2/day	
	30-day		600 mg/m^2/day	30-day sample

NOTES:

1. WHO GLOBAL GUIDELINES (WHO, 2005) DO NOT INCLUDE AN ANNUAL SO_2 LIMIT. THEREFORE, WHO EUROPE STANDARDS WERE USED (WHO, 2000).
2. WHO INTERIM 3 FOR $PM_{2.5}$ CONCENTRATION IS 99 PERCENTILE (WHO, 2005).
3. WHO GUIDELINES DO NOT INCLUDE DUSTFALL LIMITS. THEREFORE, SOUTH AFRICAN NATIONAL STANDARDS WERE USED (REPUBLIC OF SOUTH AFRICA, 2004).

1.4 PLAN UPDATES

This AQMP has been prepared for submission to the Guinea-Bissau Government as part of the ESIA for the Project. The plan is expected to be further revised prior to the start of project construction.

Management reviews of the AQMP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the management plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES

2.1 POTENTIAL AIR QUALITY IMPACTS

Potential air quality emissions for the Project are categorized as follows:

- **Fugitive Dust -** PM generated from earthmoving, material transport and handling, and unpaved road traffic.
- **Combustion Emissions -** Gas and PM generated by internal combustion engines (e.g., heavy and light vehicles, equipment motors, generators).
- **Greenhouse Gas (GHG) Emissions -** Gas emissions with the potential to affect global atmospheric GHG concentrations.
- **Nuisance Odours -** Non-health related (aesthetic) gas emissions affecting nearby receptors.

These impacts are summarized in Table 2.1.

Table 2.1 Air Quality Impact Summary

Residual Impact	Source Activity	Location/ Receptor	Phase[1]	Significance
• Changes in GHG concentrations	Mine and port operations	Atmosphere	C, O, CL	n/a
• Particulate matter (PM_{10} and $PM_{2.5}$) concentrations exceeding thresholds	Mine Operations (mining, hauling, stockpiling)	Mine site, Transport Route and Port Site receptors	C, O, CL	Low to Major
• Gaseous emissions exceeding thresholds at receptors near the Mine Site	Mine Operations (mining, hauling, processing)	Bani, Nema, Farim, Sara Ioba	O	Major
• Gaseous emissions exceeding thresholds at fishing beach adjacent to the Port Site	Port and shiploading operations, including bulk carrier and tugs	Fishing beach adjacent Port Site	O	Moderate to Major

NOTES:

1. PROJECT PHASE: CONSTRUCTION (C), OPERATIONS (O), AND CLOSURE (CL).

The degree and extent of air quality impacts is defined in the air quality impact assessment Volume 2, Section 7.0.

2.2 GENERAL MITIGATION MEASURES FOR EMISSIONS CONTROL

The emissions control measures described in this document will be applied throughout the duration of the Project. Control measures will focus on areas adjacent to project activities. A variety of design structures may be employed to control emissions depending on site specific conditions.

2.3 MINIMIZING GHG EMISSIONS

The results of the impact assessment indicate that GHG emission concentrations are likely to be low compared to Guinea-Bissau's overall emissions. The following measures are proposed to further reduce project emissions:

- Minimize combustible emissions
- Continuous maintenance of equipment by following manufacturer's specifications
- Optimize the number of trips to reduce fuel consumption
- No unnecessary idling of vehicles
- Promote energy conservation
- Revegetation to aid in carbon sequestration

2.4 MINIMIZING AIR CONTAMINANT EMISSIONS AT RECEPTOR LOCATIONS

2.4.1 Construction Phase

Gaseous emission concentrations are typically low during the construction phase. Project emissions will be mitigated by controlling internal combustion equipment through a regular maintenance program for all vehicles, equipment and machinery.

Dust control measures may include, but not be limited to, the following:

- Enforcement of appropriate speed limits for heavy equipment and on unpaved road surfaces.
- Optimizing the number of trips through efficient loading procedures for material transport.
- Spraying water on unpaved roads and other traffic areas to decrease dust emissions.
- Maintaining gravel/laterite cover on unpaved roads and traffic surfaces.
- Minimizing combustible emissions by avoiding unnecessary travel or operation of engines.
- Application of stabilizing agents on areas of high fugitive dust emissions.
- Spraying bulk material stockpiles with water or stabilizing agents as needed during the dry season to reduce fugitive dust emissions.

2.4.2 Operation Phase

The mitigation strategies described above for the construction phase will be carried over into the operations phase. The following additional mitigation measures will be implemented during the operations phase:

- The use of clean, high efficiency diesel mining equipment, using low sulfur content diesel when available.
- The use of appropriate emissions control equipment (an engineered dust suppression mechanism at the primary crusher).
- Implementation of a regular maintenance program to ensure optimum performance of light duty vehicles and diesel mining equipment.
- The use of appropriate control methods to minimize fugitive dust emissions: road watering, low vehicle speed enforcement, etc.
- Enclosing the conveyor over River Cacheu.
- Covering (not enclosing) all other of the mine and port conveyors.

Road watering programs and surface stabilizing efforts will be required to mitigate project impacts during the dry season, both in the construction and operations phase, when airborne particulate loads are significant. The engineering, procurement and construction management (EPCM) Contractor will supply adequate equipment and personnel to stabilize road surfaces to control dust on the main internal roads. This will include assigning staff to be responsible for implementing the road watering program and monitoring performance so that the road watering program can be modified as needed. Transported product will be at 8% moisture content and is not expected to generate meaningful quantities of dust.

Potential dust issues in residential and farming areas and other nearby receptors will be monitored through the community complaints mechanism and ongoing stakeholder consultation activities. In response to excessive complaints, GB Minerals will review dust suppression measures to determine if further mitigation is needed.

2.4.3 Closure and Post-Closure Phases

Due to the similarities in site activities, the mitigation strategies implemented during the closure phase will be the same as those implemented during construction. During closure reclamation of all project sites will take place and all point sources of project-related air emissions will be removed, thereby negating the need for post-closure monitoring.

3 – MONITORING PROGRAM

3.1 AMBIENT AIR QUALITY

GB Minerals will visually monitor dust during the construction phase. Stakeholder complaints about dust or other air quality issues will be resolved. For the operations phase, visual monitoring for dust will be routinely completed as per the construction phase.

GB Minerals will also monitor key air quality parameters (PM, dustfall, SO_2 and NOx) early in the operation phase to validate impact predictions and confirm that ambient air quality at nearby receptors meet the WHO guidelines identified in Table 1.1. Monitoring will cease if impacts are predominantly within ESIA predictions. Monitoring will also be conducted in Year 8 when the North Pit will be developed. If impacts are predominately with ESIA predictions continued monitoring will cease. Additional monitoring will be conducted if preliminary monitoring identifies potential exceedances relative to applicable guidelines or if monitoring would help resolve any future stakeholder complaint issues. Adaptive management for mitigation will include the review of current mitigation measures, the level of mitigation implementation, and mitigation performance.

Permanent monitoring stations are recommended at the receptor locations located in each cardinal direction from the Mine Site, including:

- Bani (R2)
- Farim (R10)
- Cancenha (R13)
- Sara Loba (R15)
- Mandinga (R23)

Short-term monitoring of SO_2 and NO_2 is recommended at the fishing beach location.

3.2 RADIOLOGICAL MONITORING

There are known low levels of radioactivity in the ore and tailings at the mine site. With a life of mine stripping ratio of 10:1, water overburden will make up most of the dust generated by the Project. The waste is not expected to have radiological properties of concern. The radioactivity of the ore, tailings and overburden has been evaluated in the radiological Human Health and Ecological Risk Assessment (HHERA) (TSD-15).

As a precautionary measure and to address the potential for stakeholder concerns, a sampling of dustfall will be collected to test for radionuclides to verify that it is not a matter of concern.

3.3 GREENHOUSE GASES

The Project will complete annual monitoring of GHG emissions relying on mass balance, stoichiometric calculations and internationally accepted factors, and GHG emissions calculation methodologies. The following data will be collected on an annual basis to support the assessment:

- Diesel consumption by mobile and stationary equipment for both the mining and non-mining fleet
- Employee transportation and travel emissions
- Emissions related to the transportation and distribution of goods sold by GB Minerals
- Emissions related to the purchase of goods, services, and fuel
- Emissions due to land use changes

4 – ROLES AND RESPONSIBILITIES

4.1 KEY PERSONNEL

The key responsibilities for implementation and adherence to this plan are identified in Table 4.1.

Table 4.1 Roles and Responsibilities for AQMP Implementation

Position	Responsibility with this Plan
General Manager	Overall responsibility for adherence to this plan
Construction Manager, Mine Manager, Process Manager, Operations Manager, Port Master	Adherence to the mitigation measures identified in this plan, within their respective areas
Health, Safety, Social, and Environmental (HSSE) Manager	Supporting the other managers in meeting the plan requirements, training, and implementation of monitoring requirements
Community Relations Specialist	Communicating complaints from adjacent communities, households or individuals through the grievance mechanism to the HSSE Manager
Environmental Superintendent and/Technicians	Conducting regular inspections and air quality monitoring and reporting

The HSSE Manager will be responsible for implementing the AQMP and, ultimately, the General Manager will be responsible for enforcing the requirements of the AQMP. The HSSE Manager (or designate) will inspect the condition of the Project areas on a monthly basis and will maintain appropriate records. The inspection and records will include:

- Evidence of excessive air contaminant emissions (i.e., dust)
- Condition of air emission control equipment
- Condition of the generators, trucks and material handling equipment
- Compliance with applicable corporate requirements

During the construction phase, the EPCM Contractor will be responsible for the integration of the mitigation measures and requirements into their operating procedures and plans during construction. The EPCM Contractor will report to the HSSE Manager on a monthly basis. The reports will include:

- Air quality reduction actions undertaken
- Maintenance of mobile equipment and power plant to reduce air quality impact
- Non-compliances identified
- Corrective actions planned and undertaken

The Mine Manager, Process Manager, Operations Manager and Port Master will be responsible for ensuring that the mitigation measures are implemented in their respective areas of control.

4.2 TRAINING

All employees and contractors will be provided with basic training in air quality mitigation measures as it relates to their role on site. They will also be notified of particularly sensitive receptors in proximity to the Project. Specialized training will be provided to management and employees whose responsibilities and activities are in areas that have been identified as air contaminant emission sources. Training will be provided to Environmental Technicians in the operation of air quality monitoring instruments used for monitoring.

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6 – CERTIFICATION

This report was prepared and reviewed by the undersigned.

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3D
NOISE MANAGEMENT PLAN

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE AND OBJECTIVES 2
1.3 REGULATORY REQUIREMENTS 3
1.4 PLAN UPDATES 3

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES 4
2.1 POTENTIAL NOISE IMPACTS 4
2.2 MITIGATION MEASURES 4
2.2.1 Transportation 4
2.2.2 Construction Activities 5
2.2.3 Mine and Port Operations 5

3 – MONITORING 6

4 – ROLES AND RESPONSIBILITIES 7
4.1 KEY PERSONNEL 7
4.2 TRAINING 8

5 – REFERENCES 9

6 – CERTIFICATION 10

TABLES

Table 1.1 Project Noise Level Standards 3
Table 2.1 Noise Impacts Summary 4
Table 4.1 Roles and Responsibilities for NMP Implementation 7

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

Farim Phosphate Project	the Project
ANSI	American National Standards Institute
AQMP	Air Quality Management Plan
EHS	Environmental, Health and Safety
EPCM	Engineering, Procurement and Construction Management
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSSE Manager	Health, Safety, Social and Environmental Manager
IEC	International Electrotechnical Commission
IFC	International Finance Corporation
NMP	Noise Management Plan
SOP	Standard Operating Procedure

1 – INTRODUCTION

1.1 BACKGROUND

This Noise Management Plan (NMP) has been prepared for GM Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

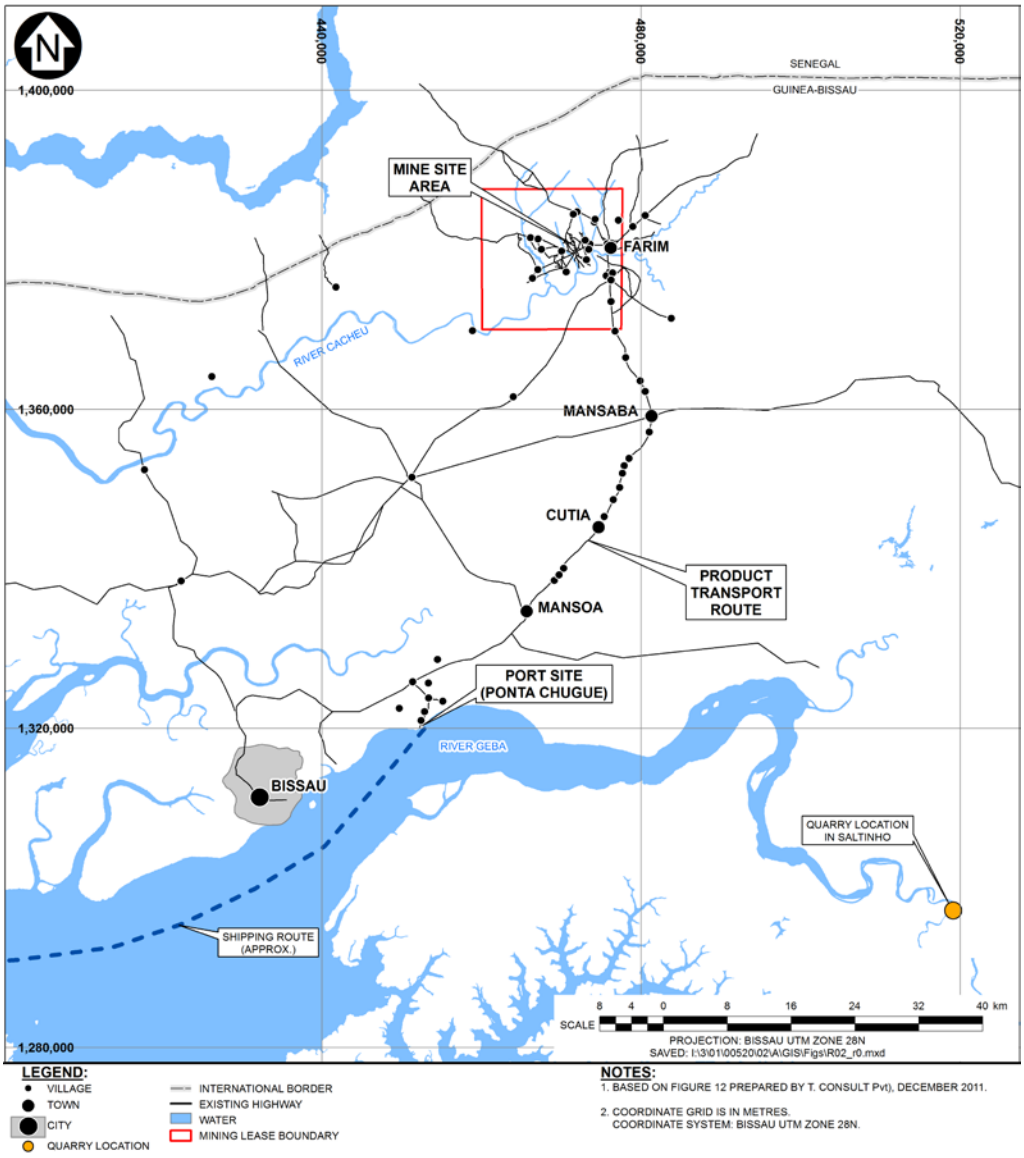

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared that evaluates and addresses the Project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA but will also act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The NMP is a Level 2 discipline-specific management plan as identified above. The Plan outlines the goals, strategies, and actions to minimize noise and vibration impacts related to the Project during the construction, operations and closure phases. The NMP establishes air quality targets, proposed mitigation measures, monitoring, training, reporting and adaptive management. GB Minerals will work to minimize noise impacts at nearby receptor locations.

A receptor, according to International Finance Corporation (IFC) may be defined as any point on the premises occupied by persons where extraneous noise is received (IFC, 2007). Examples of receptor locations may include permanent or seasonal residences, schools, hospitals and places of worship.

Key receptors of noise include a total of 17 villages in the mine site area, 46 receptors along the product transport route and 2 at the port site. The beach area adjacent the port site is used by local residents for fishing, trading and prayer, so occupants of the beach area have been identified as receptors in the commercial/industrial context.

The targets of the NMP are to:

- Maintain noise levels within appropriate regulatory standards
- Protect workers, local communities and other land users from adverse impacts due to project noise emissions

Given the ground conditions and that blasting with explosives will not occur on the Project, vibration effects are not expected to occur.

The potential for complaints related to the Project's noise emissions will be managed through the grievance mechanism identified in the Stakeholder Engagement Plan. Other related management plans include the Air Quality Management Plan (AQMP) and the Community Health, Safety and Security Management Plan.

Worker exposure to noise and vibration is addressed in the Occupational Health and Safety Plan.

1.3 REGULATORY REQUIREMENTS

National noise standards have not been developed for Guinea-Bissau, and as such, applicable international standards have been adopted by the Project.

The IFC's General Environmental, Health and Safety (EHS) Guideline establishes recommended thresholds for noise levels arising from major industrial projects including mining. The General EHS Guideline (IFC, 2007) recommends the use of the World Health Organization Guidelines for Community Noise (WHO, 1999). In addition, the Organisation for Economic Co-operation and Development has published noise level limits applicable to residential receptors located close to roads (OECD, 2001).

The General EHS Guidelines state that noise impacts should not exceed the levels presented in Table 1.1, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. OECD guidelines are absolute values with no incremental increase allowances, and apply to residences close to roads which already experience a higher than normal noise level.

Table 1.1 Project Noise Level Standards

Receptor	Period		Notes
	Daytime (07:00 - 22:00) (dB)	**Night-time (22:00 - 07:00) (dB)**	
Residential, Institutional and Educational	55	45	Or 3 dB increase in background levels (1)
	65	55	For residential close to roads (2)
Industrial and Commercial	70	70	Or 3 dB increase in background noise levels (1)

NOTES:

1. IFC, 2007, BASED ON WHO, 1999.
2. OECD, 2001.

1.4 PLAN UPDATES

This NMP has been prepared for submission to the Guinea-Bissau Government as part of the ESIA prepared for the Project. The plan is expected to be further revised prior to initiating construction of the Project.

Management reviews of the NMP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the management plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES

2.1 POTENTIAL NOISE IMPACTS

The sources of noise emissions from the Project causing noise impacts at receptor locations are summarized in Table 2.1.

Table 2.1 Noise Impacts Summary

Residual Impact	Source Activity	Location/ Receptor	Phase[1]	Significance
• Increased noise levels along the Transport Route	Route Operations (hauling)	Dugal (R53), R54, R56, Cunteda (R61)	C, O	Moderate to Major
• Increased noise levels at the fishing beach adjacent to the Port Site	Port and shiploading operations	Fishing beach (R70)	O	Moderate

NOTES:
1. LOCATION/RECEPTOR - DEFINES THE AFFECTED PARTIES OR ENVIRONMENT.
2. PROJECT PHASE - CONSTRUCTION (C) AND OPERATIONS (O).

The degree and extent of noise impacts is assessed in the noise impact assessment Volume 2, Section 15.

2.2 MITIGATION MEASURES

The following measures are proposed to mitigate project noise levels associated with construction, operation and decommissioning activities at the mine site and port site, as well as transportation along the product transport route.

2.2.1 Transportation

Transportation related activities include trucks hauling waste rock and ore along roads within the mine site area, trucks hauling supplies on access roads, and trucks hauling concentrate product from the mine site truck load out facility to the port facility. These activities generate noise during construction, operation and closure phases (except ore and waste handling and transport, which occurs during the operation phase only). The following measures will be implemented to minimize transportation-related noise impacts:

- All haul trucks will be subject to a thorough manufacturer's recommended periodical maintenance program to ensure vehicles are operating in good condition.
- Speed limits will be enforced in relation to road conditions and on-route communities.
- Truck drivers will be educated about the characteristics of diesel engines and braking systems on the equipment (for example, that the flat torque characteristic allows ascending an incline in a higher gear, which is a less noisy operation).
- Road surfaces will be maintained in good repair to reduce tire noise and facilitate continuous traffic flow to avoid prolonged idling.

- Transportation will be scheduled for daytime hours whenever possible. Product will be transported from the mine to the port between 6 a.m. and dusk. Resupply activities will be constrained by the timing of operation of the ferry crossing over the River Cacheu at Farim.

2.2.2 Construction Activities

Noise will be generated by activities during all phases of the Project. The construction and operations phase generally generate more noise than closure and decommissioning. In addition to the mitigation and management measures applied for transportation related activities, the following measures will be applied during the construction phase of the Project to mitigate noise levels:

- Schedule noisy construction activities at normal working hours to the extent possible.
- Operate equipment within specification and capacity.
- Perform regular inspection and maintenance of construction equipment.
- Use newer and more efficient construction equipment to the extent possible.
- Turn off construction equipment when not in use.
- Avoid trucking operations during night-time when possible.
- During routine maintenance of vehicles, check that noise abatement devices are in good order (e.g., brakes, exhaust mufflers, engine hoods).

2.2.3 Mine and Port Operations

In addition to the mitigation and management measures applied for transportation and the construction phase, the following measures will be applied during the operations phase of the Project to mitigate noise levels:

- The process plant components and material handling equipment at the mine and port will use equipment conforming to noise standards.
- The process plant components and material handling equipment at the mine and port will be maintained on a regular basis and worn parts replaced or lubricated as required.
- Rubber linings will be used on chutes and transfer points to minimize noise and vibration.
- The height which material drops from the plant, loading facilities and machinery will be minimized.
- An adequate buffer between the mine site and local residences is proposed.

3 – MONITORING

If written noise complaints are received by GB Minerals during the construction phase, suitable noise monitoring will be completed to confirm/refute the complaint and to identify suitable adaptive management.

For the operations phase, noise monitoring will be routinely completed as per the construction phase. GB Minerals will also setup monitoring stations early in the operation phase to validate impact predictions and confirm noise levels at nearby receptors meet the noise conformance guidelines identified in Table 1.1. Monitoring will cease if impacts are consistently within ESIA predictions. Additional monitoring will be conducted if preliminary monitoring identifies potential exceedances of the applicable guidelines, or if monitoring would help to resolve any stakeholder complaint issues that may arise in the future.

Specific monitoring activities are recommended for the following three sites

- R61 Cunteda - Monitoring of daytime noise levels between the hours of 06:00 and 20:00 on a quarterly basis.
- R69 Village Chief - Monitoring of daytime noise levels between the hours of 06:00 and 20:00 on a quarterly basis.
- R2 Bani - 24-hour monitoring on a quarterly basis.

Noise monitoring should be carried out using a Type 1 or 2 sound level meter as defined by the American National Standards Institute (ANSI) and meeting all appropriate International Electrotechnical Commission (IEC) standards, as required by the IFC General EHS Guideline (Acoustical Society of America, 1983; IEC, 2013a; IEC, 2013b; IEC, 2013c and IFC, 2007).

It is expected that the mitigation measures identified in this plan will be effective in minimizing noise below the target levels identified in the NMP. GB Minerals will liaise with local communities on noise issues. In the event that noise mitigation measures implemented do not reduce noise to acceptable levels at receiving locations, the addition of noise treatments to those receiving locations will be investigated.

4 – ROLES AND RESPONSIBILITIES

4.1 KEY PERSONNEL

The key responsibilities for implementation and adherence to this plan are identified in Table 4.1.

Table 4.1 Roles and Responsibilities for NMP Implementation

Position	Responsibility with this Plan
General Manager	Overall responsibility for adherence to this plan
Construction Manager, Mine Manager, Process Manager, Operations Manager, Port Master	Adherence to the mitigation measures identified in this plan, within their respective areas
Health, Safety, Social, and Environmental (HSSE) Manager	Supporting the other managers in meeting the plan requirements, training, and implementation of monitoring requirements
Community Relations Specialist	Communicating complaints from adjacent communities, households or individuals through the grievance mechanism to the HSSE Manager
Environmental Superintendent and/Technicians	Conducting regular inspections and sound level monitoring and reporting

The HSSE Manager will be responsible for implementing the NMP, and ultimately the General Manager will be responsible for enforcing the requirements of the NMP. The HSSE Manager (or designate) will inspect the condition of the Project areas on a monthly basis and will maintain appropriate records. The inspection and records will include:

- Evidence of excessive noise
- Condition of noise control equipment
- Condition of the generators, trucks and material handling equipment
- Compliance with applicable corporate requirements

During the construction phase, the engineering, procurement and construction management (EPCM) Contractor will be responsible for the integration of the mitigation measures and requirements into their operating procedures and plans during construction. The EPCM Contractor will report to the HSSE Manager on a monthly basis including:

- Noise reduction actions undertaken
- Maintenance of mobile and fixed plant to reduce noise impact
- Non-compliances identified
- Corrective actions planned and undertaken

The Mine Manager, Process Manager, Operations Manager and Port Master will be responsible for ensuring that the mitigation measures are implemented in their respective areas of control.

4.2 TRAINING

All employees and contractors will be provided with basic training in noise mitigation measures as it relates to their role on site, and will be notified of any particularly sensitive receptors in proximity to the Project. Specialized training will be provided to management and employees whose responsibilities and activities are in areas that have been identified as noise emission sources. Training will be provided to Environmental Technicians in the operation of a noise monitoring instrument.

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6 – CERTIFICATION

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3E
EROSION AND SEDIMENTATION CONTROL PLAN

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GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

EROSION AND SEDIMENTATION CONTROL PLAN
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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
- 1.1 BACKGROUND 1
- 1.2 SCOPE AND OBJECTIVES 2
- 1.3 REGULATORY REQUIREMENTS 3
- 1.4 PLAN UPDATES 4

2 – CONCEPTUAL EROSION AND SEDIMENT CONTROL PLAN 5
- 2.1 BACKGROUND AND ENVIRONMENTAL CONSIDERATIONS 5
  - 2.1.1 Environmental Considerations 5
- 2.2 EROSION AND SEDIMENT SOURCES 6
- 2.3 MITIGATION MEASURES 6
  - 2.3.1 General Strategies and Mitigation Measures 6
  - 2.3.2 Mitigation Measures by Project Phase: Construction 12
  - 2.3.3 Mitigation Measures by Project Phase: Operation 12
  - 2.3.4 Mitigation Measures by Project Phase: Closure 13
  - 2.3.5 Mitigation Effectiveness and Adaptive Management 13

3 – PRELIMINARY SOIL SALVAGE MANAGEMENT PLAN 14
- 3.1 BACKGROUND 14
- 3.2 SOIL TYPES AT THE MINE SITE 14
- 3.3 TOPSOIL STRIPPING AND SALVAGING DURING CONSTRUCTION 15
- 3.4 SOIL PLACEMENT 15
- 3.5 TOPSOIL STOCKPILE MANAGEMENT 15
- 3.6 SOIL REDISTRIBUTION 16

4 – MONITORING AND REPORTING 17
- 4.1 SCOPE FOR MONITORING 17
- 4.2 MONITORING LOCATIONS 17
- 4.3 REPORTING 17

5 – ROLES AND RESPONSIBILITIES 18
- 5.1 KEY ROLES AND RESPONSIBILITIES 18
- 5.2 TRAINING 19

6 – REFERENCES 20

7 – CERTIFICATION 21

TABLES

Table 2.1 Potential Sources of Erosion and Sedimentation 6
Table 2.2 General Mitigation Measures 7
Table 3.1 Mine Site Soil Types 14

FIGURES

Figure 1.1 Project Regional Setting 1
Figure 2.1 Mine Site Area - Bridge Crossing of the Rio de Caur 5

ABBREVIATIONS

Farim Phosphate Project	the Project
AQMP	Air Quality Management Plan
EHS	Environmental, Health and Safety
EPCM	Engineering, Procurement, Construction and Management
EPRP	Emergency Preparedness and Response Plan
ESCP	Erosion and Sediment Control Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
IFC	International Finance Corporation
MRCP	Mine Reclamation and Closure Plan
OPSD	Ontario Provincial Standard Drawing
SOP	Standard Operating Procedure
SSMP	Soil Salvage Management Plan
TSF	Tailings Storage Facility
TSS	Total Suspended Solids
WAMP	Water Management Plan

1 – INTRODUCTION

1.1 BACKGROUND

This document contains the conceptual level Erosion and Sediment Control Plan (ESCP) prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

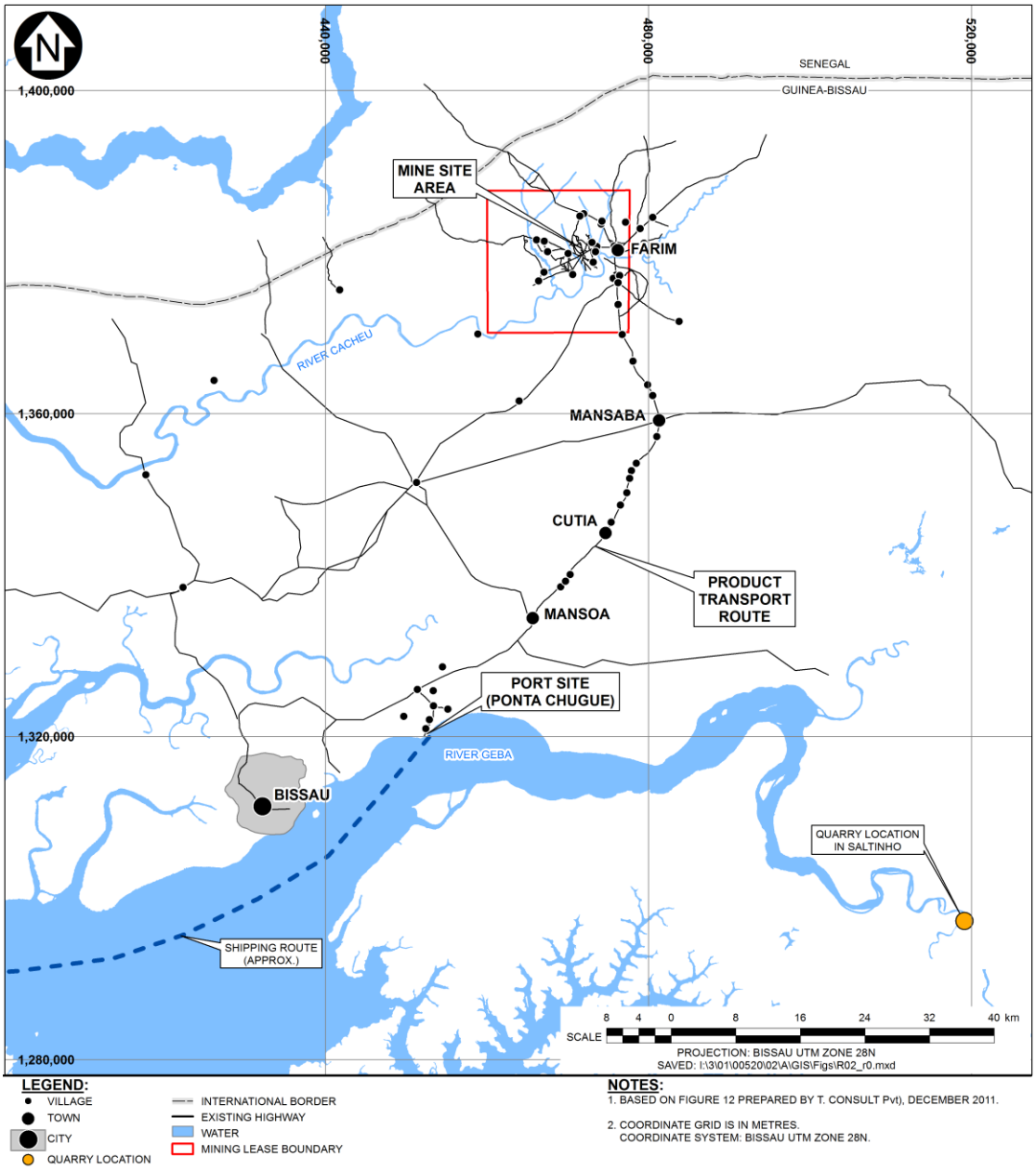

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared that evaluates the proposed project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has also been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** These are a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions and operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA, but will act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The ESCP is a Level 2 discipline-specific management plan. The conceptual plans detail the potential best management practices that will be implemented to reduce the magnitude of potential impacts on the environment from ground disturbing activities associated with the construction, operation and closure of the Project. The ESCP presents the potential best management practices that will be utilized to reduce erosion and the transport of sediment from land disturbance related to construction of the mine and port facilities and access roads, mining and other operation phase activities, and reclamation activities.

An important element of the ESCP is the salvage and handling of soils. Section 3 of the ESCP provides an overview of the best management practices that will be employed to ensure that suitable soils are salvaged to the greatest extent possible and handled in a manner that will minimize soil loss, degradation, and contamination.

The implementation and success of the management plans are linked to other related management plans including:

- **Air Quality Management Plan** (AQMP, Volume 3), which describes the strategies and mitigation measures that will be implemented to minimize fugitive dust (e.g., wind erosion).
- **Water Management Plan** (WAMP, Volume 3), addresses surface water management features that will be implemented to manage sediment-laden water prior to its release to the environment.
- **Emergency Preparedness and Response Plan** (EPRP, Volume 3), addresses the protection of soil resources from spills and accidental releases of hazardous materials.
- **Mine Reclamation and Closure Plan** (MRCP, Volume 3), which presents the strategies and measures that will be implemented to achieve the long-term physical stability objectives of the Project areas post-closure.

1.3 REGULATORY REQUIREMENTS

Guinea Bissau does not have specific regulations related to Erosion and Sediment Control (ESC) and soils; however, sediment and erosion control techniques are applied everywhere in the country to conserve soil and water resources.

The Environmental, Health and Safety (EHS) Guideline for Mining recommends limits for the discharge of sediment-laden water to aquatic ecosystems (IFC, 2007). Sediment control facilities should be designed and operated so that final discharges to the aquatic environment are less than 50 mg/L Total Suspended Solids (TSS).

The Guideline for Mining also states the following with regards to other water quality parameters:

- Other applicable parameters and guideline values for discharge water quality should also be consistent with the receiving water body use, taking into consideration background conditions and opportunities for overall improvement of the receiving water body quality.
- Discharge water quality should also be consistent with the receiving water body use.

The EHS Guidelines set out the following guidance regarding erosion management strategies (IFC, 2007):

- Establish riparian setback zones.
- Reduce exposure of sediment-generating materials to wind or water (e.g., proper placement of soil and rock piles).
- Reduce or prevent off-site sediment transport (e.g., use of settlement ponds, silt fences, etc.).
- Implement an appropriate combination of contouring techniques, terracing, shallowing slopes, limiting runoff velocity, and installing appropriate drainage to reduce erosion in both active and inactive areas.
- Grade disturbed areas, including preparing the overburden prior to application of the final layers of the growth medium.
- Revegetate reclaimed areas immediately following application of the growth medium to avoid erosion.
- Grade access and haul roads to limit erosion and to provide road drainage systems.
- Protect stormwater drains, ditches, and stream channels against erosion through a combination of designing with adequate capacity/dimensions, limiting slopes, and lining with riprap.
- Design temporary drainage installations for recurrence periods of at least a 10-year/24-hour storm event. Design permanent drainage installations for a 100-year/24-hour storm event. Consideration of the intended life of diversion structures, as well as the recurrence interval of any structures that drain into them, should be taken into account before applying the above intervals. For facilities that are expected to operate post-closure, regional predictions of climate change should be considered in their designs.
- Design drainage structures with “low flow" channels as smaller, more frequent storms can erode at rates similar to those of larger less frequent storms.

- Treat surface drainage from disturbed areas, including areas that have been graded, seeded, or planted for sediment removal.
- Design facilities for the full hydraulic load, including contributions from upstream catchments and non-mining areas.
- Design and maintain stormwater settling facilities according to internationally-accepted best engineering practices, including provisions for the capture of debris.

1.4 PLAN UPDATES

This conceptual ESCP has been prepared as part of the ESIA. The ESCP will be updated prior to undertaking the proposed works as part of the next phase of engineering. As part of this update, a stand-alone SSMP will be prepared, along with Level 3 procedures for activity-specific erosion and sediment control and soil salvage activities.

Management reviews of the ESCP and SSMP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the Plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – CONCEPTUAL EROSION AND SEDIMENT CONTROL PLAN

2.1 BACKGROUND AND ENVIRONMENTAL CONSIDERATIONS

The potential environmental impacts addressed in the ESCP include:

- Loss of soil and land capability
- Impacts to water quality and aquatic biota due to sediment loading

The potential impacts to soils and land capability, as well as surface water quality that the ESCP addresses include loss of soil, changes in land capability due to erosion and soil quantity, as well as degradation of aquatic habitat and surface water quality due to sediment loading. The best management practices (mitigation measures) presented in this ESCP have been taken into consideration as mitigation measures in the Surface Water Quality, Soils and Land Capability, and Aquatic Ecology assessments presented in Volume 2, Section 11, 12 and 14, respectively.

2.1.1 Environmental Considerations

The weather patterns of the region are similar to that of other near-equator countries and are characterized by a strong seasonality. There is a seven-month dry season from November through May and a five-month wet season from June through October. The annual rainfall of Guinea-Bissau ranges from approximately 1,500 to 2,000 mm. This range was confirmed by the local Farim weather station data (Golder, 2014a).

It is not uncommon for areas in the dry season to go months without rainfall and the rainfall for the dry season may be less than 30 mm. In contrast to this, nearly 75% of the total annual rainfall falls within a three-month period from July through September. This weather pattern leads to increased fine-grained sediment deposition in watersheds during the dry season, accentuated by fine-grained deposition on river tidal flats, picked up by relatively higher surface water flow rates in the wet season. The net effect is watercourses with naturally turbid water (relatively high concentrations of TSS). TSS concentrations of greater than 100 mg/L have been recorded in the River Cacheu and over 1,500 mg/L in the River Geba. Figure 2.1 shows the naturally turbid waters of the Rio de Caur.

Figure 2.1 Mine Site Area - Bridge Crossing of the Rio de Caur

2.2 EROSION AND SEDIMENT SOURCES

The risk for erosion and sedimentation is greatest during the construction phase; however, due to the nature of the Project, risk of erosion and sedimentation remains present during all project phases. Potential erosion and sediment sources resulting from the Project are summarized in Table 2.1.

Table 2.1 Potential Sources of Erosion and Sedimentation

Erosion and Sedimentation Sources	Location	Phase[2]
Land clearing, soil salvage and stockpiling	Mine and Port Site	C, O
Bulk earthworks associated with cut and fill operations	Mine and Port Site	C, O, CL
Access and haul road development	Mine and Port Site, Product Transport Route	C, O
Soil redistribution during reclamation	Mine and Port Site	C, O, CL
In-water works including installation of culverts, piers and wharf construction	Mine and Port Site	C, O, CL
Development within floodplain areas	Mine Site and Port Site	C, O, CL, PC
Development of Ex-Pit Waste Dumps	Mine Site	C, O, CL, PC
Collection and diversions ditches	Mine and Port Site	C, O, CL, PC

NOTES:
1. PROJECT PHASE**:** CONSTRUCTION (C), OPERATIONS (O), CLOSURE (C) POST CLOSURE (PC).

Activities and areas that pose the greatest risk for erosion and sediment transport include in-water works, steep disturbed slopes, exposed soils, and heavily trafficked areas.

2.3 MITIGATION MEASURES

2.3.1 General Strategies and Mitigation Measures

In addition to the general strategies presented in Section 1.3 the following management practices and mitigation measures will also be implemented to minimize erosion and sediment transport.

The following steps will be followed and applied to all project activities to help reduce the potential for erosion and sedimentation:

1. Plan ahead –erosion and sediment control plans will be developed in the early planning stages and incorporated into the design to the greatest extent possible.
2. Implement erosion control measures (i.e., source control).
3. Manage runoff and implement sediment controls.
4. Monitor erosion and sediment control measures for effectiveness.

Consistently assessing the environmental risks prior to undertaking an activity, and applying these steps, will help to reduce the potential for impacts arising from erosion and sedimentation.

A description of the general mitigation for sediment and erosion control is provided in Table 2.2.

Table 2.2 General Mitigation Measures

Armouring	
Description	Armouring is used as a barrier between water flow and material susceptible to erosion. Quarry rock and/or naturally occurring granular borrow material can be used to protect underlying fined grained materials from scour and erosion. Armouring may be used in areas of cuts/excavations and for the installation of culverts, typically on exposed erodible slopes. Water diversion, bunds, sumps and/or silt fencing may be used where armouring is not practical or when there is a low risk of impacts to downstream receptors.
Riprap	
Description	A stabilizing rock layer that can be installed on the ground surface or structures to prevent erosion of underlying material. It can be placed over non-woven geotextile to provide additional protection, on sides of road embankment, on upstream and downstream ends of culverts and at any location where flows exist that might cause erosion of the existing surface materials. It may also be placed in areas where there is concentrated flow. Riprap is effective in protecting embankments and preventing erosion and may be used in combination with non-woven geotextile.
Geotextile (Woven and Non-Woven)	
Description	Geotextile is a low erodible material placed as temporary erosion protection. It can be utilized as a liner along water channels/ditches And is often used on stream embankments in combination with riprap. It needs to be well anchored or will be ineffective and is difficult to remove from streambeds when it is no longer required. It can be very effective as an erosion barrier on a variety of embankments. Geotextile is very easy to install.

Table 2.2 General Mitigation Measures

Silt Fences	
Description	Silt fences are a geotextile or fabric barrier that attenuates the flow of surface water to reduce the opportunity for entrained/suspended sediment movement to downstream areas. Silt fences are typically supported using wooden stakes (usually attached to the fabric by the manufacturer) and may be placed using a variety of methods such as digging a trench and backfilling material to ensure stability. Attempts are made to install silt fence in lines of equal elevation (along contour lines) to prevent channelling or focusing of the runoff. Standards for installation including trench excavation, insertion of fabric, and backfilling and compacting can be found on the Ontario Provincial Standard Drawing (OPSD) 219.110 - Light Duty Silt Fence Barrier and 219.130 - Heavy Duty Silt Fence Barrier (OPSS 805, 2010).
Typical Location of Use	Silt fences are used in areas where surface water could potentially come into contact with disturbed sites causing elevated suspended solids. Typical installation locations are: • Downstream of drill rigs • Along roads where surface runoff is expected • Surrounding stockpiles of material or drill cuttings • Downstream of water crossing installations • Along the edge of a water body • Downstream or around of disturbed areas and sediment-laden snow piles • To divert water around construction or disturbed areas For ease of installation and best performance, silt fences should be used only in low flow areas or as a barrier between flowing water and sediment. The stakes of fences should be a suitable length (not too long) to increase drivability of stakes into difficult ground conditions.
Benefits	• Relatively quick to install and easily transportable. • Can be used in a variety of situations. • Effective in areas of low flows; water is able to pool creating a sediment pond. • Fences can be used in series. • Effective as a barrier between and parallel to flow and sediment, along channels or diversion channels.
Performance Issues	• Difficult/impossible to install properly in rocky ground. Soil conditions may prevent stakes from being driven into the ground. • Not strong enough or permeable enough to be placed in flowing water. • Regular maintenance and clearing of sediment is required - especially prior to removal.
Substitutes	• Free standing silt fences are considered for use in areas where a typical silt fence is impractical, for example on rock or impenetrable surfaces. • Diversion/collection channels or bunds are also used in certain locations.

Table 2.2 General Mitigation Measures

Silt Barriers	
Description	Non-Woven geotextile placed over a structure which creates a barrier by supporting the geotextile. The upstream edge of the geotextile is anchored to the ground surface. Water is directed into the structure and allowed to filter through. Silt barriers are easier to install than silt fences; however, non-woven geotextile can quickly plug with silt (sometimes within a day) causing the water to run around or over the structure. They are best suited for short-term work.
Typical Location of Use	• Downstream of culvert during installation. • Downstream or around of disturbed areas and sediment-laden snow piles.
Performance Issues	• Not permeable enough to be placed in medium or high flows. • Regular maintenance and clearing of sediment is required - especially prior to removal. • Structures are not very wide so not suited to overland runoff (runoff diverts around structure) - better for concentrated flows.
Benefits	• Relatively quick to install and easily transportable. • Effective in areas of low flows. Water is able to pool creating a sediment pond. • Can be used in series.
Silt (Turbidity) Curtain	
Description	Woven geotextile approximately 2 m wide and 30 m long supported by foam floats at top and anchored by chain at the bottom. The turbidity curtain is placed in no flow (or very low flow) conditions to create a barrier between a work zone and the water body. The turbidity curtain can also be supported by stakes.
Typical Location of Use	• To surround in-water work in no, or very low, flow conditions. • Designed to hang in water. • Effective for work on shoreline of a lake.
Performance Issues	• Not permeable enough to be placed in even low flows. Very difficult to anchor the base against flows. • Difficult to install due to weight and susceptibility to wind (when on dry land).
Benefits	• Can work very well for shoreline construction work.
Filter Dam	
Description	Permeable rock or gravel bund placed across a channel. Used to slow or stop the flow of water and create sedimentation ponds.
Typical Location of Use	• In channels with flows of turbid water. • Should be constructed in channels to slow the water velocity and cause sediment deposition.

Table 2.2 General Mitigation Measures

Performance Issues	• Suitable construction material not always available. • Need enough area to create a pool upstream of the dam to allow the sediment to settle. • Regular maintenance is required to remove the accumulated sediment.
Benefits	• Constructed from local materials - if available. • Effective in cleaning higher flows with sediment-laden water.
Diversion Channel	
Description	Diversion/collection channels or bunds are used to locally direct surface water runoff. When required, the channels or bunds are constructed using suitable materials to divert the surface water without causing erosion or suspension of additional sediment. Excavation of channels may be an option; however, construction of bunds using soil or man-made structures such as sand bags/tubes should also be evaluated.
Typical Location of Use	• Channels or bunds are used in locations where it is required to divert or collect surface water. • Diversion structures are installed to prevent runoff from entering a site where the surface soil has been disturbed and would cause suspension of sediment. • Collection channels or bunds may also be constructed to collect runoff emerging from an area of soil disturbance. • One possible use of a diversion/collection channel or bund is to ensure runoff is directed to a constructed mitigation measure such as an in-ground sump.
Substitutes	Silt fences can be used as an alternative to constructing a channel or bund.
Containment Berm	
Description	A containment berm can be constructed to establish a sump, basin or pond to contain or collect water. The sump could be used to contain discharge water to allow settling of sediment before discharge. The berm is constructed using native soils or acceptable man-made products. Care is taken when constructing berms to ensure the base is on a solid foundation. Soil placed to construct the berms is nominally compacted to provide strength for the structure. Berm heights are minimized, typically <1 m.
Typical Location of Use	Containment berms are constructed across small valleys, around natural depressions, to augment the capacity of the berms, and where other control measures are ineffective.
Substitute	In-ground sumps or portable containment sumps or tanks can sometimes be used in place of a containment berm.

Table 2.2 General Mitigation Measures

In-Ground Sump	
Description	An in-ground sump can be constructed to establish a sump, basin or pond to contain or collect water. In these respects, a sump performance similarly to the containment berm. An in-ground sump is constructed by excavating a depression into soil to provide water containment. Excavated material from the sump can be used to construct a containment berm surrounding the sump to increase the capacity of the sump.
Installation Locations	In-ground sumps are used in some areas where excavation of soil is possible and other control measures are impractical or ineffective.
Substitute	Containment berms, or portable containment sumps or tanks, can sometimes be used in place of an in-ground sump.
Portable Containment Sump	
Description	Portable containment sumps are used to contain water from a specific source. The portable sump requires excavation or construction to provide a level base for the sump. A series of portable containment sumps can be connected together to provide additional containment or settling capacity, if required. Collected sediment from the portable containment sumps are removed from the sumps as necessary and disposed of in approved locations.
Installation Locations	Portable containment sumps are used in areas where containment berms or in-ground sumps are impractical such as in areas where overburden is not readily available.
Substitute	Containment berms or in-ground sumps can sometimes be used in place of a portable containment sump.
Performance Issues	Portable containment vessels must be transported to locations where they are required, their effectiveness is limited by ease of mobilization to site. Limited capacity of containment vessels (relative to where flows are high).
Flocculent	
Description	Co-polymer blended flocculent blocks are an environmentally friendly means of controlling siltation in ditches and streams. Placing co-polymer blocks in a runoff stream causes sediment particles to settle by flocculation. Once introduced into the runoff stream, polymers transform elevated levels of fine suspended particles (including colloidal clays, phosphorus, and nutrients) into masses easily removed from moving water. Therefore, construction site storm water can be clarified before discharge into receiving waters. Adequate mixing and settling times for the flow rate, temperature, and sediment load must be achieved for optimum polymer performance. Flocculent can also be added at the inlet of sedimentation ponds.

Table 2.2 General Mitigation Measures

Installation Locations	This product will be used in non-fish habitat runoff streams, particularly in areas of rugged relief where other methods of sediment/siltation control are not effective. Flocculent blocks could potentially substitute for other methods of sediment/siltation control where those methods are ineffective due to factors such as stream velocity, and equipment access. The use of flocculent blocks, if effective, could reduce the degree of disturbance caused by other more intrusive sediment control measures.

2.3.2 Mitigation Measures by Project Phase: Construction

The following mitigation measures are proposed to ensure the protection of soils and the control of erosion during construction.

- Mitigation by Design - Mitigation by design will be employed by:
  - Minimizing the Project footprint to limit surface disturbance
  - Grouping buildings and project facilities wherever possible
  - Using existing roads to access the Project site
- Soil Segregation and Stockpiling - Impacts to soil quality will be minimized by segregating soils and stockpiling the different soils for future use in reclamation activities.
- Erosion Control Structures - Erosion control techniques, such as silt fences, interceptor ditches, diversion bunds, riprap, check dams and settling ponds will be utilized.

Construction monitors will be present during construction to direct the construction crews for soil salvaging and to minimize the impact on area soils.

2.3.3 Mitigation Measures by Project Phase: Operation

The following mitigation measures are proposed to ensure the protection of soils and landforms during operations:

- Utilizing Previously Disturbed Areas - Activities during operations will favour areas that have been previously disturbed. This will avoid disturbing new areas.
- Designated Transportation Routes - The operation of vehicles and machinery will be restricted to designated roads inside the Mine's property line. This will minimize the zone of influence on surface vegetation and soil.
- Erosion Control Structures - Erosion control techniques, such as silt fences, interceptor ditches, diversion berms, riprap, check dams and settling ponds, will be utilized in areas on an as-needed basis to minimize soil loss in disturbed areas. It is anticipated that these techniques will be required more often during the rainy season.
- Soil and Water Conservation - Soil and water conservation measures such as terracing and tree planting will be carried out around the major infrastructure and any other areas near waterbodies to minimize soil loss.
- Soil segregation and stockpiling - Soil will continue to be segregated and stockpiled for later use. Topsoil management procedures are described in Section 2.5.

During operations, all structures will be monitored for slope stability. The temporary establishment of vegetation may be recommended at this time to enhance stability and to minimize erosion.

Routine inspections after significant rain and flooding events will be conducted. Any observed deficiencies to any structure will be recorded and reported immediately for remedial action.

Where applicable, progressive reclamation of areas to be vegetated may be facilitated by fertilization and irrigation. This may aid in the early establishment of vegetation following soil disturbance. Details regarding progressive reclamation are provided in the Preliminary Mine Reclamation and Closure Plan (MRCP).

2.3.4 Mitigation Measures by Project Phase: Closure

At closure, the following measures are proposed for the Project to ensure the protection of soils and landforms.

- Closure Planning - The MRCP was developed to ensure:
  - Restoration and stabilization of disturbed areas
  - Long-term sustenance of seeded and planted vegetation cover on disturbed lands
  - Long-term geotechnical and chemical stability of tailings
  - Maintenance of drainage and sediment control structures such that they remain effective post-closure
  - Monitoring of the Tailings Storage Facility (TSF) embankment stability is routinely conducted
- Reclamation of Disturbed Areas - Disturbed areas including the Process Plant site, waste rock storage areas, and a portion of the TSF will be reclaimed with the soil salvaged during construction to reclaim the area to rangeland and agricultural uses.
- Monitoring - Waste rock storage areas will be visually monitored for signs of erosion. The soil will generally be monitored for its ability to sustain the intended future use.

Detailed closure planning and reclamation measures are provided in the MRCP.

2.3.5 Mitigation Effectiveness and Adaptive Management

It is expected that the mitigation measures identified above will be effective in minimizing impacts of the Project on aquatic resources and surrounding land uses.

GB Minerals is committed to continual improvement in its activities, with the objective of reducing risks to the environment and improving operational effectiveness. The strategy employed will require regular monitoring and will be supported by operational change and the adoption of other mitigating measures, as required.

Management reviews of the ESCP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented when required. The reviews will also provide a formal mechanism to assess the effectiveness of the management plan in achieving design objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

3 – PRELIMINARY SOIL SALVAGE MANAGEMENT PLAN

3.1 BACKGROUND

Soil salvaging measures are currently conceptual, but the general approach will be to maximize the preservation of segregated soils by stockpiling. Discretion will be needed during stripping and stockpiling to separate different soil types for future use. Stockpiling and incidental mixing of soil layers during handling will eventually have a negative effect by altering the basic soil properties.

For example, topsoil (0 to 300 mm) should be stripped and stockpiled separately from all other horizons due to its chemical, mineralogical, mechanical, plant seed, and microbiological properties. Some sub-horizons could be stockpiled together. It is recommended to utilize the guidelines set out in the soil stripping and stockpiling protocol compiled by a soil scientist with experience in rehabilitation of disturbed land. There is a high probability that topsoil will be lost due to wind and water erosion, which will alter the soils properties. Subsoil will be stockpiled separately from topsoil and appropriately managed to prevent soil loss and mixing.

The soils within the Project footprint are not currently delineated, it is, however, suspected that there will be an extensive quantity of fertile soils in the area. This should allow for enough topsoil to be stockpiled for rehabilitation purposes. A soil balance that compares the amount of soil available with the amount required for rehabilitation will be completed in the detailed SSMP. The soil balance will identify the quantity of excess soil present within the Project footprint. Excess soil will be disposed of in the waste overburden stockpile.

3.2 SOIL TYPES AT THE MINE SITE

The available ground investigations results indicate that the soil at the mine site has a highly variable ground profile, comprised of sandy argillaceous overburden with interbedded bands of clayey sand, sandy clay, and clay. The soils in the Mine Site area are grouped into five classifications according to the South African Taxonomical Soil Classification System (Soil Classification Working Group, 1991) as summarized in Table 3.1.

Table 3.1 Mine Site Soil Types

Soil Type	Diagnostic Horizons	Effective Depth (mm)	Surface Area (ha)
Avalon	Orthic A, Yellow Brown Apedalic B, Soft Plinthic B	>300	280
Clovelly	Orthic A Yellow Brown, Apedalic B Unspecified	>300	601
Hutton	Orthic A - Red, Apedalic B - Unspecified	>300	311
Katspruit	Orthic A, G	<300	499
Westleigh	Orthic A - Soft, Plinthic B	<300	66

The majority of the soils to be salvaged at the port site will be from the cultivated rice fields or from wetland areas (i.e., mangrove).

3.3 TOPSOIL STRIPPING AND SALVAGING DURING CONSTRUCTION

Much of the soil within the Mine Site is readily available for plant uptake and sustainable plant growth. As such, fertile soil for rehabilitation will be available in excess. Valuable plants and seeds will be salvaged prior to the temporary stockpiling of soils for all project components and affected areas within the Project fence line.

The soils in some of the Project component footprints will be altered from their original state and may lose productivity, structure and ability to infiltrate and retain moisture. The potential exists for the overall productivity of the impacted soils to be degraded and erosion to be accelerated as vegetation cover and humus in the topsoil is removed during topsoil stripping. Great care will be taken during topsoil stripping to maintain soil productivity and ensure successful site reclamation.

To ensure that topsoil stripping and salvaging is conducted appropriately, a construction monitor will be present during construction to direct the crews used for soil salvaging, soil identification and minimizing impacts to soils. All slopes will also be modified to create a slope angle that will be stable based on the local soil characteristics.

3.4 SOIL PLACEMENT

To the extent possible, soils will be stockpiled close to their place of origin and will be segregated according to soil quality or potential future use. When sites are selected to stockpile topsoil, they will have stable, vegetated landforms and ecological functions similar to that of their place of origin.

3.5 TOPSOIL STOCKPILE MANAGEMENT

The potential impacts to soil resources from topsoil stockpiling include soil compaction, soil erosion, dust and spills. As such, careful topsoil stockpile management is required during soil salvaging activities.

The primary mitigation measure to minimize losses to soil quality and maintain soil productive capacity will be to segregate the types of soils encountered within stockpiles for use in future reclamation activities. When removing soil, approximately the first 30 cm will be segregated as topsoil and the underlying material will be segregated as sub-soil. Stockpiling will occur in the dry season when possible and stockpiles will be contoured immediately after stockpiling to avoid rain erosion.

Compaction of soils by machinery and trucks will be minimized as much as possible throughout the Project area. Any fuel spills will be cleaned up immediately and the affected soils will be removed and stockpiled in a separate area for bioremediation. Soil and water conservation measures (e.g., terracing, tree planting etc.) will be carried out to minimize soil loss to water bodies such as around the collection pond, the TSF, and the River Cacheu Diversion. The movement of vehicles and machineries will be restricted to designated roads to minimize vegetation loss and soil compaction.

During operations, all stockpiles will be monitored for slope stability. Temporary vegetation may be established to enhance stability and minimize erosion. Routine inspections following rain and flooding events will be conducted. Any deficiencies in structures will be recorded and reported immediately for remedial action. Where applicable, lands to be vegetated at closure will be fertilized and irrigated to promote the establishment of vegetation as soon as possible following soil disturbance.

3.6 SOIL REDISTRIBUTION

Salvaged topsoil will be used in progressive and final reclamation of project components and footprints. During reclamation, the new landforms and footprints will be covered with topsoil obtained from the topsoil stockpiles that were established during construction and revegetated to meet the end land use objectives. Soil placement and techniques will ensure that the soil composition is sufficient to support native plant species appropriate for the local climate and consistent with the proposed future land use within the Project area. Overall thickness of the topsoil will be consistent with surrounding undisturbed areas and future land use. Monitoring of the soil and the ability of the soil to sustain the growth of vegetation will be conducted at closure.

4 – MONITORING AND REPORTING

4.1 SCOPE FOR MONITORING

The Project will measure the effects on soil resources in the Project area during the construction and operations phases. On-site personnel will be responsible for collecting monitoring information as described below.

The Project area has distinct wet and dry seasons. Sampling frequency and parameters analyzed will be reassessed based on results from the monitoring activities associated with the ESCP and related management plans. It is likely that sampling frequency will be higher during the rainy season to correspond with rain events.

Monitoring will cease if impacts are observed to be consistently within ESIA predictions. Additional monitoring will be conducted if preliminary monitoring identifies potential exceedances of the applicable guidelines or if monitoring would help to resolve any future stakeholder complaint issue.

4.2 MONITORING LOCATIONS

The ESCP monitoring program will include TSS samples from downstream locations for comparison to upstream, background sample locations during construction and operations as appropriate. Details regarding the location of these monitoring stations will be included in future revisions to the ESCP.

4.3 REPORTING

Prior to initiating construction, a detailed SSMP and ESCP will be finalized following a review completed by the Guinea Bissau Ministry of Environment. Regular sediment and erosion control reporting will be undertaken by the Environmental Manager and submitted to the General Manager for review and distribution to regulatory authorities. Reporting generally includes:

- A summary of activities and mitigation measures undertaken during the reporting period
- Unexpected/emergency situations that affected the erosion and sediment control measures employed
- Any deviations or non-compliances
- Planned activities during the next reporting period
- Any other issues of concern
- Monitoring methodology and locations
- Environmental monitoring records and observations

An Annual ESMP Report will be developed and submitted to regulatory authorities.

5 – ROLES AND RESPONSIBILITIES

5.1 KEY ROLES AND RESPONSIBILITIES

The Environmental Superintendent will be responsible for implementing the ESCP and SSMP and the General Manager will be responsible for enforcing the requirements of the ESCP and SSMP. The Environmental Superintendent (or designate) will inspect the condition of the Project area on a monthly basis and will maintain records of compliance with corporate requirements.

The Engineering, Procurement, Construction and Management (EPCM) Contractor will be responsible for integrating these procedures and requirements into their SOPs during construction. The EPCM Contractor will report to the Environmental Manager on a monthly basis. The report will include:

- Protection actions undertaken
- Monitoring undertaken by suitably trained personnel
- Non-compliances identified
- Corrective actions planned and undertaken

Monitoring activities reported from the EPCM will include:

- Visual inspection records of any problem areas identified during construction. These records will include notes and photos.
- Documentation of the date and location mitigation techniques are employed
- Effectiveness of mitigation and the techniques used
- The Mining Manager and Process Plant Manager will be responsible for ensuring the ESCP and SSMP procedures and requirements are implemented in their respective areas of control. The Environmental Superintendent is responsible for record-keeping. Regular reporting will be prepared and submitted to the General Manager. The Environment Superintendent will inspect the condition of all areas on a monthly basis and will maintain appropriate records. The inspection will include:
- Areas prone to erosion
- Evidence of erosion
- Condition of access roads
- Condition of cleared areas
- Condition of perimeter drains (if installed) and associated settlement ponds (if installed)
- Compliance with applicable regulatory and corporate requirements

During operations, all structures will be monitored for slope stability.. Regular inspections after each rain and flooding event will be undertaken. Any new observation or change on any structure will be recorded and reported immediately for appropriate action.

5.2 TRAINING

Employees and contractors will be provided with basic training in the protection of soil resources and erosion and sediment control as it relates to their role onsite. Specialized training will be provided to management and employees whose responsibilities and activities are in areas that relate to topsoil stripping or storage. Specialized training will also be provided to mine operators, plant operators, and key personnel involved in activities that are likely to impact or cause erosional processes that may degrade soil and/or water resources.

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7 – CERTIFICATION

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3F
WATER MANAGEMENT PLAN

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FARIM PHOSPHATE PROJECT

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE AND OBJECTIVES 2
1.3 REGULATORY REQUIREMENTS 3
1.3.1 National Legislation 3
1.3.2 International Standards 3
1.4 PLAN UPDATES 6

2 – MINE WASTE MANAGEMENT 7
2.1 MINE PLAN OVERVIEW 7
2.2 WASTE OVERBURDEN MANAGEMENT 11
2.3 TAILINGS MANAGEMENT 12
2.4 ADDITIONAL WORK 13

3 – MINE SITE WATER MANAGEMENT 14
3.1 KEY ELEMENTS AND COMPONENTS 14
3.1.1 Management of Non-Contact Water 14
3.1.2 Management of Sediment-Laden Water 14
3.1.3 Management of Contact Water 15
3.2 WATER MANAGEMENT DESIGN CRITERIA 16
3.3 SITE-WIDE WATER BALANCE 16

4 – PORT SITE WATER MANAGEMENT 18

5 – POTENTIAL IMPACTS AND MITIGATION MEASURES 19

6 – MONITORING AND REPORTING 25
6.1 GENERAL 25
6.2 INSPECTIONS AND AUDITS 25
6.3 GROUNDWATER MONITORING 25
6.4 SURFACE WATER MONITORING 25
6.5 REPORTING 26
6.6 ADAPTIVE MANAGEMENT 26

7 – ROLES AND RESPONSIBILITIES 28
7.1 KEY ROLES AND RESPONSIBILITIES 28
7.2 TRAINING 28

8 – REFERENCES 29

9 – CERTIFICATION 30

TABLES

Table 1.1 Applicable International Effluent Guidelines and Water Quality Objectives 4
Table 2.1 Indicative Site Stratigraphy 11
Table 5.1 Potential Water Management Impacts and Mitigation Measures 20
Table 7.1 Farim Project Water Management Plan Roles and Responsibilities 28

FIGURES

Figure 1.1 Project Regional Setting 1
Figure 2.1 Mine Site Layout - Year 7 - Near End of South Pit Mining 9
Figure 2.2 Mine Site Layout - Year 25 - Near End of North Pit Mining 10
Figure 3.1 Precipitation - Depth/Duration/Frequency Results for Kolda Climate Station 17

ABBREVIATIONS

Farim Phosphate Project ..... the Project
ECP ..... Environmental Control Pond
EHS ..... Environmental, Health and Safety
EPRP ..... Emergency Preparedness and Response Plan
ESCP ..... Erosion and Sediment Control Plan
ESIA ..... Environmental and Social Impact Assessment
ESMP ..... Environmental and Social Management Plan
FPO, FPA, and FPB ..... phosphate-bearing horizons
HDPE ..... High Density Polyethylene
HSSE ..... Health, Safety, Social and Environmental
IFC ..... International Finance Corporation
IWL ..... Integrated Waste Landform
SCP ..... Sediment Control Pond
SOP ..... Standard Operating Procedure
TSF ..... Tailings Storage Facility
TSS ..... Total Suspended Solids
WAMP ..... Water Management Plan
WHO ..... World Health Organization's Guidelines for Drinking Water Quality

1 – INTRODUCTION

1.1 BACKGROUND

This conceptual level Water Management Plan (WAMP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

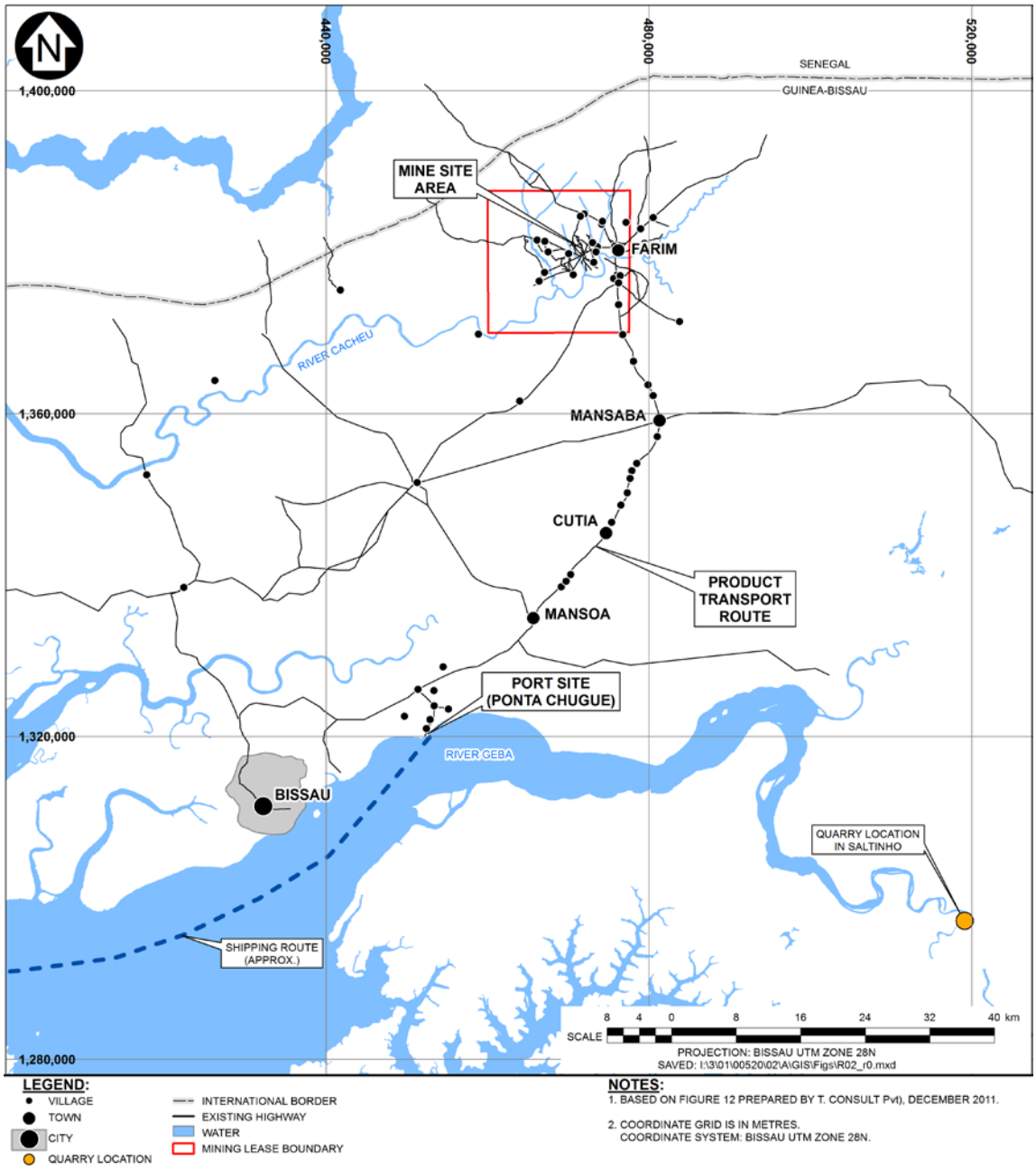


Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared to evaluate and address the proposed project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has also been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** These are a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions and operational standards for executing the discipline-specific management plans.

The WAMP is an integral part of the Project and acting as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The WAMP is a Level 2 discipline-specific management plan. The Plan details how water will be managed at the Project sites (mainly the mine site) during construction, operation and decommissioning phases of the Project. GB Minerals will:

- Comply with National (Guinea-Bissau) legislation and will align with International Finance Corporation (IFC) Performance Standards and IFC Environmental, Health and Safety (EHS) Guidelines (IFC, 2012 and 2007a, b).
- Comply with the World Health Organization's Guidelines for Drinking Water Quality (WHO, 2011).
- Plan so that the Project's use of water resources is undertaken in a sustainable manner that minimizes impacts to the receiving biophysical environment (water quality, aquatic life) and social environments (potentially affected land uses including agriculture and fishing).
- Preserve water resources in line with the objectives of integrated catchment management, to ensure this resource is utilized to the maximum benefit of Guinea-Bissau and its residents.
- Construct infrastructure and reticulation systems to standards designed to minimize water losses and leaks.

Other related management plans include but are not necessarily limited to:

- **Erosion and Sedimentation Control Plan (ESCP) -** Addresses the salvage of topsoil and measures to restrict erosion and the deposit of sediment in nearby waterbodies.
- **Emergency Preparedness and Response Plan (EPRP) -** Addresses the protection of soil resources from spills of hazardous materials.
- **Mine Reclamation and Closure Plan (MRCP) -** Focuses on achieving long-term physical and chemical stability of the Project areas post-closure.

1.3 REGULATORY REQUIREMENTS

1.3.1 National Legislation

Guinea-Bissau has developed framework legislation on the environment that lays the foundation for environmental policy and environmental assessments. This legislation includes specific requirements to protect water sources, including groundwater, which is the primary source of drinking water in Guinea-Bissau.

The National legal framework includes:

- Law No 1/2011 of 2 March 2011 - Approving the Basic Legislation on the Environment. This includes definitions of sanitation, effluents, wetlands and waters and articles preventing pollution of water resources (FAOUK, 2011a).
- Law No 10/2011 of 24 September 2011 - On Environmental Impact Assessment Regulation. This details the Projects requiring EIA, which includes mining, construction of roads and abstraction of groundwater, all of which are relevant to the Project (FAOUK, 2011b).
- Law No. 1/2000 of 24 July 2000 (FAOUK, 2000) - Mines and Minerals Act, which regulates all issues related to the exploration and commercial production of mining substances that exist in the soil or subsoil and in the territorial waters, with the exception of oil. This law includes regulations for water abstraction and discharge.

Prior to the above legislation, Guinea-Bissau adopted the Decree-Law No. 5-A/1992 establishing the Water Code (Guinea-Bissau, 1992). The Water Code objectives include the following:

- Defining the legal regime of all activities relevant with water management
- Defining the institutional framework to implement national policy on water rights, guaranteeing the control and management of water resources
- Regulating water uses
- Guaranteeing the protection of the water quality in order to avoid freshwater pollution or its waste

The Water Code does not adopt end of pipe or receiving water quality objectives.

1.3.2 International Standards

The IFC's General EHS Guideline provides useful guidance with respect to water conservation and use and the discharge of effluents (IFC, 2007a).

Effluent Discharges

The General EHS Guideline provides information relevant to water and sanitation. This Guideline includes information relevant to the operation and maintenance of (i) potable water treatment and distribution systems, and (ii) collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities.

Section 1.3 of the General EHS Guideline (IFC, 2007a) specifies that discharges should not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality. Receiving water use and assimilative capacity, taking other sources of discharges to the receiving water into consideration, should also influence the acceptable pollution loadings and effluent discharge quality.

The EHS Guideline for Mining (IFC, 2007b) provides the effluent guidelines listed in Table 1.1. The EHS Guideline for Mining also states the following with regards to other water quality parameters:

- Other applicable parameters and guideline values for discharge water quality should also be consistent with the receiving water body use, taking into consideration background conditions and opportunities for overall improvement of the receiving water body quality.
- Discharge water quality should also be consistent with the receiving water body use.

The IFC approach is well suited to the receiving environment associated with the Project in that it would allow the specification of site-specific effluent discharge limits based on an understanding of baseline water quality, water use (e.g. domestic use, agricultural use, and fishing), ecological reserve determinations, other potential sources of impact, and potential impacts related to effluent discharge.

In the absence of site-specific effluent discharge limits, the following international water quality guidelines can be used to develop protective quality limits for receiving water bodies of mine-related effluent.

- **Site Runoff -** Sediment discharge guidelines for total suspended solids (TSS) identified by the IFC (2007a).
- **Mine Effluent -** Mine effluent discharge guidelines developed by the IFC (2007b).
- **Groundwater Quality -** World Health Organization's Guidelines for Drinking-water Quality (WHO, 2011).
- **Receiving Surface Water Quality -** Applicable guideline values that are consistent with receiving water body use as described above.

The selected guidelines are presented in Table 1.1.

Table 1.1 Applicable International Effluent Guidelines and Water Quality Objectives

Pollutants	Units	Sediment Discharge Guidelines and Mine Effluent Limit (IFC, 2007a, b)	Drinking Water Guidelines (WHO, 2011) (Groundwater)
Total Suspended Solids	mg/L	50	-
pH	S.U.	6 - 9	-
COD	mg/L	150	-
BOD5	mg/L	50	-
Oil and Grease	mg/L	10	-
Arsenic	mg/L	0.1	0.01
Cadmium	mg/L	0.05	0.003
Chromium (VI)	mg/L	0.1	-
Copper	mg/L	0.3	2
Cyanide	mg/L	1	-
Cyanide Free	mg/L	0.1	-
Cyanide WAD	mg/L	0.5	-

Table 1.1 Applicable International Effluent Guidelines and Water Quality Objectives

Pollutants	Units	Sediment Discharge Guidelines and Mine Effluent Limit (IFC, 2007a, b)	Drinking Water Guidelines (WHO, 2011) (Groundwater)
Iron (total)	mg/L	2.0	-
Lead	mg/L	0.2	0.01
Mercury	mg/L	0.002	0.006
Nickel	mg/L	0.5	0.07
Phenols	mg/L	0.5	-
Phosphorus	mg/L	TBD	-
Uranium	mg/L	TBD	0.03
Zinc	mg/L	0.5	-
Temperature	degrees Celsius	<3 degree differential	-

NOTES:
1. METALS CONCENTRATIONS REPRESENT TOTAL METALS EXPRESSED AS MG/L.

IFC (2007a, b) has not established effluent discharge limits for phosphorus or uranium, both of which are applicable to the Project. Appropriate generic criteria will be identified and adopted in the ESIA. Alternatively, site-specific surface water quality benchmarks may be developed as an outcome of the ESIA process, considering both international aquatic life guidelines as well as anticipated downstream surface water quality.

Water Conservation and Water Management

Section 1.4 of the General EHS Guideline (IFC, 2007a) provides the following guidance with respect to water conservation:

- The setting of targets for water use, and monitoring of water flows against these targets
- Water reuse where possible
- Reducing leaks and making more efficient use of water within the water reticulation system

The EHS Guidelines for Mining (IFC, 2007b) recommends the following practices for water management:

- Establish a water balance for the mine, including the potential impacts of dewatering related to groundwater abstraction
- Develop a sustainable water supply management program
- Consider reuse and recycling of process water where feasible
- Consult with key stakeholders to understand any conflicting water use demands, and communities' dependency on water resources and/or conservation requirements

1.4 PLAN UPDATES

This WAMP has been prepared as part of the ESIA. The plan is expected to be revised prior to initiating construction of the Project.

Management reviews of the WAMP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. Changes may be identified based on environmental monitoring as well as updates to either the mine site water balance or water quality models. The reviews will also provide a formal mechanism to assess the effectiveness of the Plan in achieving objectives and maintaining ongoing compliance with the Project's ESMP and any applicable regulatory authorizations.

2 – MINE WASTE MANAGEMENT

2.1 MINE PLAN OVERVIEW

Two open pits (south pit and north pit) will be developed sequentially to extract the phosphate ore over a period of 26 years. Topsoil will be stockpiled for future reclamation and waste overburden will be placed in waste dumps (WDs) and used for construction of the flood protection bunds and integrated waste landform (IWL). Waste overburden will also be used to backfill the entire south pit and most of the north pit. Sorting of waste overburden will occur based on geochemical composition with cleaner material (waste overburden not expected to meaningfully generate acid or leach metals) placed in ex-pit WDs. These ex-pit WDs will require management of stormwater runoff for sediment control but water treatment will not be required. Waste overburden with the potential to leach metals will be backfilled into the pits below grade, or will be placed within WD-3b, which forms part of the IWL. The IWL will be designed to contain and collect seepage from WD-3a and the tailings storage facility (TSF). Seepage from WD-3b and the TSF will be directed to the Environmental Control Plan (ECP) and utilized in the process or sent to the water treatment plant prior to discharge.

Mine construction will take place during year -2 and -1, with operations occurring in Year 1 through part of Year 26. The operation phase can be further split between Phase 1, when the south pit is mined in Year 1 through part of Year 8, and Phase 2 involving mining of the north pit starting in Year 8 and ending in Year 26. Figure 2.1 presents the Year 7 mine plan near the end of Phase 1 of mining, and Figure 2.2 presents the Year 25 mine plan showing site conditions near the end of Phase 2 of mining.

The following provides a summary of the key project activities during the construction phase, and Phases 1 and 2 of mining:

- Construction (Years -2 and -1)
  - Construction of mine infrastructure including the process plant, waste and water management facilities, access and haul roads, etc.
  - Installation and operation of dewatering wells within the initial south pit extent to prepare for mining
- Pre-stripping of overburden from the south pit area. Operations - Phase 1 - South Pit Mining (Years 1 to 8)
  - Continue dewatering and begin mining ore from the south pit, installation of dewatering wells in future mining areas within the south pit
  - Construction of in-pit sumps to manage surface water runoff and excess groundwater infiltration
  - Tailings pumped to the TSF, construct embankment raises biannually
  - Construct WD-1 and WD-2
  - Partially backfill the south pit as mining progresses
  - Construct WD-4 above original topography within the backfilled south pit extents

- Operation - Phase 2 - North Pit Mining (Years 8 to 26)
  - Initiate north pit overburden stripping, construction of roads and required infrastructure
  - Installation and operation of dewatering wells within the north pit extents to prepare for mining (Year 8)
  - Continue dewatering and begin mining ore from the north pit, installation of dewatering wells in future mining areas within the north pit (Year 9 to 26)
  - Construction of in-pit sumps to manage surface water runoff and excess groundwater infiltration Backfill sent to south pit until full capacity (end of Year 15), construct WD-5 and WD-6
  - Tailings pumped to the TSF, construct embankment raises biannually
  - Construct waste overburden dump area above original topography within the backfilled north pit extents

An important element of both the mine plan and water management at the mine site will be pit dewatering operations. It is critical to keep the mining areas dry to protect workers within the pits. Both open pits are subject to flooding from groundwater seepage and precipitation falling directly into the pits.

Perimeter dewatering wells will be installed to remove most of the groundwater that would otherwise seep into the pits, but a portion will bypass the perimeter dewatering wells. During the rainy season, precipitation will directly enter the pits. Water within the pits will be directed to in-pit sumps and will be pumped to (Sediment Control Pond) SCP-1 for testing, recycling, or treatment prior to discharge to the environment.

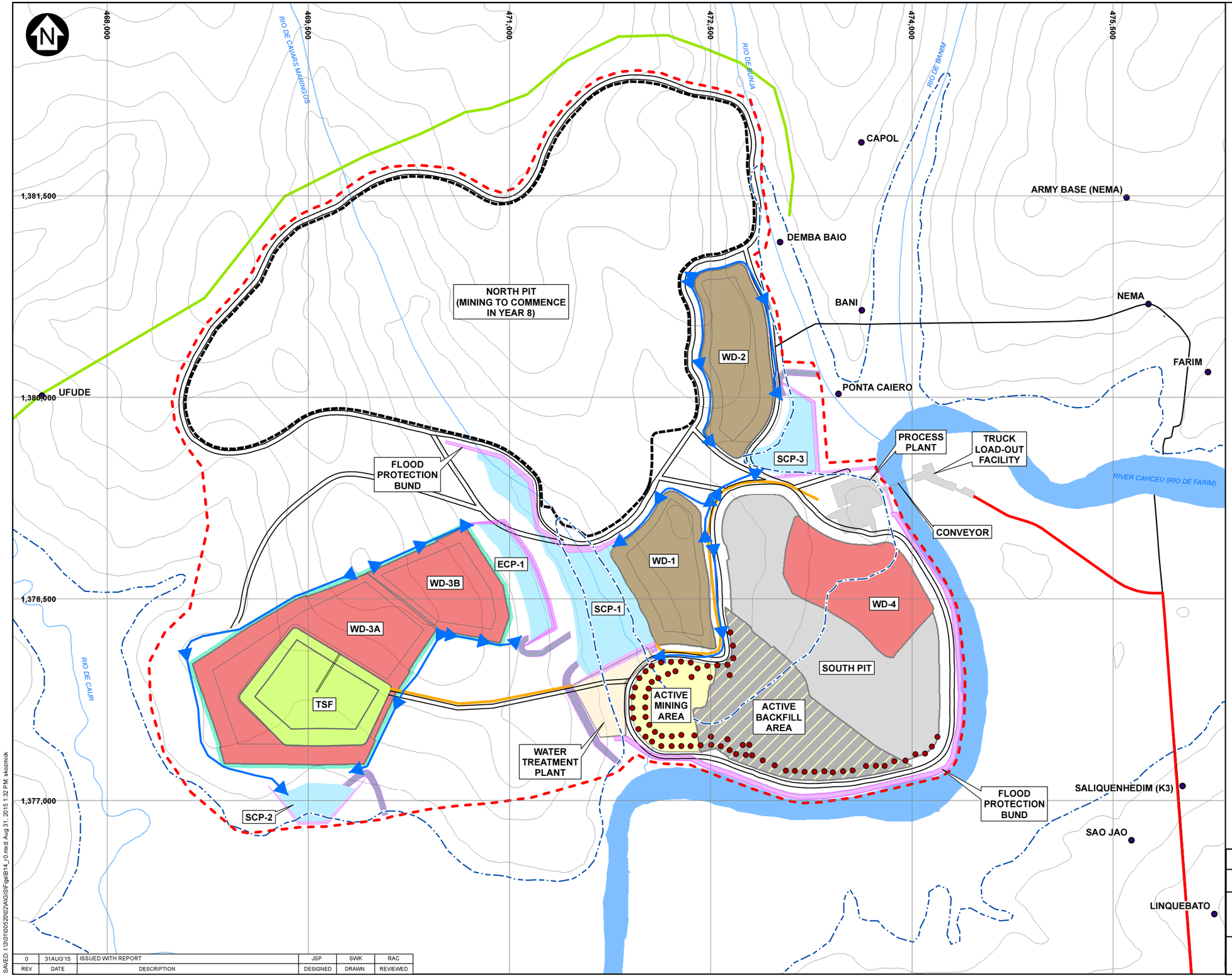
A groundwater flow model was developed for the open pits based on the proposed mining plan (Knight Piésold, 2015a). The model was developed to estimate groundwater inflows during the various stages of pit development.. The estimated pit inflows are as follows:

- South Pit - The estimated average daily groundwater inflow is approximately 13,000 m^3/day, ranging between 9,800 and 16,700 m^3/day.
- North Pit - The estimated average daily groundwater inflow is approximately 6,500 m^3/day, ranging between 5,100 and 8,900 m^3/day.

Assuming a yield from each dewatering well of 10.5 m^3/h, the total number of wells required for the life of mine is estimated to be 546, based on 75 m well spacing at locations close to the river and 150 m spacing further from the river.

Water from the dewatering wells will be discharged directly to the River Cacheu, whereas pit water collected within in-pit sumps will be directed to SCP-1 (see Section 3).

At the end of mining, dewatering and mining activities will cease and a small pit pond will form in the portion of the north pit that will not be backfilled. Groundwater levels are expected rebound quickly within the mining area.



LEGEND:

- COMMUNITY
- DEWATERING WELL (YEARS 7-8)
- EXISTING ROAD
- HAUL ROAD
- INFRASTRUCTURE
- WATER MANAGEMENT FACILITY
- PRODUCT TRANSPORT ROUTE
- TAILINGS AND DECANT RETURN PIPELINE TRENCH ALIGNMENT
- PROPOSED BYPASS ROAD
- 100 m FENCELINE
- COLLECTION DITCH
- RIVER/STREAM/DRAINAGE
- WATER
- POND EXTENT
- TAILINGS STORAGE FACILITY
- RECLAIMED WASTE DUMP
- SPILLWAY
- ACTIVE WASTE DUMP
- ACTIVE MINING AREA
- ACTIVE BACKFILL AREA
- BACKFILLED TO SURFACE GRADE
- INTEGRATED WASTE LANDFORM
- 1 IN 100 YEAR FLOODPLAIN EXTENT
- NORTH OPEN PIT EXTENT

NOTES:

1. MINE INFRASTRUCTURE AND BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). UPDATED AUGUST 17, 2015 BASED ON FIGURES PROVIDED BY KNIGHT PIESOLD PERTH.
2. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.
3. CONTOUR INTERVAL IS 5 METRES.
4. IWL - INTEGRATED WASTE LANDFORM
   TSF - TAILINGS MANAGEMENT FACILITY
   WD - WASTE DUMP
   ECP - ENVIRONMENTAL CONTROL POND
   SCP - SEDIMENT CONTROL POND

SCALE 250 125 0 250 500 750 1,000 1,250 1,500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	31AUG'15	ISSUED WITH REPORT	JSP	SWK	RAC

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GB MINERALS LTD.

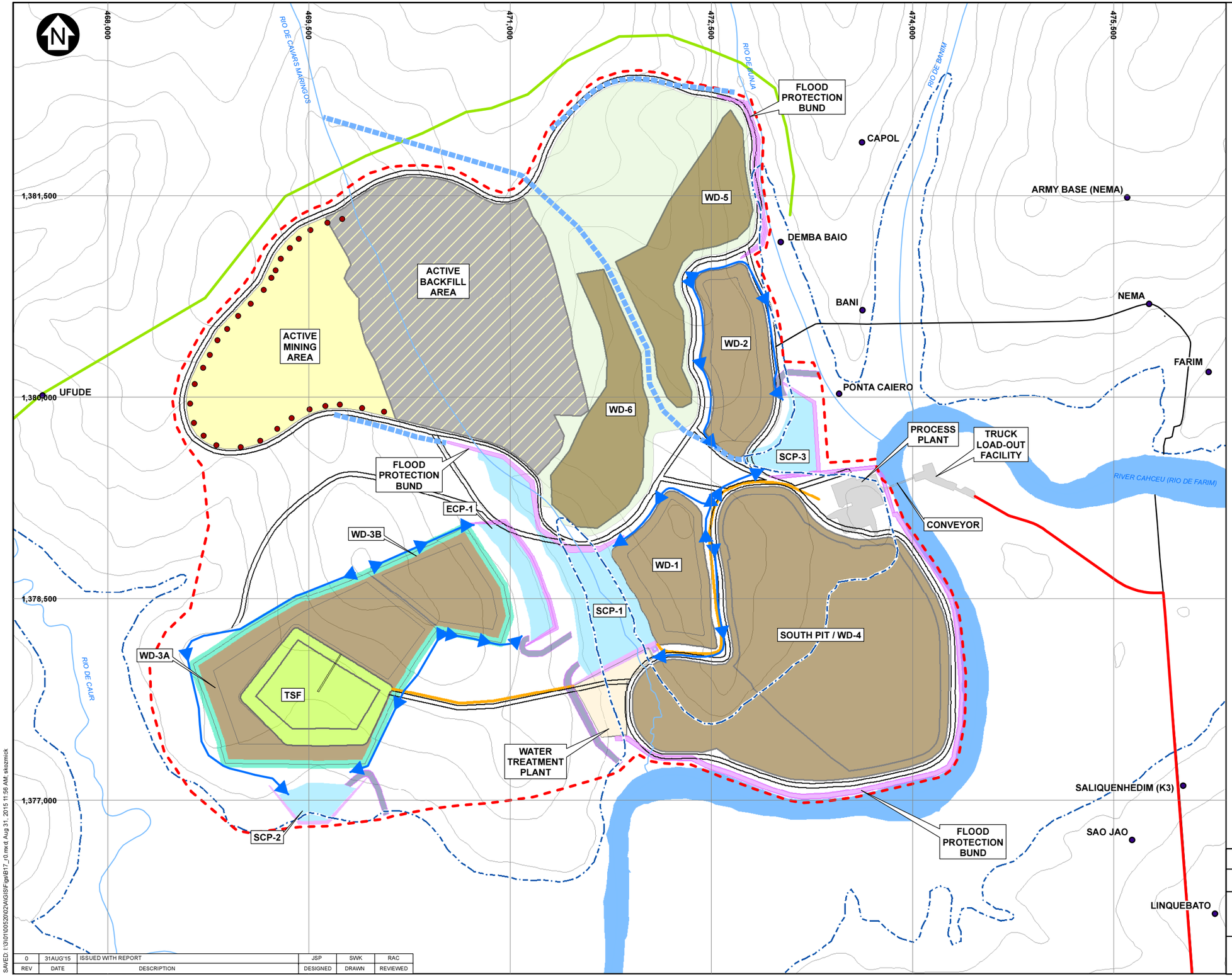
FARIM PHOSPHATE PROJECT

MINE SITE LAYOUT
YEAR 7 - NEAR END OF SOUTH PIT MINING

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB301-520/2	7

FIGURE 2.1 REV 0



LEGEND:

- COMMUNITY
- DEWATERING WELL (YEARS 25-26)
- ROAD
- HAUL ROAD
- INFRASTRUCTURE
- WATER MANAGEMENT FACILITY
- PRODUCT TRANSPORT ROUTE
- TAILINGS AND DECANT RETURN PIPELINE TRENCH ALIGNMENT
- PROPOSED BYPASS ROAD
- 100 m FENCELINE
- DIVERSION CHANNEL
- COLLECTION DITCH
- RIVER/STREAM/DRAINAGE
- WATER
- POND EXTENT
- TAILINGS STORAGE FACILITY
- SPILLWAY
- ACTIVE BACKFILL AREA
- RECLAIMED WASTE DUMP
- ACTIVE MINING AREA
- RECLAIMED PORTION OF NORTH PIT
- INTEGRATED WASTE LANDFORM
- 1 IN 100 YEAR FLOODPLAIN EXTENT

NOTES:

1. MINE INFRASTRUCTURE AND BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). UPDATED AUGUST 17, 2015 BASED ON FIGURES PROVIDED BY KNIGHT PIESOLD PERTH.
2. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.
3. CONTOUR INTERVAL IS 5 METRES.
4. IWL - INTEGRATED WASTE LANDFORM
   TSF - TAILINGS MANAGEMENT FACILITY
   WD - WASTE DUMP
   ECP - ENVIRONMENTAL CONTROL POND
   SCP - SEDIMENT CONTROL POND

SCALE 250 125 0 250 500 750 1,000 1,250 1,500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	31AUG'15	ISSUED WITH REPORT	JSP	SWK	RAC

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GB MINERALS LTD.

FARIM PHOSPHATE PROJECT

MINE SITE LAYOUT
YEAR 25 - NEAR END OF NORTH PIT MINING

Knight Piésold CONSULTING

P/A NO. NB301-520/2 | REF NO. 7

FIGURE 2.2 | REV 0

An important component of water management is understanding mine waste management. This includes the geochemistry of the waste overburden and the tailings management strategies which may have direct impacts on the surface water quality. The following sections describe the waste overburden geochemistry and provide a summary of the tailings management strategies.

2.2 WASTE OVERBURDEN MANAGEMENT

Three phosphate-bearing horizons (referred to as the FPO, FPA and FPB) have been identified at the Farim phosphate deposit. The FPA unit is the identified potentially economic phosphate bed. The FPB underlies the FPA and is of less economic interest due to the low phosphate and high limestone content. The FPO is a clayey dolomitic limestone that is weakly phosphatic with limited economic potential. The phosphate deposit is underlain by a soft, white and porous limestone unit. The phosphate bearing strata are unconformably overlain by a sandy-argillaceous sequence comprising soft alternating sandy, clayey and sandy-clay layers with a blue/green soft clay or black lignitic clay at the base. The site stratigraphy is summarized in Table 2.1.

Table 2.1 Indicative Site Stratigraphy

Age	Unit	Description	Thickness (m)
Post Eocene	Sandy/Argillaceous Overburden	Alternating sandy, clayey and sandy clayey layers	27 to 58
	Basal Clay Overburden	Blue/green soft clay and black lignitic clay (anoxic depositional environment)	
Eocene	Sand including FPO (phosphatic interval)	Grey/white fine grained sand including phosphate bearing clayey dolomitic limestone (FPO)	7 (single intercept)
	Upper Dolomitic Limestone	Clayey limestone	>2 [(2)] (single intercept)
	Decarbonised Phosphate Unit (FPA)	Ore zone comprising beige to brown, poorly cemented very fine grained phosphatic sand	1 to 11
	Calcareous Phosphate Unit (FPB)	Cemented phosphatic limestone	2 to 8
	Limestone	Soft, white and porous limestone	>6 to 17 [1]

NOTES:

1. TABLE MODIFIED FROM GOLDER, 2014.
2. BASE OF UNIT NOT ENCOUNTERED.

A geochemical assessment comprising testing of twenty composite samples of overburden was undertaken in 2012 as part of a previous phase of the Project (Golder, 2014). It was concluded that the potential for acid generation through the oxidation of overburden was expected to be low. In addition, it was reported that trace metal concentrations within the overburden are typically at or below crustal abundances. However, silver, arsenic, molybdenum, selenium and uranium were reported to exceed the crustal abundance by a factor of six in one or more samples. Distilled water extract testing results indicated that phosphate, ammonia, ammonium, sulphate, arsenic, cadmium, chromium, iron, manganese, nickel, lead and zinc exceed the reference surface water quality guidelines, with cadmium and nickel exceeding the WHO (2011) drinking water guidelines (Golder, 2014).

Based on the testing to date there is potential for elevated concentrations of environmentally significant metals and compounds in a portion of the waste overburden. The relative quantities of each lithology and their geochemical characteristics are being determined in more detail at present. In the meantime, the following design philosophy has been adopted:

- 78% (420 Mm^3 of 539 Mm^3) will be placed as in-pit overburden backfill (IOB)
- 7.5% (39.5 Mm^3) will be deposited in ex-pit waste dumps (WD-1, WD-2, WD-3a and WD-3b)
  WDs 1, 2 and 3a will stockpile inert waste only
  WD-3b will contain potentially leachable waste in specially designed encapsulation cells contained within inert waste
- 0.5% (3 Mm^3) of waste overburden (inert overburden only) will be used to construct the initial TSF embankments, sediment control dams and flood protection bund in the first two years of mining
- 14% (77 Mm^3) of waste overburden (inert overburden only) will be placed in 3 surcharge waste dumps (WD-4, WD-5 and WD-6) located within the footprint of the backfilled open pits

Water collected from the WD-1, WD-2 and WD-3a dumps will report to separate sediment control dams (SCP's) and will be discharged to the environment after reducing the sediment load to an appropriate level. Based on the current design philosophy, no seepage collection measures are proposed.

WD-3b will be designed to reduce contact water from entering the surface water and groundwater environments. A basal low permeability soil liner will be formed beneath the footprint of WD-3b and seepage/run-off flows at the base of WD-3b will report to the environmental control dam (ECP-1) by means of re-shaping the ground surface to promote drainage to the pond, or provision of a network of above-ground sand/gravel drains. Any contaminated water collected in ECP-1 will be returned to the process plant for re-use. Uncontaminated water will be returned to the plant for re-use, if required, or discharged to the environment.

The proposed geometry of the waste overburden dumps includes a maximum elevation of 30 m above sea level, 10 m bench heights, inter-bench slopes of 1V:2H, and inter-bench berm widths of 10 m.

2.3 TAILINGS MANAGEMENT

A paddock style TSF will store 6.4 Mt of tailings generated over the Project life.

The design incorporates a multi-zoned embankment, a compacted in situ soil-lined basin area, an underdrainage system covering the approximate extent of the supernatant pond, and an upstream toe drain. Due to the potential elevated levels of environmentally significant elements, a provisional allowance has been included to line the facility with an High Density Polyethylene (HDPE) geomembrane, subject to further geochemical assessment of the tailings solids and supernatant liquor. The TSF is designed to fully contain the design tonnage as well as rainfall runoff arising from storm events up to and including a 1 in 100 year average return interval (ARI) storm event or wet sequence. The embankments will be constructed in stages over the life of the facility to suit the storage capacity requirements.

Tailings will be discharged into the facility by sub-aerial deposition methods via a number of single point discharge spigots located along the embankment crest. The active tailings beach will be rotated around the facility so as to maximize tailings density and maintain the supernatant pond around the central decant. The upstream toe drains and underdrainage system will drain by gravity to a collection sump located at the toe of the southern embankment. Supernatant water will be decanted from the facility via the decant tower located at the centre of the facility. Solution recovered from the toe drains, and underdrainage and decant systems will be pumped back to the plant for re-use in the process plant.

The TSF, together with waste dump WD-3a and WD-3b located outside the perimeter of the TSF, will form the IWL. The IWL allows for the efficient management of waste materials and water.

2.4 ADDITIONAL WORK

The mine waste management will include ongoing periodic geochemical analysis of the waste overburden to assess metals content and leaching potential. These results will support assumptions regarding changes in surface water quality anticipated from the interaction of precipitation and in-pit sump water quality.

3 – MINE SITE WATER MANAGEMENT

3.1 KEY ELEMENTS AND COMPONENTS

The site presents a unique water management challenge due to the Mine Sites proximity to the tidally influenced River Cacheu and the presence of a distinct wet season. Three main types of water will need to be managed at site:

- **Non-contact (clean) Water -** Water that does not come in contact with mining areas, wastes or disturbed areas. Non-contact water includes water originating from the tidally influenced River Cacheu and its tributaries, water generated from pit perimeter dewatering wells, and runoff from stabilized or undisturbed/reclaimed areas.
- **Sediment-laden Water -** Water that originates from disturbed areas, which includes runoff from disturbed areas such as the active waste dumps and construction sites. This water type will be managed to remove sediment to acceptable levels, but otherwise the quality of this water is considered to be acceptable for discharge to the environment.
- **Contact Water -** Contact water is mine effluent that may be of adverse water quality (mainly metals) without treatment. Sources of contact water at the site include pit water (groundwater seepage that bypasses the dewatering wells, as well as direct precipitation falling into the open pit), tailings supernatant, and runoff and seepage from the TSF and WD-3b.

3.1.1 Management of Non-Contact Water

To limit the amount of water that needs to be managed, measures will be implemented to minimize the movement of non-contact (clean) water into active mining areas and construction sites. Management measures include the use of clean water diversion channels and flood protection bunds:

- **Clean Water Diversion Channels -** Diversion channels will be constructed to direct non-contact (clean) water away from construction sites and active mining areas. Temporary diversion channels will be constructed as outlined in the Erosion and Sediment Control Plan (ESCP; Volume 3). Permanent diversions will be constructed to divert clean water around the open pits.
- **Flood Protection Bunds -** Flood protection bunds will be used to divert non-contact water away from each of the pits, as follows:
  - **River Cacheu Flood Protection Bund -** The footprint of the south pit lies partially within the tidal flood plain of the River Cacheu, which has a tidal range at the site of approximately 1.5 m. A flood protection bund will be constructed along the entire perimeter of the south pit where it borders the River Cacheu. This will be constructed in stages using temporary bunds. The bund will have a crest elevation of 4 m ASL and a toe width of 20 m. An erosion protection layer will be placed on the river side of the bund.
  - **North Pit Flood Protection Bunds -** The north pit will require the construction of two flood protection bunds during the initial stages of pit development, to keep the ephemeral Rio de Cavaras Marinhos and Rio de Bunja from flowing into the pit.

3.1.2 Management of Sediment-Laden Water

Sediment-laden waters will be collected and managed within the SCPs. Erosion will be minimized to the greatest extent possible to reduce the levels of sediment in runoff by following the mitigation

measures outlined in the ESCP. Three SCPs have been situated within the mine site footprint to manage sediment laden waters coming from the waste dumps, open pits and construction sites, as follows:

- SCP-1 - Runoff from inert waste dump WD-1 and contact water from ECP-1 only if discharge criteria are met.
- SCP-2 - Runoff from the TSF and WD-3a (the IWL).
- SCP-3 - Runoff from inert waste dump WD-2.

Sediment control dams will also be required to manage runoff from the surcharge waste dumps (WD-4, WD-5 and WD-6). WAMPs for the surcharge waste dumps will require development during the next phase of engineering. It has been assumed that each of the surcharge waste dumps will require at least one pond of similar size to SCP-3. The current location and configuration of the surcharge waste dumps may need to change slightly to accommodate the required water management features.

Water will be allowed to discharge directly from the SCPs to the environment once concentrations of suspended solids meet the specific discharge requirements identified in the WAMP. Contingency measures to remove sediment include the use of flocculants, and if water quality monitoring identifies exceedances of discharge criteria for other parameters (i.e., metals), the SCP water can be directed to the treatment plant prior to discharge. Small quantities of water from SCP-1 may be utilized as make-up water in the process plant.

3.1.3 Management of Contact Water

As discussed above, sources of contact water at the site includes water from the open pits, tailings supernatant/liquor, and runoff and seepage from the TSF and waste dump WD-3b. Contact water will be managed within two facilities, the TSF and ECP-1. The first priority is to return contact water to the process plant, as the process plant operates at a water deficit.

The TSF will generate a surplus of water throughout the year. During the dry season, all available tailings supernatant will be decanted and sent back to the process plant, and additional make-up water for the process plant will be derived from ECP-1 (containing contact water) and SCP-1 (containing sediment-laden water), in that order. During the wet season, there is a surplus of tailings supernatant that will require management.

Contact water is expected to require treatment before it is discharged to the environment. ECP-1 will receive the following contact water streams:

- Water from the active pit area
- Surplus tailings supernatant from the TSF (any surplus not recirculated back to process)
- Runoff and seepage from waste dump WD-3b

The water treatment plant will treat all contact water exceeding discharge criteria. Contact water meeting discharge criteria, prior to or following treatment, will be discharged to the River Cacheu via an outfall equipped with a suitably sized diffuser.

Mine effluent discharge guidelines will be adopted from the IFC`s EHS Guidelines, or other site-specific water quality objectives developed in consideration of receiving water use and assimilative capacity, as permitted under the EHS Guidelines.

3.2 WATER MANAGEMENT DESIGN CRITERIA

The WAMP requires an understanding of the local climatic conditions as precipitation will contribute surface water that will require management within the active mining areas.

The temperature at the mine site has been recorded by a GB Minerals climate station at Farim since 2012. Monthly average temperatures range from a low of 21.9ºC in January to a high of 29.1ºC in May. In January, average daily temperatures range from 12.7ºC to 33.9ºC. In the month of May, the average daily temperatures range from 22.2ºC to 37.8ºC (KP, 2015b).

The mean annual precipitation based on the long-term record available at the Kolda climate station is 1,143 mm. This compares reasonably well with the annual precipitation measured at the Farim climate station: 1,772.6 mm in 2012; 1,080.8 mm in 2013; and 1,180.4 mm in 2014. The estimated maximum annual precipitation at the Kolda reference station is 2,152 mm (KP, 2015b).

A large proportion of the annual regional precipitation is deposited during the rainy season, approximately from June through October. Within the rainy season, most of the rainfall occurs in the months of July and August.

A climatology assessment was conducted for the feasibility study to identify appropriate design criteria for water management facilities on the Project (KP, 2015c). Historic daily precipitation data from a regional long-term climate station at Kolda was used to obtain the 24-hour design storm depths and subsequently the Depth/Duration/Frequency curves applicable to the mine site (Figure 3.1).

Operation phase water management structures (i.e., sediment control dams, TSF, etc.) will be constructed based on the 100-year return period 24-hour storm event, which was estimated to be 508 mm (KP, 2015b). The estimated dry annual precipitation was estimated at 641 mm and the wet annual precipitation was estimated at 1,765 mm for the 100-year return period.

3.3 SITE-WIDE WATER BALANCE

A site-wide water balance will be developed during the detailed engineering design stage to account for the water flows reporting to each of the water management facilities, and ensure the facilities are sized adequately. The water balance will be updated periodically to support ongoing design and construction activities such as embankment raises, and to support any required updates to water quality models.

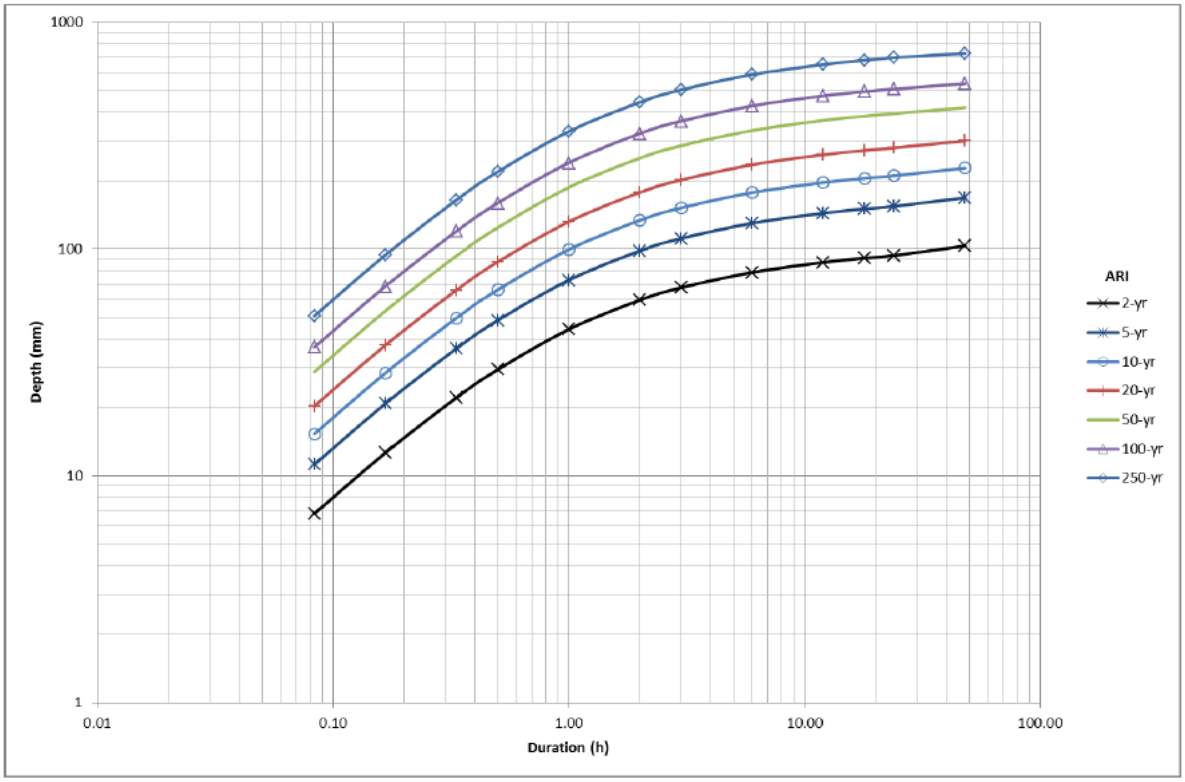

Figure 3.1 Precipitation - Depth/Duration/Frequency Results for Kolda Climate Station

4 – PORT SITE WATER MANAGEMENT

An effluent treatment system will be present at the Port Site to handle site drainage, dirty truck wash water, dryer scrubber water and water treatment plant effluent. The effluent treatment system will consist of a stormwater settlement pond, a stormwater storage pond, an effluent treatment plant and associated pumps. Effluent and stormwater runoff from the Port Site will be directed to the settlement pond; overflow from the stormwater settlement pond will report to the stormwater storage pond. Water from the storage pond will be pumped to the effluent treatment plant prior to being discharged to the environment.

5 – POTENTIAL IMPACTS AND MITIGATION MEASURES

As with any project of this scale and nature, there are certain impacts that cannot be entirely eliminated (i.e. residual impacts after implementing mitigation measures). With respect to impact mitigation, the Project subscribes to the philosophy of impact avoidance (by changes to the Project planning and/or design) and impact reduction (to reduce impacts that cannot be avoided to acceptable levels). GB Minerals has identified a number of mitigation measures to reduce potential impacts to acceptable levels.

Table 5.1 presents the following information with respect to water management grouped by project phase (construction, operation and decommissioning):

- The potential impacts to water
- Management objectives and targets related to water resources and indirect impacts
- Mitigation and management measures to minimize impacts
- Monitoring proposed to validate ESIA impact predictions and/or confirm compliance
- Responsibilities and accountability for the mitigation measures and monitoring

Construction-phase impacts are presented first in Table 5.1. Potential construction phase effects are primarily related to erosion and sediment control due to ground disturbance activities, for which the ESCP identifies mitigation measures not repeated in this plan. Impacts due to the accidental spillage of fuel and other hazardous materials are also a concern, for which spill prevention mitigation is identified in Table 5.1. The EPRP describes the response measures to be implemented in the event of a spill.

Table 5.1 Potential Water Management Impacts and Mitigation Measures

Phase/Impact	Objective(s)	Mitigation/Management Measures	Monitoring Plan	Responsibility
Construction Phase				
Surface- and groundwater quality impacts due to ground disturbance, vehicle maintenance and spillage	• To avoid/minimize adverse surface water and groundwater quality impacts.	• Vehicle maintenance and washing of vehicles will be conducted in appropriate maintenance facilities equipped with oil/water separators and sediment traps. • Suitable clean-up of areas where spillage of soil contaminants occurs and adherence to appropriate disposal policies. • Operation of sewage treatment systems, with zero discharge of raw sewage to the environment. • All employees and contractors will be trained regarding proper methods for transporting, transferring and handling hazardous substances.	• Quarterly discharge monitoring (flow and quality). • Visual Monitoring. • Periodic auditing of equipment maintenance operations, spill response activities and handling of hazardous materials. • Auditing of construction activities to ensure design commitments met.	• Health, Safety, Social and Environmental (HSSE) Manager • Construction Manager
Surface water impacts to local watercourses from SCP discharges	• Avoid/minimize impacts to aquatic and other users.	• Collect surface runoff in SCPs for controlled discharge. • Water management infrastructure (e.g., SCPs and flood protection berms) will be designed and constructed to meet best engineering practices and commitments within this Plan and ESMP. • Regular maintenance of water management facilities, as well as roads and culverts. • Meet effluent discharge criteria identified in this Plan (treat effluent if required).	• Engineering supervision during construction of SCPs. • Weekly TSS sampling of discharges from SCPs, when discharge is occurring. • Quarterly water quality sampling (general chemistry and metals) of water in SCPs collecting runoff from WDs. • Visual monitoring.	• HSSE Manager • Construction Manager

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Table 5.1 Potential Water Management Impacts and Mitigation Measures

Phase/Impact	Objective(s)	Mitigation/Management Measures	Monitoring Plan	Responsibility
Surface water impacts to the River Cacheu due to discharge of groundwater from initial pit dewatering	• Avoid/minimize impacts to aquatic life and downstream river users.	• Conveyance of groundwater from initial dewatering to the SCP-1 for controlled discharge following effluent quality sampling. • Design and construct SCP-1 to meet best engineering practices and commitments within this Plan and other ESMP management plans. • Meet effluent discharge criteria identified in this Plan (treat effluent if required).	• Engineering supervision during construction of SCP. • Water quality sampling (general chemistry and metals) of water in the SCP prior to discharge. • Visual monitoring.	• HSSE Manager • Construction Manager
Operation Phase				
Groundwater drawdown from pit dewatering resulting in water supply impacts to adjacent groundwater users	• To avoid/minimize adverse groundwater level impacts. • To avoid/minimize indirect impacts on communities (local water supply wells), as well as flora and fauna.	• Dewatering will be conducted in a staged manner to minimize groundwater abstraction. • Groundwater model will be updated every 5 years, or sooner if required, to improve impact predictions and optimize dewatering well performance. • In the event that community wells/boreholes are impacted as a result of the Projects' water abstraction, GB Minerals will ensure the provision of water of adequate quality to these affected communities.	• Continuous water level monitoring of select monitoring wells using level loggers. • Monthly to quarterly manual water level measurements at off-site wells. • Quarterly groundwater quality monitoring of on-site and off-site wells.	• GB Minerals General Manager • HSSE Manager

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Table 5.1 Potential Water Management Impacts and Mitigation Measures

Phase/Impact	Objective(s)	Mitigation/Management Measures	Monitoring Plan	Responsibility
Groundwater quality impacts as a result of project activities	• To ensure protection of water resources. • To avoid/minimize indirect impacts on flora, fauna and communities.	• Tailings will be placed in lined containment. • Waste overburden with metal leaching potential will be backfilled into open pits or contained within the lined IWL. • Spill prevention, control and containment measures included in the construction EPRP will be reviewed and amended as required to suit the completed mine and port operations. • All oil/water separators will be maintained in good working order.	• Auditing of construction activities to ensure design commitments met. • Auditing of waste disposal operations (mine waste; solid, liquid and hazardous wastes) to ensure commitments met. • Quarterly groundwater quality monitoring. • Visual Monitoring.	• HSSE Manager • Operations Manager
Surface water impacts to local watercourses and the River Cacheu due to discharge of mine effluent (combined discharge of dewatering wells, in-pit sumps, TSF and runoff from WDs)	• Avoid/minimize impacts to aquatic life and downstream river users.	• Collection of mine effluents (groundwater from dewatering wells and in-pit sumps, TSF/IWL and process plant discharges) in SCP-1 and ECP-1 for controlled discharge following effluent quality sampling. • Meet effluent discharge criteria identified in this Plan (treat effluent if required). • Update mine site water balance and water quality model every 5 years.	• Weekly TSS sampling of water in SCP's. • Water quality sampling (general chemistry and metals) of water in the environmental control dam prior to discharge.	• Mine Manager • HSSE Manager • HSSE Superintendent
Surface water impacts to local watercourses from SCP discharges	• Avoid/minimize impacts to aquatic life and other users.	• Mitigation as described for the construction phase. • Includes stormwater ponds at the port site; discharge from port site stormwater ponds will only occur after sampling verifies effluent meets criteria identified in this Plan. • Update mine site water balance and water quality model every 5 years.	• Monitoring as described for the construction phase for mine site SCPs. • Water quality sampling (general chemistry and metals) of water in the port site stormwater ponds prior to discharge.	• HSSE Manager • Mine Manager • Port Master

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Table 5.1 Potential Water Management Impacts and Mitigation Measures

Phase/Impact	Objective(s)	Mitigation/Management Measures	Monitoring Plan	Responsibility
Surface water quality impacts as a result of miscellaneous project activities	• To avoid/minimize adverse surface water quality impacts. • To avoid/minimize indirect impacts on flora, fauna and communities.	• Implementation of mitigation and management measures as described for the construction phase. • Adherence to mine waste management plans described in this Plan (and subsequent revisions). • Adherence to the Waste Management Plan.	• Visual Monitoring	• HSSE Manager • Operations Manager
Decommissioning and Post-Closure Phases				
Recovery of groundwater levels and quality to restore groundwater supply to other users	• To ensure protection of water resources. • To avoid/minimize indirect impacts on local water supply as well as flora and fauna.	• Monitor the recovery of groundwater levels and post-mining groundwater quality until conditions (levels, quality) stabilize and meet pre-mining conditions or WHO drinking water quality standards, as appropriate. • Compensate for any unexpected long-term impairment of off-site water supplies. • When groundwater conditions have stabilized and are acceptable as above, decommission and seal boreholes in accordance with GIIP. • In the event groundwater contamination relating to mining activities is established, an analysis will be performed to determine the possible sources of pollution. Once the source has been established remediation measures will be developed and implemented. • Execute the final Mine Reclamation and Closure Plan.	• Semi-annual (wet and dry season) water level and groundwater quality monitoring until mitigation objectives are met. • Monitoring could be conducted more frequently to track progress and the achievement of closure objectives.	• General Manager • HSSE Manager • HSSE Superintendent

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Table 5.1 Potential Water Management Impacts and Mitigation Measures

Phase/Impact	Objective(s)	Mitigation/Management Measures	Monitoring Plan	Responsibility
Surface water quality impacts as a result of miscellaneous project activities	• To avoid/minimize adverse surface water quality impacts. • To avoid/minimize indirect impacts on flora, fauna and communities.	• Implement construction and operation phase mitigation measures through active mine reclamation. • Implement the ESCP; constructing temporary SCPs as necessary to manage erosion and sediment issues specific to closure. • Execute the final Mine Reclamation and Closure Plan.	• Weekly TSS sampling of water in SCPs. • Water quality sampling (general chemistry and metals) of water in the environmental control dam prior to discharge. • Visual Monitoring.	• General Manager • HSSE Manager

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6 – MONITORING AND REPORTING

6.1 GENERAL

The WAMP monitoring program will include inspections and audits, groundwater monitoring associated with pit dewatering (and resultant potential impacts on other users), and surface water monitoring of effluent discharges and site runoff.

6.2 INSPECTIONS AND AUDITS

Periodic inspections and audits will be conducted by the HSSE personnel to ensure that the Project is constructed and operated in accordance with the commitments of this Plan, other aspects of the ESMP, and with GIIP. As it relates to the WAMP, this includes confirming that water management facilities are constructed and operated as intended. An audit schedule will be developed by the HSSE Manager.

6.3 GROUNDWATER MONITORING

The WAMP includes groundwater quality and quantity monitoring procedures as described below:

- An updated and detailed hydrocensus and survey of nearby wells/bores should be undertaken to determine the use, depth and groundwater level elevation prior to commencing mining. This will provide information on potentially important groundwater sources that may be impacted by a reduction in groundwater levels and will also provide additional information for model calibration and therefore greater certainty regarding mine inflows and drawdown impact predictions.
- A groundwater monitoring network of manually dipped and logger equipped bores will be established and visited on a quarterly basis. This should include village wells as well as dedicated monitoring bores, and monitoring prior to mining should be conducted to confirm pre-existing conditions.
- Quarterly groundwater quality samples will be taken within the mine development area and offsite from local community wells to evaluate potential impacts of the Project on surrounding groundwater quality.
- A minimum of ten groundwater data loggers set to record groundwater levels on a daily basis should be deployed until mitigation objectives for the Project are met. These data will be used to calibrate the groundwater model which should be periodically updated in order to provide revised pit inflow predictions and allow dewatering infrastructure to be planned and installed in advance of mining.

6.4 SURFACE WATER MONITORING

Surface water and groundwater in the Mine and Port areas will be collected in the SCPs and ECP-1 (Mine), and in stormwater ponds at the Port site. The WAMP includes surface water quality monitoring procedures for each of the collection areas and structures as described below:

- Perimeter pit dewatering well water will be sampled to verify that mine effluent limits are being met; dewatering well water can be diverted to the ECP if necessary rather than discharged direct to the River Cacheu.

- The SCPs will receive pit-dewatering contributions that are anticipated to be of good quality. Weekly TSS samples and quarterly water quality samples (e.g., general chemistry and metals) will be taken to confirm the SCP discharge water quality.
- Discharge from the ECP at the mine site will be sampled (e.g., general chemistry and metals) prior to discharge to confirm acceptable effluent water quality concentrations.
- Discharge from the Port site surface water collection ponds will be sampled (e.g., general chemistry and metals) prior to discharge to confirm acceptable effluent water quality concentrations.

Surface water quality parameters of concern for the Project include phosphorous and uranium. Mining and handing of the ore and phosphate rock product could potentially results in dust-related contamination of surface water. Consequently, ecologically protective discharge limits will be required for phosphorous and uranium, and will be included in the routine monitoring programs effluent water quality criteria noted above.

6.5 REPORTING

The HSSE Manager will be required to produce monthly and quarterly WAMP reports for internal review and action, which will generally include:

- A summary of activities and mitigation measures undertaken during the reporting period
- Unexpected/emergency situations that affected the water management protocols and practices
- Any deviations or non-compliances to the WAMP
- Planned activities during the next reporting period
- Any other issues of concern
- Monitoring methodology and locations
- Environmental monitoring records, laboratory reports, and observations

An annual WAMP report will be developed and submitted to regulatory authorities.

6.6 ADAPTIVE MANAGEMENT

The following adaptive management actions are required in order to meet the water quality and quantity objectives and targets outlined above:

- Revising the site water balance and water quality model every 5 years.
- Ongoing periodic geochemical analysis results of the waste overburden will inform revisions to the WAMP based on changes to anticipated water quality.
- Spill prevention, control and containment measures included into the Projects overall EPRP for the operational phase will be reviewed to amend decommissioning and closure procedures for rapid and efficient response to, and management of hazardous material spills during the decommissioning and closure phase of the Project. Furthermore, this review and subsequent amendment process will define the procedures for handling hazardous materials/chemicals during the decommissioning and closure phase.
- Boreholes near the local community water supply well zones will be sealed, decommissioned and will be suitably rehabilitated. Furthermore, all dewatering, pipeline and pumping infrastructure associated with these boreholes will be removed.

- If possible at the time, the use and maintenance of all community water supply boreholes will be relinquished to the local or regional authorities.
- Groundwater monitoring will continue until a positive environmental trend (i.e. until groundwater levels return to pre-mining elevations) is established. In order to understand what these pre-mining elevations are, ongoing groundwater level monitoring will be required pre-construction, through construction and into the operational phase.
- In the event of groundwater contamination relating to mining activities is established, an analysis will be performed to determine the possible sources of pollution. Once the source has been established remediation measures will be developed and implemented.
- When the water table reaches pre-mining elevations and no mining related groundwater contamination is detected, monitoring boreholes will be sealed and decommissioned, thus preventing consumption of water that is not suitable for human consumption.
- Monitoring of surface water features will continue until a positive environmental trend is established. In the event that water quality is considered contaminated (e.g., unacceptable parameter concentrations), an analysis will be performed to determine the possible sources and recommend mitigation measures.

7 – ROLES AND RESPONSIBILITIES

7.1 KEY ROLES AND RESPONSIBILITIES

GB Minerals has the responsibility to provide water management and to structure and coordinate water management procedures for the Project. This includes the responsibility to ensure that the employees and contracted third parties are trained and aware of all required water management procedures. The roles and responsibilities within the Project for implementation of the WAMP are presented in Table 7.1.

Table 7.1 Farim Project Water Management Plan Roles and Responsibilities

Position	Responsibility with this Plan
General Manager	• Overall responsibility for adherence to this plan • Review monthly and quarterly water reporting • Work with the Environmental and Social Manager to identify necessary improvements
Health, Safety, Social, and Environmental (HSSE) Manager	• Supporting the other managers in meeting the plan requirements, training, and implementation of monitoring requirements • Responsible for implementation of Water Management requirements during all phases of the Project • Develop training and management plans to ensure water concerns are addressed • Responsible for implementing water monitoring programme
Construction Manager, Mine Manager, Process Manager, Operations Manager, Port Master	• Adherence to the mitigation measures identified in this plan, within their respective areas • Together with the HSSE is responsible for staffing, planning and day-to-day execution of the management measures described under this WAMP during the construction/operation/closure phase of the Project • As needed, they will develop and propose staff plans and contractual language to ensure that these measures are implemented by GB Minerals staff and contractors throughout the duration of the Project

7.2 TRAINING

Employees and contractors shall be provided with basic training in water management. Additional, specialist training shall be provided to plant operators and key personnel involved in activities which involve water management.

Employees and contractors shall be provided with basic training in the management practices required to accomplish the objectives of the WAMP. Records of training completion will be maintained for all employees. Additionally, specialist training shall be provided to key personnel who have key responsibilities under the WAMP.

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9 – CERTIFICATION

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Approval that this document adheres to Knight Piésold Quality Systems:

DRAFT BIODIVERSITY MANAGEMENT PLAN

FARIM PHOSPHATE PROJECT,

GUINEA-BISSAU

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TABLE OF CONTENTS

List of Figures 4
List of TABLES 4
1 Introduction 5
1.1 Background 6
1.2 Scope of Plan 7
1.3 Regulatory Requirement and Legislative Context 7
2 The Study Area 8
2.1 Geomorphology 8
2.2 Climate 9
2.3 Soils 10
2.4 Current Status and Land Use 10
2.5 Regional Overview of the Vegetation 11
2.6 Study Area Floristics 12
2.7 Faunal Communities 16
3 Potential Impacts and Biodiversity Threats 18
3.1 Oryza Rice Paddy Community 18
3.2 Secondary Forest Community 19
3.3 Elias – Cyperus Floodplain Community 19
3.4 Natural Forest Community 20
3.5 *Rhizophora – Avicennia* Mangrove Community 20
3.6 *Dialium guineense - Sterculia tragacantha* Coastal Woodland Vegetation Community 21
3.7 Anadelphia Afzeliana Wet Grassland Community 22
4 Biodiversity Management Plan 23
4.1 Management Objectives 23
4.2 Priority Species for Management 24
4.3 Priority Vegetation Communities for Management 25
4.4 Priority Sites for Management 27
4.5 Actions 27
4.6 Performance Criteria 30
4.7 Role and Interests of Local Communities 30
4.8 Responsible Parties 30
4.9 Plan Review and Evaluation 31
4.10 Stakeholder Consultation 31
5 References 32

LIST OF FIGURES

Figure 1 Project Location Map (Source Knight Piésold) 5
Figure 2 Mine Site Study Area Showing Vegetation Communities 14
Figure 3 Port Site Study Area Showing Vegetation Communities 15

LIST OF TABLES

Table 1 Areas of Vegetation Communities in the Mine Study Area 13
Table 2 Areas of Vegetation Communities in the Port Site Area 13
Table 3 Sensitivity Index of the Vegetation Communities 25
Table 4 Vegetation Community Losses at the Mine Site 26
Table 5 Vegetation Community Losses at the Port Site 26
Table 6 Biodiversity Management Implementation Plan 28

1 INTRODUCTION

Scherman Colloty & Associates (SC&A) was appointed by Knight Piésold to assist with the development of a Biodiversity Management Plan (BMP or "the Plan") on behalf of GB Minerals Ltd. for its Farim Phosphate Project in Guinea-Bissau. The BMP is a Level 2 Discipline-specific management plan developed under GB Minerals' Environmental and Social Management Plan (ESMP). The mining proposal also includes various haul roads and a port handling facility on the Geba River near Chugue (Figure 1).

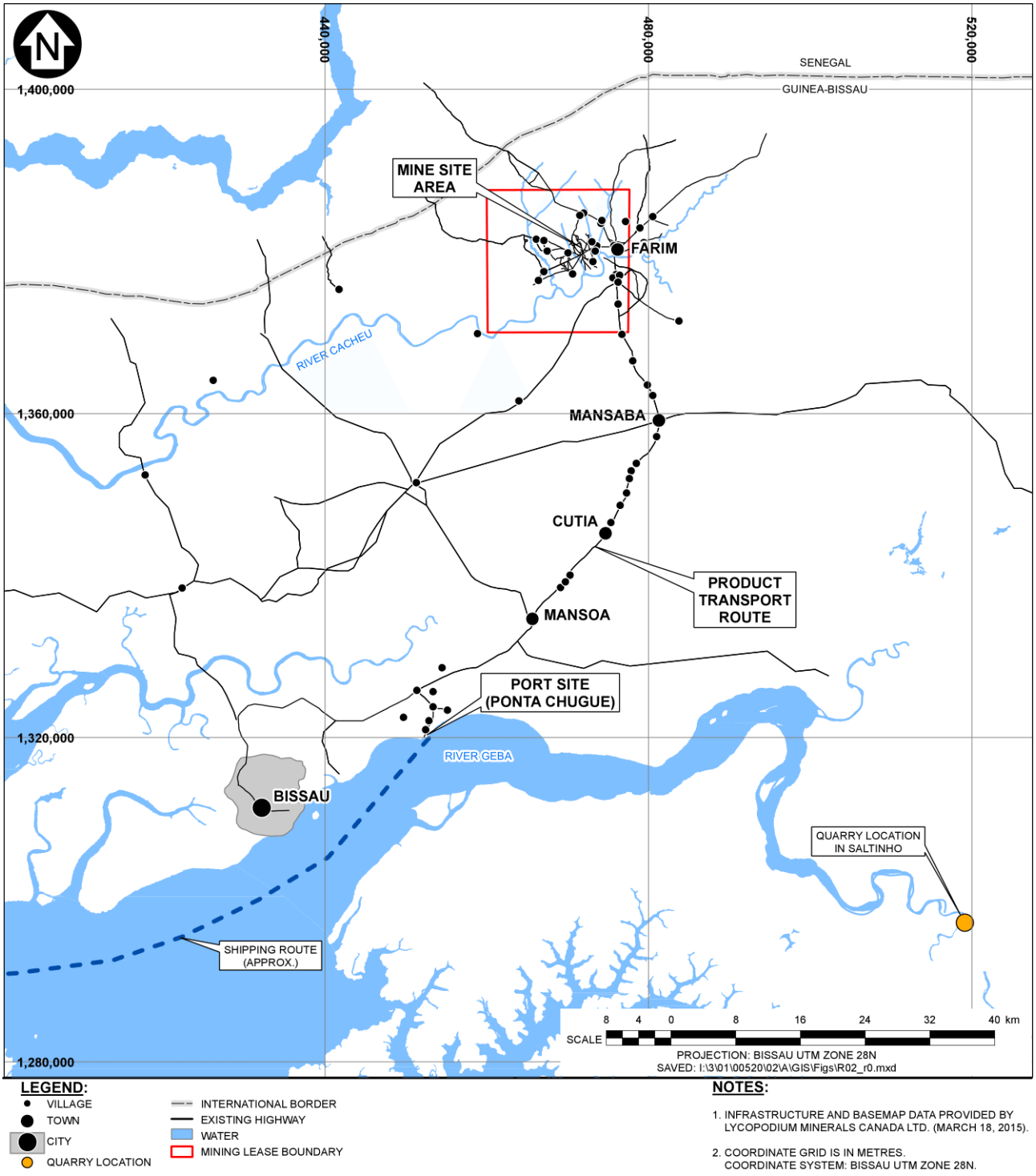

Figure 1 Project Location Map (Source Knight Piésold)

1.1 Background

Biodiversity (biological diversity) is a term used to describe the variety of all life forms: different plants (from the small herbs and grasses, to shrubs and tall trees), animals (invertebrates, fish, amphibians, reptiles, birds and mammals), and fungi; the genes they contain; and the ecosystems or habitats in which they live.

According to Noss (1990), biodiversity can be categorised at various levels or scales, and this is dependent on the inherent attributes of the ecosystem as follows:

- Structural complexity, e.g. a forest versus grassland;
- Functional complexity such as ecological or evolutionary processes, e.g. disturbance requirement such as fires, geographical separation; or
- Species composition, i.e. habitats containing important, sensitive or conservation worthy species.

Protecting biodiversity and ecosystem services has invaluable and tangible benefits to humans. Healthy ecosystems provide many of nature's most vital services, including filtering pollutants from the air, water and soil, and reducing the impacts of disease outbreaks and natural disasters. Within rural and subsistence communities, ecosystem services are even more critical in supporting these groups as the natural environment provides natural resources, such as food, building materials and medicines.

Within the Farim Project context, biodiversity is an importance resource with regard the provision of the following:

- Wood for example building material, manufacturing of canoes and charcoal production
- The estuarine environment provides valuable protein resources in the form of fish, crabs and prawns.

Within the context of resource use, coupled to the potential loss of portions of habitat brought about by the mine, it is important to develop a plan to manage the local biodiversity on a habitat scale (land use). Managing these habitats at this scale would also serve to indirectly protect species with conservation importance found within the region.

1.2 Scope of Plan

The Plan is a guide to the management of the proposed development area biodiversity. It provides an overview of the area's natural and physical environments, provides maps of areas of importance to biodiversity, and outlines management actions to address threats. This information can help guide the strategic investment of biodiversity conservation actions, while assisting with sourcing the required personnel and funds to manage the Plan. The BMP is a Level 2 Discipline-specific management plan developed under GB Minerals' Environmental and Social Management Plan (ESMP) to be submitted to the Guinea-Bissau Government. The current Plan accompanies an Environmental and Social Impact Assessment (ESIA), currently under preparation by GB Minerals.

Typically BMP's use regional, threat-based, multi-species approach to managing threatened entities, and biodiversity more broadly. It seeks to address threatening processes at the regional scale where any single action may benefit multiple species. However, where threats, threatened entities or significant locations are not able to be adequately addressed at the regional scale, finer-scale or specific actions need to be developed. Furthermore as this project is mining related the BMP should also be aligned to the Mine Reclamation and Closure Plan and ultimately the ESMP used in the day to day management of the mine and its facilities.

A range of recovery actions that vary in their spatial scale, priority and potential benefits to biodiversity are provided. Action priorities may, however, vary at different times within the life of the Plan depending on the availability of resources, opportunistic project proposals and other competing priorities and interests.

1.3 Regulatory Requirement and Legislative Context

The legal framework relevant to this project is outlined below, although it is currently understood that no local laws or regulations require the development of a BMP, but is being produced to meet international best practices and standards.

Guinea-Bissau

- Republic of Guinea-Bissau Law No. 2.2004 establishing the norms for protection, promotion and exploitation of wildlife.
- Republic of Guinea-Bissau Decree No. 5.2001 Forestry Act
- Republic of Guinea-Bissau Law No. 1.2000 Mining Act
- Republic of Guinea-Bissau Decree No. 6-2006 Amending Law No. 1.2000
- Republic of Guinea-Bissau Decree-Law No.7-2000 Pesticides
- Republic of Guinea-Bissau Law No.10.2010 Environmental Impact Assessment Regulation
- Legal framework on protected areas 1996.

International Standards

- IFC Performance Standard 6

Treaties and Conventions

The Republic of Guinea-Bissau is a signatory of the following relevant international treaties and conventions:

- Convention of Biological Diversity;
- International Tropical Timber Agreement;
- United Nations Convention on Climate Change;
- United Nations Convention on International Trade and Endangered Species (CITES);
- RAMSAR (The Convention on Wetlands of International Importance);
- Convention on the Conservation of Migratory Species of Wild Animals;
- United Nations Convention to Combat Desertification;
- Kyoto protocol;
- International Plant Protection Convention;
- Convention concerning the Protection of the World Cultural and Natural Heritage;
- Stockholm Convention on Persistent Organic Pollutants;
- West African Aquatic Mammals Memorandum of Understanding; and
- West African Elephant Memorandum of Understanding.

2 THE STUDY AREA

Guinea-Bissau is located in the Northern Intertropical Zone of West Africa, between 10°59' – 12°20' north and 13°40' – 16°43' west, having a surface area of 36,125 km^2. It is bordered by the Republic of Senegal to the north, the Republic of Guinea to the east and south and by the Atlantic Ocean to the west. The country includes a continental mainland and a group of 40 islands, the Bijagós Archipelago, not far from the continent. There are also some other islands separated from the continent only by narrow sea straits, such as Bolama, Pecixe and Melo.

2.1 Geomorphology

The geomorphology of the Guinean territory shows a smooth relief, with most of the land below 50 m altitude. The coastal zones are mainly lowlands. With the high tide range occurring here, reaching up to 6 m, extensive areas in the coastal zones remain exposed to the daily tidal effect. Most of the inner centre and north-eastern parts of the country are occupied by scarcely raised plains, where the elevation does not surpass 100 m.

The inner south-eastern region is the hilliest region of the country but the Boé Hills, the most raised part of their territory, only reach 298 m altitude (Mota, 1954). The islands of the Bijagós Archipelago show morphology similar to the mainland, with a sinuous shoreline and low altitudes.

The hydrographic network is complex and extensive. In addition to the climate, it is conditioned by the levelling of the territory and by the marine transgression (Ribeiro, 1950). Low altitudes in a large portion of the territory allow flooding of extensive areas in the river banks and coastal plains, which can remain flooded during the rainy season and even several weeks after its end. The same occurs often in lowland inner plains with slow superficial drainage and impermeable soils. Because water flow has a strong dependence on rainfall, the fresh watercourses show a seasonal flow regime, classified as tropical pluvious (Costa, 1946). As a consequence most of the streams and some rivers dry up by the end of the dry season. There are a few permanent fresh watercourses in the country with the Corubal, Cacheu and

Geba being the most important rivers. Most of the locally called rivers are in fact estuaries and inlets, which penetrate deeply in the continental territory due to the plain relief.

In addition to the rivers, there are some small lakes in the country, namely in the southern and eastern regions. Temporary pools with variable sizes, locally called vendus, are common in the south-east (Alves, 2000).

2.2 Climate

Without geomorphologic features sufficiently marked to influence it, the climate in Guinea-Bissau depends mainly on its geographic position between the tropics. The climate, and particularly the rain regime, is conditioned by the seasonal migration of the Intertropical Convergence Zone (ITCZ).

In the dry season, from November to May, the ITCZ is positioned to the south of the territory, which is under the influence of continental, dry air masses coming from the north-east or north (White, 1983). When the ITCZ, in its yearly movement from south to north reaches the territory, the rainy season begins. The rains start usually in late May or early June, advance from south-west to north-east and last during the length of time in which the ITCZ is over or has moved to the north of the country. The rainy season usually ends in late October, when the ITCZ returns south. Annual rainfall is the climatic factor that shows the largest differences in the country, decreasing from 2400–2600 mm in the south-west to 1200–1400 mm in the north-east (White, 1983).

The differences in temperature between regions are small: the annual means vary from 25.9 to 27.1 °C and the mean annual temperature in the country is around 26.5 °C. There are two annual maxima and minima in the air temperature: by the end of the dry season, in April or May, there is a primary maximum and in October or November a secondary one. The mean minimum temperatures have a primary minimum in the December or January and a secondary one in August, in the rainy season. The annual thermal ranges are also low: the differences between the annual minimum and maximum averages vary from 7.0 to 14.7 °C which is greater in the eastern inner region (WWF & IUCN, 1994).

The relative humidity shows large seasonal variations related to the rain regime and the prevailing winds. Their annual means vary from 69 to 79%. Hayward & Oguntoyinbo (1987), in a classification of the climatic regions in West Africa locate the country in zone 7 West, characterized by rains from June to November, with a peak in August, annual rainfall from 1500 to 2000 mm and the higher annual temperatures occurring in April–May. According to Fosberg *et al*. (1961) only the coastal part of the country is included in the humid tropics.

2.3 Soils

As most tropical soils, the greater part of Guinea-Bissau soils are poor both in organic matter and ion exchange bases. The most representative soil groups in the country are Ferralsols, Plinthosols, Gleysols, Fluvisols and Arenosols. There are other substrates that cannot be considered as soils, such as lateritic cuirasses and mud deposits (WWF & IUCN, 1994).

- Ferralsols – deep soils with a sandy or sandy-clayish texture, are very common all over the country. The soils of this group are quite poor in nutrients and organic matter and, according to the topographic position can have red, orange, yellow or grey colours. The natural vegetation in these soils is mainly woodland and savannah woodland, as well as forest in the south-west of the country. Most of the country's agriculture is done on this kind of soils.
- Plinthosols – mineral soils that show, at small deepness, layers of lateritic materials more or less consolidated. These soils occur in a greater extent in the inner part of the country, and particularly in the south-east and are occupied mostly by woodland and savannah woodland. Even though these soils are poor and shallow, some areas are used for rain fed agriculture.
- Arenosols – sandy soils, mainly quartzose, scarce in organic matter, deep and well drained. Derived from consolidated dunes, these occur in belts in the north and south coastal regions of the mainland as well as in some islands in the Bijagós archipelago and are mainly covered by savannah woodland.
- Gleysols – fine textured soils, deep, grey-coloured, from alluvial origin, with the upper layers often rich in organic matter. Occurring mainly in the inner lowlands and near the upper and middle courses of rivers in the continental territory and in some islands, Gleysols are almost absent in the inner east region. As most of the Gleysols are flooded in the rainy season, the natural vegetation is mainly composed of wet grass savannah, locally called lala. They are often used to crop wetland rice.
- Fluvisols – fine textured soils from fluvial origin occur along the coastline and in the lower courses of rivers. They are often reached by salt water and therefore rich in sodium. The natural vegetation on the Fluvisols is mainly mangrove and grass savannah, and this kind of soils is often cropped with wetland rice, after an ingenious desalinization process.
- Other substrates – the lateritic cuirasses are layers of secondary rock at the surface, not covered by fine earth particles that fill only the gaps and holes. In most cases only sparse herbaceous vegetation develops on it. The coastal muds and sands are flooded on each high tide and most of them support mangrove.

2.4 Current Status and Land Use

Natural resources found in Guinea-Bissau include fish, timber, clay, granite, limestone and unexploited deposits of petroleum, phosphates, bauxite. 8.31% of the land is arable and 250 square kilometres is irrigated. Natural hazards include a hot, dry, dusty harmattan haze that may reduce visibility during the dry season and brush fires. Severe environmental issues include deforestation; soil erosion; overgrazing and overfishing (White, 1983).

2.5 Regional Overview of the Vegetation

The coastal lowlands are covered by dense forests, mostly swamp forests, while the interior is savanna covered, with gallery forests along streams. The low coasts and estuarine shores are cloaked by mangroves, indeed there is little coastline that is not so vegetated. The exceptions are a 15 km strip along Vareola Bay, south of Cape Roxo and immediately north of the Cacheu River mouth, which is sandy, and a 3 km strip south of Point Cabaciera (12°02'N/16°20'W), which is sandy/rocky. Other shores devoid of mangroves occur on the offshore islands, e.g. the north facing shores of Caravella, Carache and Bubaque Islands, and the west facing shores of Caravella, Uno and Orango Islands. The outermost islands, Unhocomo and Unhocomomozinho, are rocky (Catarino, *et al*., 2008).

Upstream of the mangroves, and behind them, are swamps dominated either by palms and pandans, or by freshwater swamp forest trees. Inland the country is characterised by low hills, 30-100 m above sea level (asl). There is little flat land and no important wetland. However, almost all the narrow gallery forests are subject to periods of inundation during the rainy season (Catarino, *et al*., 2008).

Tidal forests (mangroves) are found along much of the coast and extend far up many streams. They reach 160 km up the Cacheu River, where after they grade into palm swamps and freshwater swamp forest. This latter vegetation once extended for another 42 km upstream to the town of Farim (12°29'N/15°13'W), but much of it has been replaced by rice fields. Towards the river mouth the mangroves reach a maximum width of 15 km on the north bank. Once there were more than 110 000 ha of mangrove forest and 13 000 ha of freshwater swamp forest on this single river system, but 10 -15 % has been cleared in recent years (Hudson, 2015). Tidal forests, backed by freshwater swamp forests, used to extend for 110 km up the Mansoa River, but here too most of the upper 65 km of brackish and freshwater forests have been cleared. Mangrove forests still reach 35 km up the Tombali River, but up the Cumbija River the upper 55 km have again been cleared. On this river mangroves now occupy only the lower 15 km.

By contrast, the Geba Estuary, the largest inlet in Guinea-Bissau, never had extensive mangroves, being characterised by banks of high relief. Nevertheless, a major block of 9000 ha, which used to extend along the south bank upstream from the mouth for nearly 50 km, reaching widths of 3 km, has now been reduced to scattered stands. Above this, for many kilometres upstream, mangroves have always been scarce although small stands do occur in suitable sites. The estuaries of the Grande de Buba and Cacine Rivers are also lacking in extensive mangrove forests, except near their mouths. The offshore islands are partly fringed by mangroves, but this is a coast of submergence and the high islands of the Bijagos Archipelago, which represent old hilltops, rise quite steeply from the sea in places. However, all along the coast, numerous recent offshore mudbanks are largely, or even completely, covered by mangroves. There were approximately 250 000 ha of tidal forest in Guinea-Bissau in 1975, but this had been reduced by 15-20% by 1986 (Catarino, *et al*., 2008).

The mangrove and Guinean/Soudanian freshwater swamp forest flora is as described in the regional introduction. The fauna is typical of tropical West African coastal swamps, again as detailed in the regional introduction. The coastal mudflats are important as a wintering ground for Palearctic waders, and the Bijagos Islands support many sea birds (Catarino, *et al*., 2008).

Mangrove timber has long been cut for fuel, and mangrove poles are used for building. There are many villages in the mangroves, and fish, crabs and prawns from the mangroves have traditionally been an important source of protein for the people. Many thousands of hectares of swamp forest have been cleared for rice cultivation, particularly on the upstream ends of estuarine swamp forests. Annual production now exceeds 45 000 tonnes, and this is to be increased. Fishing is the second most important export industry in Guinea-Bissau, most of the fish being trawled offshore and exported. These fish and prawns however, spend their juvenile stages in the mangroves, and the vast annual catches, exceeding 100 000 tonnes of fish and 2000 tonnes of prawns, will inevitably alter the balance of the estuarine food chains. Overfishing is a fact rather than a threat (Catarino, *et al*., 2008).

Floodplains occur on almost all rivers in Guinea-Bissau above the limits of tidal influence. They extend, in semi-continuous fashion, up the Corubal for 230 km to the border with Guinea, and far up the Geba River. In general they are forested, but narrow, about 0.5-2 km wide. Many hectares of riverine floodplain have been cleared for rice paddy (Catarino, *et al*., 2008).

2.6 Study Area Floristics

A total of 341 plant species were recorded during the surveys (Hudson, 2015). Floral species diversity in the area is moderate to high, but not as high as many regions of West Africa, such as the Upper Guinea Forest zone. A large proportion of the species recorded are indigenous with few exotic species occurring in the area although, in areas of higher anthropogenic disturbances, some exotic species are more prevalent.

Flora assessments were conducted in wet and dry seasons between November 2011 and May 2015 respectively. Based on physiognomy, moisture regime, rockiness, slope and soil properties, seven main communities were recognised, namely:

- *Rhizophora – Avicennia* Mangrove community (Farim and Ponta Chugue study areas);
- Natural Forest vegetation community (Farim study area only);
- Secondary Forest community (Farim study area only);
- Elias – Cyperus Floodplain community (Farim and Ponta Chugue study areas);
- *Oryza* Paddy vegetation community (Farim and Ponta Chuge study areas);
- *Dialium* - *Sterculia* coastal woodland vegetation community (Ponta Chuge study area only); and
- *Anadelphia afzeliana* seasonally wet grassland community.

These vegetation communities are shown in Figure 2 and 3. A further "vegetation community" namely township vegetation community was identified within the villages and towns in the area, but due to the transformed nature of these areas, these communities were not extensively surveyed and are indicated in Figure 2 in black.

The total area of the mine site study area was calculated to be 19566.4 ha. Table 1 provides the relative areas of each of the vegetation communities to the study area. Table 2 provides a summary of the plant aerial cover at the port site, which covered approximately 58 ha.

Table 1 Areas of Vegetation Communities in the Mine Study Area

Vegetation Community	Area in ha	% of total study area
Rhizophora – Avicennia **Mangrove community**	1005.5	5.14%
Natural Forest vegetation community	5034.9	25.73%
Secondary Forest community	10174.2	52.00%
Elias – Cyperus **Floodplain community**	1254.4	6.41%
Oryza **Paddy vegetation community**	1325	6.77%
Townships	772.4	3.95%
Total	**19566.4**	**100.00%**

Table 2 Areas of Vegetation Communities in the Port Site Area

Vegetation Community	Area in ha	% of total study area
Rhizophora – Avicennia **Mangrove community**	11.2	19%
Dialium - Sterculia **coastal woodland vegetation community**	15.5	27%
Anadelphia afzeliana **seasonally wet grassland community**	17	29%
Elias – Cyperus **Floodplain community**	2.9	5%
Oryza **Paddy vegetation community**	11.8	20%
Total	**58.4**	**100%**

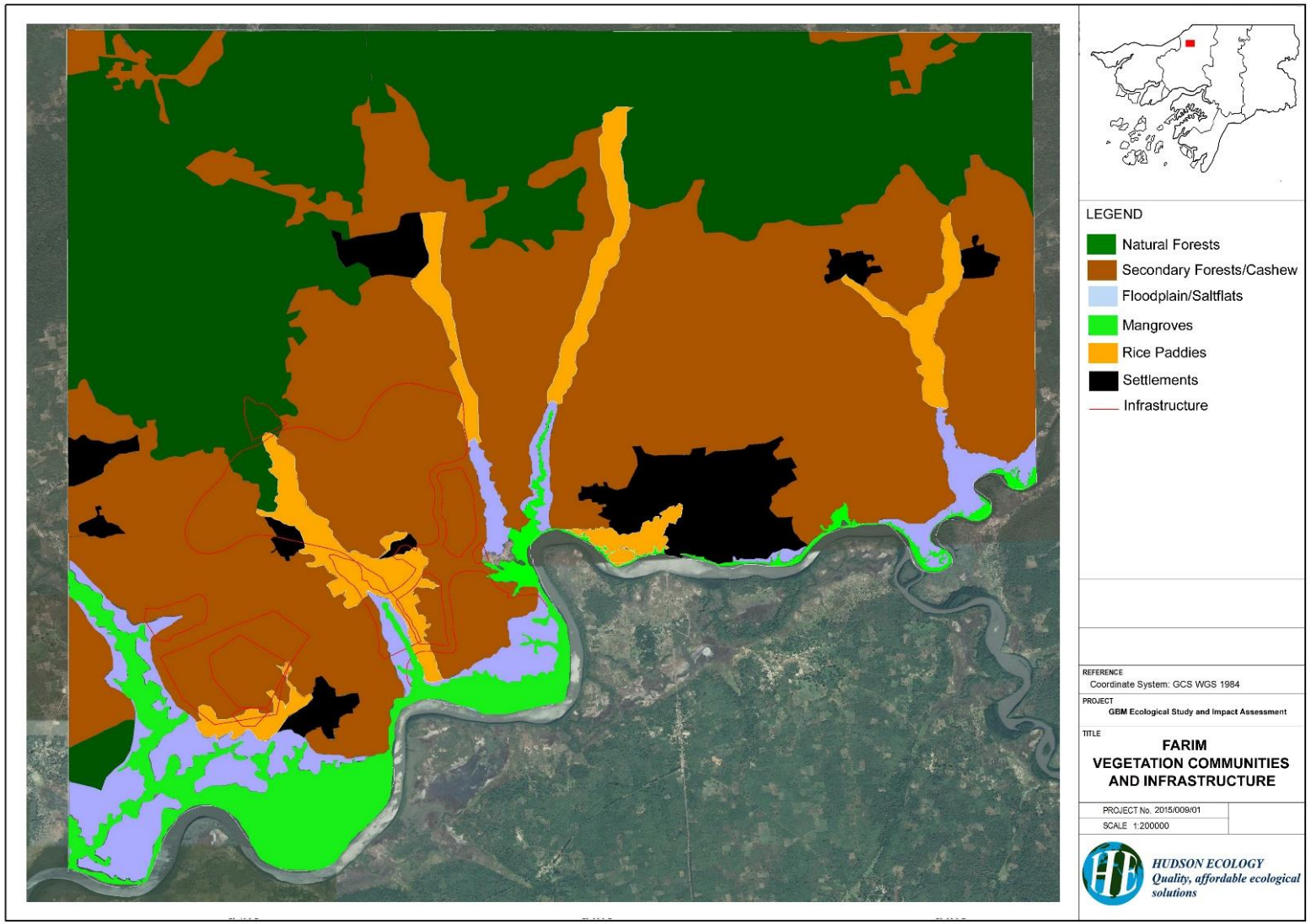

Figure 2 Mine Site Study Area Showing Vegetation Communities

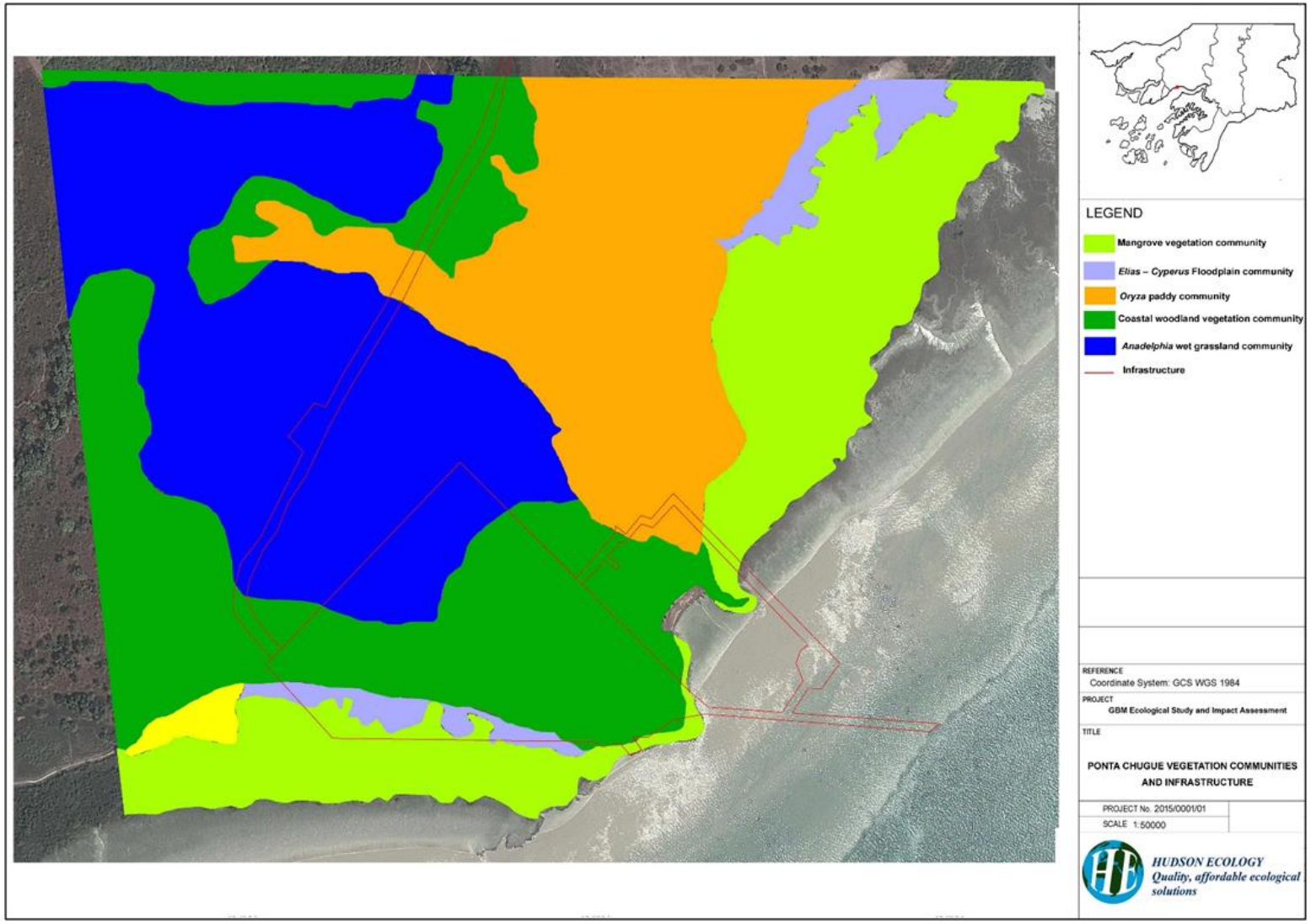

Figure 3 Port Site Study Area Showing Vegetation Communities

2.7 Faunal Communities

The faunal assessments were conducted in the wet and dry seasons between November 2011 and May 2015.

Non-chordate diversity within the study area was relatively high with a total of 124 arthropod species being recorded during the study. Most species recorded were common species with some specialised species being recorded in the mangrove communities. Although the mangrove species are highly specialised for this habitat type, they are locally common and not of conservation importance. Most of the species recorded are not restricted in terms of range and habitat preferences. Common species included Red Winged Dropwing (*Trithemis kirbyi*) and locust (*Locusta* sp.)

The herpetofauna of the region can be classified as having moderate diversity, of the 69 reptile species known to occur in Guinea Bissau, only 11 species recorded. This may be due to the proximity of the project area to the town of Farim and other settlements in the area. Common species occurring in the area include Ornate Monitor (*Varanus ornatus*) and Tree Agama (*Agama agama*).

The region can be classified as having low amphibian diversity, of the 34 amphibian species recorded in Guinea Bissau, 5 species were recorded during the 2011/12 surveys. Amphibian species do not appear to be utilized by the local community for food, although some species are said to have superstitious importance or medicinal uses. Of the 5 amphibian species recorded during the surveys, none are listed on the IUCN Red data list for the area. Amphibian species diversity was low. It must be noted that the rivers in the area are tidal and have a very high salinity. These are both characteristics to which amphibians are very sensitive. Due to the permeability of amphibian skin, saline water causes loss of fluids and dehydration in frog species (Vitt & Caldwell, 2009) or as found by Bentley and Schmidt-Nielsen (1971) due to sodium toxicity due to sodium entering through the permeable skin. During their study they found that Rana pipiens (Leopard frog) died within an hour of being placed in sea-water (Bentley & Schmidt-Nielsena, 1971). For this reason most of the rivers in the study area are uninhabitable for amphibian species, and only freshwater systems host this taxon. Five amphibian species were recorded, which included only common species such as *Ametia angolensis* and *Ametiophrynus regularis*, and none of the recorded species are listed as Red Data species or restricted in terms of range or habitat.

Avifaunal diversity in the study area was very high with a large number of upper trophic level species occurring in the area. The Hooded Vulture is currently listed as Endangered by the IUCN (2010). Seventy-five species were recorded, these include Palmnut Vulture (*Gypohierax angolensis),* Long-crested eagle *(Lophaetus occipitalis),* Hooded vulture *(Necrosyrtes monachus) and* Gymnogene (*Polyboroides typus).* In general, species diversity was moderate to high throughout the study area with the rice paddies and natural forests showing the highest levels of species diversity.

Mammal species diversity was very low in the study area, probably due to severe subsistence hunting. Hunters were regularly seen or heard during the surveys often with animals ranging from snakes to monkeys. This not only reduces the number of animals and species in the area, but also causes the remaining animals to be very shy of humans, which in turn makes accurate survey of species occurring in the area very difficult.

Of the 192 mammal species known to occur in the study area, 15 species were recorded during the 2011 to 2015 surveys. The species recorded in the study area include Striped Ground Squirrel (*Xerus erythropus),* Musk shrew *(Crocidura* sp). Lesser Spot-nosed Guenon (*Cercopithecus petaurista),* Red colobus *(Procolobus badius).* Species trapped during the surveys included *Mastomys natalensis* and *Crocidura* sp. All species recorded are common species, with the exception of *Procolobus badius,* which is listed as **Endangered** (IUCN, 2010). It must be noted that this species was recorded dead and being transported by a hunter from some distance away in the natural forests to the north.

A total of 28 Red Data fauna species may occur in the area, according to the IUCN Red Data list. Some of the animals listed are believed to be locally extinct and suitable habitat for others is not available. The Red Data species that may occur in the study area consist of 2 reptile species, 15 avian species and 11 mammal species. The habitat suitability for Red Data species ranges from low to high with 4 species for which the habitat suitability can be classified as high. Only two Red Data species were recorded during the 2011 to 2015 surveys, namely the Red Colobus and the Hooded Vulture, the Red Colobus was, however, killed by a hunter just south of the Senegal border. All indications of this study appear to show that the African slender –snouted crocodile and the West African dwarf crocodile do not occur in this area. Features of the demographics of the crocodile population in the Cacheu river system showed that the crocodile population increases exponentially with an increase in distance from the Cacheu River Mouth. Only three individuals were recorded in the Cacheu River downstream from Farim (2015 survey) indicating the majority of individuals of this taxon occur upstream of the mining area, thereby making it unlikely that the project will have a significant effect on crocodile populations in the river.

The fact that young crocodiles use the area close to the mine site along the river as a nursery area may be a fact which will require more study as dewatering of the mangroves and loss of this habitat may impact crocodile populations.

Although *Necrosyrtes monachus* is currently listed on the IUCN Red Data List as critically endangered (CR), it is a locally common species in the area with a total of more than 600 individuals being recorded during the surveys. This species has become highly human commensal throughout West Africa and is well adapted to anthropogenic disturbance. *Necrosyrtes monachus* appears to be unaffected by the current anthropogenic activities in the area and it is unlikely that the mining will have a significant effect on these species. A monitoring program could be put in place in order to monitor any unforeseen effects.

Due to the specialised nature of *Gypohierax angolensis*, their range is very restricted in the study area. Although a small percentage of palm trees will be lost during the mining operations it is unlikely that this will affect the *Gypohierax angolensis* populations in the area.

3 POTENTIAL IMPACTS AND BIODIVERSITY THREATS

The majority of threats directed towards the loss of biodiviersty will be physical destruction of habitat, either by the creation of the mine pits and or the new for supporting infrastructure (including tailings and stockpile facilties). A future revision of this Plan will quantify the loss in habitat due to the Project.

For this reason it is thus important to rate the senstivity of the observed habitats in relation to the proposed development. Habitat sensitivity has thus been selected as a unit to assess the pontential impact as the majority of species that have conservatio concern have very specific habitat requirements (e.g. Colobus monkeys or crocodiles) or are highly mobile and will move from the areas of disturbance.

The habitat senstivities have thus been rated on a plant community level, which will then highlight the conservation requirements for each of the vegetation types based on their sensitivity to change, ease of rehabilation and / or conservation importance as follows:

3.1 Oryza Rice Paddy Community

This vegetation community occurs in areas of freshwater wetlands, which are not affected by tidal ebbs and flows throughout the study area, these areas of freshwater wetlands have been modified to facilitate the planting of rice, so alterations to the flow of freshwater systems create large inundated areas where rice is planted. Although tree species are sparse, a few species are often associated with these areas, especially Anthostema senegalense, Elaeis guineensis, *Pterocarpus santalinoides* and *Sarcocephalus latifolius*. Closer to the permanently inundated areas there are communities in which some common species are *Eichhornia natans, Nymphoides indica, Ottelia ulvifolia, Rotala tenella, Sphenoclea zeylanica* and *Utricularia gibba*. The herbaceous layer in this vegetation community is dominated by *Oryza glaberrima, Oryza longistaminata* and *Oryza sativa*, which has been planted for food. The only species found which is known to be listed by the IUCN Red Data list is *Raphia palma-pinus*, which is found along rivers and is listed as Data Deficient. A total of 103 flora species were recorded in this vegetation community and complete list of species for this vegetation community is provided in the specialist assessment.

Sensitivity Aspects

- This vegetation community has been moderately disturbed;
- As little vegetation clearing takes place for this agriculture, this vegetation community could be relatively easily rehabilitated to a natural state;
- Moderate species diversity;
- Suitability of the habitat for Red Data flora and faunal species is moderate;

- One floral Red Data species, Raphia palma-pinus, was found in this vegetation community;
- Ecological integrity of this community is Moderate; and
- The Conservation importance of this community is moderate.

3.2 Secondary Forest Community

Large sections of natural forests have been cleared in order to grow Cashew nuts and other crops. This vegetation community encompasses areas that have been cleared and that have been replanted with Cashew trees (*Anacardium occidentale*). The cashew plantations vary from areas which are dominated by Cashew trees, with some local trees such as *Albizia zygia, Detarium senegalense, Dialium guineense* and *Malacantha alnifolia* still occurring within these plantations. Other areas have been effectively devoid of natural vegetation and are completely dominated by *Anacardium occidentale*. Many of the areas that have been recently cleared are devoid of larger trees, but still contain many of the species associated with natural forests. These areas may be easily rehabilitated, but areas where a greater deal of disturbance has taken place will be far more difficult to rehabilitate. A total of 145 flora species were recorded in this vegetation community.

Sensitivity Aspects

- This vegetation community has been moderately to severely disturbed;
- Depending on the severity of the vegetation clearing , which has taken place, rehabilitation of this vegetation community could be relatively easily conducted, but in more severely degraded areas rehabilitation will be more difficult;
- Low - moderate species diversity;
- Suitability of the habitat for Red Data flora and fauna species is moderate;
- No floral Red Data species were recorded in this vegetation community;
- Ecological integrity of this community is moderate; and
- The Conservation importance of this community is moderate.

3.3 Elias – Cyperus Floodplain Community

Another halophytic (salt tolerant) community recorded in the study area is the so-called salt water lala, a grassland. This vegetation community is found on Fluvisols in the floodplain areas adjacent to the larger rivers which are under tidal influence. The alinity of the water which floods these areas has resulted in the dominance of salt-tolerant species, such as *Paspalum vaginatum* as common species and the communities of *Blutaparum vermiculare , Cyperus amabilis, Cyperus crassipes, Cyperus cyperoides, Cyperus difformis, Cyperus dilatatus* and *Sesuvium portulacastrum* which are found in small patches along the shoreline. The woody layer of these areas is poorly defined but *Hyphaene thebaica, Phoenix reclinata* and *Elias guineensis* occur in this vegetation community with few *Adansonia digitata* also scattered within this vegetation community. The denuded areas of these areas are widely utilised by local communities for the gathering of salt during the dry season and this vegetation

community appears to be an important dry season grazing area. A total of 76 flora species were recorded in this vegetation community.

Sensitivity Aspects

- This vegetation community has been very slightly disturbed in some areas, mainly due to trampling by cattle;
- Where degraded rehabilitation of this vegetation community will occur naturally;
- Low species diversity due to the effects of the saline water on this vegetation community, but many specialised species occur;
- Suitability of the habitat for Red Data flora and fauna species is moderate to high;
- No floral Red Data species were recorded in this vegetation community;
- Ecological integrity of this community is high; and
- The Conservation importance of this community is high.

3.4 Natural Forest Community

The natural forest community occupies large areas of the northern part of the study area , with some variation in structure and composition. Common tree species include *Albizia zygia, Detarium senegalense, Dialium guineense, Malacantha alnifolia, Anisophyllea laurina, Dialium guineense, Hunteria umbellata, Malacantha alnifolia, Parinari excelsa and Strombosia pustulata. Lianas such as Agelaea pentagyna, Calycobolus heudelotii* and *Landolphia dulcis* are also common. The shrub layer is usually poor in these areas, but some common shrub species include *Clerodendrum sinuatum, Combretum micranthum* and *Psychotria peduncularis* and among the most frequent climbers are *Mezoneuron benthamianum, Saba senegalensis* and *Tetracera potatoria*. This vegetation community is currently under threat due mainly to slash and burn agricultural practises for the cultivation of food crops or Cashew nuts. Although only one Red Data species was recorded in this vegetation community, the likelihood of occurrence of Red Data species in this community is high. A total of 209 flora species were recorded in this vegetation community.

Sensitivity Aspects

- This vegetation community has been very slightly disturbed in some areas;
- Where degraded rehabilitation of this vegetation community will occur naturally, if not further impacted;
- Moderate to high species diversity;
- Suitability of the habitat for Red Data flora and fauna species is high, with one Red Data species recorded;
- Ecological integrity of this community is high; and
- The Conservation importance of this community is high.

3.5 *Rhizophora – Avicennia* Mangrove Community

Mangrove forests line all the larger rivers in the region and is an important consideration as this would represent one of two direct impacts on the aquatic (estuarine) environment. The

seond pontential impact would relate to water quality changes within the water column brought about by any effluent discharges. This could howver impact the aquatic organisms, which are highligh mobile and would disperse from the impact site source.

The mangrove areas are however static and are dominated by Rhizophora spp. (mainly *R. mangle* but also *R. racemosa* and to a lesser extent *R. harrisonii*). In the zones less frequently flooded by salt water *Avicennia germinans* is the prominent species. Other halophytic communities are the so-called salt water lala, a grassland found on Fluvisols with *Paspalum vaginatum* as common species and the communities of *Blutaparum vermiculare* and *Sesuvium portulacastrum* which are found in small patches along the shoreline. No Red Data species were recorded in this vegetation community and, due to the specialisation required for plants to survive in the tidal saline conditions, it is unlikely that any of the Red Data species, known to occur in the area, will occur in this vegetation community. Species diversity is low in this vegetation community, but species occurring in the area are highly specialised and this vegetation community can be characterised as a unique vegetation community. This vegetation community is integral in the functioning of the estuarine nature of the larger rivers in the area. A total of 29 highly specialised flora species were recorded in this vegetation community.

Sensitivity Aspects

- This vegetation community has been very slightly disturbed in some areas;
- Where degraded rehabilitation of this vegetation community will occur naturally, if not further impacted;
- Moderate to high species diversity;
- Suitability of the habitat for Red Data flora and fauna species is high, with one Red Data species recorded;
- Ecological integrity of this community is high; and
- The Conservation importance of this community is high.

3.6 *Dialium guineense - Sterculia tragacantha* Coastal Woodland Vegetation Community

This particular kind of vegetation occurs in the transition zone between the terrestrial and the halophytic communities in the coastal regions. According to Catarino (2004), there are three types of coastal transition vegetation, which are usually identified according to species composition of the substratum. The substrata of the transitional zone in the vicinity of Ponta Chugue, for the most part, has been severly transformed, due to cropping of mainly millet (*Pennisetum glaucum*) and peanuts (*Arachis hypogaea*). Many of the tree strata species recorded, by Catarino (2004), to occur on ferralsols (Identified by the redder colour and clayey composition), namely *Dialium guineense, Elaeis guineensis, Phoenix reclinata, Sterculia tragacantha* and *Ximenia americana* are present in the transitional zone closer to the coast itself. Slightly further inland on the Arenosols (identified by the greyer colour and sandier composition) *Dialium guineense, Lannea acida* and *Neocarya macrophylla* are typical species.

On the Fluvisols closer to the drainage lines, *Dichrostachys cinerea subsp. Platycarpa var. platycarpa, Phoenix reclinata* and *Vernonia colorata* are dominant.

Sensitivity aspects

- This vegetation community has been disturbed in some areas;
- Where degraded rehabilitation of this vegetation community will occur naturally, if not further impacted;
- Moderate to high species diversity;
- Suitability of the habitat for Red Data flora and fauna species is moderate;
- Ecological integrity of this community is moderate; and
- The Conservation importance of this community is moderate.

3.7 *Anadelphia Afzeliana* Wet Grassland Community

The most extensive wetland vegetation in the country is the locally called lala, a wet grass savannah with *Anadelphia afzeliana* being the dominant species in this vegetation community. This vegetation community is prevalent on gleysols, which are fine textured soils, deep, grey-coloured, from alluvial origin, with the upper layers often rich in organic matter. Furthermore, this vegetation community prevails in the inner lowland plains flooded by rainwater during the wet season, located mostly in the lower zones of the mainland. Noticeable in the area of Ponta Chugue, is that this vegetation community is particularly homogenous, with *Anadelphia afzeliana* being by far the most dominant species. It is likely that this is the result of human intervention through the use of fire, or harvesting of this grass species for thatching purposes.

Sensitivity Aspects

- The homogeneity of this vegetation community is indicative of it being perturbed by human intervention;
- Rehabilitation of this vegetation community will occur naturally, if not further impacted;
- Low to moderate species diversity;
- Suitability of the habitat for Red Data flora and fauna species is low, although Floscopa axillaris and Digitaria patagiata have a moderate to high probability of occurence in this vegetation community;
- Ecological integrity of this community is moderate; and
- The Conservation importance of this community is moderate.

4 BIODIVERSITY MANAGEMENT PLAN

4.1 Management Objectives

The key objective of the BMP is to promote the ongoing growth and recovery of any remaining vegetation units or habitats, thus ensuring that the relevant species persists in the long term, particularly if that habitat contains an important species or provides an important function.

Additional objectives will include:

- Halt the decline and retain presence of any intact plant community types
- Maintain and improve the extent of vegetation, including quality, connectivity and functionality for priority species.
- Ensure no further indigenous species or ecological communities become threatened within the study area.
- To inform, encourage and support community participation in the implementation of the Plan.
- Improve baseline information on the biodiversity particularly within the wet season.
- To implement the Plan and measure its success in achieving the management objectives in cooperation with, local stakeholders, relevant government and non-government organisations.

The following section identifies for management:

- priority species and vegetation communities;
- priority sites;
- priority threats; and
- specific actions

Actions and priorities have been determined using a combination of information and data sources including specialist technical knowledge and will be refined further using stakeholder consultation.

It may also be deemed necessary to develop a Biodiversity Offset Strategy, should the net loss of a critical habitat exceed an acceptable level. No such criteria or levels have been set for Guinea-Bissau, although based on independent Critical Habitat study, the mangrove communities along the West African coast will fall within the Critical Habitat criterion (Martin *et al*., 2015). Specific management objectives could thus be set in this regard once an acceptable means and or area has been determined with regard a suitable offset strategy.

In order to mitigate the loss of natural areas, especially the mangroves, areas can be set up within the mining lease area to be managed as biodiversity refuges. Due to the endangered nature of these vegetation types in the region, areas to be identified as such can include:

- Any freshwater wetland areas;
- Mangroves; and
- Natural forests.

Offsetting is an option that will need to be determined by the client in terms of:

- Type of offsetting (rehabilitation, conservation area, donations for conservation etc.);
- Size of offset area (if conservation or rehabilitation is considered);
- Amount to be spent on offset area;
- Vegetation communities to be offset; and
- Methodology of offsetting.

Challenges with offsetting in African countries include:

- Communal nature of land;
- Restriction of access to land; and
- Money donated to conservation actually reaching its intended goal.

4.2 Priority Species for Management

Flora and fauna species that are considered priorities for management were highlighted in the ecological specialist assessment. They include all listed species, except for those discussed in considered irregular migrants or visitors to the region. Each priority species has been placed in one of four categories, i.e., very high, high, medium or low. The species' ranking is based on the following:

- Status based on IUCN criteria;
- Endemism;
- Relative contribution of the mine and port site to the conservation of important habitats within the region and to Guinea-Bissau;
- Range, distribution and abundance;
- Sensitivity to threats
- Functional importance;
- Capacity for actions to address the threats to the species; and
- whether the study area community and stakeholders regard it as a priority to conserve any of the species or habitats

Species for consideration included the following:

Red Data listed

Floscopa axillaris

Digitaria patagiata

Red Colobus Monkey *(Procolobus badius)*

Functional importance and important habitats

All mangrove species

4.3 Priority Vegetation Communities for Management

Based on an analysis of the species observed, and the rating of the various criteria listed in Table 4, the observed vegetation units were rated in the ecological assessment. Particular attention was also given to the levels of present degradation and the ease at which these areas can be rehabilitated should any be included as conservation or protected (no-go) areas in future. Ratings are expressed from 1 to 5, where 1 = Low and 5 is the highest score possible.

Table 3 Sensitivity Index of the Vegetation Communities

Vegetation Community	Proximity to formally protected area	Ecological integrity	Conservation importance	Diversity of Species of Concern	Ecoregion Status (according to WWF)	Level of Degradation	Rehabilitation Index	Sensitivity Index	Overall Sensitivity
Rhizophora – Avicennia Mangrove community	1	5	5	5	5	1	5	**8.7**	High
Natural Forest vegetation community	1	5	5	4	5	1	5	**8.3**	High
Secondary Forest community	1	3	3	2	3	3	3	**1.7**	Negligible
Elias – Cyperus floodplain community	1	5	5	5	3	2	3	**3.7**	Low
Oryza Paddy vegetation community	1	5	5	4	5	2	3	**3.8**	Low
Townships	1	1	1	5	1	5	1	**0.7**	Negligible
Dialium - Sterculia coastal woodland vegetation community	1	3	3	3	3	3	2	**1.7**	Negligible
Anadelphia afzeliana wet grassland community	1	3	3	4	3	3	2	**1.8**	Negligible

Note: 1= Low and 5 = High

Based then on the ratings and in the information summarised in Table 3, the priority vegetation communities were be rated as priority for management as follows:

1 *Rhizophora – Avicennia* Mangrove community
2 Natural Forest vegetation community

The estimated losses of each vegetation community at the mine and port sites are presented in Tables 4 and 5, respectively.

Table 4 Vegetation Community Losses at the Mine Site

Vegetation Community	Local Study Area (ha)	Mine Footprint (ha)	% loss
Mangroves	1005.5	65	6.4%
Floodplain	1254.0	129.22	10%
Natural forest	5034.9	27	1%
Secondary forest	10174.2	1358.5	13%
Rice paddy	1325.0	203	15%
Townships	772.4	0	0%
Total Area	**19566.0**	**400.72**	**2%**

Table 5 Vegetation Community Losses at the Port Site

Vegetation Community	Local Study Area (ha)	Port Footprint (ha)	% loss
Mangroves	11.2	0.5	4%
Floodplain	2.9	0.5	17%
Natural forest	0	0	0%
Secondary forest	0	0	0%
Rice paddy	11.8	5	42%
Townships	0	0	0%
Coastal forest	15.5	5.8	37%
Seasonally wet grasslands	17	2	12%
Total Area	**58.4**	**13.8**	**24%**

Approximately 65 ha of mangrove area will be lost in the creation of the south pit (Figure 2), which equates to a 6.4% loss of this habitat at the mine site. Although this may not seem high in terms of the remaining mangrove cover both within the study area and nationally, this is a high sensitivity habitat that plays an important ecological role in the area. As previously indicated developing an offset strategy may be required, but due to the regional setting (land tenure) this may be challenging.

Mining related impact on the Natural Forest vegetation community can be described as negligible, as the Project footprint is outside of the current extent of natural forest. According to delineations conducted over four years of this study, the natural forest areas are being cleared at a rate of approximately 200 ha per annum to make way for cashew plantations.

4.4 Priority Sites for Management

As baseline and impact assessment work is ongoing, priority sites for management will be identified in the revision of this Plan that accompanies the ESIA.

This will include any important areas that contain habitat for the species of concern listed in this report, but more importantly should any biodiversity offset be required, then detailed plans for the offset site/sites must be developed. This will be done in accordance with the international guidelines, however the value of an offset strategy needs to be rationalised in terms of the present state of the current site, the state of regional environment and the loss of critical habitats in relation to the remaining habitat within the local and national context (e.g. mangroves).

However these sites and their management also need to be duly considered during the stakeholder process, e.g. land ownership or cultural issues that may arise.

4.5 Actions

A list of specific actions that addresses threatened species management and biodiversity management at a landscape scale, or both, is included in Table 6. Each action is prioritised and has a specified timeframe and estimated cost over the 10-year period of the Plan.

I have had another look at this in terms of thresholds and criteria and these are country and habitat specific within the literature. I think the focus should be on the fact there is going to be a net loss of habitat (mangroves, wetlands) and that a means to offset should be discussed (i.e. list that I sent to you previously of options) with the client and various stakeholders. If the outcomes are that no feasible means for an offset are possible (which may be the case) then the motivation can be made based on the rules within the IFC guideline notes.

Table 6 Biodiversity Management Implementation Plan

Actions	Priority	Timeframe	Estimated Cost (for a 10 year period)
1. Manage the threat of habitat degradation and fragmentation to biodiversity			
1.1. Ensure financial provision is made to develop and implement BMP, targeting priority vegetation communities. Exclude stock from grazing these sites and any resource utilisation beyond any of the agreements made with the local community if found that valuable natural resources are included within any of the demarcated areas.	A	Annually	$50,000.00
1.2. Continue to promote the importance of maintaining and managing remnants with high species diversity and with the presence of threatened species values.	A	Ongoing	
1.3. Encourage landowners to manage native vegetation for the preservation of threatened flora and fauna through government and non-government initiatives where possible.	A	Ongoing	
1.4. Continue to liaise with government and non-government organisations to identify properties of high conservation value. Encourage properties with high conservation values to develop vegetation management agreements.	A	Ongoing	
1.5. Maintain and improve the quality of vegetation, connectivity and buffering of remnants through participation in and planning of fencing and revegetation programs. Priority locations for this action should be those with priority species, or vegetation communities and identified priority sites.	B	Ongoing	
1.6. Monitor water levels across the study area and ensure that environmental flows are maintained in all catchment areas.	B	Ongoing	
2. Minimise the threat of fire to biodiversity			
2.1 Support the implementation of the provision of information regarding the distribution of priority populations of flora, fauna and vegetation communities and suitable methods for improving grazing and land preparation using sustainable burning methods (e.g. .cool fires).	A	Ongoing	Included in Section 1 above
2.2 Support any local or national initiatives to explore future opportunities to protect remnant vegetation with high conservation values from the impacts of unsustainable.	A	Ongoing	
3. Minimise the impact of invasive plants (aliens) to biodiversity			
3.1. Develop and implement alien plant eradication programme within and adjacent the mining /port sites as well as the priority areas. This must include update and managing alien species maps.	B	Ongoing	$50,000.00

4. Minimise the impact of pollution on biodiversity			
4.1. Continue to promote and encourage responsible use of chemicals, particularly around waterways and priority threatened species sites.	B	Ongoing	
5. Manage the threat of climate change to biodiversity			
5.1. Make use of local and international climate change research results and programs to inform decision making and actions for biodiversity management.	A	Ongoing	$5,000.00
5.2. Identify species and sites at risk from climate change. Develop a program to monitor these sites and species and respond to changing environmental conditions.	A	Years 1–3	$5,000.00
6. Address knowledge gaps for priority fauna species that do not have specific actions identified.			
6.1. Resurvey potential habitat for priority fauna species that do not have specific actions identified, including surveys to determine their status (Increase or Decrease).	A	Year 1-2	$8,000.00
6.2. Monitor any populations found every two years.	A	Years 3	
6.3. Identify conservation management priorities for each species.	B	Year 1-2	$1,000.00
7. **Develop an overarching program at all organisational levels to ensure the Plan informs, encourages and supports community participation at all stages of Plan implementation.**	A	Ongoing	$5,000.00
8. Co-ordinate implementation of the Plan			
8.1. Employ a Biodiversity Conservation Officer to: • Coordinate implementation of the Plan; • Review management plans, including offset plans, natural resource management plans and local government development plans to ensure threatened species requirements are included appropriately; • Ensure recovery actions are implemented as part of existing management programs; • Conduct community education programs; and • Prioritise on-ground works.	A	Ongoing	$400,000.00
8.2. Establish a BMP Steering Committee, to review progress of all implementation against management objectives on an annual basis, provide guidelines on priorities and communicate results to relevant stakeholders. Determine membership and terms of reference of the BMP Steering Committee.	A		$5,000.00
8.3. Develop and implement a monitoring program, where applicable utilising existing monitoring undertaken within the Plan, to measure the Plan's success in achieving the performance criteria. Review and revise actions within the Plan, based on the results of performance criteria monitoring.	A		$400,000.00

NOTE: Priority: 'A' = very high, 'B' = high, 'C' = medium and 'D' = low

4.6 Performance Criteria

The following performance criteria, which are typically used in BMP's (Gardener, 2013) will form the basis of measuring the success of the BMP, and should as a minimum include the following criteria:

1. Demonstrate that there has not been any loss of known priority sites for listed threatened species, nor any loss of known sites for 90% of other priority species on a biennial basis.
2. By year 5 of the Plan, have information to be able to assess population health and/or range for all priority species and habitats.
3. From year 5 to 10 demonstrate that population health and/or range is maintained or improved for all priority species.
4. All priority vegetation sites have maintained their extent, on an ongoing yearly basis.
5. Demonstrate that connectivity has been increased and improved between sites that support high biodiversity values over the life of the project.
6. Demonstrate an improvement in the quality of vegetation remnants by year 5 and 10. Assess the quality of remnant vegetation utilising Vegetation Condition Benchmarks, using a representative sample with a range of community types, established in Year 1.
7. Information, mapping, monitoring and research results are readily available and accessible
8. Plan implementation recognises and utilises community, non-government and government knowledge in a collaborative fashion.

4.7 Role and Interests of Local Communities

In the preparation of this plan the important role local society have played in land management must be recognised.

4.8 Responsible Parties

GB Minerals has primary responsibility for providing the necessary resources and ensuring to the extent of their control that the Plan is implemented. The General Manager will have overall responsibility to see that the necessary resources are allocated to implement the Plan. The Health, Social, Safety and Environment (HSSE) Manager will be responsible for the day-to-day implementation of the Plan, including liaising with stakeholders and partners in its implementation.

Potential stakeholders in the implementation of the Biodiversity Management Plan include:

A Steering Committee will be established in year 1 of the Plan to oversee the implementation of the recommended actions against the management objectives, provide guidelines on priorities and to communicate results to all relevant stakeholders.

The Committee will consist of one or more GB Minerals representatives and a cross-section of stakeholders and will review progress on an annual basis.

4.9 Plan Review and Evaluation

GB Minerals presented an initial draft of this Plan to the Guinea-Bissau Government in advance of submission of its ESIA, though no feedback has been received. The current version of the plan accompanying the ESIA will be distributed to the Guinea-Bissau Government as well as potential lenders and other stakeholders. GB Minerals will actively seek feedback on the biodiversity elements of the Project at the ESIA review stage, and feedback will be considered in a subsequent revision to the Plan.

Once implemented, the Plan will be further reviewed within 5 years of its adoption.

4.10 Stakeholder Consultation

Stakeholders have not yet been consulted on this initial Plan, as described above. GB Minerals will seek feedback on the Plan from stakeholders during the ESIA review stage. The Steering Committee identified in Section 4.8 will be the primary venue for incorporating stakeholder input beyond the ESIA review stage.

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3H
COMMUNITY HEALTH, SAFETY AND SECURITY PLAN

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Rev 0
August 31, 2015

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GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

COMMUNITY HEALTH, SAFETY AND SECURITY PLAN
NB301-520/2-8

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
- 1.1 BACKGROUND 1
- 1.2 SCOPE AND OBJECTIVES 2
- 1.3 REGULATORY REQUIREMENTS 3
  - 1.3.1 Guinea-Bissau National Requirements 3
  - 1.3.2 Applicable International Standards 3
- 1.4 PLAN UPDATES 4

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES 5
- 2.1 IMPACT SUMMARY 5
- 2.2 PUBLIC SAFETY AROUND PROJECT SITES 7
- 2.3 EMPLOYEE CONDUCT AND CONTACT 7
- 2.4 TRAFFIC SAFETY 8
- 2.5 TRANSPORTATION OF HAZARDOUS MATERIALS 9
- 2.6 POPULATION INFLUX 11
- 2.7 COMMUNITY HEALTH AND WELL-BEING AND DISEASE PREVENTION 11
- 2.8 SECURITY MEASURES AND THE USE OF FORCE 12
- 2.9 MITIGATION AND MANAGEMENT SUMMARY 13
  - 2.9.1 Monitoring and Reporting 17
  - 2.9.2 Vehicle Inspections 17

3 – ROLES AND RESPONSIBILITIES 18
- 3.1 KEY PERSONNEL 18
- 3.2 TRAINING 18

4 – REFERENCES 19

5 – CERTIFICATION 20

TABLES

Table 2.1 Impact Summary 5
Table 2.2 CHSSP Mitigation Summary 14

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

Farim Phosphate Project	the Project
AIDS	Acquired Immune Deficiency Syndrome
CHSSP	Community Health, Safety and Security Plan
EPCM	engineering, procurement and construction management
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HIV	Human Immunodeficiency Virus
HSSE	Health, Safety, Social and Environmental
IFC	International Finance Corporation
MSDS	Material Safety Data Sheet
PPE	Personal Protective Equipment
SOPs	Standard Operating Procedures
STI	Sexually Transmitted Infection
WHO	World Health Organization

1 – INTRODUCTION

1.1 BACKGROUND

This Community Health, Safety and Security Plan (CHSSP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

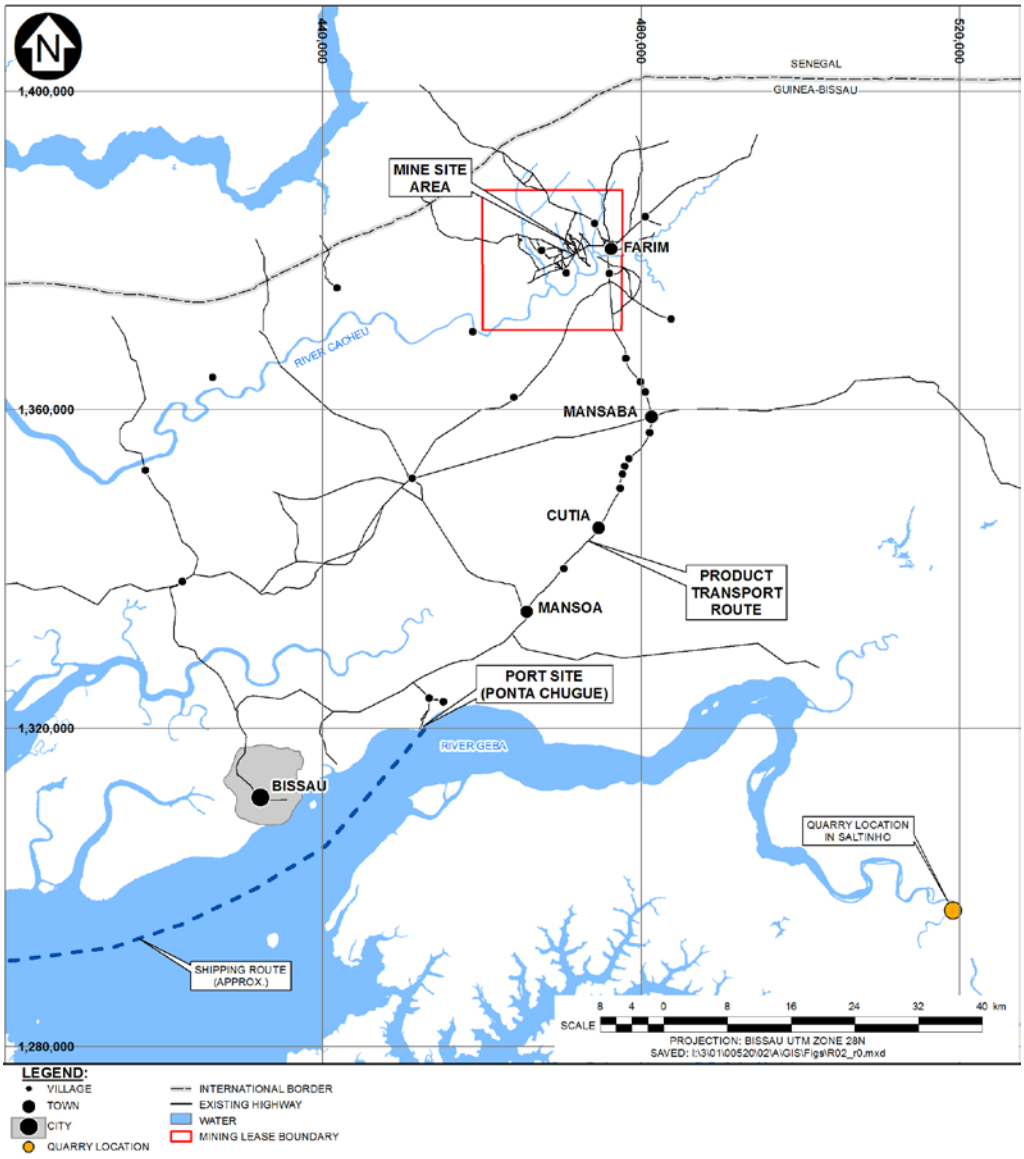

Figure 1.1 Project Regional Setting

The Project consists of the construction, operation and decommissioning of a proposed open pit mine, a process plant at the Mine Site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) was prepared that evaluates and addresses the Project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the disciple-specific management plans.

The ESMP is an integral part of the ESIA, but will also act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The CHSSP is designed to protect the health, safety and security of people and communities that have the potential to interact with the Project. The CHSSP aims at protecting the health and safety of people within the local communities.

The objectives of the CHSSP are to:

- Establish effective plans and procedures for protecting local communities around the Project Sites as well as the communities along the Transport Route, from potential project-related hazards
- Define GB Minerals' requirements and procedures to guide project teams and contractors
- Define roles and responsibilities
- Define monitoring and reporting procedures

The CHSSP considers both potentially adverse and positive impacts related to:

- Public access to the Mine Site
- Employee conduct and awareness (in the community)
- Traffic Safety
- Transportation of hazardous materials
- Community health and well-being and disease prevention
- Population influx
- Security measures and the use of force

The CHSSP is a flexible document that will be reviewed on a regular basis by GB Minerals. GB Minerals will ensure that this CHSSP is available to staff and that procedures and actions included within the CHSSP are applied during all project phases.

Associated plans, which also incorporate health, safety and security measures to protect people and communities outside the project Sites and along the Transport Route include the:

- Occupational Health and Safety Plan
- Emergency Response and Preparedness Plan
- Air Quality Management Plan
- Noise Management Plan
- Stakeholder Engagement Plan
- Grievance Mechanism (as part of the Stakeholder Engagement Plan)

GB Minerals recognizes that it is necessary to collaborate with local communities and authorities to develop appropriate health, safety and security safeguards.

1.3 REGULATORY REQUIREMENTS

1.3.1 Guinea-Bissau National Requirements

Although Guinea-Bissau does not have explicit regulatory requirements pertaining to health, safety and security, it does identify the requirement to maintain the health, safety and security of citizens through other regulations. This includes the Mining and Minerals Law (Law 1/2000) which requires the installation of markers at the boundary of the mining lease area and the Environmental Assessment Law (Law 10/2010) which requires the development of ESMPs which shall include the attenuation/mitigation of potential adverse effects on the environment and human health.

The World Health Organization (WHO) compiles an annual report discussing road safety around the world. Within the report country profiles are provided identify road safety and transportation regulations. The National speed limits of Guinea-Bissau have been reported by the WHO as a maximum of 50 km/h on urban roads, rural roads and around school (WHO, 2013). A national drink and driving law is in place, however it is not based on blood alcohol content (WHO, 2013).

1.3.2 Applicable International Standards

International Finance Corporation (IFC) Performance Standards set out a range of recommendations with regard to community health, safety and security under Performance Standard 4 (IFC, 2012). GB Minerals will comply with IFC Performance Standard 4. Key requirements include:

- Evaluation of the risks and impacts of the affected community during the design, construction, operation and decommissioning of the Project.
- Where the Project poses risks to health, safety and security of communities, an Action Plan will be disclosed on an ongoing basis to enable the community to understand the risks and adverse impacts.
- The design, construction, operation and decommissioning of the Project will be in accordance with good international industry practice. Particular consideration will be given to potential exposure to natural hazards.
- Adverse impacts on soil and groundwater as a result of the Project will also be avoided.
- The transmission of communicable diseases from temporary to permanent labour will be minimized.

- Risks and impacts from project activities will be assessed and communicated in a culturally appropriate manner. Emergency community situations shall be addressed.
- Where employees or contractors are retain to provide security, the risks to those inside and outside the Project site will be assessed.

The IFC Environmental, Health, and Safety (EHS) Guidelines set out to provide technical reference and industry specific examples of Good International Industry Practice (GIIP) (IFC, 2007a). With respect to this Plan the EHS guidelines identify issues that may arise as a result of the Project that have the potential to affect community health and safety. The issues that may arise are related to:

- Water quality and availability
- Structural safety of project infrastructure
- Traffic safety
- Transport of hazardous materials
- Disease prevention

Industry specific EHS Guidelines are also available for the mining sector (IFC, 2007b). These Guidelines identify the potential community health and safety issues associated with mining activities as:

- Transport safety along access corridors and the handling of dangerous goods
- Impacts on water quality and quantity
- Inadvertent development of new vector breeding sites
- Potential transmission of communicable diseases
- Effects on social determinants of health
- Burden on existing community health facilities and resources
- Shift from pattern of infectious diseases to a pattern of non-communicable diseases

1.4 PLAN UPDATES

This CHSSP has been prepared for submission to the Guinea-Bissau Government as part of the ESIA for the Project. The plan is expected to be further revised prior to initiating construction of the Project.

Management reviews of the CHSSP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the Plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES

2.1 IMPACT SUMMARY

The Project has the potential to affect the health, safety and security of people and communities adjacent to the Project, if not mitigated. The predicted potential impacts to community health, safety and security and associated mitigation measures are related to issues identified as follows:

- Public access to mine sites
- Employee contact and awareness (in the community)
- Traffic safety
- Transportation of hazardous materials
- Community health and well-being and disease prevention
- Population influx
- Security measures and the use of force

Generic issues and potential impacts identified in Section 2.1 are described further in Table 2.1.

Table 2.1 Impact Summary

Activities/Components	Potential Impact	Zone of Influence	Receptor/ Beneficiary[1]	Phase[2]
Public Access				
• Transportation activities along the transportation routes • Local residents accessing restricted project areas	Safety hazards to residents in communities neighbouring project sites	Mine Site, Port Site, Transport Route	Residents, livestock and wildlife	C, O
Employee Conduct and Contact				
• Hiring of employees	Increase in crime and other social ailments	Mine Site and Port Site	Residents	C, O
• Hiring of employees • Rotation schedule	Social disruption	Mine Site and Port Site	Residents	C, O
Transport				
• Equipment • Personnel • Driving onsite and offsite	Increased traffic and risk of accident	Transport Route	Livestock, wildlife, and residents	C, O
• Hazardous Materials • Equipment • Personnel • Driving onsite and offsite	Risk of hazardous materials spill	Transport Route	Environment, residents	C, O

Table 2.1 Impact Summary

Activities/Components	Potential Impact	Zone of Influence	Receptor/ Beneficiary[1]	Phase[2]
Community Health				
• Mine construction and operation • Transportation activities along the transportation routes	Dust, fugitive and combustible emissions on health	Mine Site, Transport Route	Residents, livestock and environment	C, O
• Dewatering of the OPAs • Release of contaminated water from TMF	Groundwater quality and volume reduction	Mine Site	Residents, livestock, wildlife and environment	C, O
• Construction activity	Reduction in the quality and quantity of surface water	Mine Site	Residents, livestock, wildlife and environment	C
• Construction activity • Mining, processing and loading and unloading of ore • Transport of ore	Noise pollution	Mine Site, Transport Route and Port Site	Residents	C, O
• Interactions between project personnel and local residents	Increase in communicable diseases and Sexually Transmitted Infections (STIs)	Mine Site, Transport Route	Residents	C, O
• Interactions between project personnel and local residents • Construction of water retaining structures		Mine Site	Residents	C,O
Population Influx				
• Construction and operation of mine • Use of transportation route • Employment in the Farim area • Improved infrastructure	Increase in crime and other social ailments Social disruption Increase in communicable diseases and STIs	Mine Site, Transport Route	Environment, residents, services	C, O
Security Measures				
• Interactions between project personnel and local residents	Safety hazards to residents in communities neighbouring project sites	Mine Site	Residents	C, O

NOTES:

1. **RECEPTOR/BENEFICIARY:** DEFINES THE AFFECTED PARTIES OR ENVIRONMENT.
2. **PROJECT PHASE:** CONSTRUCTION (C) AND OPERATIONS (O).

2.2 PUBLIC SAFETY AROUND PROJECT SITES

In accordance to IFC Performance Standard 4 (IFC, 2012), GB Minerals will design, construct, operate and decommission the mine with the safety of affected communities in mind. The mine and its associated structures and components will be designed and constructed by competent professionals and will be certified by the appropriate authorities and/or professionals.

During the life of the Project public access to the Mine Site and Port Site will need to be controlled in order to protect the public from exposure to project hazards. Mine sites can be dangerous and not suitable for public access. To help ensure public safety commonly used travel routes between villages and Farim will be rerouted as required to preserve the travel between communities. Furthermore, fencing and/or signage around the Mine and Port will be erected and security personnel will restrict access to the Mine Site to authorized personnel only. Areas which raise particular concern to the health and safety of the public will be demarcated with signage and fencing.

Farim is the largest urban center in the region. Many of the residents from the surrounding villages regularly travel to Farim in order to access services and participate in the market. As a result it is to be expected that people from the villages outside of the mine footprint will travel in close proximity to the Mine Site increasing their risk of exposure to Mine Site hazards.

One option is for GB Minerals to provide a shuttle service between Farim and select key communities around the Mine Site to help reduce the risk of accidents or injury and limit unwarranted access to the mine site. GB Minerals will construct a ring-road around the northern extent of the Mine Site linking communities west of the Mine with Farim. The exact alignment of the road will be determined following consultation with local stakeholders.

2.3 EMPLOYEE CONDUCT AND CONTACT

The development of the Project will result in the employment of both local residents and people outside of the region (including expats). It is anticipated that employees will have interaction with local residents during the life of the Project. The development of the Project and associated accommodations with nearby villages has the potential to result in unfavourable interactions between the Project workforce and adjacent communities. GB Minerals does not want to adversely disrupt the social dynamic of communities in the mine site area and as such will hold employees accountable to its Employee Code of Conduct Policy. The Policy will include the following terms:

- Employees will be viewed as representatives of GB Minerals and as such will be expected to refrain from violent and illegal activities.
- Requirements and rules related to alcohol and substance abuse and discrimination.
- GB Minerals will implement disciplinary procedures related to its workforce for any illegal conduct by project personnel, including a zero tolerance policy for violence and illegal conduct and a three chance system for incidents carried out by employees which are contrary to the company Policy.
- The Policy will be made public in all potentially affected communities so that local communities are aware of the expectations of the Project workforce.
- All workers will be required to adhere the of the Company's Code of Conduct.
- Complaints against employees, filed under the Grievance Mechanism identified in the Stakeholder Engagement Plan, will be investigated by management.

2.4 TRAFFIC SAFETY

Traffic in the region is mainly comprised of pedestrian traffic with limited vehicular traffic. There are generally four types of traffic scenarios that project related traffic will contend with:

- Project truck traffic from ferry crossing to the Mine Site through Farim
- Highway between communities
- Highway within most communities without an active street market day and minimal pedestrian presence
- Highway through heavy pedestrian activity/presence

Traffic safety risks are most paramount in areas of heavy pedestrian activity. The larger communities of the region (Mansaba, Mansoa, Farim) regularly hold market days along the transport route.

The following traffic management procedures are designed to mitigate adverse traffic impacts:

- Routine vehicle movements will be scheduled during daytime hours wherever possible, for the primary reason of road safety, but also for reasons of traffic noise in particular from heavy vehicles. In general heavy vehicle movements will be limited to daylight hours of 6:00 AM to 8:00 PM.
- Drivers will be required to restrict maximum vehicle speeds out of town to 80 km/hr and through towns and villages to 30 km/hr, even where no speed limits are posted.
- GB Minerals will discuss and agree on Emergency Response Procedures with local emergency services and local administrations. Emergency response plans will be shared during public consultation and disclosure activities.
- Public awareness campaign, including posters highlighting the Project traffic and safety risks.
- GB Minerals will identify suitable points for refuelling, rest, and overnight parking if required. Locations will be identified by GB Minerals with appropriate consultation with local communities to take account of economic benefits to those communities, and where stopping vehicles do not present a hazard to other traffic or other road users.
- GB Minerals will liaise and consult routinely with local communities, police, military and emergency services. GB Minerals will provide local community representatives with a summary of these traffic safety measures.

Within larger cities and town, the following additional measures will be implemented:

- Designated routes through towns, and major features of the route (e.g., markets, schools, hospitals) at which drivers should take particular care.
- Preferred diversion routes if designated route is not available.
- Speed limits, including any special speed limits, for example near schools or markets.
- Any time-of-day restrictions to be considered for trips through the towns, in particular night-time, but also possibly peak traffic periods.
- Whether there is any need for trucks to group in convoys, with designated meeting/waiting points either side of town.
- Whether there is any need for escorts through the town, for convoys or for individual trucks.
- Details of Traffic Police contact (note the need to liaise regularly with the Traffic Police to discuss enforcement, and sanctions, e.g., how to pay/avoid fines or what happens if vehicles are impounded.
- Details of community contacts and engagement in each town: Mayor, schools (in particular offering road safety education and/or campaigns), and other community groups.

Drivers will be required to have experience and an understanding of Guinea-Bissau's driving (Highway) Code. Applicants will be required to hold a valid license for the type of vehicle to be driven and pass testing for vehicle manoeuvring skills. Driving licence records will be updated on a bi-annual basis. Drivers will also have to adhere to the following behavior and responsibilities:

- Road safety is the key consideration for GB Minerals.
- Drivers will be encouraged in general to drive in a smooth and non-aggressive manner, minimizing strong acceleration and braking and periods of idling, in order to minimize noise and emissions.
- Drivers will be encouraged to show consideration for other vehicle traffic and general road users, in particular pedestrians and other non-motorised transport, stopping when necessary for safety, yielding to pedestrians and livestock, and also to show consideration for other vehicles seeking to overtake.
- Seatbelts must be fitted and worn by all drivers and passengers in any vehicle. Passengers may only be carried in vehicles where there is a seat and seatbelt fitted. It is the driver's responsibility to ensure that all passengers are properly seated and seat belts are fastened. Passengers are not permitted to be carried in the back of a pickup. No unauthorised passengers are permitted to travel in GB Minerals vehicle.
- No person shall attempt to operate a vehicle while under the influence of drugs or alcohol.
- Drivers will not use mobile phones while the vehicle is in motion. Vehicles must be parked safely and out of the way of other traffic before a mobile phone may be used by the driver.
- Smoking and also sucking/chewing of tobacco in GB Minerals vehicles is not permitted.

GB Minerals proposes to sponsor a Road Safety and Traffic Awareness Campaign, for village and town residents affected by project-related traffic to reduce the risk of accidents. The road safety campaign will include a range of practical education activities, demonstrations and other events to help residents avoid traffic accidents and incidents. The campaign will be facilitated by the Health, Safety, Social and Environmental (HSSE) Manager and the community programs team.

One of the most effective ways to focus a road safety campaign is to target schools and school children. Targeting primary schools in particular tends to result in a receptive and enthusiastic initial audience, with the road safety message then spreading rapidly from the school gates into homes and the community, often resulting directly in strong community interest and follow-up requests for assistance and advice. GB Minerals will assist in developing the campaign and will fund its implementation. GB Minerals will work with the local municipalities and local highway and traffic Police agencies, and will also seek guidance from relevant government agencies and national organizations.

2.5 TRANSPORTATION OF HAZARDOUS MATERIALS

Hazardous materials, including fuel, will be hauled along the transport route. The specific types of hazardous materials that will be transported are not yet finalized and they will be identified in future revisions of this report. The general risk of spills as a result of transportation of such materials is low, given the mitigation measures proposed including those identified in section 1.3.3 above.

The following general procedures will be adopted:

- Material Safety Data Sheets (MSDSs) for all hazardous materials including a summary of the physical and chemical properties of the materials held will be transported with the shipments, and the vehicle equipped with the appropriate safety signage. This will ensure that the driver understands the hazards associated with the cargo and the potential hazards posed by them both to humans and the environment; this will include details on the segregation of potentially reactive materials. MSDSs will be in English, French and Portuguese.
- Drivers will be trained in the transportation of hazardous goods.
- Containers will be appropriate for the material being shipped and will be properly secured.
- Containers and trucks will be properly marked, labelled and placarded.
- Manifests will be maintained in accordance with Guinea-Bissau regulations.
- Appropriate Personal Protective Equipment (PPE) will be made available to personnel involved in the transport of fuel and hazardous substance handling operations; all relevant personnel will be trained in the use and maintenance of protective equipment.
- All trucks will be equipped with fire extinguishers and personnel will be trained in the use of these.
- Hazardous substances cargos will be protected during transport from rainfall and direct sunlight.
- Materials will be clearly labelled, appropriately segregated on or between trucks (e.g., potentially reactive materials will be kept separate).
- The GB Minerals HSSE Manager will assess suitable locations for vehicles to park overnight when on route and stipulate the minimum distances from water courses etc.
- All suppliers to the Project will provide GB Minerals with:
  - All pertinent data necessary to ensure maximum protection of the environment, health and safety during transport
  - Instructions in the use, operation, storage, transportation, handling and disposal of the goods supplied, sufficiently clear and specific for use by non-technical personnel and in the appropriate language will be provided
  - Appropriate shipping certification
  - Labelling in compliance with any Hazardous Materials Information System prepared by GB Minerals
- Hazardous materials or goods containing hazardous materials shall be packed, documented and marked strictly in accordance with statutory requirements or the laws and regulations of all parties having jurisdiction over the goods.
- No smoking will be permitted when transporting materials.
- Fire prevention and management practices will be developed specific to the materials being transported.

Liquid procedures apply to petroleum products, solvents and reagents, waste oils, solvents or greases from maintenance or workshop areas:

- Only suitably qualified contractors will be used to transport the liquid materials (drums or bulk).
- Transportation vehicles will include emergency spill containment materials and fire extinguishers. Personnel will be trained in their use.
- Waste oils and solvents will be protected from the weather and will be clearly labelled with their contents.

2.6 POPULATION INFLUX

GB Minerals recognizes the potential for population influx or "project-induced in-migration most commonly occurs in response to direct and indirect employment and economic opportunities" (IFC, n.d.). Influx can have effects on the following community health and safety related issues:

- **Housing -** In-migration has the potential to put pressure on existing occupancy levels thereby increasing the incidence of disease transmission (IFC, n.d.).
- **Vector Borne Diseases -** Individuals arriving in the area may not have acquired the same levels of immunity as local residents thereby increasing the incidence rate for vector borne diseases. Similarly water and soil based diseases can emerge and/or increase as there is greater strain on any sanitation programs that may be in place in the region (IFC, n.d.).
- **STIs (including HIV (Human Immunodeficiency Virus)/AIDS (Acquired Immune Deficiency Syndrome)) -** With an increase in workers (predominately males) and money from earned wages the potential for the spread of STIs grows. This would be true of both the Mine Site area and along the transportation route as more people may move into the region and travel along the transport route (IFC, n.d.).
- **Food and Nutrition -** The current livelihoods in the area rely heavily on subsistence agriculture and resources. The development of the Project will result in the elimination of agricultural lands adversely impacting the availability of food and ultimately the nutrition of the affected families. The influx of migrants into the region can put a further strain on the availability of food, particularly impacting families of lower income as monetary exchange for food becomes more common (IFC, n.d.).
- **Social Dynamics -** The social dynamics within communities can be altered as a result of an influx of individuals. Individuals migrating to the area are generally in the hopes of improving their livelihoods by repeating the potential economic benefits of the Project. Not everyone will be successful in gaining employment with the Project or indirect employment. This will create a greater divide between those improving in their economic status and those who have not been able to gain employment. This will result in potential tension and resentment (IFC, n.d.).

GB Minerals will engage in proper, organized planning with local administrators and regional and national government agencies to plan for controlled in-migration in order to reduce the potentially adverse effects of population influx. Following discussions with government authorities more detail regarding population influx and its proposed management will be provided in future revisions of this report.

2.7 COMMUNITY HEALTH AND WELL-BEING AND DISEASE PREVENTION

The health of residents and ultimately their communities may be affected as a result of the development of the Project. Fugitive dust and combustible emissions have the potential to adversely affect the health of residents around the Mine Site and along the transportation route. Effects on health as a result of fugitive dust and emissions are possible not only from respiring polluted air, but also from consuming food that has not been properly cleaned, thus ingesting residual dust or pollutants.

Dust from project vehicles will be negligible on the main highways assuming that they are free of debris. All trucks carrying loose material will be covered.

Groundwater level reduction from dewatering and any changes in groundwater quality have the potential to affect other groundwater users, and/or result in ecological effects. GB Minerals will ensure the

provision of water of adequate quality to these affected communities and compensate for any long-term impairment of off-site water supplies.

The Project will attract workers from outside the region thereby increasing the local population. The growth in population has the potential to increase the prevalence of STIs and other communicable diseases. This can occur as a result of the increase in prostitution potential which can ultimately spread STI and other communicable diseases to either project workers, local communities or to commercial sex workers. Communicable diseases also have the opportunity to spread between individuals given the influx of workers to project location.

Malaria and vector borne risks from reservoirs located on the Mine Site are possible. Netting, insect repellant and educational awareness programs are potential mitigation measures to reduce the risk of an increase in malaria and vector borne diseases.

The increase in truck traffic between the Mine Site and the Port will increase traffic noise. Noise mitigation measures rely on good vehicle maintenance and driver behaviour. In addition good road surfaces reduce tire noise; however responsibility for the maintenance and repair of public roads rests with the Government. GB Minerals will liaise with the Government to bring road maintenance and repair issues to their attention in a constructive manner.

Maintaining community health and well-being is important in order for the communities to be able to benefit from the potential positive effects associated with the Project. Measures will be implemented to raise awareness of the potential health issues associated with the Project by implementing:

- Awareness, education and outreach events on health issues, particularly communicable diseases, including HIV/AIDS for communities close to the Mine Site.
- The engineering, procurement and construction management (EPCM) Contractor will be expected to participate in some health awareness events with local communities during the construction phase.
- Printed materials including posters, leaflets and other documents will be prepared and disseminated though health clinics, at community meetings, and at Public Information Centres.
- Provision of prophylactics to employees.
- An on-site medical clinic to treat employees.

2.8 SECURITY MEASURES AND THE USE OF FORCE

GB Minerals intends to use a private security firm to provide site security and will conduct the relevant assessments and apply applicable standards to any individual or company it contracts for such activities. GB Minerals will develop and adopt a policy describing the requirements for all personnel, contractors and sub-contractors related to security arrangements and GB Minerals' policy on the use of force. These guidelines will help GB Minerals to protect its personnel and assets in a way that minimizes conflict and respects the human rights of its stakeholders. The security guidelines and use of force policy will include:

- GB Minerals will adhere to national laws as well as international standards on law enforcement in securing project operations, particularly those that relate to the use of force.
- GB Minerals will carry out risk assessments in relation to security issues at each of its project sites.
- A Security Plan will be developed for each project site in order to prevent and mitigate any threats identified in its risk assessment.

- The Security Plan will adopt the following principles:
  - Deploy personnel at the Project sites to address security threats in a way that respects and protects human dignity and human rights and avoids conflict
  - Ensure force is a last resort and is used only to prevent or minimize damage, injury and for defensive purposes. GB Minerals will put in place procedures to:
    - First try to resolve any security incidents without using force
    - Only use the minimum force needed
    - Provide training regarding the use of force
- Armed guards will only be used when it is the only way to mitigate the risks identified in the Security Plan or where it is required by law.
- Firearms will only be used where human life is at risk and other measures are not sufficient. In every instance in which a firearm is discharged, a report will be filed.
- Security personnel must ensure that medical aid is given to anybody injured at the earliest possible moment.
- A community complaints process (as outlined in the Stakeholder Engagement Plan) will be in place to allow the local community to express concerns about the security arrangements and acts of Company security personnel.
- GB Minerals will investigate any credible allegations of unlawful or abusive acts of its security personnel, take action to prevent recurrence, and report unlawful and abusive acts to public authorities when appropriate.
- GB Minerals will never place or pressure employees to work in areas of high risk to personal security.

2.9 MITIGATION AND MANAGEMENT SUMMARY

A summary of the mitigation and management requirements and responsibilities are provided in Table 2.2.

The Project is committed to continual improvement in its activities and the goal of reducing risks to the environment and improving operational effectiveness. The strategy employed will include regular monitoring supported by operational change and adoption of other mitigating measures as required.

Management reviews of the CHSSP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the management plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

Table 2.2 CHSSP Mitigation Summary

Potential Impact	Receptor/ Beneficiary[1]	Phase	Activities/Components	Mitigation Measures	Responsible Parties
Public Access					
Safety hazards to residents in communities neighbouring project sites	Residents, livestock and wildlife	C, O	• Transportation activities along the transport routes • Local residents accessing restricted project areas	• Maintenance of commonly travelled routes • Use of security personnel • Signage and fencing around project sites • Updates on project activities made available to local residents	• HSSE Manager • Mine Manager
Employee Conduct and Contact					
Increase in crime and other social ailments	Residents	C, O	• Hiring of workers	• Development of Employee Code of Conduct Policy • Population influx management strategy • Money management workshops	• Human Resources Manager • Mine Manager
Social disruption	Residents	C, O	• Hiring of workers • Rotation schedule	• Development of Employee Code of Conduct Policy • Population influx management strategy • Publicly available hiring policy • Continued stakeholder engagement	• Human Resources Manager • Mine Manager
Transport					
Increased traffic and risk of accident	Livestock, wildlife, and residents	C, O	• Vehicular traffic moving to site • Increased speed of vehicular traffic	• Implement speed restrictions • Awareness campaign for communities • Training of transport contractors • Minimum standards for transportation activities (e.g., speed restrictions)	• HSSE Manager • Mine Manager • EPCM Contractor

Table 2.2 CHSSP Mitigation Summary

Potential Impact	Receptor/ Beneficiary[1]	Phase	Activities/Components	Mitigation Measures	Responsible Parties
Risk of hazardous materials spill	Environment, residents	C, O	• Trucks and materials to have proper containment for hazardous materials • Trucks to have spill containment kits • Awareness campaign for communities • Training of transport contractors • Compliance with Guinea-Bissau standard procedures	• Trucks and materials to have proper containment for hazardous materials • Trucks to have spill containment kits • Awareness campaign for communities • Training of transport contractors • Compliance with Guinea-Bissau and international standard procedures	• HSSE Manager • Mine Manager • EPCM Contractor
Community Health					
Fugitive dust and combustible emissions	Residents, livestock, environment	C, O	• Mine construction and operation • Transportation activities along the transport routes	• Covering trucks carrying loose material • Wheel wash prior to entering public highway • Dust suppression measures at project sites	• Mine Manager • HSSE Manager
Groundwater quality and volume reduction	Residents, livestock, wildlife, environment	C, O	• Dewatering of the OPAs • Release of contaminated water from TMF	• Replacement of water if levels drop below acceptable limits	• Mine Manager • HSSE Manager
Reduction in the quality and quantity of surface water	Residents, livestock, wildlife, environment	C, O	• Construction activity	• Compensation for loss in livelihood related to the reduction of water available for downstream rice paddies • Compliance with standards	• Mine Manager • HSSE Manager
Increase in communicable diseases and STIs	Residents	C, O	• Interaction between project personnel and local residents • Construction and operation of water retaining structures	• Employee education on hygiene and illness prevention • Awareness, education and outreach events for communities close to the Mine Site • Provision of prophylactics • On-site medical clinic to treat employees	• HSSE Manager

Table 2.2 CHSSP Mitigation Summary

Potential Impact	Receptor/ Beneficiary[1]	Phase	Activities/Components	Mitigation Measures	Responsible Parties
Noise pollution	Residents	C, O	• Construction activity • Mining, processing and loading and unloading of ore • Transport of ore	• Vehicle and road maintenance • Driver education • Limiting as many noise generating activities to daytime hours as possible	• Mine Manager • HSSE Manager
Population Influx					
Increase in crime and other social ailments Social disruption Increase in communicable diseases and (STIs)	Residents, Environment and services	C, O	• Construction and operation of mine • Use of transport route • Employment in the Farim area • Improved infrastructure	• Appropriate and organized planning with local administration and regional and national government agencies	• HSSE Manager • General Manager
Security Measures					
Safety hazards to residents in communities neighbouring project sites	Residents	C, O	• Interaction between project personnel and local residents	• Development of Security Plan • Appropriate screening of security personnel • Grievance mechanism	• HSSE Manager • Mine Manager

NOTES:

1. **RECEPTOR/BENEFICIARY:** DEFINES THE AFFECTED PARTIES OR ENVIRONMENT.
2. **PROJECT PHASE:** CONSTRUCTION (C) AND OPERATIONS (O).

2.9.1 Monitoring and Reporting

GB Minerals will monitor activities that occur off-site and along the transport route to ensure that community health and safety are protected during construction and operations. Community health and safety monitoring procedures will include:

The EPCM Contractor will report on a regular basis to the HSSE Manager on the implementation of this CHSSP including:

- The conduct of the workforce within local communities
- Instances of workforce non-compliance with project rules and regulations
- Condition of access roads and dust suppression activities
- Security arrangements
- Employee personal health program
- Implementation of the Employee Code of Conduct
- Time lost to illness or disease by workers

The HSSE Manager will monitor and report on health, safety and security activities including:

- Safety practices of project workers in areas that could impact communities
- Spot checks of vehicles entering or exiting nearby local communities
- Spot checks to indicate that workers and communities are aware of health issues, the Code of Conduct and other project rules
- Conditions of roads and other areas prone to dust
- Health and safety orientations
- Records for the personal health program
- Records for the drug, tobacco and alcohol testing program
- Lost time incident statistics
- Records related to education events to raise health and safety awareness in communities

Regular reporting of this CHSSP will be conducted through the ESMP and will include:

- A summary of activities undertaken during the reporting period
- Any material deviations or non-compliances to this CHSSP
- Planned activities
- Any other issues of concern

Further information on social monitoring and reporting requirements and procedures is set out in the ESMP.

2.9.2 Vehicle Inspections

Vehicles shall be given a preventive maintenance inspection at least once every 3 months. Valves, pumps and pipe work on tankers shall be checked monthly, along with other listed inspection items.

3 – ROLES AND RESPONSIBILITIES

3.1 KEY PERSONNEL

The HSSE Manager is responsible for the implementation of this CHSSP, with the support of the Health and Safety Superintendent. The HSSE Manager will report to the General Manager. The implementation of this CHSSP is also the responsibility of:

- The EPCM Contractor is responsible for the integration of these procedures and requirements into their operating procedures and plans.
- The Community Programs Manager is responsible for ensuring that health and safety activities related to engaging and working with local communities are conducted in accordance with the Stakeholder Engagement Plan and the Community Development Plan.
- The Project Managers are responsible for ensuring that these procedures and requirements are implemented for all project operations.

With respect to transportation the Health and Safety Superintendent will inspect the condition of the Project area on a monthly basis and will maintain records which will include:

- Road conditions along preferred routes
- Driver updates
- Driver orientation
- Maintenance and mechanical inspection of trucks
- Compliant with applicable regulatory and corporate requirements

Revisions will be made to the procedures where necessary to comply with changing site conditions and any new relevant legislation. Personnel will be notified on any changes and if necessary, retraining will take place. Overall responsibility for the implementation of this Management Plan shall rest with the GB Minerals HSSE Manager. GB Minerals Community Relations Specialist shall be responsible for ensuring that activities related to engaging and working with local communities is conducted in accordance with relevant procedures and requirements for stakeholder engagement and community assistance.

3.2 TRAINING

All employees and contractors will be provided with training on health, safety and security. Additional specialist training will be provided to key personnel involved in activities that are conducted off-site and along the transport route, including driver training.

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5 – CERTIFICATION

This report was prepared and reviewed by the undersigned.

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Approval that this document adheres to Knight Piésold Quality Systems: _____

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3I
WASTE MANAGEMENT PLAN

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NB301-520/2-9
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GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

WASTE MANAGEMENT PLAN
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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE AND OBJECTIVES 2
1.3 PLAN UPDATES 3

2 – REGULATORY REQUIREMENTS 4
2.1 NATIONAL REQUIREMENTS 4
2.2 INTERNATIONAL FINANCE CORPORATION ENVIRONMENTAL GUIDELINES 4

3 – POTENTIAL IMPACTS AND MITIGATION MEASURES 7
3.1 WASTE CATEGORIES 7
3.2 POTENTIAL IMPACTS 7
3.3 HIGH-LEVEL MITIGATION STRATEGIES AND TARGETS 7

4 – WASTE MANAGEMENT FACILITIES AND PROCEDURES 9
4.1 WASTE MANAGEMENT FACILITIES 9
4.2 WASTE SEGREGATION SYSTEM 9
4.3 PRELIMINARY WASTE DISPOSAL PLANS BY WASTE TYPE 10
4.4 NON-HAZARDOUS WASTE MANAGEMENT PROCEDURES 11
4.4.1 Waste Recycling 11
4.4.2 Domestic Waste 11
4.4.3 Sewage and Greywater 12
4.4.4 Solid Waste 12
4.4.5 Liquid Wastes 12
4.5 HAZARDOUS WASTE MANAGEMENT PROCEDURES 13
4.5.1 General Procedures for Hazardous Substances 13
4.5.2 Hazardous Substances Storage 13
4.5.3 Transportation of Hazardous Substances 14
4.5.4 Biomedical Waste 14
4.6 PETROLEUM AND OIL MANAGEMENT PROCEDURES 14
4.6.1 Construction Materials and Design 14
4.6.2 Use of Petroleum and Oils 15
4.6.3 Waste Oil and Petroleum Contaminated Materials 16
4.7 OTHER LIQUID HAZARDOUS WASTES 16
4.7.1 Storage 16
4.7.2 Spills, Clean-up and Reuse 16
4.8 SHIP WASTE MANAGEMENT 16

5 – ROLES AND RESPONSIBILITIES 17
5.1 KEY PERSONNEL 17
5.1.1 Training 17

6 – MONITORING AND REPORTING 19
6.1 OBJECTIVES 19
6.2 VERIFICATION AND MONITORING PROGRAM 19
6.2.1 Inspections 19
6.2.2 Waste Data Collection 20
6.2.3 Annual Waste Audit 20
6.2.4 Landfill Monitoring 20
6.2.5 Hazardous Materials Monitoring 20
6.3 KEY PERFORMANCE INDICATORS 21

7 – REFERENCES 22

8 – CERTIFICATION 23

TABLES

Table 2.1 IFC Health and Safety Guidelines for Waste Management 4
Table 4.1 Potential Waste Sources and Disposal Methods 10

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

Farim Phosphate Project	the Project
CHSSMP	Community Health, Safety and Security Management Plan
EHS	environment, health and safety
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GHS	Global Harmonization System
HSSE	Health, Safety, Social and Environment
IFC	International Finance Corporation
PPE	Personal Protective Equipment
SDS	Safety Data Sheet
SOPs	Standard Operating Procedures
WMP	Waste Management Plan (this Plan)

1 – INTRODUCTION

1.1 BACKGROUND

This conceptual Waste Management Plan (WMP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

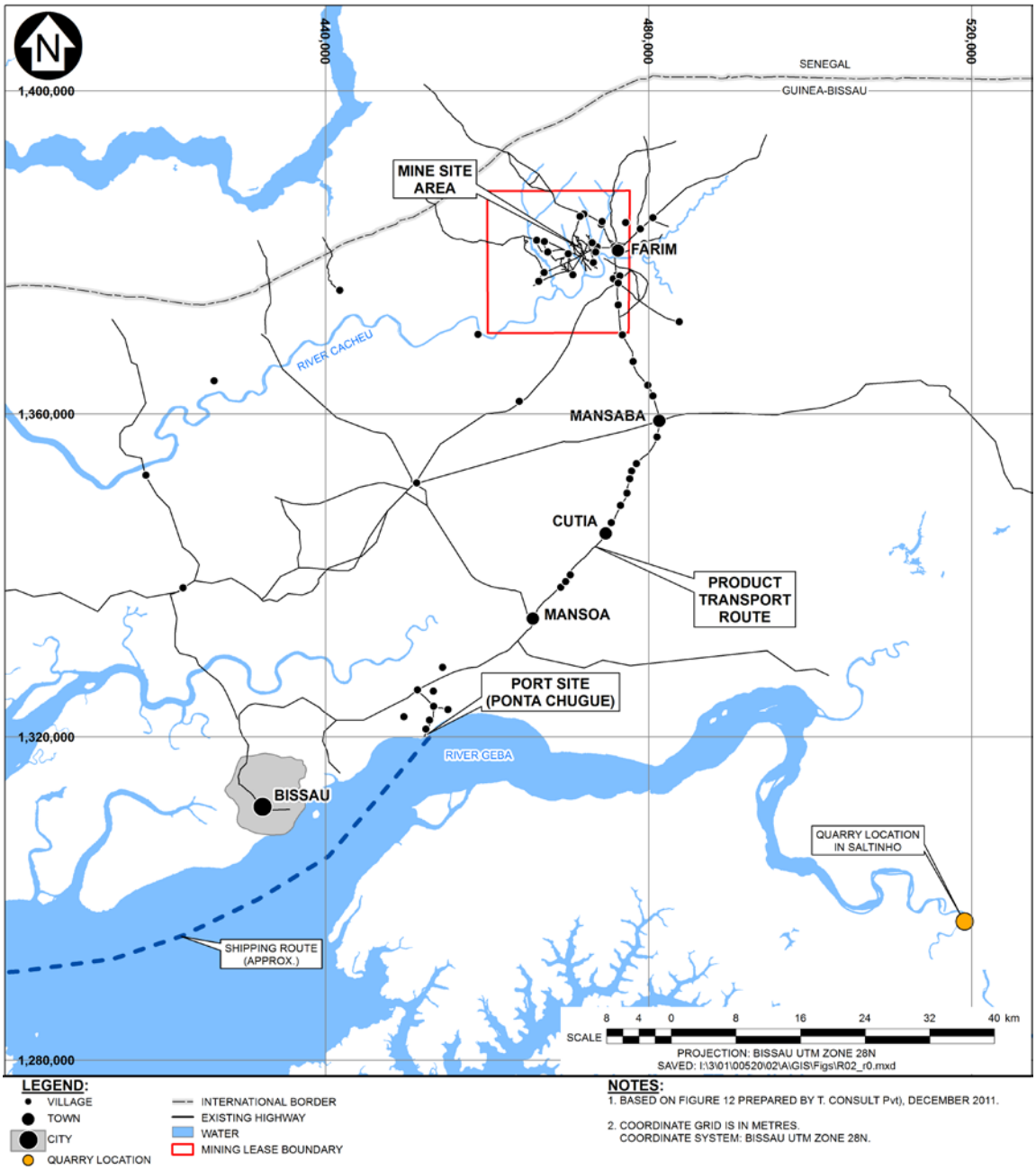

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open mine, a process plant, and port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared that evaluates the proposed project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has also been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** These are a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions and operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA, but will act as a stand-alone document that will be updated as needed throughout project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The WMP is a Level 2 discipline-specific management plan forming part of the ESMP. The Plan details the procedures to be undertaken by GB Minerals to ensure the effective collection, storage, management and disposal of hazardous and non-hazardous industrial and domestic waste for all phases of the Project.

The objectives of this Plan are to:

- Ensure that the waste management practices for the Project complies with:
  - National requirements (Section 2.1)
  - International Finance Corporation Performance Standards for Environmental and Social Sustainability (IFC, 2012)
  - IFC General Environment, Health and Safety (EHS) Guidelines (IFC, 2007a)
  - IFC EHS Guidelines for Mining (IFC, 2007b)
- Identify the waste streams and waste types anticipated to be generated during all phases of the Project.
- Categorize the waste streams so that the waste management hierarchy of reduce, reuse, recycle, reclaim and disposal can be adopted.
- To ensure that end use of waste is consistent with the assigned waste disposal method(s).
- Describe mitigation measures to minimize waste-related impacts associated with project activities.
- Define roles and responsibilities in regard to waste management and implementation of this plan.
- Define monitoring and reporting procedures.

For the purposes of this plan, the following definitions have been applied:

- **Industrial Waste -** Includes inert bulk wastes, including hazardous and non-hazardous wastes.
- **Domestic Waste -** Kitchen, biological, and general camp waste; generally non-hazardous.
- **Hazardous Waste -** Substance that poses substantial or potential threats to public health or the environment. Hazardous substances are known or tested to exhibit one or more of the following four hazardous traits:
  - Ignitability (i.e., flammable)
  - Reactivity
  - Corrosivity
  - Toxicity
- **Special Waste -** Waste such as biomedical waste, which has unique risks and disposal requirements distinct from other hazardous and non-hazardous wastes.
- **Mine Waste -** Waste overburden and tailings generated by mining.

This plan addresses the management and disposal of industrial waste (hazardous and non-hazardous) and domestic waste. This plan should be reviewed in concert with other discipline-specific management plans, including the Community Health, Safety and Security Management Plan (CHSSMP) which details the precautions to be undertaken with the transport of hazardous materials, as well as the Emergency Preparedness and Response Plan (EPRP), which discusses the response procedures in the event of a hazardous material spill. The management and disposal of mine waste is addressed in the Mine Waste Management Plan.

1.3 PLAN UPDATES

This WMP has been prepared as part of the ESIA. The plan is expected to be further revised prior to initiating construction of the Project.

Management reviews of the WMP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the Plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – REGULATORY REQUIREMENTS

2.1 NATIONAL REQUIREMENTS

Guinea-Bissau`s Basic Law on the Environment (Law No. 1/2011) addresses waste disposal and its potential effects on the environment at a high level. This law defines the basic concepts, norms, and principles related to the protection, preservation and conservation of the environment. It aims to improve quality of life through the management and rational use of natural resources, to achieve the sustainable use of such resources.

Law 10/2010 (the Environmental Assessment Law) sets requirements for major development projects to establish environmental and social management plans describing mitigation measures, monitoring, capacity building, and a schedule and cost estimate to implement the mitigation measures.

2.2 INTERNATIONAL FINANCE CORPORATION ENVIRONMENTAL GUIDELINES

IFC`s Performance Standard 1 (Assessment and Management of Environmental and Social Risks and Impacts) aims to identify and assess environmental and social risks and impacts of a project and to adopt a mitigation hierarchy to avoid, minimize or compensate for risks and impacts.

Performance Standard 3 (Resource Efficiency and Pollution Prevention) promotes the implementation or pollution prevention strategies and the sustainable use of resources, and includes requirements for the reduction and safe management of waste including hazardous wastes.

Collectively, the IFC General Environmental Health and Safety (EHS) Guidelines (IFC, 2007a) and the EHS Guidelines for Mining (IFC, 2007b) set out the recommendations for waste management summarized in Table 2.1.

Table 2.1 IFC Health and Safety Guidelines for Waste Management

Guideline Topic	IFC Environmental Guideline
Non-hazardous household and non-process related Industrial Waste	• Non-hazardous solid waste should be collected for disposal at an approved sanitary landfill. • External landfills should be audited to ensure appropriate waste management practices. When such a facility is not available within a feasible distance, the mine should establish and operate its own with appropriate regulatory permits and scientifically defensible studies that can demonstrate that the disposal of the non-hazardous waste will not impact human health and the environment. • Non-hazardous solid waste should not be disposed of together with waste rock or overburden except under exceptional circumstances to be fully documented in the environmental and social assessment of the Project.

Guideline Topic	IFC Environmental Guideline
Waste Storage Facilities	• Facilities that generate and store wastes should practice the following: o Establishing a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes. o Avoiding or minimizing the generation of waste materials, as far as practicable. o Where waste generation cannot be avoided but has been minimized, recovering and reusing waste. o Where waste cannot be recovered or reused, treating, destroying, and disposing of it in an environmentally sound manner. • Under a waste management hierarchy, management options will be evaluated in the following sequence to minimize the amount of waste generated for final disposal: o Reuse: Wastes will be reused were possible and practicable. o Recycle: Materials or goods that are waste but cannot be reused will be recycled were practicable (i.e., paper, wood, metal, plastic, and glass); recycling may occur onsite or in the immediate region. o Segregation: Hazardous and non-hazardous wastes will be segregated; non-hazardous materials which can be reused or recycled will be evaluated and managed to minimize negative waste impacts. o Recovery: Materials will be recovered if neither reuse nor recycling is practicable. o Send for disposal: If none of the previous options are practicable, waste will be sent for disposal at a controlled onsite disposal location.
Hazardous Waste - General	• Hazardous materials should be handled, stored, and transported so as to avoid leaks, spills or other types of accidental releases into soils, surface water, and groundwater resources. In order to minimize the risk associated with accidental spills from storage tanks and pipelines (e.g., tailings pipelines) the recommended mitigation measures include: o Providing secondary containment to restrict movement into receiving water bodies (e.g., sumps, holding areas, impermeable liners). o Constructing pipelines with double-walled or thick-walled sections at critical locations (e.g., large stream crossings). o Installing shutoff valves to minimize spill volumes and to isolate flow in critical areas.
Petroleum and Oils	• Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids. • Using impervious surfaces for refueling areas and other fluid transfer areas. • Training workers on the correct transfer and handling of fuels and chemicals and the response to spills. • Providing portable spill containment and cleanup equipment on site and training in the equipment deployment. • Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g., polychlorinated biphenyl (PCB) containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal.

Guideline Topic	IFC Environmental Guideline
Petroleum and Oils (Cont'd)	• Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos-containing flooring or insulation) and decontaminating or properly managing contaminated building materials. IFC Performance Standard 3, Pollution Prevention and Abatement also provide useful guidance in relation to petroleum and oils.

3 – POTENTIAL IMPACTS AND MITIGATION MEASURES

3.1 WASTE CATEGORIES

Various industrial and domestic waste will be generated at both the mine site and the port site throughout the life of the Project. A greater volume and types of waste will be generated at the mine site. The following summarizes the waste categories anticipated to be generated by the Project:

- Reusable Materials (glass and plastic bottles, non-contaminated containers, concrete and wood)
- Dry Non-combustible Waste (glass, plastic, concrete and Styrofoam)
- Dry Combustible Waste (cloth, wood trim, kitchen greases, cardboard)
- Metal
- Organic Waste (mainly food wastes)
- Paper and Cardboard
- Treated Sewage Effluent and Sewage Sludge
- Biomedical Waste (mainly used bandages and sharps)
- Hazardous Waste (batteries, greases, oil filters, contaminated soils, light ballasts, fluorescent light tubes, and computer wastes)

3.2 POTENTIAL IMPACTS

The potential impacts of poor or incorrect management of wastes can include:

- Contamination of soil and water resources (surface waters and/or groundwater)
- Indirect impacts to flora and fauna as a consequence of contaminated soil and water resources
- Social or visual impacts associated with bad odours or scattered litter
- Public health impacts associated with waste scavenging by community members and/or livestock, and/or exposure to biomedical waste

3.3 HIGH-LEVEL MITIGATION STRATEGIES AND TARGETS

The primary mitigation measures for waste management include:

- Application of the waste management hierarchy to reduce, reuse, recycle, reclaim (the “4Rs”), followed by disposal as the least preferred option.
- Reduce the amount of waste produced by procuring materials in bulk, thus reducing packaging requiring management or disposal.
- Implementation of containment measures to protect soil, surface water and groundwater from contamination.
- Restricting public and untrained worker access to waste management and disposal facilities.
- Application of best management practices with respect to the final disposal of each waste type.
- Development of standard operating procedures for the safe segregation, handling and disposal of the different waste types.
- Adherence to this management plan through the proper allocation of resources, training auditing of plan implementation, and the application of corrective actions.

The targets for waste management include:

- Zero spills of hazardous materials including wastes
- Zero discharge of untreated sewage
- Zero incidents of illegal dumping of wastes
- No unauthorized access to the Project's waste storage facilities

4 – WASTE MANAGEMENT FACILITIES AND PROCEDURES

4.1 WASTE MANAGEMENT FACILITIES

The Project will construct, operate or contract the following waste management facilities:

- **Waste Segregation/Management Facilities -** A dedicated waste management facility (WMF) will be located at the mine site and the port site to receive, sort and temporarily store all wastes. The port site WMF will be smaller than that at the mine. Each facility will be designed for the volume and types of waste to be handled.
- **Non-hazardous Solid Waste Landfill -** A landfill will be located at the mine site for the disposal of non-hazardous wastes generated from the mine site and port.
- **Sewage Treatment Facilities -** The Mine and Port Sites will be serviced with multiple septic systems appropriately sized for the number of potential users.

4.2 WASTE SEGREGATION SYSTEM

Effort will be made to avoid the generation of waste, followed by efforts to reuse, recycle and reclaim waste. Disposal of waste (via the onsite landfill, offsite disposal by specialist contractor, and via the sewage treatment plant) will be undertaken where waste cannot be reduced, reused, recycled or reclaimed.

Waste containers will be used to segregate waste at its source. Bins and dumpsters will be selected based on waste material requirements, prevention of wildlife attraction (steel or heavy-duty plastic containers with positive clamping lids), and transport requirements (truck, forklift). All containers will be labelled and colour-coded to identify only those wastes which are appropriate. These bins will be in all locations onsite where waste is generated and will make provision for the sorting of all wastes according to the categories in Table 4.1.

The Waste Management Facility will receive all wastes (hazardous and non-hazardous) generated onsite, where they will be sorted and managed as appropriate, either for reuse, recycling or disposal by outside contractors or in the onsite landfill. All waste movement will be recorded in a register by the Waste Management Contractor at the Facility.

The WMF will be installed with an apron and appropriate perimeter drainage. Areas used for loading and unloading will also have suitable drainage, spill containment and other controls. The area will be protected from inclement weather to avoid risk of contamination. The Waste Management Centre will be protected from access by the public, livestock and/ or local fauna (e.g. birds, rodents).

Non-hazardous waste is discussed in detail in Section 4.5. Non-hazardous waste will be sent from the WMF for burial at the onsite landfill. A sewage treatment plant will treat all sewage from the mine site, and effluent will be discharged to the tailings storage facility.

Hazardous and recyclable waste will be held at the WMF for collection by licensed waste contractors for off-site disposal or recycling. Copies of licenses for pre-approved waste contractors and disposal facilities will be kept at the facility for reference. Biomedical wastes will be contracted for disposal by the Bissau Hospital.

4.3 PRELIMINARY WASTE DISPOSAL PLANS BY WASTE TYPE

A summary of the potential waste sources, and there general disposal method are summarized in Table 4.1 below.

Table 4.1 Potential Waste Sources and Disposal Methods

Waste Type	Generated/Location	End Use
HAZARDOUS WASTE		
Used greases	Maintenance shop	Dispose via Outside Contractor
Used batteries and power supplies	Site wide	Dispose via Outside Contractor
Soiled pails and drums	Process Plant	Dispose via Outside Contractor
Soiled parts	Process Plant	Dispose via Outside Contractor
Soiled rags	Process Plant	Dispose via Outside Contractor
Used absorbents	Process Plant	Dispose via Outside Contractor
Oil filters	Maintenance shop	Dispose via Outside Contractor
Used oil	Maintenance shop	Dispose via Outside Contractor
Ink cartridges	Site wide	Dispose via Outside Contractor
Laboratory wastes	Plant site	Dispose via Outside Contractor
Fluorescents	Site wide	Recycle or Dispose via Outside
Hydrocarbon contaminated soils	Site wide	Dispose via Outside Contractor
Obsolete electronics	Site wide	Recycle or Dispose via Outside
Mill reagents	Process Plant	Dispose via Outside Contractor
Propane gas	Site Wide	Dispose via Outside Contractor
Medical wastes	Clinic	Dispose via Bissaun Hospital
RECYCLABLE WASTES		
Scrap copper, brass, aluminium, precious metals	Maintenance shop	Recycle via Outside Contractor
Plastic and glass bottles	Site wide	Recycle via Outside Contractor or will be reused
Scrap iron and steel including punctured and crushed spray cans	Maintenance shop	Recycle via Outside Contractor
REUSABLE WASTES		
Clean wood	Process Plant	Will be reused where practical
Clean drums, pails, boxes	Site wide	Will be reused where practical
Wooden pallets	Process Plant	Will be reused where practical
Packaging materials	Process Plant	Will be reused where practical
Paint	Site wide	Will be reused where practical
Mechanical parts	Maintenance shop	Will be reused where practical
Hardware (*viz.* old tools, fasteners, etc.)	Maintenance shop	Will be reused where practical
Ducts	Process Plant	Will be reused where practical
Building's roof and side metal sheets	Process Plant	Will be reused where practical

Waste Type	Generated/Location	End Use
NON-HAZARDOUS WASTES		
Cloth	Site wide	Solid Waste Landfill
Wood trim	Site wide	Solid Waste Landfill
Kitchen greases	Kitchen	Solid Waste Landfill
Paper and cardboard	Site wide	Solid Waste Landfill
Concrete	Site wide	Solid Waste Landfill
Gypsum	Site wide	Solid Waste Landfill
Glass	Site wide	Solid Waste Landfill
Dried paint containers	Maintenance shop	Solid Waste Landfill
Plastics	Site wide	Solid Waste Landfill
Tires	Maintenance shop	Solid Waste Landfill
Fiberglass	Maintenance shop	Solid Waste Landfill
Kitchen Waste	Kitchen	Solid Waste Landfill
Sewage waste	Site wide	Septic systems
Sanitary sludge	Wastewater treatment	Solid Waste Landfill
Shredded paper and cardboard	Offices/Site wide	Solid Waste Landfill

4.4 NON-HAZARDOUS WASTE MANAGEMENT PROCEDURES

Non-hazardous waste will be segregated into either:

- Reusable and Recyclable materials
- Solid Waste
- Liquid Waste
- Domestic Waste (organics, shredded paper and cardboard)

4.4.1 Waste Recycling

GB Minerals will consult with the community regarding the opportunities for any reusable products such as scrap metal, cardboard and wood that have local value. GB Minerals will also look at commercial options for reusing materials where practicable. If not, waste will be disposed of in accordance with this Management Plan. The Health, Safety, Social and Environment (HSSE) Manager or delegate will identify what waste re-use routes are available to the Project, develop relationships with suitable contractors and establish re-use points for glass, paper, cardboard and scrap metal. Re-use containers will be clearly labeled and colour-coded. For non-re-useable waste, the procedures are documented below. Waste contractors will provide receipts or other confirmation that recyclables and wastes were disposed at authorized, approved facilities.

4.4.2 Domestic Waste

Domestic wastes, including food wastes from the cafeteria and paper and cardboard from offices, will be collected and immediately sealed in segregated plastic bins. Kitchen staff will be responsible for emptying food leftovers and organics into the appropriate bins. The sealed plastic bins will be sent to the Waste Management Facility daily and stored in a secure area prior to transport to an approved landfill location by an outside contractor. GB Minerals will look for opportunities for the use of a composter for organic materials. GB Minerals will also look into using an incinerator for domestic wastes in the future. Otherwise, waste will be disposed of in accordance with this Plan.

The HSSE will implement a schedule for domestic waste collection which will collect waste frequently enough to avoid attracting vermin and to minimize odour. The domestic waste materials will be monitored to ensure the optimal volume of material is being reused and recycled as practicable. The approximate volume of wastes generated will be registered in order to establish a reliable baseline for waste minimization purposes.

4.4.3 Sewage and Greywater

Sewage and greywater will be discharged to septic systems or soak-aways..

4.4.4 Solid Waste

This includes all solid wastes classified as non-hazardous that cannot be practicably recycled or reused including office wastes, concrete, steel, timber, plasterboard and mixed construction waste. These wastes will predominately be generated throughout the Project lifecycle from construction to decommissioning and closure phases.

Solid waste will be segregated by waste type at their source using coloured bins prior to being transported to the Waste Segregation/Management Facility. Here, the wastes will be organized by type. Solid wastes are then to be disposed of in the onsite landfill. For example, used tires are typically a major waste stream of mining operations. Used tires will be disposed of in the landfill in a segregated location. If feasible, tires will be sent off-site for recycling.

Solid wastes which are found to be dumped in unauthorized areas will be immediately collected and disposed of at an approved facility. Combustible items and non-combustible items which are not recyclable will be landfilled. There is no incinerator on site. Aerosol cans will be punctured and drained prior to being sent to the landfill.

Separate storage areas will be constructed and utilised where appropriate. Separate storage areas will be appropriately designated and labelled. If by error a hazardous waste is mixed with non-hazardous waste, the entire consignment will be regarded as hazardous.

Separate bins for food waste, metals, paper, and miscellaneous wastes will be located separated throughout the Project complex to provide immediate sorting of domestic wastes. Steel bins will be located at each major facility for the recyclable wastes such as scrap metal, timber, tires (if applicable), and unsalvageable equipment.

4.4.5 Liquid Wastes

Liquid waste procedures apply to non-hazardous liquid wastes generated on the site, such as kitchen greases and wastewater treatment sludge. The procedure for managing these wastes is as follows:

- Spills of liquid non-hazardous waste will be cleared using absorbent materials which will subsequently enter the waste management stream. If the area requires washing, it will be confirmed that the liquid will not impact the wastewater treatment plant and, if it will not, water and onsite draining systems will be used.
- Storm water collection systems will not be used for liquid waste management under normal operations.

- Soil surfaces will not be used to dispose of liquid wastes.
- Non-hazardous liquid waste (kitchen greases, wastewater treatment sludge, spill kit pads) bins will be transferred to the Waste Segregation Facility and finally disposed of in the onsite landfill.

4.5 HAZARDOUS WASTE MANAGEMENT PROCEDURES

4.5.1 General Procedures for Hazardous Substances

The following general procedures for hazardous substances will be adopted:

- Maintain an inventory of the Safety Data Sheets (SDSs) for all hazardous materials onsite in a known, easily accessible location. The SDSs will be displayed in both English and Tigrinya.
- Ensure the appropriate measures are in place to accommodate the directions on the SDS in the event of an emergency event.
- Document all hazardous materials or in accordance with statutory requirements or the laws and regulations of all parties having jurisdiction over the goods.
- Label material containers in accordance with SDS standards and protect the substances from general access.
- Ensure appropriate Personal Protective Equipment (PPE) is available for all personnel involved in hazardous substance handling; train all relevant personnel in the use and maintenance of projective equipment.
- Train all personnel to use fire extinguishers and locate appropriate fire-fighting equipment near hazardous material storage and handling areas.
- Maintain oil-filled electrical appliances in fire-resistant condition.
- Minimize the volume of hazardous materials onsite through monitoring material inventory.
- Assess locations for materials and determine minimum distances from water courses and sensitive areas consistently throughout the Project area.

Hazardous material suppliers for the Project will provide GB Minerals with the following:

- Relevant data necessary to ensure maximum protection of the environment, health and safety.
- Instructions in the use, operation, storage, transportation, handling and disposal of the Goods supplied which will be sufficiently clear and specific for use by non-technical personnel.
- Appropriate shipping certification.
- Labeling in compliance with GHR requirements.

4.5.2 Hazardous Substances Storage

- Storage areas will be designed to store sufficient quantities of the substances for the Project.
- Storage areas will be designed to contain spills of hazardous substances, protect the substances from inclement weather, and prevent contamination to the environment.
- Spill kits, fire containment and suppression materials, protective equipment, and other necessary equipment will be stored in close, accessible proximity to the hazardous substances storage.
- Fire prevention systems which are appropriate for the material being stored will be implemented.
- Only containers that are in good condition will be used.

- Incompatible (e.g., bases and acids) materials will not be stored in the same container and will be stored in safe manner and distance as determined by the SDS and manufacturer's recommendations.
- Walls, dykes, berms, or separate facilities will be implemented to incompatible materials, as necessary.
- Drums, containers, and storage areas will be properly labelled, marked, placarded, and secured in accordance with SDS and manufacturer's recommendations.
- Sufficient storage space between containers will be maintained to ensure the substances can be accessed and handled safely.
- Eating, drinking, smoking and applying topical lotions will not be allowed near the hazardous substances storage. Signage will be in place indicating where the noted activities are not allowed.

4.5.3 Transportation of Hazardous Substances

The following procedures will be implemented for the transport of hazardous substances:

- Materials which are non-compatible will be transported in separate shipments.
- Fire suppression and prevention products will be shipped with the substances, as appropriate.
- Spill management products will be shipped with the substances, as appropriate.
- Drivers will be trained in initial spill response, fire suppression and containment, and communication.
- Substances will be shipped in appropriate containers, in accordance with SDS information and manufacturers specifications.
- Containers will be properly secured during transport.
- Containers and transport vehicles will be properly marked, labelled and placarded.
- Manifests will be maintained in accordance with Guinea Bissaun regulations.

4.5.4 Biomedical Waste

The following procedures will be implemented for the disposal of Biomedical Waste:

- Biomedical waste will be generated and collected at the medical centre only.
- Biomedical waste will be collected in containers designed for that purpose and will be disposed of by the Bissaun Hospital.

4.6 PETROLEUM AND OIL MANAGEMENT PROCEDURES

Potential spills of petroleum and oil products will be minimized by following practices outlined in sections 4.6.1 and 4.6.2 below.

4.6.1 Construction Materials and Design

- Select suitable pipeline material with respect to corrosion potential and material transfer.
- Implement signage to identify potential spill risks.
- Implement spill detection systems and provide secondary containment of non-permeable, chemically-resistant material for all petroleum and oil storage facilities.

- Ensure secondary containment will contact the larger of 110% of the largest tank or 25% of the combined tank volumes for above-ground tanks with a total storage volume greater than or equal to 1,000 litres.
- Slope the base of the containment areas so spilled products can be contained and removed.
- Storage containers will be equipped with wide-mouth, long-necked funnels to reduce spills during filling.
- Equipment storage containers will be equipped with pressure relief valves to reduce a build-up of pressure which could cause leaks.
- Ensure storage facilities for petroleum and oil products are designed to comply with the American Petroleum Institute (API) Standard 650 “Welded Steel Tanks for Oil Storage” or an equivalent international standard.
- Ensure all petroleum and oil products are stored above ground with volume measuring devices.

4.6.2 Use of Petroleum and Oils

- Ensure all transfer of petroleum and oil products are undertaken in designed areas with impervious surfaces and drainage systems with oil-water interceptors.
- Restrict smoking from any area where petroleum and oil transfer takes place.
- Ensure all product handling is in accordance with the Global Harmonization System (GHS; the global replacement to the Workplace Hazardous Materials Information System - WHMIS).
- A contract supplier will fill fuel tanks in the main fuel farm; fuelling is the contractor's responsibility. Fuel transfer will take place inside the bermed area; general procedures to be followed are presented below. For fuelling station tanks, if they are used, similar procedures will be followed.
- Before fuel transfer verify that:
  - All fuel transfer hoses have been connected properly and couplings are tight
  - Transfer hoses are not obviously damaged
  - Fuel transfer personnel are familiar with procedures
  - For fuelling stations, personnel are located at both the fuel truck and fuel transfer tank(s) and have the ability to shut off fuel flow manually
  - A means of communication has been established between the two people transferring fuel
  - A high liquid level shutoff device can be substituted for the person at the delivery tank; in which case operation of the shutoff should be verified each time it is used
- Transfer fuel as per established procedures.
- The Contractor (or mine employee in the case of fuelling station tanks) will report any accidents and/or spills immediately to the mine or operations manager and in writing to the General Manager.

4.6.3 Waste Oil and Petroleum Contaminated Materials

Management and disposal of waste oil (considered to be hazardous waste) will include the following:

- All used petroleum products will be collected in tanks marked “Waste Oil” (signage will also be in Portuguese) and disposed of according to legal requirements under the direction of the Mine Manager.
- Empty petroleum containers will, unless otherwise directed, be stored on site in a designated area and returned to the supplier on back hauls.

4.7 OTHER LIQUID HAZARDOUS WASTES

Liquid waste procedures apply to solvents and reagents, waste oils, solvents or greases:

4.7.1 Storage

- Waste oils and solvents will be stored in separate drums on pallets, on paved areas equipped with secondary containment and protected from the weather. Drums will be clearly labeled with their contents.
- Waste oils will not be stored for extended periods in underground sumps. Tanks and sumps will be emptied and inspected regularly for any signs of cracks or holes. The findings of the inspections will be recorded. Cracks or holes will be repaired, and repairs conducted will be recorded.
- Materials and equipment for spill containment and cleanup as well as fire containment and suppression will be available in the storage area. Personnel will be trained in its use.

4.7.2 Spills, Clean-up and Reuse

- Any spills of oils, grease, solvents or other hazardous substances in the maintenance areas, fuel storage areas or loading/unloading areas will be cleaned up using absorbent materials and placed in bins, not washed.
- Waste oils will be reused, if possible.
- If waste oil is not of suitable quality for onsite use, it will be collected by a licensed contractor for offsite recycling; copies of contractor licenses will be retained onsite. If recycling is not possible it will be burnt.
- There will be no onsite disposal of waste oils and solvents direct to the soil surface or storm water collection system.

4.8 SHIP WASTE MANAGEMENT

GB Minerals will not accept any type of waste originating from a ship. The vessels will be expected to manage their own wastes.

5 – ROLES AND RESPONSIBILITIES

5.1 KEY PERSONNEL

Position	Responsibility with this Plan
General Manager	• Overall responsibility for adherence to this plan
Construction Manager, Mine Manager, Process Manager, Operations Manager, Port Master	• Adherence to the mitigation measures identified in this plan, within their respective areas
Health, Safety, Social, and Environmental (HSSE) Manager	• Supporting the other managers in meeting the plan requirements, training, and implementation of monitoring requirements
Waste Management Contractor	• Integration of the management measures and requirements into their operating procedures and plans during construction and operation

The HSSE Manager will be responsible for implementing the WMP, and ultimately the General Manager will be responsible for enforcing the requirements of the Plan. The HSSE Manager (or designate) will inspect the condition of the Project areas on a monthly basis and will maintain appropriate records. The inspection and records will include:

- Evidence of inappropriate waste management
- Condition of waste management equipment (fences, temporary storage, segregation)
- Compliance with applicable corporate requirements

During the construction phase, a waste management contractor will be responsible for the integration of the mitigation measures and requirements into their operating procedures and plans during construction. The waste management contractor shall report on a monthly basis to the HSSE Manager on the implementation of this Management Plan including:

- Construction and operation of waste storage facilities
- Vermin and litter control
- Status of wastes inventory
- Waste management and reduction actions undertaken
- Adaptive plans to reduce waste produced during construction and operations
- Non-compliances identified
- Corrective actions planned and undertaken

The Mine Manager, Process Manager, Operations Manager and Port Master will be responsible for ensuring that the mitigation measures are implemented in their respective areas of control.

5.1.1 Training

All employees and contractors shall be provided with basic training in waste management. Additional, specialist training shall be provided to plant operators and key personnel involved in activities which involve non-hazardous waste management. Waste haulers will have appropriate

training and hauling will be undertaken in a manner that prevents inadvertent release of wastes or recyclables during transport.

All employees and contractors shall be provided with basic training in the management and handling of hazardous substances as well as GHS training. Records of training completion will be maintained for all employees. Additionally, specialist training shall be provided to key personnel who have frequent contact with and/or use of hazardous substances.

The GHS will be utilized to screen and classify materials. GHS training will include:

- Identification of hazardous materials
- Information regarding how to obtain appropriate information on special handling procedures required (i.e., location of and information on SDSs)
- Precautions and protective equipment required, including instructions on how to label and package hazardous substances

Employees who are tasked with receiving, shipping, and storing potentially hazardous substances will also receive hazardous substances handling training. This training will ensure that the appropriate measures for packaging, handling, labelling, and storing during transport and onsite are undertaken.

Working with hazardous substances demands a culture of cleanliness. Workers must wash their hands before eating, drinking, smoking, and before applying topical lotions. Signage indicating disallowed activities will be posted where hazardous materials are stored and used.

6 – MONITORING AND REPORTING

6.1 OBJECTIVES

The main goal on monitoring is to provide assurance that the mitigation and management measures outlined in this WMP are being met and are successful. Specific Objectives of Verification and monitoring are to:

- Verify that the WMP is being implemented
- Verify the performance of personnel in implementing the WMP
- Monitor the success of the measures stipulated in the WMP
- Evaluate the need for remedial or corrective action to:
  - Improve performance or personnel
  - Improve success of the management measure
  - Introduce new measures to address existing or new waste-related impacts

6.2 VERIFICATION AND MONITORING PROGRAM

6.2.1 Inspections

Regular site inspections and formal documented audits will be undertaken in order to verify performance of personnel and implementation of this WMP. The Project site will be divided into sections, with each section being inspected on a monthly basis.

Inspections will be conducted by the HSSE Manager. The HSSE Manager shall inspect the condition of the WMF area on a monthly basis and shall maintain appropriate records. Major non-compliances noticed during the inspections will be reported as per the procedure described in this WMP. The inspections shall include:

- Physical walk-over and inspection of the condition of WMF areas
- Review of waste documentation
- Condition of waste transfer and storage areas
- Condition of incinerator (if applicable)
- Condition of recycling activities (if undertaken)
- Compliance with applicable regulatory and corporate requirements

The following information will be reported on an annual basis:

1. The quantities hazardous waste transported off-site for disposal.
2. The location and name of the disposal facility for each waste type.
3. The date that each was hauled off-site for disposal, for each occasion that these are removed from the site.
4. Quantities of non-hazardous inert solid wastes disposed of in the landfill.

Quantities of hydrocarbon contaminated soils and water will be processed in treatment facilities. Inert solid wastes will be stored and disposed in a manner that minimizes the opportunity for wind-blown debris and animal attraction. Any wastes that are shipped off site will be recorded using an Off-Site Waste Disposal Log.

6.2.2 Waste Data Collection

Implementation of the “4Rs” waste management concept requires that destinations and quantities of wastes are monitored. A register of waste material will be maintained at all waste sites (i.e. the Waste Segregation Management Facilities, onsite landfill, and sewage treatment plant) to ensure measurement of wastes that have been reused, recycled, reclaimed and disposed. Moreover, waste manifests, proving that the disposal of hazardous wastes has been delivered to an accredited facility, and disposed of in such a facility correctly, will be maintained. These data will then be used for the quantitative reporting of Key Performance Indicators pertaining to project waste.

6.2.3 Annual Waste Audit

After a year of operation (and annually thereafter), waste audits will be undertaken to ensure waste streams are properly following the Waste Segregation System. The audit and inspection will comprise the following:

- Designated waste storage locations will be marked on a plan.
- Each waste storage area will be numbered to facilitate inspections.
- Monthly inspections of waste storage areas will be conducted.
- Spills, leaks, poor containment, lack of labeling or other issues will be recorded and reported to the relevant department for corrective action.
- Corrective actions will be documented on completion.

6.2.4 Landfill Monitoring

Monitoring of the inert landfill, involves visual inspections to ensure that only inert wastes are deposited in the landfill, and that adequate cover is provided so that wastes are contained and are not being dispersed by wind. The Landfill Inspection Form will be included in the landfill standard operating procedures. Wastes will be managed and monitored for compatibility with landfill disposal prior to disposal. Also, waste audits will be undertaken periodically at generation points to ensure waste streams are properly segregated and that potential wildlife attractants are diverted from the landfill.

6.2.5 Hazardous Materials Monitoring

All hazardous materials will be subject to strict inventory control from the time they enter the site. The inventory will include all hazardous substances purchased, delivered, stored and used at the site. Fuel and gasoline use will be automatically metered as it is distributed from bulk tanks. The HSSE Manager or designate will reconcile the total amounts of a specific substance received against amounts ordered and inventory the quantity on a monthly basis.

The HSSE Manager will conduct routine inspections of all hazardous substances storage areas, worksite areas to look for spills, leaks, overflows and compliance with the procedures and, where necessary, implement corrective action. The schedule for these inspections will be completed in future revisions to the WMP.

6.3 KEY PERFORMANCE INDICATORS

Based on the specified objectives and targets, certain Key Performance Indicators (KPIs) associated with waste management have been developed. Performance Indicators are an important tool in improving performance. Performance indicators will help GB Minerals to define and measure progress towards their goals. The following Key Performance Indicators will be measured and used to evaluate the proposed project's performance with respect to its stated objectives and commitments regarding waste management:

- Annual volumes of waste (per waste stream - i.e. hazardous and non-hazardous) disposed of at the onsite landfill and/or incinerated and not reused, recycled or reclaimed.
- Annual volume of waste (per waste stream - i.e. hazardous and non-hazardous) reused, recycled or reclaimed.
- Annual percent change of volume of waste (per waste stream - i.e. hazardous and non-hazardous) produced compared to previous year.
- Annual percent change of volume of waste reused, recycled, reclaimed and disposed of compared to the previous year.
- Annual volume of contaminated soils generated and treated on-site.
- Good segregation of waste streams (recyclables, general waste and hazardous waste).
- No reports of hazardous waste being mixed with general waste and vice versa.
- Zero reports of illegal dumping of wastes.

7 – REFERENCES

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8 – CERTIFICATION

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3J
OCCUPATIONAL HEALTH AND SAFETY PLAN

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GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

OCCUPATIONAL HEALTH AND SAFETY PLAN
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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
- 1.1 BACKGROUND 1
- 1.2 SCOPE AND OBJECTIVES 2
- 1.3 REGULATORY REQUIREMENTS 3
  - 1.3.1 Corporate Policy 3
  - 1.3.2 National Requirements 3
  - 1.3.3 Applicable International Standards 3
- 1.4 PLAN UPDATES 4

2 – OCCUPATIONAL HEALTH & SAFETY PLANNING 5
- 2.1 CONTROL AND MANAGEMENT OF RISKS 5
- 2.2 RISK ASSESSMENT PROCEDURE 5
  - 2.2.1 Define the Activity/Assessment Objectives 5
  - 2.2.2 Identify the Hazards 5
  - 2.2.3 Analyze the Consequences of Hazards in Terms of Severity 6
  - 2.2.4 Estimation/Measurements of Risks 6
  - 2.2.5 Evaluate the Risks 6
  - 2.2.6 Propose Corrective Action 6
  - 2.2.7 Standard Operating Procedures 7

3 – OHS RISK ASSESSMENT 8

4 – OHS MEASURES 9
- 4.1 STANDARD OPERATING PROCEDURES 9
- 4.2 PERSONAL PROTECTIVE EQUIPMENT 9
- 4.3 SAFE WORKPLACE ENVIRONMENT 10
- 4.4 FIRST AID AND EMERGENCY RESPONSE 11

5 – ROLES AND RESPONSIBILITIES 12
- 5.1 GENERAL MANAGER 12
- 5.2 EPCM MANAGER 12
- 5.3 OPERATIONS MANAGER 13
- 5.4 HEALTH, SAFETY, SOCIAL, AND ENVIRONMENT (HSSE) MANAGER 13
- 5.5 HEALTH AND SAFETY SUPERINTENDENT 14
- 5.6 ALL PROJECT PERSONNEL 14
- 5.7 COMMUNICATION OF OHS 14
- 5.8 OHS RESOURCES 15

6 – TRAINING 16
- 6.1 EMPLOYEE SELECTION, COMPETENCY AND TRAINING 16

6.2 INDUCTION AND FORMAL TRAINING 16
6.2.1 Basic Induction Training 16
6.2.2 Site–Specific Induction 16

7 – MONITORING, EVALUATION AND REPORTING 18
7.1 DATA MANAGEMENT 18
7.1.1 Management System Documentation 18
7.2 HEALTH AND SAFETY REPORTING 18
7.2.1 Incident and Hazard Reporting 18
7.3 MONITORING AND EVALUATION 18
7.3.1 Inspection, Testing and Monitoring 18
7.3.2 Health Monitoring Systems 19
7.3.3 Audit and Review 19
7.3.4 Annual OHS Reporting 19
7.4 MANAGEMENT OF CHANGE 19

8 – REFERENCES 21

9 – CERTIFICATION 22

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

Farim Phosphate Project	the Project
EPCM	Engineering, Procurement and Construction Management
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HAZOPs	Hazard and Operability Analyses
IFC	International Finance Corporation
MSDS	Material Safety Data Sheet
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SOPs	Standard Operating Procedures

1 – INTRODUCTION

1.1 BACKGROUND

This conceptual level Occupational Health and Safety (OHS) Plan has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

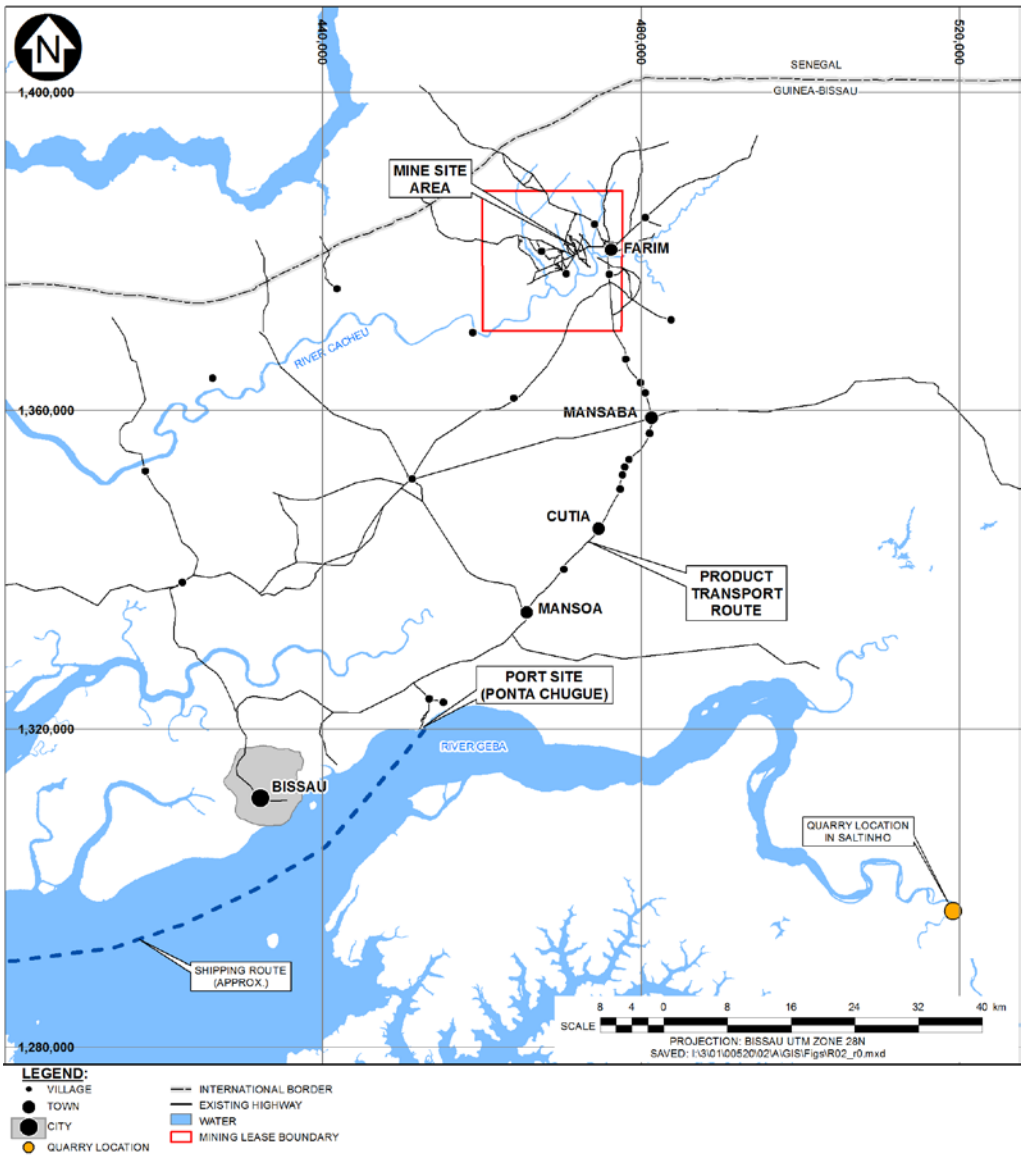

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared that evaluates the proposed project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA, but will act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The OHS Plan is a Level 2 discipline-specific management plan. The Plan includes details regarding education and awareness, general safety practices for housekeeping, working in remote and adverse conditions, proper equipment and tool use, maintenance and inspection requirements, and use of personal protective equipment (PPE). The OHS Plan outlines the proper procedures to ensure the continued safety of all workers.

The objectives of this OHS Plan are to:

- Define and communicate the Health and Safety objectives, principles, and requirements for the Project.
- Define the criteria against which Health and Safety performance will be judged.
- Describe Health and Safety roles and responsibilities for project personnel, including contractors.
- Describe the OSH SOPs that will ensure that Health and Safety activities are conducted, regulated and reported in a systematic manner.
- Ensure that the Project provides inherently safe and secure facilities.

Specific Requirements of the OHS Plan include:

- It is a requirement that employees comply with the requirements of this OHS Plan.
- The engineering, procurement and construction management (EPCM) Contractor and other contractors shall submit safety management plans to GB Minerals for review and approval prior to use; these safety management plans must, at a minimum, meet the requirements of this OHS Plan.
- Where the requirements of this OHS Plan are of a higher standard or exceed those provided by the EPCM Contractor or other contractors, this OHS Plan and its procedures shall be followed.

The key receptors that have been identified as applicable to this management plan include workers employed for the Project including those working for/with the EPCM contractor.

1.3 REGULATORY REQUIREMENTS

The key regulations and standards relevant to the OHS Plan are:

- Corporate Policy
- Applicable National requirements
- International Standards

A summary of these requirements is provided below.

1.3.1 Corporate Policy

GB Minerals is committed to providing safe working conditions for its employees and educating its workers on health, safety, social, community and environmental issues as part of the Environmental, Social, Health and Safety Policy. The Policy is provided in Volume 3, Section 3.1 of the Level 1 Management System.

1.3.2 National Requirements

Guinea-Bissau requirements pertaining to OHS are provided below:

- Law 2/1986 (Overall Work) sets out the duties and guarantees of parties pertaining to work including the safety and health of workers (Republic of Guinea-Bissau, 1986).
- Decree 24-A/1990 (Regulations of the General Inspectorate of Labour and Social Security) provides inspectors the duty to ensure the implementation of laws concerning working conditions, protection of workers and those relating to health, safety and prevention of occupational risks (Republic of Guinea-Bissau, 1990).
- Decree 17/1988 (National Minimum Wage) establishes the minimum wage for full time working hours of no less than 40 hours per week or 7 hours a day (Republic of Guinea-Bissau, 1988).

In addition, as part of the Environmental Assessment Law (Law 10/2010) there is a requirement for the development of ESMPs (Republic of Guinea-Bissau, 2010). This Plan is designed to contribute to meeting that requirement.

1.3.3 Applicable International Standards

Applicable international standards include the World Bank Groups Equator Principles and the International Finance Corporation (IFC) Performance Standards (World Bank Group, 2013 and IFC, 2012). These international lender requirements are described generally in the Level 1 Management System. Specifics of these requirements in regard to OHS are provided below.

IFC Performance Standard 2 addresses labour and working conditions (IFC, 2012). Key requirements specific to OHS include:

- Provision of safe and healthy working environment including:
  - Identification of potential hazards to workers
  - Provision of preventive and protective measures
  - Training of workers

- Documentation and reporting of occupational accidents, diseases and incidents
- Emergency prevention, preparedness and response arrangements

The points provided below from Performance Standard 2 related to human resources and are addressed in the Human Resource Policy in Volume 3 (IFC, 2012):

- Adoption and implementation of human resources policies and procedures that are clear and understandable to employees.
- Provision of reasonable working conditions and terms of employment.
- Non-discrimination and equal opportunity to employment.
- Prevention and address of harassment, intimidation and/or exploitation of employees, especially women.
- Provision of a grievance mechanism for workers to raise workplace concerns.
- No employment of forced labour.

1.4 PLAN UPDATES

This OHS Plan has been prepared as part of the ESIA. The plan is expected to be further revised prior to initiating construction of the Project.

Management reviews of the OHS Plan will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the Plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – OCCUPATIONAL HEALTH & SAFETY PLANNING

2.1 CONTROL AND MANAGEMENT OF RISKS

The OHS Plan requires that the level of risk of potential injury or illness is within acceptable limits, and that the likelihood of injury or illness from the risk and the severity of the risk are considered. Risk management is the systematic application of policies, procedures and practices to:

- Identify, analyze and assess risk
- Avoid or remove unacceptable risk
- Monitor levels of risk and the adverse consequence of retained residual risk
- Investigate and analyze causes of accidents and high potential incidents to prevent their occurrence
- Review effectiveness of risk control measures
- Take appropriate correctives and preventive action

If there is an unacceptable level of risk to persons, they must be evacuated to a safe location and action must be taken to reduce the risk to an acceptable level. When hazards are identified and risks analyzed, GB Minerals and its EPCM Contractor will adopt the following standard hierarchy of hazard controls:

- Elimination of the hazard
- Substitution with a lesser hazard
- Separation of persons from the hazard
- Engineering controls
- Administrative controls
- Use of PPE

OHS risks will be identified beforehand using a risk assessment procedure detailed below.

2.2 RISK ASSESSMENT PROCEDURE

GB Minerals (and the EPCM Contractor, during the construction phase) shall conduct a risk assessment following key steps and develop a risk register. This will be completed prior to the start of construction, and will follow the steps described below.

2.2.1 Define the Activity/Assessment Objectives

The limit of a risk assessment shall be defined, either as an environmental event, occupational safety and health, specific technical process, or a specific task. Within these limits, identify the design objectives, materials being handled or processed and the exposure patterns for individuals involved in the operation or its maintenance, setting or cleaning.

2.2.2 Identify the Hazards

This is the most important step in every risk assessment. It requires absolute thoroughness and validation because any hazard omitted can result in the associated risk not being assessed. It is important to distinguish between continuing hazards (inherent to the work activity, process machinery or substance under normal operation) and occasional hazards, which arises from

equipment failures or foreseeable human error. The final output is to develop, implement and maintain a hazard identification and risk register with a prioritized corrective action component.

2.2.3 Analyze the Consequences of Hazards in Terms of Severity

GB Minerals and the EPCM Contractor will categorize the consequences of each hazard into the following three categories:

- Injury or damage to health (employees, contractors, third parties/public, visitors, other)
- Economic consequences (damage to equipment, loss of production, etc.)
- Effects to the environment (temporary or permanent)

For the vast majority of consequences relating to operational hazards, root cause and fault tree analyses will be used as analytical tools.

2.2.4 Estimation/Measurements of Risks

GB Minerals and the EPCM Contractor will estimate/measure risk:

- Qualitatively: no data, judgment is used to estimate risk level
- Semi-quantitatively: risks are ranked on a comparative scale
- Quantitatively: in absolute quantities or as probabilities

2.2.5 Evaluate the Risks

GB Minerals and the EPCM Contractor will evaluate the risks to determine whether the levels are tolerable or unacceptably high warranting urgent attention. GB Minerals will divide the risk level in to three general categories i.e. high risk (A), substantial risk (B) and low risk (C).

2.2.6 Propose Corrective Action

GB Minerals and the EPCM Contractor will determine corrective or preventive measure in cases where the level of risk requires reduction. The hierarchy of corrective measures to be followed is:

- **Elimination -** The complete elimination of the hazard.
- **Substitution -** Replacing of equipment, machinery or substances with less hazardous options.
- **Engineering -** Control risk at source by engineering control measures to reduce the likelihood or certain the hazard.
- **Systems of Work -** Administrative control measures to minimize the risk by suitable safe system of work, training and procedure.
- **Mitigation -** Mitigate the consequences by the use of PPE, and/or emergence procedure. Corrective measured shall not introduce new hazards into the work process. GB Minerals shall conduct a second hazard analysis after corrective measures have been introduced to determine the adequacy of the corrective measures.
- **Quantitative Risk Assessment -** Where the risk of a hazard cannot be reduced to as low as reasonably possible by conventional control measures, a quantitative risk assessment will be conducted and alternative control measures will be implemented.

2.2.7 Standard Operating Procedures

GB Minerals will develop SOPs to address risks identified in the risk assessment. All employees will be trained on these SOPs, which will be documented and readily accessible. A list of the proposed SOPs is provided in section 4.1 of this OHS Plan.

3 – OHS RISK ASSESSMENT

Future revisions of this Plan will present the outcome of a completed pre-construction risk assessment. This will include a description of the risk assessment methodology and identify the outcomes of the risk assessment for the potential work related hazards associated with the Project.

Generic risks, which are typical of mining in West Africa, that will be discussed in greater detail in a future revision to the Plan include:

- Physical injury due to:
  - Material handing by mobile equipment operators
  - Working from heights
  - Common vehicle hazards at surface mines (Ministry of Labour, 2012):
    - Improper mounting and dismounting of vehicles
    - Collisions with other vehicles or pedestrians and rollovers
    - Improper traffic controls
    - Improperly maintained haulage vehicles
    - Lack of proper loading and dumping procedures
    - Improperly maintained haulage roads
    - Overloaded haulage vehicles and improperly secured loads
    - Excessively steep or narrow haulage roads
    - Lack of dust control
- Violence
- Communicable diseases
- Vector-borne diseases, such as malaria
- Radiological exposure risks associated with the ore, product and mine wastes
- Risks to mental health due to shift in social and economic status

4 – OHS MEASURES

The following section identifies high level OHS measures that will be developed to ensure the health and safety of workers. The measures identified in the following section include:

- Development and implementation of SOPs
- Use of appropriate PPE
- Maintaining a safe work environment
- Appropriate first aid and emergency response

4.1 STANDARD OPERATING PROCEDURES

As introduced in Section 2.2.7 of this Plan, GB Minerals will develop the following SOPs in the near future:

- When to use PPE
- Confined Space Entry
- Working at Height
- Working around Drills
- Hazardous Substances Storage and Handling
- Fire and Explosion Safety
- Crusher Operation
- Loading and Unloading Operations
- Electrical Safety
- Infrastructure and Equipment - General Site Housekeeping
- Machinery Use/ Machinery Guarding
- Lightning Strike Precautions
- Dust Control
- Fork Lift Truck Operations
- Site Access/Egress/Fencing
- Flammable Gases - Storage and Use
- Vehicle Operations
- Driver Competence
- Rough Terrain Driving
- Vehicle Maintenance
- Emergency Preparedness and Response Procedures

Employees will be trained on appropriate and applicable SOPs.

4.2 PERSONAL PROTECTIVE EQUIPMENT

GB Minerals and the EPCM Contractor will be responsible for ensuring that personnel are provided with appropriate PPE. All PPE will comply with applicable legal standards, including the following PPE:

- Safety helmet
- Eye protection
- Respirator

- Gloves
- Footwear
- Skin protection by way of sunscreen
- Clothing to protect skin against burns by heat or fire
- Clothing to protect skin against toxic or volatile chemicals
- Noise/hearing protection

Only personnel with the prerequisite training and qualifications will be authorized to use specialist PPE such as breathing apparatus or rigging harnesses. Worksites will be assessed for specialized PPE zones.

When entering construction areas, the minimum PPE shall include:

- Long sleeved protective clothing
- Safety footwear
- Safety helmet
- Safety spectacles/goggles
- Gloves (if conducting any manual tasks)

Where there is a potential to fall greater than 2 m, the hierarchy of control is:

- Fall prevention
- Fall restraint
- Fall arrest

In all cases where no physical barrier creates a fall potential, personnel shall wear appropriate fall restraint devices. This may include a full body safety harness secured as per the manufacturer's specifications. Certain areas of the Project worksites may be declared PPE free. Such areas may include office areas with clearly defined boundaries, car park areas, dining areas, etc. as defined by the HSSE Manager.

4.3 SAFE WORKPLACE ENVIRONMENT

To maintain a safe and healthy working environment, GB Minerals and the EPCM Contractor shall:

- Maintain each work environment to a high standard of housekeeping, cleanliness, hygiene and ergonomics.
- Develop procedures, standards, inspection checklists, monitoring programs and inspection schedules for environmental issues/hazards including:
  - Atmospheric contamination
  - Housekeeping
  - Employee amenities
  - Ergonomics
  - Biological hazards
  - Radiation
  - Gravitational hazards
  - Electrical hazards
  - Access/egress
  - Noise and vibration

- Occupational hygiene
- Lighting and ventilation
- Temperature extremes
- Fitness for work
- Working hours
- PPE
- Signposting
- Smoking
- Hazardous substances

4.4 FIRST AID AND EMERGENCY RESPONSE

GB Minerals and the EPCM Contractor will establish an emergency management facility at each project site. Personnel involved in the Emergency Response Team, will be trained in, and understand, the Emergency Preparedness and Response Plan (EPRP) and their respective roles therein. Emergency response simulations will be conducted frequently to identify potential risks and to provide feedback to improve the EPRP. First aid boxes will be installed in vehicles used for the Project. Personnel will be trained in first aid. At project sites and in vehicles there will be communication equipment provided to allow anyone to call for medical or other assistance in the event of a serious incident. To meet these objectives the GB Minerals and the EPCM Contractor will:

- Develop, implement and maintain a first aid/medical procedure including:
  - Use the hazard identification and risk assessment process to identify all types of first aid and medical incidents for the Project
  - Develop standards for the numbers of first aid trained employees and level of training
  - Provide first aid facilities at each location
  - Regularly inspect first aid facilities and provisions
  - Notify personnel in control of first aid and medical incidents
  - Develop a medical emergency procedure
  - Develop procedures for dealing with personnel with specific medical issues
- Develop an EPRP for each Mine Site including:
  - Emergency response and reporting
  - Emergency assessment and mobilization
  - Response to natural disasters
  - Response to reasonably foreseeable emergencies
  - Response to external human threats
  - Search and rescue
  - Medical evacuation
  - Non-company offsite emergencies
  - Conclusion of emergency
  - Emergency response training and facilities
  - Schedule emergency exercises
  - Maintain emergency response equipment
  - Develop, implement and maintain an emergency response manual for each project site

5 – ROLES AND RESPONSIBILITIES

A culture of OHS will be instilled in all GB Minerals employees. All managers and the health and safety superintendent will participate in the risk assessment. The following section identifies additional roles and responsibilities of employees as they pertain to the implementation of this Plan.

5.1 GENERAL MANAGER

The responsibilities of the General Manager are to foster compliance with the Company's OHS policies, as follows:

- Develop, approve and disseminate the OHS Plan to personnel.
- Provide a working environment that encourages and supports safety management.
- Regularly review GB Minerals' policies, objectives, targets and key performance standards to ensure continuous improvement in OHS risk management.
- Monitor and review the EPCM's OHS performance.
- Approve funds necessary to fully implement the OHS Plan.
- Approve work orders to correct risks and hazards identified during inspection and/or audit.
- Arrange independent OHS audits of the Project construction activities and operations facilities.

5.2 EPCM MANAGER

The EPCM Contractor is responsible for safe delivery of the Project by implementing appropriate risk assessment and control measures as prescribed in this Plan and related SOPs. The responsibilities of the EPCM Manager are to:

- Formally assign a Construction Safety Manager to monitor safety during construction and ensure appropriate levels of supervision at all times.
- Communicate and implement the OHS Plan.
- Provide hazard and risk assessments of new or modified infrastructure/equipment/systems.
- Develop, implement and maintain a management system that achieves compliance with the OHS Plan and legal requirements.
- Select and train staff that are competent and fit for the work assigned to them.
- Report and investigate all serious incidents and hazards immediately.
- Employ sub-contractors who have the ability to comply with the OHS Plan.
- Maintain a system that ensures all health and safety documentation is controlled and up to date
- Provide sufficient and appropriately skilled personnel for the effective management of health and safety.
- Document health and safety responsibilities in the position descriptions for all levels of employment.
- Document health and safety responsibilities for all critical activities.
- Review roles, responsibilities, accountabilities and authorities through a formal performance appraisal system.

5.3 OPERATIONS MANAGER

The responsibilities of the Operations Manager are to:

- Communicate and implement the OHS Plan.
- Provide Hazard and Operability Analyses (HAZOPs) and risk assessments of new or modified infrastructure/equipment/systems.
- Develop, implement and maintain a management system that achieves compliance with the OHS Plan and legal requirements.
- Select and train staff so that they are competent and fit for the work assigned to them.
- Report and investigate serious incidents and hazards immediately.
- Maintain a system that ensures health and safety documentation is controlled and up to date
- Provide sufficient and appropriately skilled personnel for the effective management of health and safety.
- Document health and safety responsibilities in the position descriptions for all levels of employment.
- Document health and safety responsibilities for critical activities.
- Review roles, responsibilities, accountabilities and authorities through a formal performance appraisal system.

5.4 HEALTH, SAFETY, SOCIAL, AND ENVIRONMENT (HSSE) MANAGER

The responsibilities of the HSSE Manager are to:

- Coordinate the implementation and management of the OHS Plan.
- Set up, maintain and update Mine Site OHS Notice Board(s).
- Ensure Material Safety Data Sheet (MSDS) registers are developed and maintained and are available in the appropriate language(s).
- Participate in area inspections on a regular basis.
- Participate in investigations relating to OHS issues.
- Attend meetings of the Project OHS Committee and consult with the General Manager on OHS issues.
- Assist and / or represent employees with OHS issues.
- Contribute to accident/incident investigations and the preparation of reports.
- Display and disseminate OHS material suitable for project toolbox topics.
- Attend toolbox/tailgate meetings.
- Compile safety statistics and safety reports monthly.
- Act as the custodian of risk, safety, training registers.
- Review OHS training needs for all employees.
- Assist in the conduct of or arrange for job hazard analysis to be conducted for new, changed or additional tasks.
- Review of procedures and work instructions on a scheduled basis.
- Participate with department managers or contractor in incident investigations.
- Follow-up on hazards reported with corrective actions and track to completion.

- Ensure that a system is in place to control personnel and third parties entering and leaving project areas.
- Report hazards and incidents to the General Manager.

5.5 HEALTH AND SAFETY SUPERINTENDENT

The role of the Health and Safety Superintendent is to act as a focal point for occupational safety and health matters. The major function of the Health and Safety Superintendent shall be to:

- Discuss with the site manager effective ways to stimulate and promote safety and health.
- Study and know safety rules.
- Promote occupational safety and health awareness.
- Inspect work areas when requested by employees and advising on occupational safety and health problems or obtaining advice on such problems from the labor inspection division where appropriate.
- Assist GB Minerals in the preparation of occupational safety and health programs.
- Investigate and report significant incidents, injuries and occupational health problems and notifying to the safety and health officer.
- Investigate complaints by employees relating to that employee's safety and health at work.
- Participate in appropriate training courses and encouraging other staff to participate in relevant training courses dealing with safety and health issues.
- Discuss with fellow workers the possible serious results when unsafe practice are not followed.

5.6 ALL PROJECT PERSONNEL

Each worker on the Project is responsible:

- To work in such a manner as to not endanger the health, safety or welfare of themselves or others.
- To proactively promote a safe working culture through leading by example.
- Report hazards or potential risks.
- Stop any activity that may be seen as a direct violation of this OHS Plan or may endanger personnel, mine infrastructure, or the environment.

5.7 COMMUNICATION OF OHS

The HSSE Manager shall have regular scheduled meetings with the EPCM Manager (or Designate), to review policies, objectives, targets, and performance standards and to audit findings. GB Minerals requires that the EPCM Manager has a schedule of meetings and sets reporting frequencies, so that all of its employees, sub-contractors and GB Minerals are informed of new technical, operational, safety, health and environmental information. The EPCM Manager (or designate) is required to empower the employees and sub-contractors with the ability to discuss any issue affecting their ability to work safely. The EPCM Manager and HSSE Manager will ensure the schedule of meetings and reports will include:

- Documented weekly toolbox meetings held by the EPCM Contractor and HSSE Manager.
- Monthly reports to the HSSE Manager.

- Provision of training for the health, safety and environmental representatives and elect OHS representatives at different levels in the organization.
- Development of policies, procedures, work instructions, job safety assessments, hazard identification, risk assessment and incident investigations.
- Formal issue resolution process findings.
- Communication records to demonstrate they have advised employees and sub-contractors of the outcome of audits, incident analysis, hazards identified and control measures.

5.8 OHS RESOURCES

The HSSE Manager may regularly review the resources within GB Minerals and the EPCM Contractor to ensure compliance with the objectives as stipulated in the EPCM Agreement. The HSSE Manager may arrange periodical audits to assess the compliance with this OHS Plan and the EPCM management system including consideration of the adequacy of resources. The EPCM Contractor shall review its resources to ensure compliance with its safety management system on a scheduled basis as determined by an internal audit schedule.

6 – TRAINING

6.1 EMPLOYEE SELECTION, COMPETENCY AND TRAINING

It is imperative that personnel engaged for work on the Project are competent and adequately trained in the work tasks they are assigned. Personnel need to be fit for work at all times and all personnel need to be aware of issues that can affect their concentration and ability to perform efficiently and safely and of the control measures they need to apply to sustain effectiveness.

6.2 INDUCTION AND FORMAL TRAINING

All personnel and visitors will undergo formal training and basic induction training on relevant aspects and safe working practice before starting employment. Induction training will be carried out by the HSSE Manager or designate, and on completion will be recorded and acknowledge by the participant in writing.

6.2.1 Basic Induction Training

The following will be included basic induction training:

- Occupational health and safety
- First aid
- Communication protocols for project sites and transport route
- Maintenance of equipment
- Vehicle/driver awareness and driving techniques
- Bush sense and survival skills
- Fire protection and control

6.2.2 Site–Specific Induction

In addition to the general induction it is essential that each person is fully aware of relevant health and safety policies, and hazards at each project site they will work at. The following will be included at site-specific induction training:

- Special emergency procedures for the area of work
- Safety aspects of the particular geographical area such as climatic condition, vegetation, plant species, isolation, access, tides, river flows, dangerous animals and insects
- Safety aspects of open pit mining
- Safety aspects of particular excavation methods
- Equipment to be used as earthmoving equipment, drill rigs and helicopters
- Land use hazards and practices including herbicides and pesticides
- Potential hazards such as gases and liquids under pressure in drill holes, surface and underground excavations, toxins such as cyanides or arsenic around active or abandoned sites and radioactive ores

- Workers must be prepared to work safely within the terrain and climate of their field area. The training may include:
  - Hot and dry or wet conditions
  - Natural hazards may include lightning, bush fire, or flash floods, etc.
  - Insects, reptiles, and/or large animals may present life threatening hazards
  - Deserts, swamps, forest, and/or mountainous terrain of jungle fields
- Potential health hazards including malaria risk, especially for expatriates.

7 – MONITORING, EVALUATION AND REPORTING

7.1 DATA MANAGEMENT

To accurately evaluate the effectiveness of the OHS Plan data will need to be properly collected and managed. The data management system to be in place is discussed below.

7.1.1 Management System Documentation

GB Minerals and the EPCM Contractor shall maintain:

- All health and safety data such as OHS statistics, policies, procedures, work instructions, plans and drawings in hardcopy and/or electronic format as part of its overall management system
- All data in an accessible form for employees who need to access the data
- All data so that it is current
- All data such that it is easily understandable and useable
- Training for employees in the relevant aspects of the management system

7.2 HEALTH AND SAFETY REPORTING

Incidents related to health and safety will be reported.

7.2.1 Incident and Hazard Reporting

The General Manager, in consultation with the HSSE Manager and EPCM Manager will be responsible for reporting incidents in accordance with legislative obligations on notification. The HSSE Manager will compile and maintain a record of accidents or incidents occurring on or in connection with the Project, including details in each case of corrective action taken. The report will include:

- Hazard and incident risk rating and proposed corrective action in the risk register
- Corrective Action Register to record hazards and incidents and progress of the follow-up of corrective actions
- Time allowed for closeout of corrective actions
- Linking of corrective actions with the management of change process

7.3 MONITORING AND EVALUATION

To ensure the effectiveness of the OHS Plan as the Project progresses it will be essential to conduct monitoring and evaluation as described below.

7.3.1 Inspection, Testing and Monitoring

GB Minerals and the EPCM Contractor will conduct inspections, testing and monitoring based on the risks/hazards identification and Risk Register, regulatory requirements, and best construction mining industry practice.

7.3.2 Health Monitoring Systems

To assess and monitor the health of employees and the effect of the work environment on the health of GB Minerals and the EPCM Contractor will develop, implement and maintain a health monitoring procedure that will include:

- Pre-employment medicals as an integral part of the recruitment process
- An audiometric testing program
- Injury management and return to work system
- Eye screening program
- Advice on lifestyle and health issues/controls
- Advice on fitness

7.3.3 Audit and Review

Regular audits will be conducted to:

- Determine the effectiveness of the OHS management system
- Verify the level of compliance and conformance with OHS legislation, Policy, and procedures
- Establish actions to rectify deficiencies found during audits

Additional audits will be conducted in the event of:

- A major incident
- Recurring incidents
- Non-compliance to performance standards

7.3.4 Annual OHS Reporting

Regular reporting will be undertaken via the ESMP Report that will be prepared and submitted to the General Manager. Reporting may include:

- A summary of incidents
- A summary of injury and lost time statistics
- Findings of regular and additional audits
- Any other issues of concern

7.4 MANAGEMENT OF CHANGE

Changes or modification to plant, equipment and systems are to be reviewed for hazards and risk. Control measures will be developed so that such risks are as low as reasonably possible prior to project implementation. All information related to significant changes or modifications of the Project are to be communicated to relevant employees, sub-contractors and stakeholders. GB Minerals and the EPCM Contractor will ensure that changes are appropriately considered, approved and recorded before they are implemented. The Management of Change procedure shall include:

- Use of the hazard identification and risk assessment process to introduce control measures and reduce risk to as low as reasonably possible.
- Control the update of drawings, procedures, work instructions and safety risk assessments for engineering modifications.

- Control the update of drawings, procedures, work instructions and safety risk assessments for work activity modifications.
- Enforcement of the authorization for changes.
- Consultation with and training for affected employees, sub-contractors and other affected third parties prior to engineering or project activity.
- Management of documents, plans, drawings and data.
- Review and control of documents and drawings.
- Withdrawal of obsolete documents and drawings.

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9 – CERTIFICATION

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3K
EMERGENCY PREPAREDNESS AND RESPONSE PLAN

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GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

EMERGENCY PREPAREDNESS AND RESPONSE PLAN
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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
- 1.1 BACKGROUND 1
- 1.2 SCOPE AND OBJECTIVES 2
- 1.3 REGULATORY REQUIREMENTS 3
  - 1.3.1 Guinea-Bissau Regulatory Requirements 3
  - 1.3.2 International Guidelines 3
- 1.4 PLAN UPDATES 4

2 – POTENTIAL EMERGENCIES 5
- 2.1 HAZARD IDENTIFICATION 5
- 2.2 POTENTIALLY IMPACTED INDIVIDUALS AND COMMUNITIES 5

3 – RESPONSE PROCEDURES 6
- 3.1 EMERGENCY PREPAREDNESS AND PREVENTION 6
- 3.2 GENERAL EMERGENCY RESPONSE PROCEDURES 6
  - 3.2.1 Initial Assessment 7
  - 3.2.2 Emergency Communications and Coordination 8
  - 3.2.3 Emergency Response Team 8
  - 3.2.4 Emergency Situation - ‘All Clear’ 8
  - 3.2.5 Post Emergency Mitigation 8
  - 3.2.6 Evacuation 9
- 3.3 SPECIFIC RESPONSE PROCEDURES 9
  - 3.3.1 First Aid and Medical Emergencies 9
  - 3.3.2 Security Emergencies within the Local Area 10
  - 3.3.3 Fire Preparedness, Prevention and Response 10
  - 3.3.4 Natural Disasters 11
  - 3.3.5 Spill Prevention and Response 11
  - 3.3.6 Open Pit Flooding 14
  - 3.3.7 Embankment Failure 16
- 3.4 COMMUNITY EMERGENCY PREPAREDNESS AND RESPONSE 17
- 3.5 MITIGATION EFFECTIVENESS AND ADAPTIVE MANAGEMENT 17

4 – RESPONSIBILITIES AND RESOURCES 18
- 4.1 KEY ROLES AND RESPONSIBILITIES 18
- 4.2 RESOURCES 19
- 4.3 TRAINING 19

5 – MONITORING AND REPORTING 21
5.1 MONTHLY REPORTING 21
5.2 EMERGENCY INCIDENT INVESTIGATION AND REPORTING 21

6 – REFERENCES 22

7 – CERTIFICATION 23

TABLES

Table 4.1 EPRP Roles and Responsibilities 18

FIGURES

Figure 1.1 Project Regional Setting 1
Figure 3.1 Emergency Response Procedure 7
Figure 3.2 Medical Emergency Response Procedure 9
Figure 3.3 Mine Site General Arrangement 15

ABBREVIATIONS

Farim Phosphate Project	the Project
ALARA	as low as reasonably achievable
CDA	Canadian Dam Association
EHS	environment, health and safety
EPCM	engineering, procurement and construction management
EPRP	emergency preparedness and response plan
ERT	Emergency Response Team
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HAZOP	hazard and operability study
HSSE	health, social, safety and environment
IFC	International Finance Corporation
OHS	occupational health and safety
OMS	operation, maintenance and surveillance
PPE	personal protective equipment
SCD	sediment control dam
SDS	safety data sheet
SOP	standard operating procedure
TSF	tailings storage facility
WD	waste dump

1 – INTRODUCTION

1.1 BACKGROUND

This conceptual level Emergency Preparedness and Response Plan (EPRP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project, a proposed phosphate mine located in the central northern part of Guinea-Bissau in West Africa (Figure 1.1).

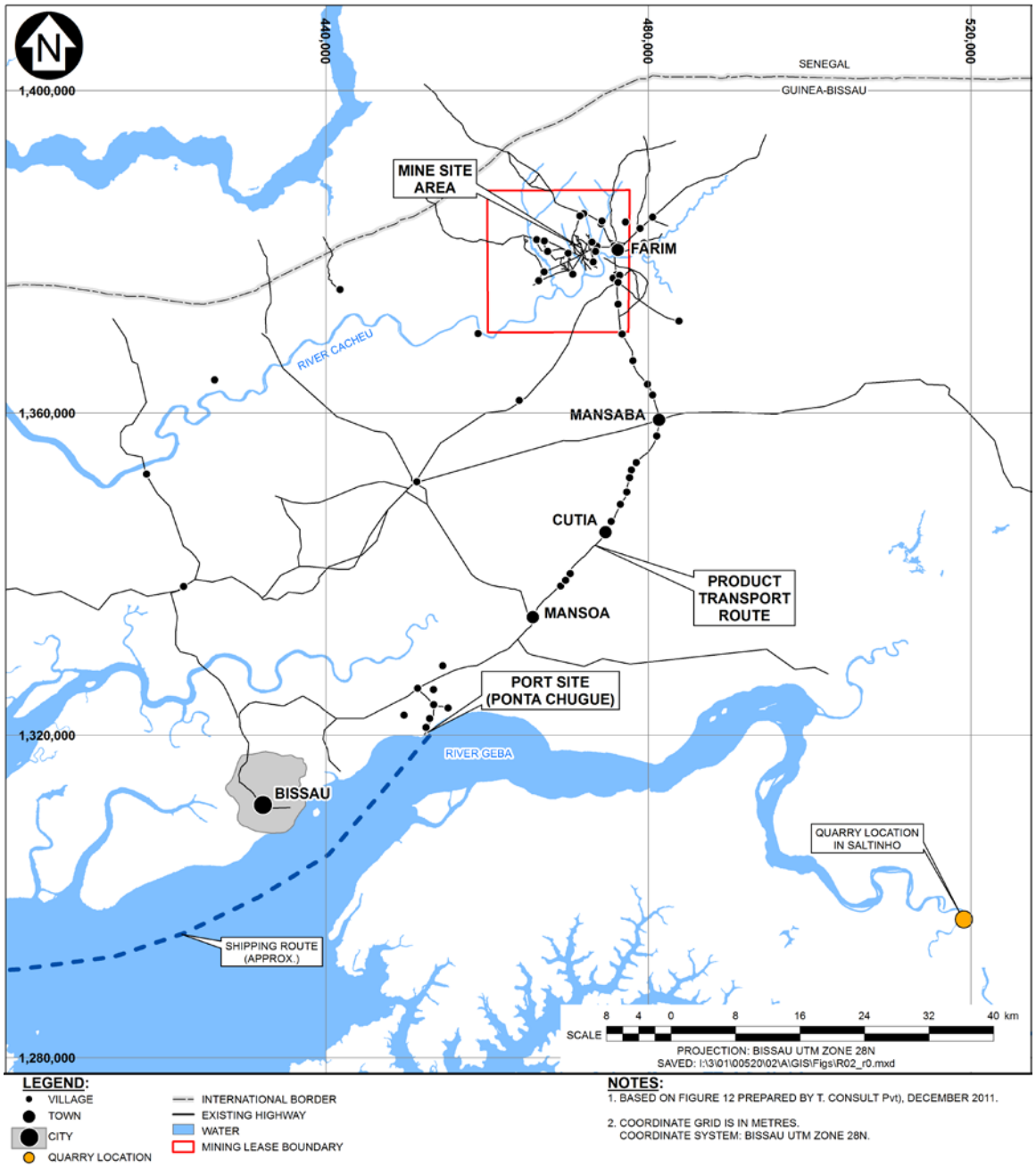


Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) is currently being prepared that will evaluate and address the Project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has been prepared at a conceptual level and will be further updated as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the discipline-specific management plans.

The EPRP will be an integral part of the ESIA, but will act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The EPRP is a Level 2 discipline-specific management plan. The Plan is designed to ensure the protection of human health and the environment, adjacent to the mine sites or along the transport route, from emergency situations that might arise from project activities (onsite and offsite) during the construction, operations and decommissioning phases of the Project. The EPRP outlines the responsibilities of GB Minerals, its contractors and employees for emergency preparedness planning and response procedures. It provides a reference document that can be used for emergencies as a result of the Project activities and outlines the steps to be taken if an emergency occurs.

The key objectives of the EPRP derived from the relevant legislation and guidance are to:

- Protect people, livestock, vegetation, wildlife and the environment from incidents and emergencies.
- Ensure that project is carried out in conformance with safety, maintenance, support and administrative requirements following an emergency or any serious incident.
- Ensure that interruptions at project-related locations do not result in major performance loss.
- Identify the designated personnel and responsibilities for dealing with on- and off-site emergencies.
- Provide information to rescue, recovery and clean-up crews, project personnel, and government agencies in the event of a spill.
- Promote safe and effective recovery of spilled materials.
- Conform with the GB Minerals Corporate Commitments and Environment, Social, Health and Safety Policy (see the Management System in Volume 3, Section 3.1).
- Comply with the emergency response and preparedness requirements of the International Finance Corporation Performance Standards for Environmental and Social Sustainability (IFC, 2012) and the associated Environment, Health and Safety (EHS) guidelines.

Related plans that also incorporate measures to protect people and the environment from project activities include the:

- Occupational Health and Safety Plan (for worker safety)
- Community Health, Safety and Security Plan (includes traffic safety and the transport of hazardous materials)
- Waste Management Plan (disposal of hazardous and non-hazardous wastes)

GB Minerals recognizes that it is necessary to collaborate with local communities and government authorities to develop appropriate emergency safeguards because the Project will introduce new activities to a largely rural setting that have the potential to develop into emergency incidents.

The key receptors that have the potential to be impacted by project generated emergencies are residents, communities, livestock, wildlife, and vegetation residing adjacent to the mine site, port site and along the transportation route.

1.3 REGULATORY REQUIREMENTS

1.3.1 Guinea-Bissau Regulatory Requirements

National requirements around emergency preparedness and response have not been identified. Nonetheless, Guinea-Bissau that relate to emergency response are described below.

1.3.2 International Guidelines

The IFC Performance Standards for Environmental and Social Sustainability outline requirements regarding emergency preparedness and response (IFC, 2012).

IFC Performance Standard 1 requires project Owners to establish and maintain an emergency preparedness and response system so that the Project Owner, in collaboration with appropriate and relevant third parties, will be prepared to respond to accidental and emergency situations associated with the Project in a manner appropriate to prevent and mitigate any harm to people and/or the environment. This preparation will include:

- Identification of areas where accidents and emergency situations may occur
- Communities and individuals that may be impacted
- Response procedures
- Provision of equipment and resources
- Designation of responsibilities
- Communication, including that with potentially Affected Communities and periodic training to ensure effective response

Performance Standards 1 and 4 require that project Owners also assist and collaborate with the potentially affected communities and the local government agencies in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to ensure effective response. Where local government agencies have little or no capacity to respond effectively, the Project Owner will play an active role in preparing for and responding to emergencies associated with the Project. The Project Owner will document its emergency preparedness and response activities, resources, and responsibilities, and will provide appropriate information to potentially Affected Community and relevant government agencies.

1.4 PLAN UPDATES

This EPRP has been prepared as part of the ESIA being submitted for government and public review. The plan is expected to be revised prior to the start of project construction, in consultation with local communities, applicable government agencies and GB Minerals' Engineering, Procurement and Construction Management (EPCM) contractor. The construction-ready EPRP will include the following additional information:

- Updates (if any) to the hazard identification/risk assessment (Section 2 of this plan)
- Facility evacuation plans and diagrams that include the location of key response resources (i.e., spill kits)
- Emergency Response Team (ERT) contact information
- Evacuation Plan including muster points
- Checklists

The emergency preparedness and response activities will be periodically reviewed and revised, as necessary, to reflect changing conditions.

2 – POTENTIAL EMERGENCIES

2.1 HAZARD IDENTIFICATION

An emergency is any unforeseen event which has the potential to (Workplace Safety North. 2010):

- Cause death or injury to employees, customers or members of the general public
- Disrupt or shut down business operations
- Physically damage equipment and/or the environment
- Jeopardize a company's financial viability
- Threaten a company's public image or reputation

An incident is any occurrence that has caused or has the potential to cause a negative impact on people, the environment, property, or mine production. It also includes deviations from standard operating procedures.

A risk assessment was prepared as part of the feasibility study undertaken by Lycopodium Miners Canada Ltd. (Lycopodium, 2015). The risk assessment identified the following potential hazards associated with the Project:

- First Aid or medical emergency
- Security concern
- Fire
- Natural disasters (flood, earthquake, adverse weather)
- Embankment failure
- Spillage of hazardous or potentially-hazardous materials
- Road incident or road obstruction
- Collisions of vehicles
- Ship collisions or groundings
- Criminal, sabotage or arson attack
- Security or geopolitical emergency
- Interruption to telecommunications system
- Interruption/failure of power supply

Occupational risks that do not constitute an emergency are to be managed under the Occupational Health and Safety (OHS) Plan.

During the detailed engineering phase and prior to construction, a mine hazard and operability study (HAZOP) will be completed that will identify potential hazards and identify project design changes to lower the risk incidents as low as reasonably achievable (ALARA).

2.2 POTENTIALLY IMPACTED INDIVIDUALS AND COMMUNITIES

The individuals and communities that may be impacted by an emergency in relation to the Project includes project employees and contractors, and any of the communities in the vicinity of the mine site, downstream of the mine along the River Cacheu, along the Product Transport Route, or near the port site including on the River Geba (Figure 1.1).

3 – RESPONSE PROCEDURES

3.1 EMERGENCY PREPAREDNESS AND PREVENTION

GB Minerals is committed to a prevention strategy of ongoing maintenance, inventory control, staff training, site security and vigilance of all aspects of the work. It is the responsibility of all health, social, safety and environmental (HSSE) staff to follow the emergency preparedness and prevention requirements.

The following activities and procedures will be standard practice for working at the Project sites:

- **Inventory Control -** All hazardous materials will be subject to strict inventory control from the time they depart the port of site to the time they reach their destination.
- **Safety Data Sheets -** All hazardous materials transported will have a Safety Data Sheet (SDS) accompanying the product in Portuguese and English.
- **Storage:** All transport containers will be suitable for the hazardous materials to be transported as set out in the manufactures' SDS.
- **Staff Reminders -** Pre-Job meetings/safety meetings will contain a component to constantly remind employees to look out for ways to improve environmental and safety performances.
- **Spill Kits:** Regularly maintained spill kits in trucks carrying hazardous materials will be available along with suitable communications equipment for haulage contractors in Guinea-Bissau.
- **A Health and Safety/Emergency Response Card -** Will be prepared and provided to all workers, to be carried at all times. This will set out:
  - Key policies and procedures
  - What to do in an emergency
  - Key contacts and telephone numbers
- **Local Emergency Services and Local Administrators -** Will be apprised of GB Minerals' emergency response plans and procedures with local emergency services and local administrations.
- **Emergency Response Plans -** Will be included in public consultation and disclosure activities.
- **Contractors -** Will have suitable communications equipment to enable GB Minerals to be immediately informed of, and react to, any incidents.

3.2 GENERAL EMERGENCY RESPONSE PROCEDURES

Figure 3.1 presents the basic response procedures with regards to an emergency situation. A designated person (such as the GB Minerals' HSSE Manager) will be identified for first response and their contact details made available through worksites, offices, the mine, the EPRP and on Emergency Response Cards. Details of the relevant emergency services will also be provided.

Emergency events can occur and develop rapidly, requiring personnel to act without obtaining guidance from supervisors.

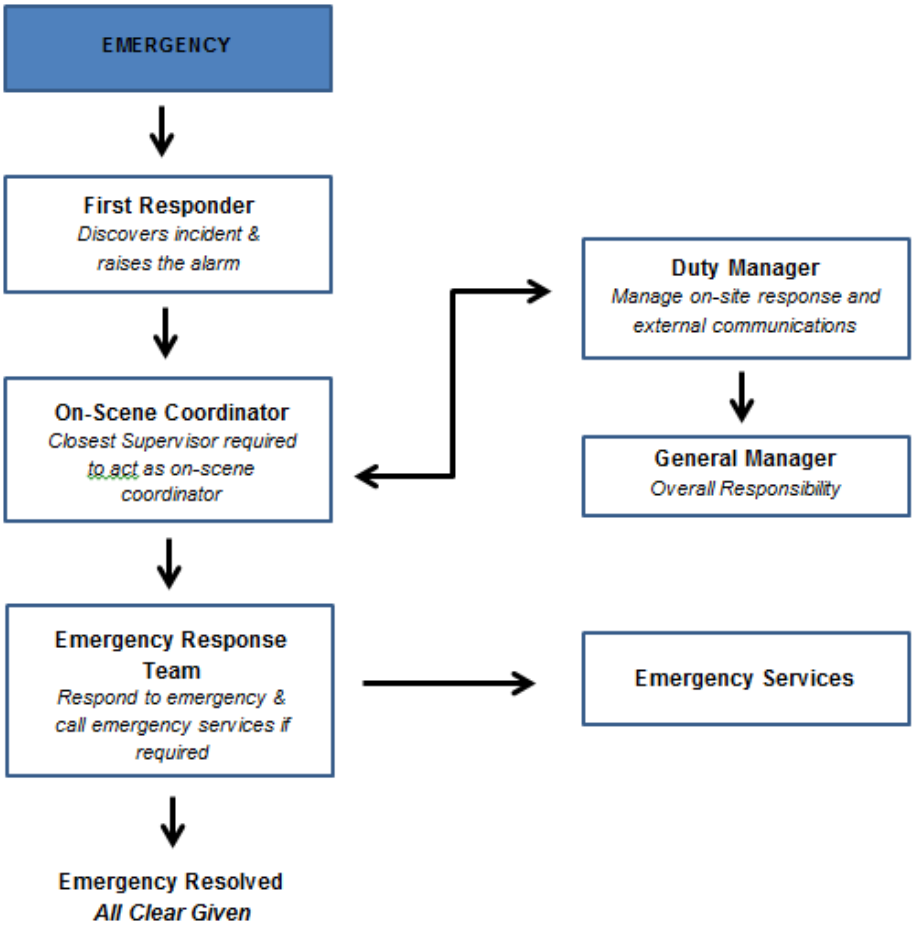


Figure 3.1 Emergency Response Procedure

3.2.1 Initial Assessment

On discovery of an incident, the On-Scene Coordinator will undertake an initial assessment of the emergency and collect the following key information:

- The nature of the incident
- What hazards are involved
- Who is in charge
- Location of the incident
- The physical situation
- Type of substances involved
- Injuries to people
- Environmental/social impact

The On-Scene Coordinator is the closest supervisor to the incident.

3.2.2 Emergency Communications and Coordination

In any emergency situation where there is an immediate threat to communities, personnel or the environment, the On-Scene Coordinator will notify the General Manager immediately (or the applicable Duty Manager and/or the HHSE Manager). The General Manager will dispatch the appropriate Duty Manager who will determine the appropriate plan of action depending on the severity of the emergency, the people affected, and the need to evacuate.

If there is a developing emergency or unusual situation, where an emergency is not imminent, but could occur if no action is taken, the General Manager (or if the General Manager is absent the HSSE Manager or applicable Duty Manager) is to be informed immediately. Once the emergency or unusual situation has been managed, the correct incident/near miss must be reported to the General Manager. If an emergency situation poses a direct threat to communities in the area, the Duty Manager and HSSE Manager (delegating to the Community Relations Specialist, when appropriate) will advise persons in the vicinity of the emergency to evacuate due to the potential risk. The appropriate authorities will immediately be notified of such an emergency evacuation.

3.2.3 Emergency Response Team

GB Minerals' ERT will be notified of the emergency and the Leader of the ERT is responsible for obtaining all emergency details from the On Scene Coordinator or any person announcing the emergency. The ERT will respond accordingly to any emergency situations and report to the location as per direction of the ERT Leader with emergency equipment/supplies if conditions permit. The ERT are responsible for *response* during the emergency, i.e., stopping and containing spills, medical services, firefighting, or conducting rescue operation.

3.2.4 Emergency Situation - 'All Clear'

Typically, the ERT will remain in control until the emergency is determined to be over, i.e., medical response to all injured persons is complete, fires are out, spills are stopped and contained, any other situation prompting the emergency is under full control, and the chance of a recurring emergency is deemed minimal. It is the Leader of the ERT who will determine when the emergency is over and the "All-Clear" can be issued.

3.2.5 Post Emergency Mitigation

Once the emergency has been declared to be over, the typical ERT's actions will include:

- Documentation of the incident.
- Initiation of the emergency incident investigation, reporting, and record keeping.
- Initiation of clean-up which will be the responsibility of the Safety and Environment Department who will also develop a clean-up plan with the involvement of the ERT.
- Immediately provide for treating, storing or disposing of recovered waste, contaminated soil or surface water, or any other material that results from the incident.
- Follow-up communication with outside emergency response personnel including notification to any outside agencies or emergency response personnel which were notified during the emergency that operations are about to resume.
- Ensure that all emergency equipment is cleaned or replaced, and is fit for use before operations are resumed.

The clean-up and decontamination after the emergency has been declared over is the responsibility of the HSSE Department.

3.2.6 Evacuation

An Evacuation Plan will be developed and incorporated into a future revision of this plan, detailing the thresholds for triggering evacuation and the procedures to be followed. The Evacuation Plan may be triggered automatically by fire or gas detectors or manually by an individual or site management upon awareness that an incident requires evacuation. If site management, the Duty Manager will be responsible for determining if evacuation is required, and to implement evacuation procedures. A site-wide notification and alarm system will be established. A general evacuation will go into effect upon the sounding of an alarm at any or all of the buildings and facilities on site.

Muster stations will be established clearly around the Project area and site personnel will have been made aware of them during orientation and follow-up training programs. Primary evacuation from the various project areas and mine sites will be by road.

3.3 SPECIFIC RESPONSE PROCEDURES

3.3.1 First Aid and Medical Emergencies

Basic first aid training will be provided to all staff, contractors and consultants by their respective employers. At least one member of each working team must be qualified first-aider. Each working team must be equipped with the appropriate level first aid kit. In the case of medical emergencies, the Medical Emergency Response Plan will be implemented as illustrated in Figure 3.2.

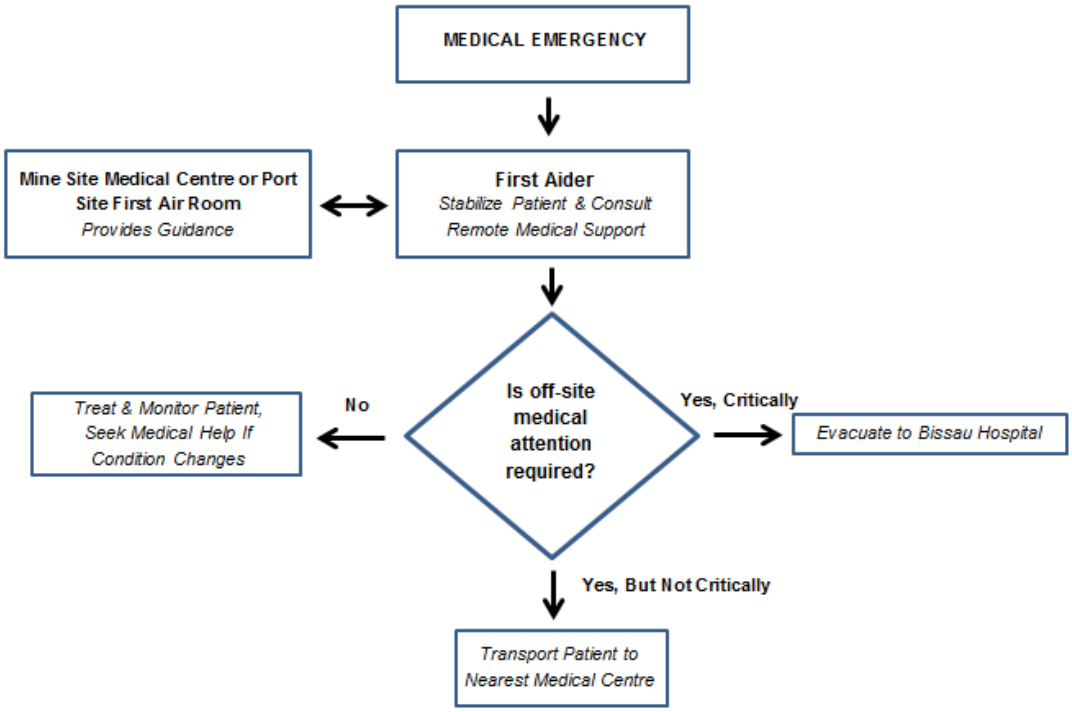


Figure 3.2 Medical Emergency Response Procedure

At the discretion of the General Manager, the GB Minerals Medical Centre may treat local residents on a strictly exceptional basis, but the objective is for all medical treatment to be provided by local health care practitioners.

3.3.2 Security Emergencies within the Local Area

In the event of a security emergency within the local area the following procedures will be implemented:

- The General Manager will announce a security emergency and an “emergency stand down” will be implemented.
- All workers and contractors will withdraw to secured sites (such as the accommodation area and processing plant) and await further instructions.
- The General Manger will liaise with government and security force representatives to determine the nature and likely duration of the security emergency and an event-specific action plan will be prepared and implemented. This may include, but not be limited to a range of actions such as:
  - Resumption of normal working activities
  - Increasing site security and security of in-bound and out-bound transportation
  - Evacuation of non-essential personnel and placement of operations on care and maintenance until the temporary security emergency is resolved

3.3.3 Fire Preparedness, Prevention and Response

Fires may occur in the area due to: lightning strikes; an accidental industrial fire within the mine or port sites; or due to human-set fires to clear land for farming or cashew plantations.

A HAZOP will have been completed to reduce the risk of on-site industrial fires from occurring, and the mine will be equipped with firefighting equipment and ERT members trained in firefighting to address plausible mine site fire scenarios.

Fire prevention and protection is intended to guide workers on effective fire protection during mining activities and transport. The following requirements and activities are considered the minimum requirements for fire prevention and protection:

- Selection and use of portable fire extinguishers.
- Providing, maintaining, checking and inspecting fire extinguishers and other fire control devices.
- The segregation of non-compatible materials.
- Providing and maintaining adequate access into storage areas and other facilities.
- General housekeeping and the disposal of waste and other debris.
- The hazardous materials stores will not be allowed to accumulate unnecessary combustible materials.
- Solid waste will be removed at regular intervals.
- Metal bins with close-fittings lids will be provided for oily rags, wood shavings, and other highly-combustible wastes.
- Control of vegetation or other developments which may have vulnerability to fire.
- Fuel storage in appropriate containers.
- Providing and maintaining fire warning signs as necessary.
- Clear instruction to the personnel for fire protection and prevention.

- Instruction and training on the use of fire extinguishers.
- Electrical equipment should be checked regularly for defects.
- Smoking is prohibited in or near vehicles, or any working areas/sites.
- Open fires and/or burning of materials are strictly prohibited.
- Proper bonding and grounding techniques will be used for any operation where static electricity could become an ignition source.
- SDS will be available for all kind of dangerous products (including flammable); the SDS will describe which type of fire extinguisher must be used in case of a fire.
- Adequate availability of first-aid firefighting equipment in order to suppress/contain fire spread in the event of any outbreak of fire at any point on or adjacent to the site under his control.
- Prompt warning of an outbreak of fire will be advised to personnel in accordance with the EPRP
- Establishment of an ERT to respond to any fires.

Should signs of a fire be observed, the first responder will notify the Duty Manager, who will assume the position of On-Scene Coordinator and notify the ERT to respond to the fire. If the fire has the potential to spread off-site, the Duty Manager will notify local authorities in adjacent villages, and implement evaluation procedures (Section 3.5).

The potential of an off-site fire, caused by lightning or intentionally set, is likely a greater risk to both the mine and adjacent villages. Human-set fires are set regularly, though evidence of such fires becoming out of control and spreading has not been seen. Should signs of a fire be observed off-site, the first responder will notify the Duty Manager, who will assume the position of On-Scene Coordinator. The Duty Manager will notify workers and local authorities in adjacent villages, and evaluate the potential risk of the fire to affect community and worker safety and property. The mine will provide support to local off-site firefighting efforts to the extent possible without putting the mine at undo risk.

3.3.4 Natural Disasters

Potential natural disasters include floods and earthquakes. In the event of a natural disaster or severe weather causing damage to a facility and possibly requiring evacuation, the Duty Manager assumes the position of On-Scene Coordinator. All site employees must follow the Duty Manager's (or designates) directions through the emergency broadcast system or other means.

3.3.5 Spill Prevention and Response

The following provisions will be built into the Project design to minimize the potential for spills:

- In accordance with manufacturers design protocols, shut-off valves will be installed on all tanks.
- Operators of these control systems will be appropriately trained in order to be able to identify and to react to indicators for spillages.
- Visual inspections of tanks, pipes and associated equipment will be routinely carried out and any non-conformances reported to the Environment Manager. Records of all inspections will be kept by the Environmental Engineer.
- Visible leaks which result in a loss of chemicals from a tank will be promptly reported and addressed.

The following general procedures will be adopted for **transport of hazardous materials**:

- SDSs for all hazardous materials including a summary of the physical and chemical properties of the materials held will be included with the shipments. The vehicles will also be equipped with the appropriate safety signage. This will ensure that the driver understands the hazards associated with the cargo and the potential hazards posed by them both to humans and the environment; this will include details on the segregation of potentially reactive materials. SDSs will be held in Portuguese.
- Containers will be appropriate for the material being shipped and will be properly secured.
- Containers and trucks will be properly marked, labelled and placarded.
- Manifests will be maintained in accordance with International best practices.
- Appropriate Personal Protective Equipment (PPE) will be made available to personnel involved in the transport of fuel and hazardous substance handling operations; all relevant personnel will be trained in the use and maintenance of protective equipment.
- All trucks will be equipped with fire extinguishers and personnel will be trained in their use.
- Hazardous substance cargos will be protected during transport from rainfall and direct sunlight.
- Materials will be clearly labelled and appropriately segregated on or between trucks (e.g., potentially reactive materials will be kept separate).
- All suppliers to the Project will provide GB Minerals with:
  - All pertinent data necessary to ensure maximum protection of the environment, health and safety during transport.
  - Instructions in the use, operation, storage, transportation, handling and disposal of the goods supplied, sufficiently clear and specific for use by non-technical personnel and in the appropriate language.
  - Appropriate shipping certification.
  - Labelling in compliance with any Hazardous Materials Information System prepared for GB Minerals.
- Hazardous materials or goods containing hazardous materials will be packed, documented and marked strictly in accordance with statutory requirements or the laws and regulations of all parties having jurisdiction over the goods.
- No smoking, fire prevention and management practices will be developed specific to the materials being transported.

Response to spills will include the following provisions:

- A qualified individual will be assigned with responsibility for spill prevention and response i.e. to co-ordinate and lead the team.
- The EPRP will be reviewed by qualified and experience professionals familiar with the facilities, to confirm that the EPRP has been prepared in accordance with best practice.
- Details of the EPRP will be discussed with local communities through the ongoing program of community consultation and led by the Community Programs Officer.
- The EPRP will be discussed with the local emergency services and, as appropriate, annual reviews will be undertaken. This is particularly important in the early stages of the Project as the site is developed and import requirements for raw materials, including chemicals, are variable.
- Sufficient spill response equipment will be maintained to ensure that contingency stocks are available in the event of a major spill requiring emergency response.

- Responsibilities are assigned for maintaining and regularly updating the inventory of the available equipment for spill response.
- All response procedures include clear responsibilities for immediate actions to be carried out by the operator detecting the spill, and will provide advice on any actions, which may only be carried out by the ERT.
- SDSs will be maintained on site for all potentially hazardous materials; staff will be familiar with both the content and location of the SDSs.
- The location and phone numbers for the ERT, fire service and other appropriate emergency services will be clearly visible in all operational areas.

In the case of small spills, which can be mitigated with readily available clean-up equipment, operators will be responsible for initiating immediate clean-up action, notifying HSSE staff, and completing an incident report.

After identification and reporting of a significant spill, the ERT will be deployed immediately in order to eliminate the source of the spill and to perform emergency response measures for preventing further migration of hydrocarbons and other pollutants into soil and/or water. The general response procedures for spills to soil will be as outlined below:

- The source of the spill is closed or, where immediate closure is not possible, isolated by appropriate catchment provisions.
- The spilled material will be contained using booms, earthen dams, or other techniques.
- For oils, free product will be recovered as technically feasible. This may involve special seasonal and regional provisions. Sorbent material, such as synthetic sorbents, may be used to soak the free oil for small-scale spills.
- Once contamination has been removed from the soil, the soil will be remediated in accordance with accepted remediation procedures so that it prevents no significant risk to the environment.

The **general response procedures for spills to surface water** will be as outlined below:

- The source of the spill is closed or, where immediate closure is not possible, isolated by appropriate catchment provisions.
- For contaminants such as free oil, these will be contained by permanent booms.
- Such free oil will be recovered by pumps, and then transferred to oil preparation facilities for separation and further processing.
- Residual oil in the water may either be burnt or recovered using sorbent material.
- If sorbent material is utilised, then the spent sorbent material should subsequently be disposed of in accordance with accepted procedures.
- Once free oil has been removed, the banks will be remediated in accordance with accepted procedures.

The general response procedures for spills involving grease, solvents, reagents or other hazardous materials in the maintenance areas, fuel storage areas or transfer areas will be to clean up the spill using absorbent materials and place the materials in appropriate storage containers for disposal. The area of the spill will not be washed and dispersed with water.

A process of **decontamination** will be undertaken following the response to a spill of hazardous substances. Employees involved in the incident, emergency response personnel, emergency

response equipment, buildings, process equipment, containment pads, and floors all may come in contact with hazardous materials. Employees, emergency response personnel, and equipment must be decontaminated of all chemicals and dusts prior to returning to normal operations.

The equipment cleaning will typically consist of a rinse down of the equipment with a mildly alkaline solution; however, SDS should be consulted to provide guidance on decontamination. The equipment will be scrubbed as necessary to remove any solids. The On-Scene Coordinator and the clean-up plan must ensure that the resulting washing liquids are handled and disposed of properly. Care should be taken to perform decontamination within permanent or temporary containment systems to prevent further soil and/or surface water contamination.

The ERT will be responsible for mitigation actions in conjunction with the HSSE Department and the Community Relations Specialist; however, the community stakeholders will be involved in the planning and clean-up process. If there has been an impact on third party land, once all appropriate stakeholders have been identified, a clean-up committee will be established lead by the Community Relations Specialist. The committee will establish the scope, authority, work plan and schedule of the clean-up.

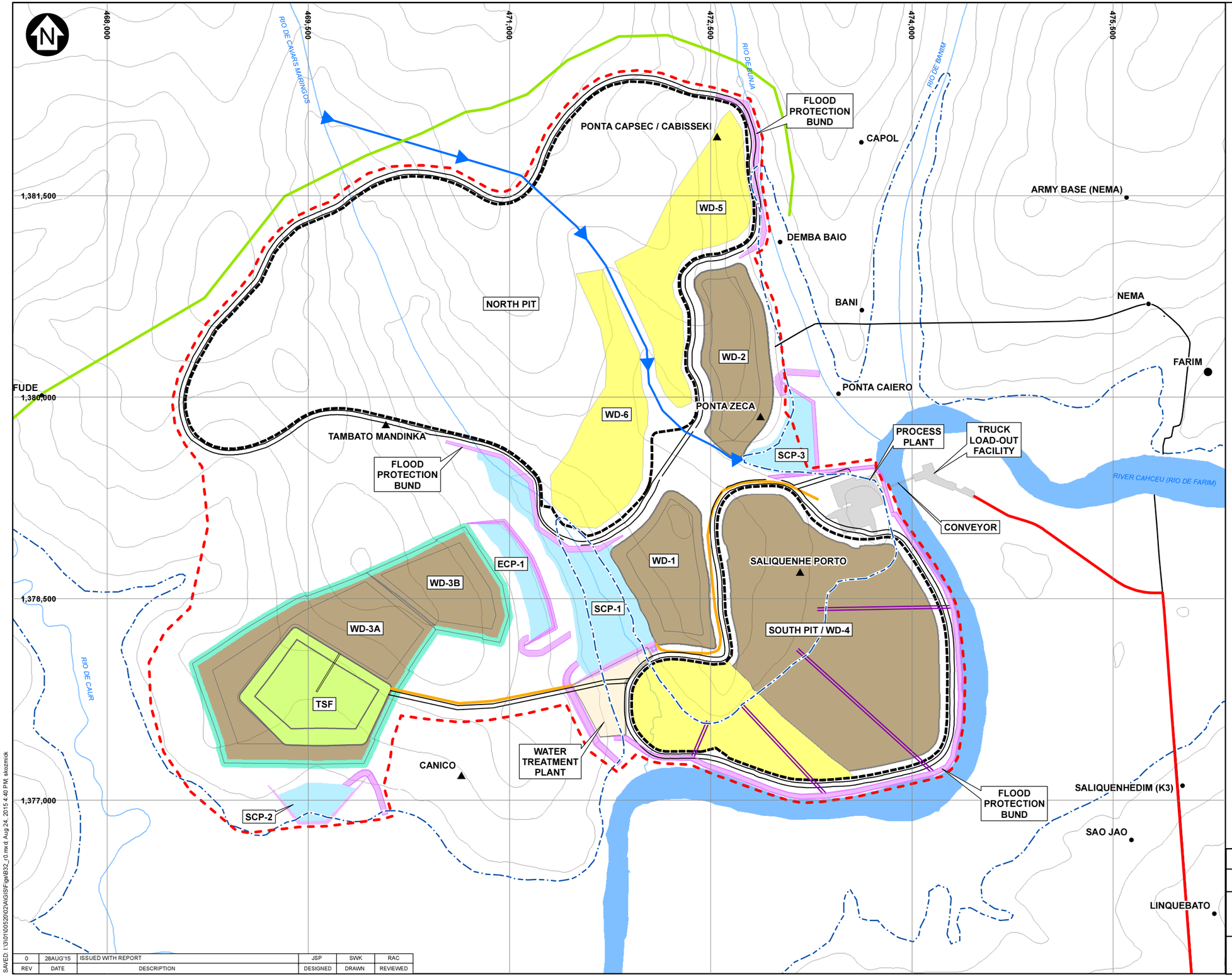
3.3.6 Open Pit Flooding

It is critical to keep the mining areas dry to protect workers within the pits. Both open pits are subject to flooding from groundwater seepage and direct precipitation falling into the pits. The south pit is also susceptible to flooding as it is located within the floodplain of the River Cacheu (Figure 3.3).

Perimeter dewatering wells will be installed to remove most of the groundwater that would otherwise seep into the pits, but a portion will bypass the perimeter dewatering wells. During the rainy season, direct precipitation will enter the pits. Water within the pits will be directed to in-pit sumps and will be pumped to the mine's water management system for testing, recycling, or treatment prior to discharge to the environment.

The primary mitigation measure for minimizing the risk of pit flooding is to cease mining during the heaviest of rainfall events, which will normally occur during the months of July and August, when much (up to 70%) of the annual rainfall occurs. The mine plan allows for 10 days in which mining operations would cease due to heavy rainfall, since when mining is difficult and less safe under these conditions. It will also allow the mine to redirect resources to water management, if necessary.

The south pit is located within the floodplain of the River Cacheu, and is therefore subject to the additional risk of flooding. A perimeter flood protection bund will be constructed and maintained between the river and the pit. A diversion of the ephemeral Rio de Cavaras Marinhos will be constructed across the backfilled east side of the north pit in Year 20, and a flood protection bund constructed across the original channel to allow for mining in that area of the north pit.



LEGEND:

- COMMUNITY
- VILLAGE TO BE RESETTLED
- EXISTING ROAD
- HAUL ROAD
- INFRASTRUCTURE
- WATER MANAGEMENT FACILITY
- PRODUCT TRANSPORT ROUTE
- TAILINGS AND DECANT RETURN PIPELINE TRENCH ALIGNMENT
- TEMPORARY FLOOD PROTECTION BUND
- PROPOSED BYPASS ROAD
- 100 m FENCELINE
- DIVERSION CHANNEL
- RIVER/STREAM/DRAINAGE
- WATER
- POND EXTENT
- TAILINGS STORAGE FACILITY
- PERMANENT WASTE DUMP
- TEMPORARY WASTE DUMP
- INTEGRATED WASTE LANDFORM
- 1 IN 100 YEAR FLOODPLAIN EXTENT
- OPEN PIT EXTENT

NOTES:

1. MINE INFRASTRUCTURE AND BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). UPDATED AUGUST 17, 2015 BASED ON FIGURES PROVIDED BY KNIGHT PIESOLD PERTH.
2. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.
3. CONTOUR INTERVAL IS 5 METRES.
4. IWL - INTEGRATED WASTE LANDFORM
   TSF - TAILINGS MANAGEMENT FACILITY
   WD - WASTE DUMP
   ECP - ENVIRONMENTAL CONTROL POND
   SCP - SEDIMENT CONTROL POND

SCALE 250 125 0 250 500 750 1,000 1,250 1,500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28AUG'15	ISSUED WITH REPORT	JSP	SWK	RAC

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GB MINERALS LTD.

FARIM PHOSPHATE PROJECT

MINE SITE GENERAL ARRANGEMENT

Knight Piésold CONSULTING

P/A NO. NB301-520/2 | REF NO. 12

FIGURE 3.3 | REV 0

If either of these bunds were to fail, there is the potential loss of life with workers in the pits. The embankments will be engineered structures designed and constructed in accordance with established guidelines (such as the Canadian Dam Association's Dam Safety Guidelines; CDA, 2011), and based on site geotechnical, hydrogeological, hydrometeorological, and seismic information. Instrumentation will be installed in the berms to monitor the structural integrity and provide an early warning for potential issues. Daily visual inspections of the embankments will be conducted. The monitoring requirements and other mitigation measures will be detailed in the Operation, Maintenance and Surveillance (OMS) Manuals developed for each embankment. Development of the OMS Manuals will provide a detailed update to this EPRP to reflect appropriate site procedures.

A water level gauge will be operated on the River Cacheu that will be equipped with an alarm to the main control centre/office, to notify mine staff if the elevation of the river due to flooding is approaching an unsafe level (such as the designed freeboard of the flood protection bund). Site procedures will include notification criteria for workers to evacuate the pit in case of potential flooding.

3.3.7 Embankment Failure

In addition to the flood protection measures described above, there will be a number of other embankments (i.e., dams) located at the site as follows (Figure 3.3):

- Tailings storage facility (TSF), and outer embankments of waste dumps (WDs)
- Sediment Control Dams (SCDs) and an Environmental Control Dam

As described in Section 3.3.6, these embankments will be engineered structures designed and constructed in accordance with established guidelines based on site information. An OMS Manual for each embankment will prescribe operational, maintenance and surveillance requirements based on the level of risk and consequence assigned to each structure.

An embankment failure could result in the release of sediment-laden water, water with metals concentrations exceeding applicable discharge criteria, or tailings solids. From the position of most of the embankments, such a release would report to one of the nearby tributaries of the River Cacheu or the River Cacheu itself (Figure 3.3).

Land users are not expected to be located downstream of these structures during their operation, so loss of life is low, but effects to water quality as well as social and livelihood effects could occur to downstream agricultural lands or fishing activities.

The Mining Manager has primary responsibility for the operation of the TSF, WDs and associated water management facilities and implementation of the Water Management Plan. As such, the Mining Manager is the Duty Manager responsible for emergency preparedness as well as triggering emergency response measures related to these project components. The HSSE Manager will support the Mining Manager by providing expert advice regarding environmental and social matters, and assisting in the implementation of response measures. Emergency response procedures will be based on the general response procedures along with provisions for notification of downstream land users, evacuation and spill response. Preventative actions will be developed to protect the public from unknowingly being affected by the situation (e.g., possibly by restricting access to downstream

waterways). GB Minerals will work closely with the appropriate authorities to ensure that notification of downstream-affected persons is timely and comprehensive.

3.4 COMMUNITY EMERGENCY PREPAREDNESS AND RESPONSE

GB Minerals will provide information to local communities and authorities on GB Minerals' strategy for emergency preparedness and response through the provision of information in the areas of:

- Transport accidents
- Security and the use of force
- Crimes and violence
- Health and wellbeing
- Road safety and traffic awareness

To minimize the impacts of emergency situations on local communities, GB Minerals will work with communities and local administrators to identify an effective emergency alert system for the Project. Potentially affected communities will be provided with information regarding the potential hazards of project activities and the agreed upon project responses. Communities will also be informed of the ERT and their responsibilities in response to an offsite emergency.

GB Minerals will look for opportunities to work with communities in a collaborative manner to develop action plans for their preparedness and response in an event of an offsite emergency. For example, participative workshops and emergency response demonstrations can be carried out in project-affected communities. GB Minerals will investigate sponsoring a Road Safety and Traffic Awareness Campaign, for villages and towns affected by project-related traffic to reduce the risk of accidents.

3.5 MITIGATION EFFECTIVENESS AND ADAPTIVE MANAGEMENT

It is expected that the mitigation measures identified above will be effective in providing the required emergency prevention and response.

The Project is committed to continual improvement in its activities and the goal of reducing risks to the environment and improving operational effectiveness. The strategy employed will be regular monitoring supported by operational change and adoption of other mitigating measures as required.

Management reviews of the EPRP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the management plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

4 – RESPONSIBILITIES AND RESOURCES

4.1 KEY ROLES AND RESPONSIBILITIES

The roles and responsibilities of GB Minerals' staff with respect to emergency preparedness and response are outlined in Table 4.1.

Table 4.1 EPRP Roles and Responsibilities

Responsible Party	Roles and Responsibilities
General Manager	• Overall responsibility for enforcing EPRP implementation • Review emergency preparedness and response procedures with HSSE Manager on a regular basis
Duty Manager	• Manage on-site response and external communications
Supervisor (On-Scene Coordinator)	• Closest Supervisor to act as on-site coordinator • Contact and coordinate the Emergency Response Team
HSSE Manager	• Distribute the EPRP to all parties with implementation responsibilities • Maintaining the EPRP; review regularly with the General Manager • Review monthly spill and incident reports • Review contracts before signing to confirm EPRP and OHS requirements • Review quarterly report of contractor practices • Develop and deliver emergency response training • Lead any reviews or investigations into reported incidents and ensure proper response is being followed including reporting and review
Environmental Superintendent	• Support HSSE Manager in emergency response planning and the development of training and management plans, focusing on relevant environmental issues • Provide regular spill and accident reporting
Health & Safety Superintendent	• Support HSSE Manager as required • Schedule monthly inspections and audits and resolve issues
Security Manager	• Provide local management and coordination of security for personnel • Deliver security induction briefings for new employees, contractors and visitors • Provide training on security procedures and security awareness training to relevant personnel with a role in security • Implement security risk mitigation measures and procedures • Maintain local security plans to ensure they remain up-to-date • Assist with investigations on incidents when requested • Provide security support to Government and expatriate personnel • Provide field-level security advice and assistance with planning • Be the focal point for security issues in the field and at camp • Maintain and develop local information network to understand potential security issues as well as community concerns
Community Relations Specialist	• Assist with external communications under the direction of the Duty Manager
All Staff	• Provide first response if first on the scene • Select staff will be recruited for the Emergency Response Team
Contractors	• Responsible for following the procedures and requirements of the EPRP

4.2 RESOURCES

GB Minerals will have the following internal resources to respond to an emergency:

- An ERT including emergency response and firefighting vehicles and equipment
- Shelter and power supply
- Mining, other heavy equipment, vehicles
- Maintenance facilities and bulk fuel storage to supply equipment and vehicles
- Employees, including project managers, engineers, tradesmen, equipment operators, and unskilled and semi-skilled labourers
- Medical services staffed with a doctor, nurses and first responders and equipment with an emergency services vehicle (ambulance)
- Modern communication systems
- Security contractor

In addition, the following external resources have been identified:

- Local residents, including leaders, technical experts and farmers
- Medical doctor in Farim and hospital in Bissau
- Civil contractors based in Bissau and in Senegal
- Police and National security forces (i.e., Navy)
- National experts within government and the private sector
- Power generation facilities in Farim and Bissau

4.3 TRAINING

Emergency preparedness training will, at a minimum, address the following:

- Medical emergency, accident or fatality
- Fuel and lubricant spill or effluent spill or leak
- Firefighting
- Flood
- Earthquake
- Missing person(s)

To accomplish this, the following will be implemented:

- All employees will be introduced and instructed on the policies and procedures established with this plan.
- All employees and contractors will be provided with basic training in spill and emergency response.
- Additional specialized training will be provided to plant operators and key personnel.
- All employees, contractors and visitors will be introduced and instructed on the policies and procedures established with this plan. Area specific inductions will be given to individuals working in high risk activity areas such as the mill, the open pit, or the stores or warehouses.
- Safety and environmental concerns and awareness will also be discussed at every safety meeting and at the start-up of any new operations that may affect the environment. If an incident happens all employees will be informed and re-instructed and retrained as deemed necessary.

- The training for spill response will be part of the driver training; all drivers will be made aware of the products which will be transported and the SDS.
- Supervisors who will fill the role of Spill Response Coordinator, the Spill response Supervisor and the clean-up crew will receive a more detailed training allowing them to respond quickly and safely to any spill on the site; specified disaster response teams will receive additional training as well.
- All employees on site will have valid workplace hazardous materials training certificates and will be familiar with SDS.
- Drills and practice will include planned and unplanned mock drills.
- GB Minerals will ensure that all drivers are trained in the GB Minerals emergency response procedures, in particular the procedures following a road traffic accident, and basic techniques of first aid.
- GB Minerals will also ensure appropriate specialized training for drivers carrying hazardous materials.
- Site personnel and drivers will undertake periodic testing of the emergency response procedures using mock drill scenarios. These tests will be undertaken on a twice-yearly basis. These intervals will be more frequent if there is a high turnover of employees. The outcome of each exercise will be recorded, and reviewed for areas of improvement by the responsible person for the respective area.

5 – MONITORING AND REPORTING

5.1 MONTHLY REPORTING

Regular EPRP monitoring and monthly reporting will be undertaken by the HSSE Manager (or designate) and submitted to the General Manager. Reporting will include:

- A summary of activities undertaken during the reporting period
- Any deviations or non-compliances to the EPRP
- Planned activities during the next reporting period
- Any other issues of concern

This information will be summarized in the Annual ESMP Monitoring Report.

5.2 EMERGENCY INCIDENT INVESTIGATION AND REPORTING

During any emergency incident, documentation of the emergency begins with the initial report of the emergency by the first responder. Key persons keeping a log of the incident include the Security personnel taking the call and the Leader of the ERT, who immediately begins a log of the incident and of the emergency response at the scene.

All of these documents, as well as others generated throughout the emergency, become part of the emergency record. In addition, emergencies must be investigated and documented, and corrective actions taken to ensure that such emergencies can be prevented in the future. Once the emergency is declared over by the ERT, the incident investigation process begins, under the direction of the Leader of the ERT, with the purpose of:

- Determining the root cause of the emergency
- Determining if appropriate emergency response was taken
- Determining if the EPRP, ERT preparedness and emergency procedures were adequate or need to be modified
- Determining corrective and preventative actions to prevent recurrence

The reporting and investigation of all potential and actual incidents is required so that a cause investigation and corrective action can be undertaken. The results of investigations of incidents will be used to revise and update this EPRP.

6 – REFERENCES

Canadian Dam Association, 2011. *Guidelines for Public Safety Around Dams*. ISBN 978-0-9680811-8-1.

Workplace Safety North, 2010. *Emergency Response Planning for Surface Mines*.

7 – CERTIFICATION

This report was prepared and reviewed by the undersigned.

Prepared:

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Senior Environmental Scientist | Associate

Reviewed:

Steven R. Aiken, P.Eng.
Manager, Environmental Services

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Approval that this document adheres to Knight Piésold Quality Systems:

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3L
PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN

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NB301-520/2-10
Rev 0
September 8, 2015

Knight Piésold CONSULTING
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ISO 14001 - EMS 550121
OHSAS 18001 - OHS 550122

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
NB301-520/2-10

Rev	Description	Date
0	Issued in Final	September 8, 2015

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 GENERAL 1
1.2 CLOSURE PLANNING APPROACH 2
1.3 REGULATORY CONTEXT 3
1.4 CLOSURE OBJECTIVES 6
1.5 CLOSURE SCENARIOS 7

2 – BASELINE SUMMARY 8
2.1 ATMOSPHERIC CONDITIONS 8
2.2 TOPOGRAPHY, GEOLOGY AND HYDROGEOLOGY 8
2.2.1 Topography 8
2.2.2 Geology of the Farim Phosphate Orebody 8
2.2.3 Groundwater Conditions 9
2.3 AQUATIC ENVIRONMENT 10
2.3.1 Mine Site Aquatic Environment - River Cacheu and Tributaries 10
2.3.2 Port Site 11
2.4 TERRESTRIAL ECOLOGY 11
2.4.1 Flora 11
2.4.2 Fauna 13
2.4.3 Summary of Species of Conservation Concern 14
2.4.4 Exotic Species 14
2.4.5 Ecological Function and Conservation Importance of the Mine Site and Port Site Areas 14
2.5 SOCIO-ECONOMIC CONDITIONS 15
2.6 CULTURAL HERITAGE 16

3 – PROJECT DESCRIPTION 17
3.1 PROJECT SUMMARY 17
3.2 MINE LEASE BOUNDARIES 18
3.3 GEOCHEMISTRY OF ORE, TAILINGS AND WASTE OVERBURDEN 22
3.4 RADIOLOGICAL CHARACTERISTICS OF ORE, TAILINGS AND OVERBURDEN 23
3.5 MINING ACTIVITIES 23
3.6 PROCESS ACTIVITIES 24
3.6.1 Mine Site Process Overview 24
3.6.2 Port Site Process 24
3.7 BUILDINGS AND OTHER STRUCTURES 27
3.7.1 Mine Site Infrastructure 27
3.7.2 Port Site Infrastructure 28
3.8 TAILINGS STORAGE FACILITY 30

3.9 WASTE OVERBURDEN DUMPS 30
3.10 TOPSOIL STOCKPILES 32
3.11 SOLID WASTE MANAGEMENT 32
3.12 SURFACE WATER MANAGEMENT 32
3.12.1 Management of Non-Contact Water 32
3.12.2 Management of Sediment-Laden Water 33
3.12.3 Management of Contact Water 33

4 – PROGRESSIVE RECLAMATION 35
4.1 PROGRESSIVE RECLAMATION MEASURES 35
4.2 CLOSURE RESEARCH PROGRAMS AND FURTHER STUDIES 36

5 – TEMPORARY SUSPENSION OF OPERATIONS 37
5.1 OVERVIEW 37
5.2 SITE ACCESS AND SECURITY 37
5.3 OPEN PIT 37
5.4 SECURING OF MECHANICAL, HYDRAULIC AND ELECTRICAL SYSTEMS 37
5.5 CONTROL OF EFFLUENTS 37
5.6 STOCKPILES 38
5.7 TAILINGS, WATER AND OTHER IMPOUNDMENT STRUCTURES 38
5.8 SCHEDULE FOR IMPLEMENTATION OF TEMPORARY SUSPENSION 38

6 – FINAL RECLAMATION MEASURES 39
6.1 OVERVIEW 39
6.2 OPEN PITS 39
6.2.1 South Pit 39
6.2.2 North Pit 41
6.3 INTEGRATED WASTE LANDFORM AND WASTE DUMPS 41
6.4 INDUSTRIAL INFRASTRUCTURE 42
6.5 ACCESS AND HAUL ROADS 42
6.6 WASTE MANAGEMENT FACILITIES 43
6.7 WATER MANAGEMENT 43
6.8 PORT SITE 44
6.9 SOCIO-ECONOMIC ASPECTS 44

7 – POST-CLOSURE MONITORING AND MAINTENANCE 45

8 – RELINQUISHMENT CRITERIA 47

9 – FINAL CLOSURE COST ESTIMATE 48
9.1 OVERVIEW 48
9.2 ASSUMPTIONS 49
9.3 CLOSURE FUNDING OPTIONS 50

10 – REFERENCES 51

11 – CERTIFICATION 53

TABLES

Table 2.1 Indicative Site Stratigraphy 9
Table 3.1 Mining Lease Coordinates 18
Table 3.2 Waste Overburden Disposal Plan 31
Table 8.1 Relinquishment Criteria 47

FIGURES

Figure 1.1 Project Location Map 1
Figure 1.2 Project Zone of Influence 4
Figure 1.3 Closure Planning Process 5
Figure 3.1 Mine Site Layout - Year 7 - Near End of South Pit Mining 19
Figure 3.2 Mine Site Layout - Year 25 - Near End of North Pit Mining 20
Figure 3.3 Port Site Layout 21
Figure 3.4 Process Block Flow Diagram 26
Figure 6.1 Mine Site - Post Closure Conditions 40

APPENDICES

Appendix A Closure Cost Estimate

ABBREVIATIONS

the Project	Farim Phosphate Project
API	American Petroleum Institute
ECP	Environmental Control Pond
ESIA	Environmental and Social Impact Assessment
FS	Feasibility Study
HV	High Voltage
IFC	International Finance Corporation
IOB	In-pit Overburden Backfill
IWL	Integrated Waste Landform
LOM	Life-of-Mine
LV	Low Voltage
MRCP	Mine Reclamation and Closure Plan
ROM	Run-of-Mine
SCP	Sediment Control Pond
TSF	Tailings Storage Facility
WD	Waste Dump

1 – INTRODUCTION

1.1 GENERAL

This preliminary Mine Reclamation and Closure Plan (MRCP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

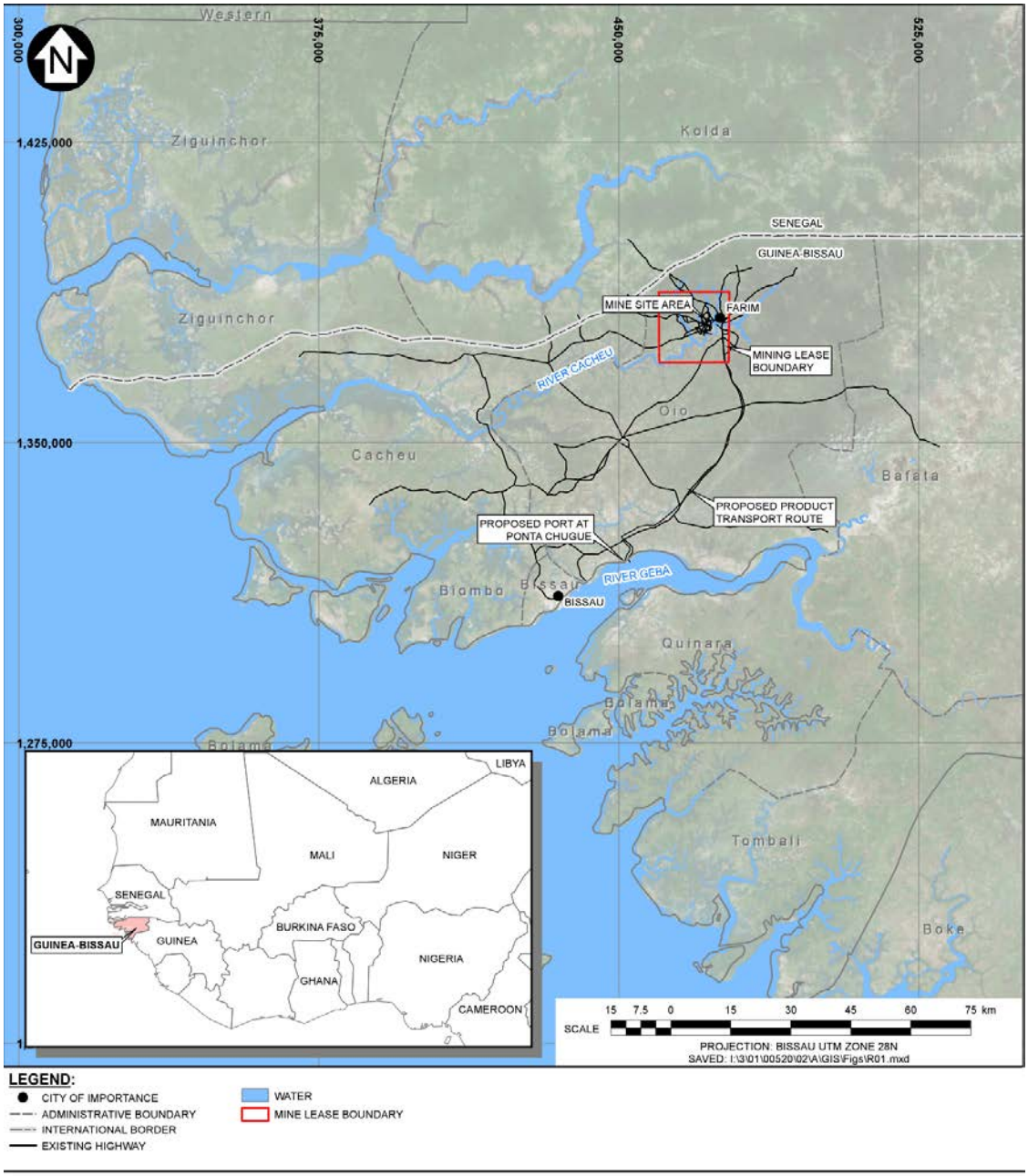


Figure 1.1 Project Location Map

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared to evaluate and address the proposed project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has also been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans, and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** These are a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions and operational standards for executing the discipline-specific management plans.

The MRCP is an integral part of the Project and acting as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, the results of additional studies, and monitoring.

The Project consists of the construction, operation and closure of a proposed open pit mining operation to exploit the Farim phosphate orebody within two open pit mines (the south pit and north pit), a process plant at the Mine Site to beneficiate the ore into a phosphate rock concentrate (product), and an associated port facility to export the product to customers. The mining production rate will be 1.75 Mt/a of ore, which will be beneficiated to produce 1.32 Mt/a of product.

The three main project components (Mine Site, Product Transport Route, and Port Site) and the Project's anticipated zone of influence are shown on Figure 1.2.

Reclamation of the Mine Site and related project components will be carried out at the end of the 26-year operation phase over a 2-year active closure period. Mine closure would also be implemented should the mine close prematurely at any time during the life of the Project.

An approximate 5-year post-closure monitoring period will follow active closure, and will consist of environmental and social monitoring to ensure mine closure objectives have been met.

This Preliminary MRCP is based on the Project design presented in a feasibility study (FS) (Lycopodium, 2015), and draws on a previous MRCP prepared by Golder Associates (Golder) (UK) Ltd. for the Farim Phosphate Project (Golder, 2014a).

1.2 CLOSURE PLANNING APPROACH

Closure planning is an integral component of the Project. The mine closure planning process occurs in stages:

- **Stage 1 -** Compilation of a preliminary MRCP as part of the ESIA.
- **Stage 2 -** Preparation of revised Interim MRCPs at regular intervals during the Project life.

- **Stage 3 -** Engineering design of stated closure measures, based on the latest Interim MRCP and following significant changes to the Project or information base.
- **Stage 4 -** Finalization of the MRCP, at least two years prior to the end of mine life, taking account of previous work and consultation with stakeholders.

This Preliminary MRCP establishes key closure objectives and documents the closure scenario based on information available at the planning stage of the Project. The MRCP and the associated financial assurance will be reviewed and updated throughout the mine's life. Figure 1.3 outlines the typical closure planning process.

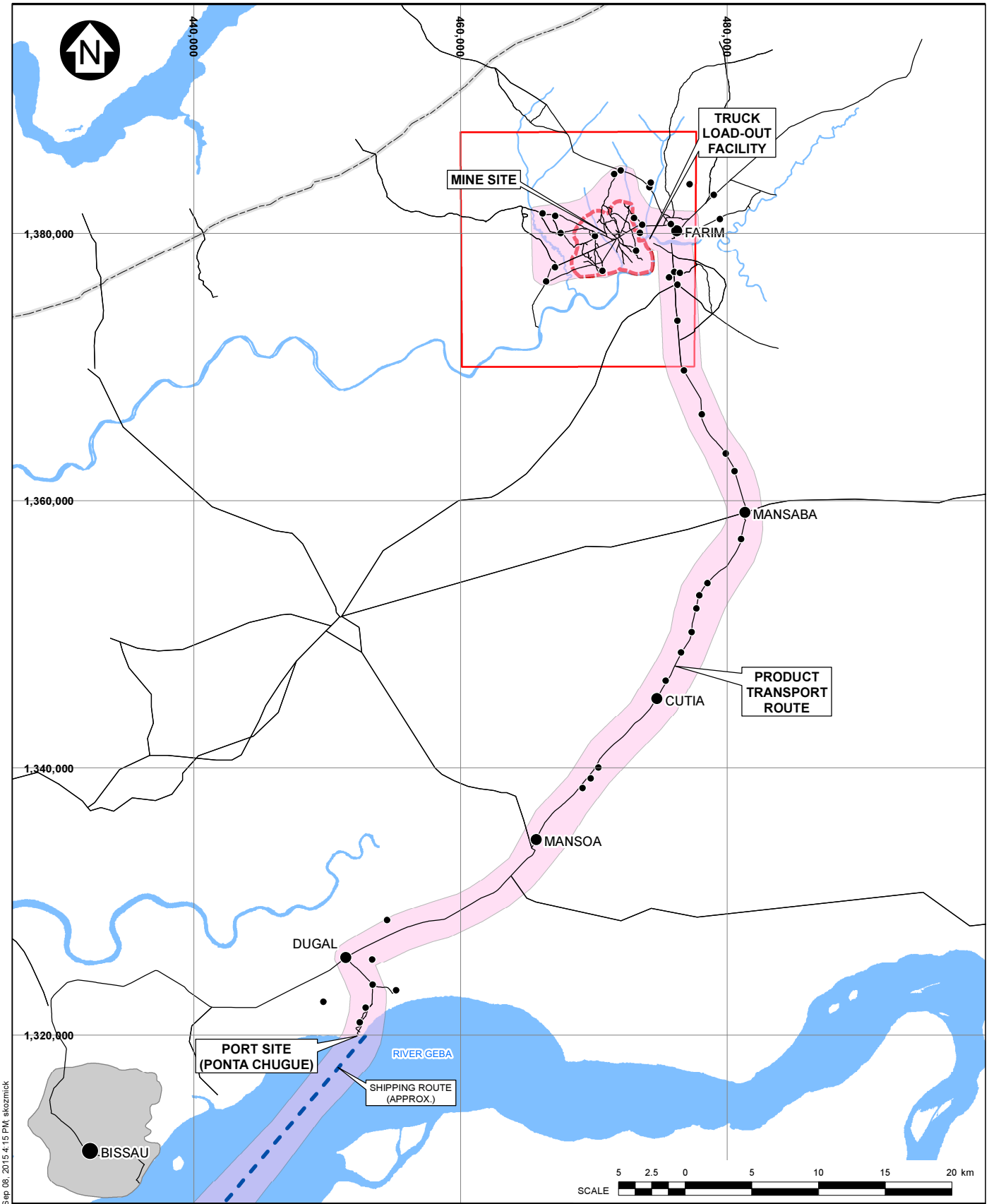
1.3 REGULATORY CONTEXT

GB Minerals is committed to adhering to the national laws of Guinea-Bissau, as well as applying international industry best practices.

The key National regulatory authorities involved in permitting and environmental management of extractive industries are the Ministry of Natural Resources and Energy, Industry and Natural Resources, in collaboration with the Secretary of State of Environment and Tourism.

The key National legislation applicable to mine closure is Law 1/2000 (the Mining and Minerals Law), which regulates all issues related to the exploration and commercial production of mining substances that exist in the soil or subsoil and in the territorial waters (with the exception of oil). All mining resources in Guinea-Bissau belong to the State and property rights and the issuing of licenses/permits is the sole responsibility of the government. The Mining and Minerals Law sets out the procedures that enable individuals and entities (national or foreign) to be issued with mining leases, licenses, and rights.

With regards to closure, the national Mining and Minerals Law identifies that the environmental management plans be prepared to rehabilitate and compensate for environmental and social effects arising from mining activities (Article 90). In addition, the environmental management plan should comply with all specification and practices established by international standards and regulations.



LEGEND:

- VILLAGE
- TOWN
- CITY
- MINING LEASE BOUNDARY
- INTERNATIONAL BORDER
- EXISTING HIGHWAY
- MINE SITE FENCELINE
- WATER
- PROJECT ZONE OF INFLUENCE

NOTES:

1. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	08SEP'15	ISSUED WITH REPORT	RAC	SWK	RAC

GB MINERALS LTD.

FARIM PHOSPHATE PROJECT

PROJECT ZONE OF INFLUENCE

Knight Piésold CONSULTING

P/A NO. NB301-520/2

REF NO. 10

FIGURE 1.2

REV 0

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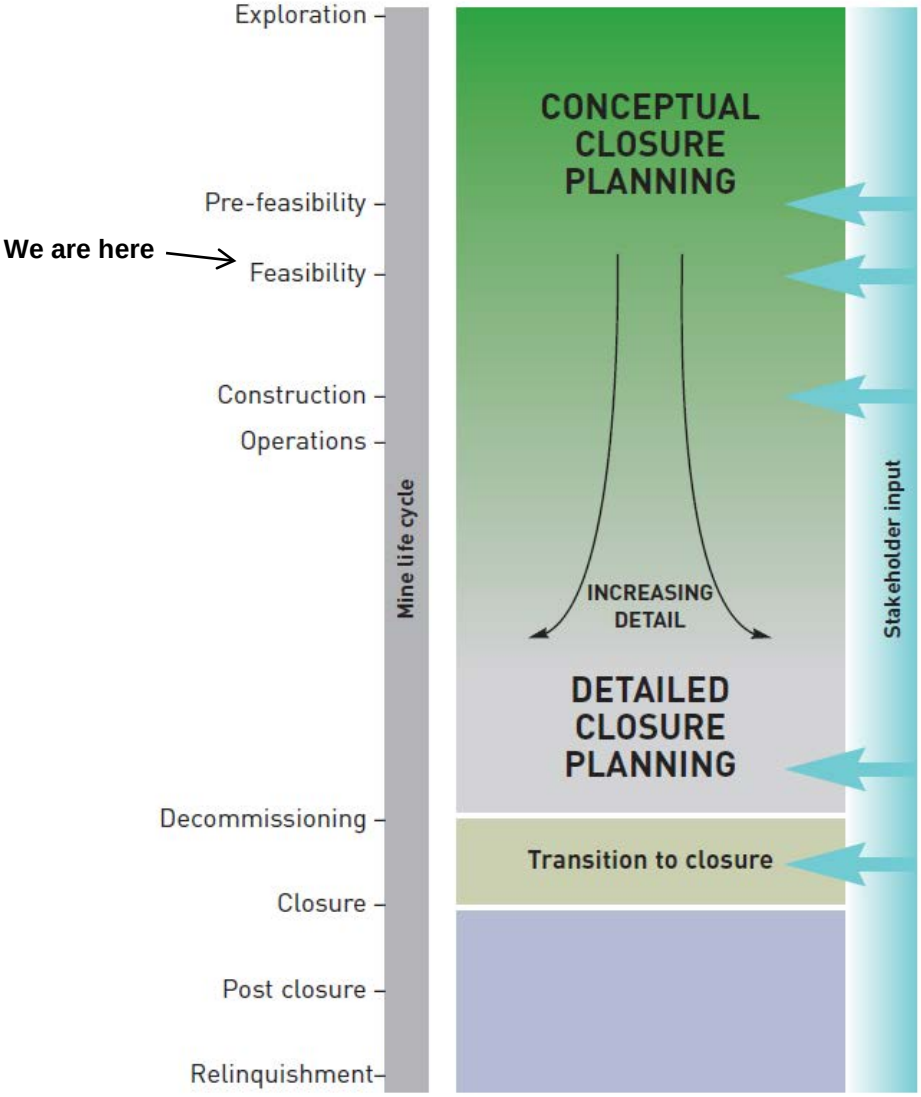


NOTES:
1. SOURCE: INTERNATIONAL COUNCIL ON MINING AND METALS (ICMM), 2008.

Figure 1.3 Closure Planning Process

As such, the MRCP has been developed according to the following international industry best practices requirements:

- **IFC Performance Standards on Environmental and Social Responsibility -** The IFC performance standards apply to all projects that are not yet operational, and provide guidance on how to identify, avoid, mitigate, and manage project risks and impacts. While the performance standards contain little detail on mine closure, the IFC's Environmental, Health and Safety (EHS) Guidelines for Mining (IFC, 2012) contain guidance and recommendations on the issue. The mine closure objectives identified in Section 1.4 are derived in part from this guidance.

- **Equator Principles -** Are a *'benchmark for the financial industry to manage* social *and environmental issues in project financing'* (Equator Principles Association, 2013). These principles have been adopted by numerous companies to ensure that their projects are developed in a manner that is socially responsible and reflect sound environmental management practices.
- **ICMM Mine Closure Toolkit -** The international mining industry through the International Council on Mining and Metals (ICMM) has established its own association for developing and disseminating sustainable development best practice in the industry. This has resulted in the development of the *Planning for Integrated* Mine *Closure:* Toolkit, which has produced best practice guidance for closure planning and funding (ICMM, 2008). Closure planning for the Project will be developed according to this guidance, with closure considered early in the planning stages.

Inclusion of these international industry best practices is reflected in the closure objectives outlined below.

1.4 CLOSURE OBJECTIVES

The closure objectives adopted by the Project are as follows:

- Not compromise future public health and safety
- Ensure the after-use of the site is beneficial and sustainable to the affected communities in the long term
- Minimize adverse socioeconomic impacts and maximize the Project's socioeconomic benefits
- Establish the estimated cost to implement the MRCP and the identify the funding sources to implement the plan
- Commit to establishing the preferred beneficial future land use through a multi-stakeholder process, and reflecting this input in future revisions to the MCRP
- Maximize progressive reclamation opportunities to reduce environmental liabilities and financial assurance requirements throughout the mine life
- Meet national regulatory requirements and adopted international guidelines
- Conduct post-closure monitoring for a period of time appropriate to the risks; at a minimum for 5 years after closure

The first five objectives listed above are adopted from the IFC (2007) and The World Bank (2009), and the final objective on post-closure monitoring is adopted from the ICMM (2008). These high-level objectives will become more specific as the Project proceeds and subsequent interim MRCPs are prepared, incorporating project and site conditions at that time, as well as input from stakeholders.

Specific closure objectives for each key project component are presented in Section 6.

1.5 CLOSURE SCENARIOS

Three mine closure scenarios have been considered in this report:

- **Temporary Closure -** Temporary closure is defined as a cessation of activities that lasts for a prolonged period of time (e.g., greater than six (6) months). Temporary closure can take place for several reasons such as market downturns, technical problems, or civil unrest.

  During a period of temporary closure, the objective is to ensure that the site is left in a state that is safe, as well as physically and chemically stable. In this scenario, the mine would be maintained so as to be ready to resume operations as soon as conditions become favorable. Section 5 outlines the measures that will be taken to ensure that the site is left in a safe and environmentally sound manner in event of temporary closure.

- **Early/Sudden Closure -** Early or sudden closure could take place for the same underlying reasons as listed above for temporary closure. However, sudden closures are typically caused by a higher magnitude event such as corporate failure. Under these circumstances the mining company may no longer exist to oversee the completion of the closure activities and the Government or other parties may need to step in and oversee the implementation of closure activities. Sudden closure may happen at any time. This scenario highlights the importance of having a closure plan and sufficient financial assurance in place prior to mine development and throughout operations.

- **Planned Closure -** Under a planned closure scenario the mine will be closed-out as scheduled during Years 26 and 27. By that time, this preliminary MRCP will have been replaced by a detailed Final MRCP that has been developed through public consultation, as well as on-site observations and trials. In this scenario, the financial liability would be alleviated and the leased lands would be relinquished back to the Government of Guinea-Bissau once the specified sites have been successfully reclaimed in accordance with the accepted closure plan and verified through post closure monitoring. In the event that additional closure activities are required post closure, financial assurance would remain in place to fund the necessary ongoing site care and maintenance for the required period.

2 – BASELINE SUMMARY

2.1 ATMOSPHERIC CONDITIONS

The climatic and seasonal variations are very distinct in Guinea-Bissau and follow the general West African climate patterns. It is hot and humid all year round with little fluctuation in average temperature. Data collected at the Bissau station indicates that temperatures range from 16.6°C to 38.6°C, with the lowest temperatures occurring in January and the highest temperatures occurring in April (Golder, 2014b).

There are two distinct seasons in Guinea-Bissau, the wet season and the dry season. During the wet season (June to October), most of the average rainfall is accounted for and the winds are predominately southwesterly. The dry season (November to May) accounts for very little rainfall and the winds are predominately northeasterly. The average annual rainfall at Farim is 1,150 mm, which is representative of long-term annual precipitation values reported for Bissau. The majority of the rainfall events are short in duration and have a high intensity. Wind speeds are generally light all year round and are typically less than 5 m/s (18 km/h; Golder, 2014b).

Air quality data collected at the Mine and Port Sites indicates that the air quality is representative of a natural environment with low concentrations of anthropogenic gases. Particulate matter is elevated (measured at the Mine Site only) due to naturally high concentrations of dust (Golder, 2014b). This is further elevated during late November to middle March when the Harmattan winds blow dust from the Sahara in the direction of the study region.

The daytime and night time noise levels in the vicinity of the Project sites regularly exceed the noise limits identified in the IFC`s noise guideline values of 55 and 45 LAeq 1 hour, respectively (Golder, 2014b; Knight Piésold (KP), 2015a). Baseline noise surveys indicate that measured daytime noise levels are typically higher than the lowest measured night-time noise levels. Daytime noise levels are most influenced by human activities. Noise levels increase around dusk due to the calling of crickets and toads, which steadily reduce as the night passes.

2.2 TOPOGRAPHY, GEOLOGY AND HYDROGEOLOGY

2.2.1 Topography

The topography of the Mine Site area is relatively flat with elevations ranging from 2 m next to the River Cacheu to 40 m at the northern edge of the north pit. The topography at the Port Site is similarly low relief.

2.2.2 Geology of the Farim Phosphate Orebody

The site contains a high-grade sedimentary, flat-lying phosphate deposit located within a single phosphate ore bed known as the FPA ore zone.

Three phosphate-bearing horizons (referred to as the FPO, FPA and FPB) have been identified at the Farim phosphate deposit. The FPA unit is the economic phosphate bed. The FPB underlies the FPA and is of less economic interest due to the lower phosphate and high limestone content. The FPO is a clayey dolomitic limestone that is weakly phosphatic with limited economic potential. The phosphate deposit is underlain by a soft, white and porous limestone unit. The phosphate bearing strata are unconformably overlain by a sandy-argillaceous sequence comprising soft

alternating sandy, clayey and sandy-clay layers with a blue/green soft clay or black lignitic clay at the base. The Mine Site stratigraphy in the vicinity of the deposit is summarized in Table 2.1.

Table 2.1 Indicative Site Stratigraphy

Age	Unit	Description	Thickness (m)
Post Eocene	Sandy/Argillaceous Overburden	Alternating sandy, clayey and sandy clayey layers	27 to 58
	Basal Clay Overburden	Blue/green soft clay and black lignitic clay (anoxic depositional environment)	
Eocene	Sand including FPO (phosphatic interval)	Grey/white fine grained sand including phosphate bearing clayey dolomitic limestone (FPO)	7 (single intercept)
	Upper Dolomitic Limestone	Clayey limestone	>2[1] (single intercept)
	Decarbonized Phosphate Unit (FPA)	Ore zone comprising beige to brown, poorly cemented very fine grained phosphatic sand	1 to 11
	Calcareous Phosphate Unit (FPB)	Cemented phosphatic limestone	2 to 8
	Limestone	Soft, white and porous limestone	>6 to 17[1]

NOTES:
1. BASE OF UNIT NOT ENCOUNTERED.

2.2.3 Groundwater Conditions

Hydrogeological investigations were completed at the Mine Site in 2015 by Knight Piésold (2015b) to update the previous assessments completed by Golder (2014b, d). Groundwater quality at the Mine Site was reported previously by Golder (2014b), and supplemental baseline water quality sampling was completed in 2015 at both the Mine and Port Sites (Knight Piésold, 2015c). Baseline groundwater quality was compared to the World Health Organization Drinking Water Guidelines (WHO, 2011); International Finance Corporation (IFC) Mine Effluent Guidelines (IFC, 2007); and Canadian Environmental Quality Guidelines for the Protection of Aquatic Life (CEQG-PAL) (Canadian Council of Ministers of the Environment - CCME, 2015).

Knight Piésold (2015b) has conceptualized the hydrostratigraphy of the Mine Site as follows:

- An overburden layer comprising sands, clays and gravels, extends from the land surface to the absolute elevation of -30 m RL. This unit can be considered an unconfined aquifer and is shown to be in limited hydraulic connection with the River (Rio) Cacheu due to the presence of extensive superficial clay in the lowland plain.
- A blue clay horizon is not continuous, occurring in localized areas only and ranging in thickness.
- A calcareous layer (limestone) lies beneath the orebody. Water levels in this unit are at a higher elevation than those of the overburden. This result suggests that the ground water in the calcareous layer is under pressure with a vertically upwards hydraulic gradient. Note that field observations do not support this being a dolomitic limestone and instead suggest that this unit is better characterized as a calcareous sandstone that is clayey and friable. This alternative characterization is consistent with the low hydraulic conductivities measured for this layer.

Groundwater levels respond to seasonal rainfall and lower during the dry season and rise during the wet season. Groundwater provides baseflow to surface water bodies, including the River Cacheu and its tributaries. Groundwater elevations are indicative of upward flow and groundwater discharges have been observed in the south area of the Mine Site. As a result, surface water bodies are potentially sensitive to losses in baseflow caused by lower groundwater levels. Lower groundwater levels could lead ephemeral stream flows of shorter duration (Golder, 2014b).

Groundwater sampling at the Mine Site occurred in 2011, 2012, 2013 and 2015. The wells were distributed within the various facility footprints (i.e., north pit, south pit and tailings storage facility (TSF)) to characterize baseline conditions and differences among the areas. Notable changes in groundwater quality were observed in the tidally influenced water systems, including the River Cacheu and its tributaries. Deep wells (screened in the limestone unit underlying the deposit) contained elevated baseline metal concentrations (i.e., Al, As, Cd, Cu, Fe, Mn, Pb, Ni, and Zn) in comparison to the referenced guidelines identified above. Chloride concentrations from several wells (KP-PS-BH01, KP-SGW-BH02, MW02A&B, and PW1) in the south pit area were above the WHO aesthetic (taste) standard of 250 mg/L. Fewer exceedances were observed in samples collected from the north pit shallow and deep wells. No bacteriological analyses were completed.

Four groundwater monitoring wells at the Port Site area were sampled in May 2015. No previous sampling had been conducted at the Port Site. Elevated baseline metal concentrations (i.e., boron, copper, iron, lead, manganese and selenium) were identified in three wells (BHPT03, 04 and 07). No bacteriological analyses were completed. Chloride concentrations exceeded the WHO aesthetic (taste) standard in all of the wells.

2.3 AQUATIC ENVIRONMENT

A description of the aquatic environment at the Mine Site and Port Site is provided below.

2.3.1 Mine Site Aquatic Environment - River Cacheu and Tributaries

The Mine Site is located adjacent to the River Cacheu, a major river that meanders through the study area in a southwesterly direction. Rio de Banim, Rio de Bunja, Rio de Cavaras Marinhos, and Rio de Caur are four streams within the Mine Site area that report to the Cacheu River.

Adjacent to the Mine Site, the River Cacheu channel is approximately 150 to 200 m wide and the maximum flow velocities in the river range between 1.1 to 1.5 m/s during the dry and wet seasons, respectively (Golder, 2014b). The River Cacheu experiences a semi-diurnal tidal influence (two high tides and two low tides each day), thus forming part of the estuarine environment. By strict definition, any part of a river that is tidal is considered estuarine. This is further supported by the development of the mangroves and salt marsh areas, as well as the presence of marine/estuarine species of fish that have been captured within the River Cacheu in the vicinity of the Mine Site (Scherman, Colloty & Associates (SC&A), 2015). The maximum tidal variation near the mouth of the estuary is approximately 3 m, and the tidal variation at a survey location downstream of Farim at Binta at Cacheu was measured at approximately 2 m (SC&A, 2015). Each of the streams transecting the Mine Site is also tidally influenced.

The River Cacheu banks near the Mine Site are relatively flat and are susceptible to inundation during periods of high rainfall and/or high tides. The floodplain extends approximately 1,500 m to the north and south. The river banks are composed of fine-grained sediments and are well vegetated

with mangroves and other vegetation. Most of the river is in a relatively pristine state with the majority of the mangrove and beach shorelines being undisturbed. The fine-grained sediments are exposed at low tides and are subject to erosion by wave action and currents. The river is dominated by ongoing transport of fine-grained sediments. The river bed particle size distribution ranges from silt or clay at Farim to sand-sized particles near the estuary mouth. The monitored section of the river exhibits a quick response to rainfall events given sufficient antecedent rainfall. During the recent surveys in 2015, grab samples indicted areas of excessive scour within the larger river bends, which yield mostly weathered ferricrete in the samples (Golder, 2014b).

The aquatic ecosystem in the rivers near the Mine Site are driven primarily by seasonal variations in nutrient and sediment transport to the coastal areas and by the daily tidal regime. The highest diversity of fish and invertebrates (in faunal and water column) was observed in the more saline sections of the river. Seagrasses were not observed within the length of the river studied; their absence is likely due to the naturally high turbidity and lack of suitable intertidal habitat (sandy areas). Shellfish and other invertebrates reproduce throughout the length of the river and estuary. The mangrove ecosystems along the tributaries serve as nursery areas for fish. Fish tissue analyses indicated that the system is not contaminated from anthropogenic sources/activities (Golder, 2014b).

2.3.2 Port Site

Like the River Cacheu, the River Geba is estuarine and heavily influenced by ocean tides. At the Port Site location, the river is almost 7 km across, with depths measured during the spring high tide between 3 m and 28 m (SC&A, 2015). The tide within the River Geba ranges from 3 m at the most eastern end of the Canal de Caio and 6 m near Ponte Chugue (Baird, 2015). These winds combined with the large volume of water that moves during the tidal cycle accounted for strong currents (7 to 8 m/s) and local occurrences of large standing waves (0.6 to 1.2 m) during the sampling period. The substrate in the vicinity of the Port Site consisted of fine mud with a depth of 5 to 8 m.

The wetlands areas are located within the floodplains, most of which have been converted to rice paddies, with only a band of mangrove remaining along the shorelines.

2.4 TERRESTRIAL ECOLOGY

The following summary is derived substantially from a recent terrestrial ecology report prepared by Hudson Ecology (2015).

2.4.1 Flora

A total of 341 plant species were recorded during various project surveys undertaken between 2011 and 2015. Floral species diversity in the area is moderate to high, but not as high as many regions of West Africa, such as the Upper Guinea Forest zone. A large proportion of the species recorded are indigenous with few exotic species occurring in the area although, in areas of higher anthropogenic disturbances, some exotic species are more prevalent.

Based on physiognomy, moisture regime, rockiness, slope and soil properties, seven main communities were recognized, namely:

- Rhizophora - Avicennia Mangrove community (Mine and Port Site study areas)
- Natural Forest vegetation community (Mine Site study area only)
- Secondary Forest community (Mine Site study area only)
- Elias - Cyperus Floodplain community (Mine and Port Site study areas)
- Oryza Paddy vegetation community (Mine and Port Site study areas)
- *Dialium* - Sterculia coastal woodland vegetation community (Port Site study area only)
- Anadelphia *afzeliana* seasonally wet grassland community

The *Oryza* Paddy vegetation community occurs in areas of freshwater wetlands, which are not affected by tidal ebbs and flows throughout the country, these areas of freshwater wetlands have been modified to facilitate the planting of rice, so alterations to the flow of freshwater systems create large inundated areas where rice is planted. The only species found which is known to be listed by the International Union for Conservation of Nature (IUCN) Red Data list is *Raphia palma-pinus,* which is found along rivers and is listed as Data Deficient. The possible presence of two Red Data species *Floscopa axillaris* and *Digitaria patagiata* will be confirmed during follow up ecological surveys at the end of the rainy season in September or October 2015. A total of 103 flora species were recorded in this vegetation community.

Large sections of natural forests have been cleared in order to grow cashew nuts and other crops. This vegetation community encompasses areas that have been cleared and that have been replanted with cashew trees. The cashew plantations vary from areas which are dominated by cashew trees (cashew monoculture), to areas of mixed cashews and secondary forest. A total of 145 flora species were recorded in this vegetation community.

Another halophytic community recorded in the study area is the salt water *lala*, a grassland. This vegetation community is found on Fluvisols type soils in the floodplain areas adjacent to the larger rivers, which are under tidal influence. The salinity of the water which floods these areas has resulted in the dominance of salt-tolerant species. The denuded areas of these areas are widely utilized by local communities for the gathering of salt during the dry season and this vegetation community appears to be an important dry season grazing area. A total of 76 flora species were recorded in this vegetation community.

The natural forest community occupies large areas of the northern part of the study area, with some variation in structure and composition. This vegetation community is currently under threat due mainly to slash and burn agricultural practices for the cultivation of food crops or cashew nuts. Although only one Red Data species was recorded in this vegetation community, the likelihood of occurrence of Red Data species in this community is high. A total of 209 flora species were recorded in this vegetation community.

Mangrove forests line all the larger rivers in the region. No Red Data species were recorded in this vegetation community. Due to the specialization required for plants to survive in the tidal saline conditions, it is unlikely that any of the Red Data species known to occur in the area occur in this vegetation community. Though species diversity is low, the species occurring are highly specialized, and therefore this vegetation community is characterized as unique. This vegetation community is

integral in the functioning of the estuarine nature of the larger rivers in the area. A total of 29 highly specialized flora species were recorded in this vegetation community.

The *Dialium* - *Sterculia* coastal woodland vegetation community occurs in the transition zone between the terrestrial and the halophytic communities in the coastal regions. Much of the substrata of the transitional zone in the vicinity of Ponta Chugue have been severely transformed due to cropping of mainly millet and peanuts.

The most extensive wetland vegetation in the country is the locally called lala, a wet grass savannah. This vegetation community is prevalent on gleysols, which are fine textured soils, deep, grey-coloured, from alluvial origin, with the upper layers often rich in organic matter. Furthermore, this vegetation community prevails in the inner lowland plains flooded by rainwater during the wet season, located mostly in the lower zones of the mainland. Noticeable in the area of Ponta Chugue, is that this vegetation community is particularly homogenous. It is likely that this is the result of human intervention through the use of fire, or harvesting of this grass species for thatching purposes.

2.4.2 Fauna

Non-chordate diversity within the study area was relatively high with a total of 124 arthropod species being recorded during the study. Most species recorded were common species with some specialized species being recorded in the mangrove communities. Although the mangrove species are highly specialized for this habitat type, they are locally common and not of conservation importance. Most of the species recorded are not restricted in terms of range and habitat preferences. Common species included Red Winged Dropwing and locust.

The herpetofauna of the region can be classified as having moderate diversity, of the 69 reptile species known to occur in Guinea-Bissau, only 11 species recorded. This may be due to the proximity of the Project area to the town of Farim and other settlements in the area. Common species occurring in the area include Ornate Monitor and Tree Agama.

The region can be classified as having low amphibian diversity; of the 34 amphibian species recorded in Guinea-Bissau, only 5 species were recorded during project surveys, none of which are IUCN listed. None of the five recorded species appear to be utilized by the local community for food, although some species are said to have superstitious importance or medicinal uses. The rivers in the area are tidal and have a very high salinity, characteristics to which amphibians are very sensitive. For this reason most of the rivers in the study area are uninhabitable for amphibian species, and only freshwater systems host this taxon.

Avifaunal diversity in the study area was very high with a large number of upper trophic level species occurring in the area. The Hooded Vulture is currently listed as Endangered by the IUCN (2010). Seventy-five species were recorded, including the Palmnut Vulture, Long-crested eagle, Hooded vulture and Gymnogene. In general, species diversity was moderate to high throughout the study area with the rice paddies and natural forests showing the highest levels of species diversity.

Mammal species diversity was very low in the study area, probably due to severe subsistence hunting. Hunters were regularly seen or heard during the surveys often with animals ranging from snakes to monkeys. This not only reduces the number of animals and species in the area, but also causes the remaining animals to be very shy of humans, which in turn makes accurate survey of species occurring in the area very difficult. Fifteen of the 192 mammal species known to occur in the

study area were recorded during project surveys. The species recorded in the study area include Striped Ground Squirrel, Musk shrew, Lesser Spot-nosed Guenon, and Red colobus, all of which are common species, with the exception of Red colobus, listed as Endangered by IUCN (2010), which was recorded dead and being transported by a hunter from some distance away in the natural forests to the north.

2.4.3 Summary of Species of Conservation Concern

A total of 28 Red Data fauna species may occur in the area, according to the IUCN Red Data list. Some of the animals listed are believed to be locally extinct and suitable habitat for others is not available. The Red Data species that may occur in the study area consist of 2 reptile species, 15 avian species and 11 mammal species. The habitat suitability for Red Data species ranges from low to high with 4 species for which the habitat suitability can be classified as high. Only two Red Data species were recorded during project surveys, namely the Red Colobus (recorded dead and being transported from the north, as mentioned above) and the Hooded Vulture. All indications of this study appear to show that the African slender - snouted crocodile and the West African dwarf crocodile do not occur in this area. Features of the demographics of the crocodile population in the Cacheu River system showed that the crocodile population increases exponentially with an increase in distance from the Cacheu River mouth. Young crocodiles use the area close to the Mine Site along the river as a nursery area.

Although the Hooded Vulture is currently listed on the IUCN Red Data List as critically endangered (CR), it is a locally common species in the area with a total of more than 600 individuals being recorded during the surveys. This species has become highly human commensal throughout West Africa and is well adapted to anthropogenic disturbance. The Palm Nut Vulture's range is restricted in the study area due to its specialized nature.

2.4.4 Exotic Species

Guinea-Bissau has one of the lowest number of exotic species in Africa with only eight exotic invasive species occurring in the country:

- *Lantana camara*
- *Eichhornia crassipes* (aquatic plant)
- *Leucaena leucocephala* (tree)
- Prosopis spp. (tree, shrub)
- *Adenanthera pavonina* (tree)
- *Columba livia* (bird)
- *Rattus rattus* (mammal)
- *Mus domesticus* (Mammal)

2.4.5 Ecological Function and Conservation Importance of the Mine Site and Port Site Areas

The ecological function of the Mine Site study area can generally be described as moderate for the majority of the study area, although this does vary from low (in the highly transformed areas due to slash and burn cropping techniques) to high in the more inaccessible areas. Areas in which prospecting and slash and burn farming has taken place, as well as areas in which settlements have been established are considered as areas where ecological function is reduced. The cashew

plantations and secondary forests appear to both have moderate ecological function, particularly in areas where indigenous species have been allowed to intersperse the Cashew trees. Although areas such as the rice paddies are transformed to some extent, the fauna species composition of these areas seem to indicate that the ecological integrity can still be considered high.

At the Ponta Chugue Port Site, the ecological integrity of the site varies between high for the Mangrove community, the Floodplain community and the less degraded coastal woodland vegetation community; moderate for the more degraded coastal woodland vegetation community and the seasonally wet grassland community, and low for the *Oryza* Paddy vegetation community. The *Oryza* Paddy vegetation community in this area are considered more degraded than those at the Mine Site due to the fact that there is a monoculture of *Oryza* spp. in these areas, whereas the *Oryza* Paddy vegetation community near the Mine Site show far greater species diversity, with a large number of indigenous species represented in these areas.

The Mine Site study area falls within the dry tropical forest biome of the Guinean Forest zone and due to the high species diversity and intrinsic conservation value of the area it is classified as having high conservation importance overall, with subareas of low, moderate and high conservation importance due to the presence of Red Data species or other intrinsic factors. Areas that have been severely disturbed such as settlements are considered of low conservation importance. These areas are, however, quite small in relation to the overall study area (>30% of the study area). Areas that have been disturbed by farming are considered of moderate conservation importance due to the fact that rehabilitation of these areas is possible. The natural forest, floodplain and mangrove areas are considered of very high conservation importance due to the presence of Red Data species in these areas and the intrinsic importance of these areas. Finally, the rice paddies may host two of the red data plant species endemic to the region (Floscopa axillaris and Digitaria patagiata); follow up surveys are planned for September or October of 2015 to confirm.

The conservation importance at the Ponta Chugue Port Site can generally be described as moderate due to the disturbance in the area.

2.5 SOCIO-ECONOMIC CONDITIONS

The local social environment can be described as rural villages that are largely dependent on small-scale agriculture for both household subsistence and income generation, and larger peri-urban settlements where there is more social infrastructure such as schools and religious establishments. In general, the whole project area lacks adequate social infrastructure such as health care facilities, schools, sanitation, water systems, and waste management. Many households reside in compounds and land ownership is followed through the integration of traditional law such as customary land management practices and legal forms of ownership. Decision-making is primarily through consensus facilitated by the village leaders or committees.

The larger villages have trade businesses and a more cash-based local economy. The smaller communities in the Project area and along the transport route engage predominantly in subsistence agriculture, with the trade of any agricultural surplus for cash income. Natural resource-based livelihoods are also predominant. Livelihood activities entail cultivation of cashew, maize, millet, sorghum, rice and fonio, which are commonly grown in the area for consumption or sale; the production of natural resources use as home building materials and medicinal products; fishing,

especially in villages along the River Cacheu and near the Port Site on River Geba; livestock rearing; and the production of salt, which is undertaken predominantly by women.

2.6 CULTURAL HERITAGE

A number of cultural heritage features were identified within the Mine Site area, including archaeological sites, cemeteries and spiritual sites (living/intangible cultural heritage). Cultural heritage features were also identified in the vicinity of the Port Site, but beyond the proposed footprint. Archaeological remains were predominantly pottery sherds and other fragmentary remains of low to moderate cultural heritage significance. Archaeological features of low to moderate cultural heritage significance will be mitigated through systematic data recovery prior to mine development.

Field surveys confirmed the presence of three Muslim cemeteries within the mine study area, one located near the village of Saliquenhe Ba, which is of high sensitivity (ERM, 2015). A sacred grove (or holy forest) is also located south of Saliquenhe Ba and is also of local to regional importance (ERM, 2015). These features are expected to be relocated out of the mine site area prior to construction.

3 – PROJECT DESCRIPTION

3.1 PROJECT SUMMARY

The Project will consist of three main components: a Mine Site, Product Transport Route, and a Port Site (Figure 1.2). The Project design presented in this Preliminary MRCP is based on the FS prepared by Lycopodium (2015).

Phosphate ore will be extracted using conventional open pit mining techniques using excavators and haul trucks. Drilling and blasting will not be required. The ore will then be beneficiated in a process plant at the Mine Site to produce the phosphate rock product. The product will be transferred from the process plant to a truck load-out facility via a closed conveyor system. Trucks will be loaded from a product bin at the load-out facility and transport the product to the Port Site via the product transport route. The product will be unloaded, dried and stored at the Port before being loaded onto bulk carrier vessels for delivery to market. The operating life of the Project is 26 years, mining ore at a rate of 1.75 million tonnes per annum (Mt/a) to produce 1.32 Mt/a of phosphate rock product at an overall P_2O_5 recovery rate of 78.4%.

The Project will have a life of approximately 30 years over the following project phases:

- **Construction Phase (2 years; Years -2 and -1) -** The mine and port components of the Project will be constructed over a 2-year period.
- **Operations Phase (26 years; Years 1 to 26) -** The operation phase of the Project. During this phase the ore will be extracted, processed and transported to markets. Two distinct mining phases have been identified:
  - Phase 1 - mining of the south pit starting in Year 1 and ending in Year 8
  - Phase 2 - mining of the north pit from Year 8 to Year 26

  The operations phase also includes the progressive reclamation of areas that have been mined out, as described in Section 4.
- **Active Closure Phase (2 years; Years 26 to 28) -** Following completion of mining, the MRCP will be executed. This includes the reclamation of the open pits, waste management facilities, and the decommissioning/ dismantling of buildings and infrastructure where required (if agreed to by all parties some buildings and infrastructure may be handed over to local authorities or communities.
- **Passive Closure Phase -** A minimum of 5 years in duration, this phase will consist of the post-closure monitoring and maintenance activities that are outlined in the MCRP. The passive phase will take place at the conclusion of the active closure phase. During this phase, monitoring will confirm that the closure objectives have been achieved. It is possible that the passive closure phase could extend beyond the expected 5 years to achieve the stated closure objectives.

The Mine Site will comprise the following elements:

- South and north pits
- Process plant
- Truck load-out facility
- TSF
- Waste dumps (WD)

The Mine Site general arrangement in Year 7 (near the end of south pit mining) is presented as Figure 3.1, and Year 25 (near the end of north pit mining) is presented as Figure 3.2.

The Product Transport Route consists of existing public roads, including 6 km of rural road near the Port Site which will be upgraded by the Project, as well as a 2 km connector road at the truck load-out facility. All roads are expected to remain at closure.

The Port Site will consist of the following elements:

- Truck unloading facility
- Product drying and storage sheds
- A wharf and shiploading system

The Port Site general arrangement is shown in Figure 3.3.

3.2 MINE LEASE BOUNDARIES

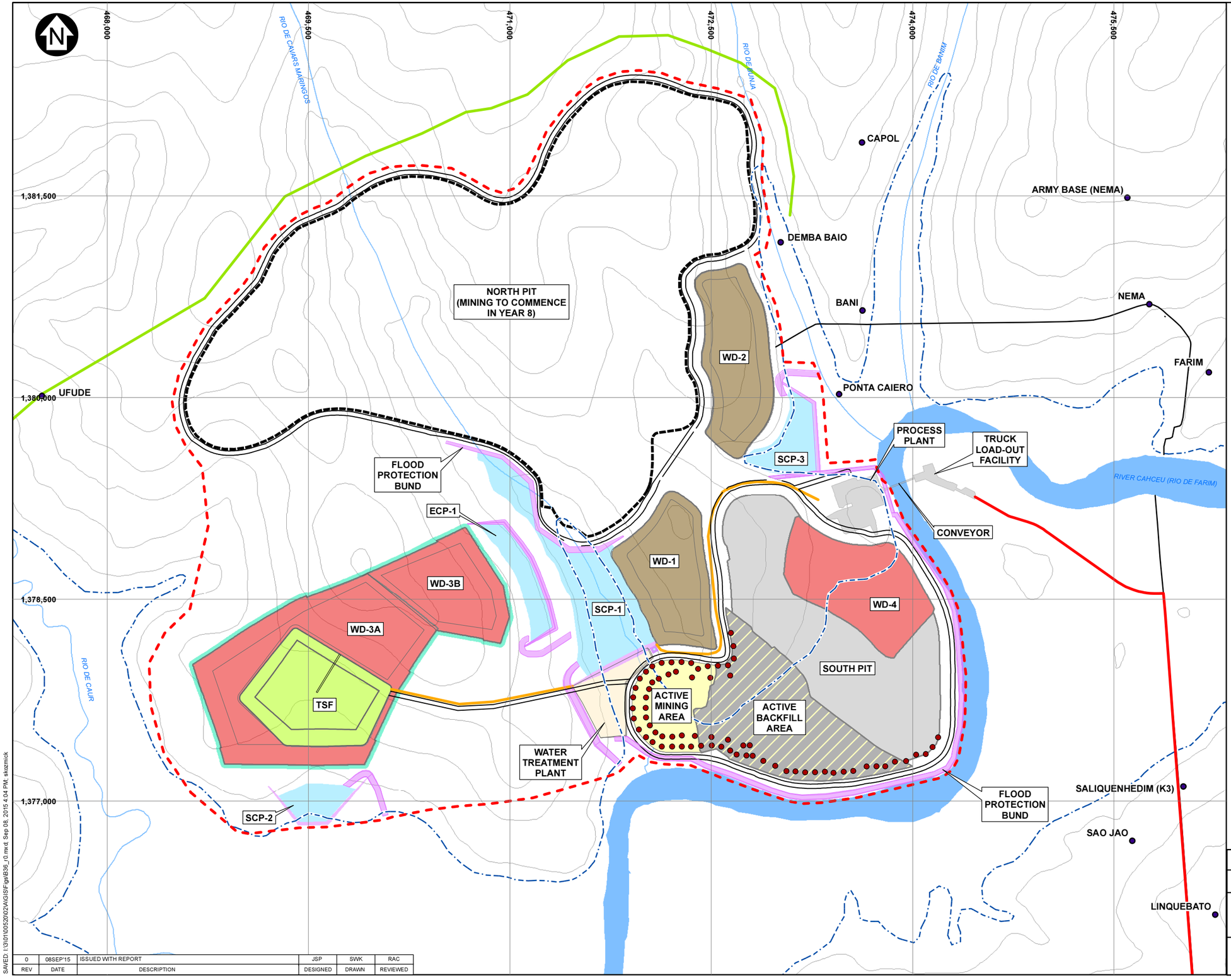
The boundaries of the Project mining lease are outlined in Table 3.1.

Table 3.1 Mining Lease Coordinates

Description	Location	Co-ordinates (Bissau UTM Zone 28N)	Area	Date of Issue	Interest
Mining Lease No. 004/2009	#14 Binta	A (1387,500/460,000)	30,625 ha	28 May 2009	100%
	#15 Farim	B (1376,500/477,500)			
	#1 Guidaje	C (1370,000/477,500)			
	#2 Jumbembem	D (1370,000/460,000)			

The Mining Lease License is granted in terms of a Mining Agreement, which provides access to surface rights required for mining, processing and associated infrastructure. An annual fee is payable to the Guinea-Bissau Government to retain the Mining Lease Licence. The phosphate bearing zones underlie the Mining Lease License area, with property boundaries identified by concrete beacons.

The Mining Agreement also permits GB Minerals to use the Ponta Chugue area as a Port Site; however, coordinates are not delineated in the Mining Agreement and a lease has not been issued.



LEGEND:

- COMMUNITY
- DEWATERING WELL (YEARS 7-8)
- EXISTING ROAD
- HAUL ROAD
- INFRASTRUCTURE
- WATER MANAGEMENT FACILITY
- PRODUCT TRANSPORT ROUTE
- TAILINGS AND DECANT RETURN PIPELINE TRENCH ALIGNMENT
- PROPOSED BYPASS ROAD
- 100 m FENCELINE
- RIVER/STREAM/DRAINAGE
- WATER
- POND EXTENT
- TAILINGS STORAGE FACILITY
- RECLAIMED WASTE DUMP
- ACTIVE WASTE DUMP
- ACTIVE MINING AREA
- ACTIVE BACKFILL AREA
- BACKFILLED TO SURFACE GRADE
- INTEGRATED WASTE LANDFORM
- 1 IN 100 YEAR FLOODPLAIN EXTENT
- NORTH OPEN PIT EXTENT

NOTES:

1. MINE INFRASTRUCTURE AND BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). UPDATED AUGUST 17, 2015 BASED ON FIGURES PROVIDED BY KNIGHT PIESOLD PERTH.
2. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.
3. CONTOUR INTERVAL IS 5 METRES.
4. IWL - INTEGRATED WASTE LANDFORM
   TSF - TAILINGS MANAGEMENT FACILITY
   WD - WASTE DUMP
   ECP - ENVIRONMENTAL CONTROL POND
   SCP - SEDIMENT CONTROL POND

SCALE 250 125 0 250 500 750 1,000 1,250 1,500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	08SEP'15	ISSUED WITH REPORT	JSP	SWK	RAC

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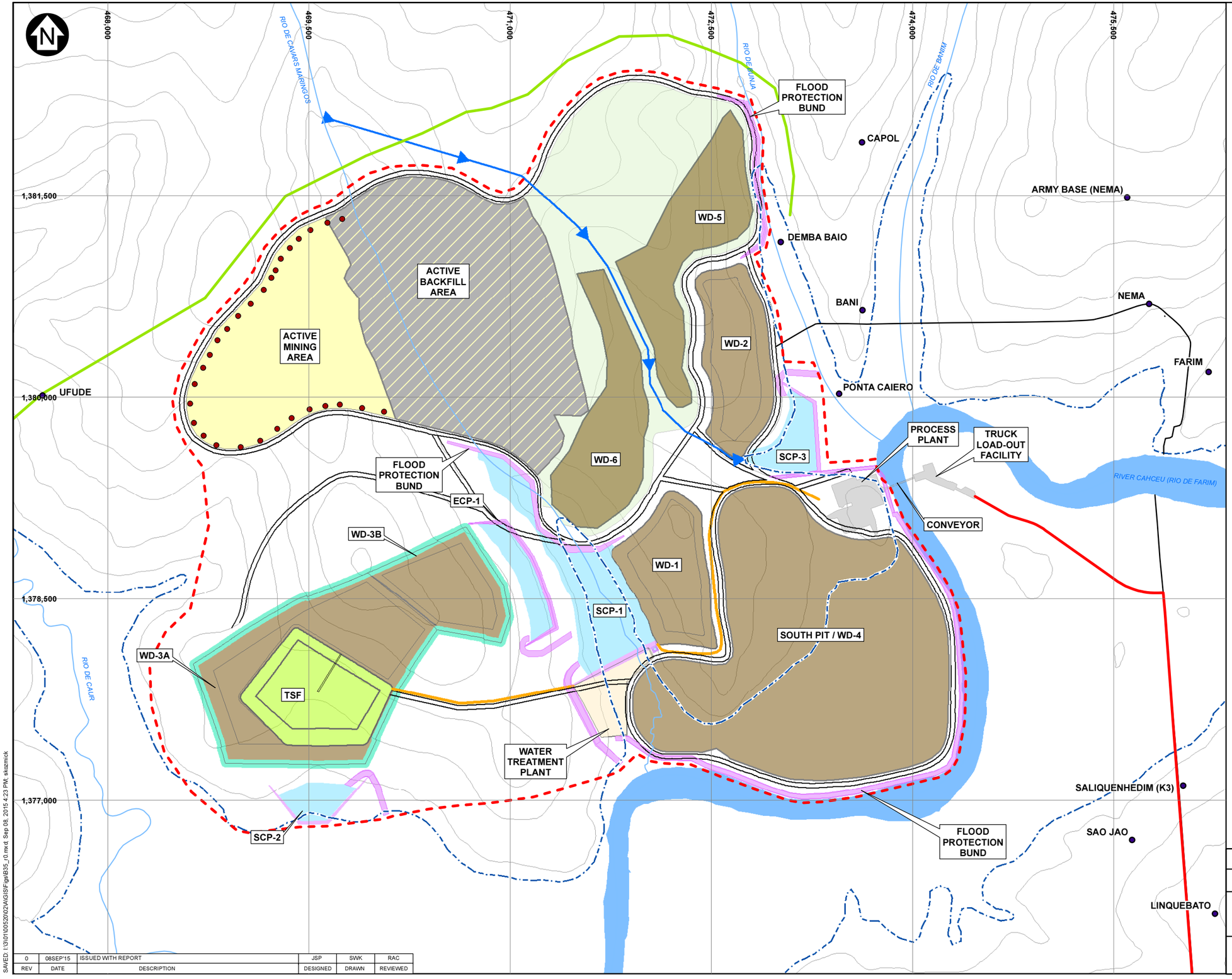
GB MINERALS LTD.

FARIM PHOSPHATE PROJECT

MINE SITE LAYOUT
YEAR 7 - NEAR END OF SOUTH PIT MINING

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB301-520/2	10
FIGURE 3.1	REV 0



LEGEND:

- COMMUNITY
- DEWATERING WELL (YEARS 25-26)
- ROAD
- HAUL ROAD
- INFRASTRUCTURE
- WATER MANAGEMENT FACILITY
- PRODUCT TRANSPORT ROUTE
- TAILINGS AND DECANT RETURN PIPELINE TRENCH ALIGNMENT
- PROPOSED BYPASS ROAD
- 100 m FENCELINE
- DIVERSION CHANNEL
- RIVER/STREAM/DRAINAGE
- WATER
- POND EXTENT
- TAILINGS STORAGE FACILITY
- ACTIVE BACKFILL AREA
- WASTE DUMP RECLAIMED
- ACTIVE MINING AREA (YEARS 7-8)
- RECLAIMED PORTION OF NORTH PIT
- INTEGRATED WASTE LANDFORM
- 1 IN 100 YEAR FLOODPLAIN EXTENT

NOTES:

1. MINE INFRASTRUCTURE AND BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). UPDATED AUGUST 17, 2015 BASED ON FIGURES PROVIDED BY KNIGHT PIESOLD PERTH.
2. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.
3. CONTOUR INTERVAL IS 5 METRES.
4. IWL - INTEGRATED WASTE LANDFORM
   TSF - TAILINGS MANAGEMENT FACILITY
   WD - WASTE DUMP
   ECP - ENVIRONMENTAL CONTROL POND
   SCP - SEDIMENT CONTROL POND

SCALE 250 125 0 250 500 750 1,000 1,250 1,500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
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GB MINERALS LTD.

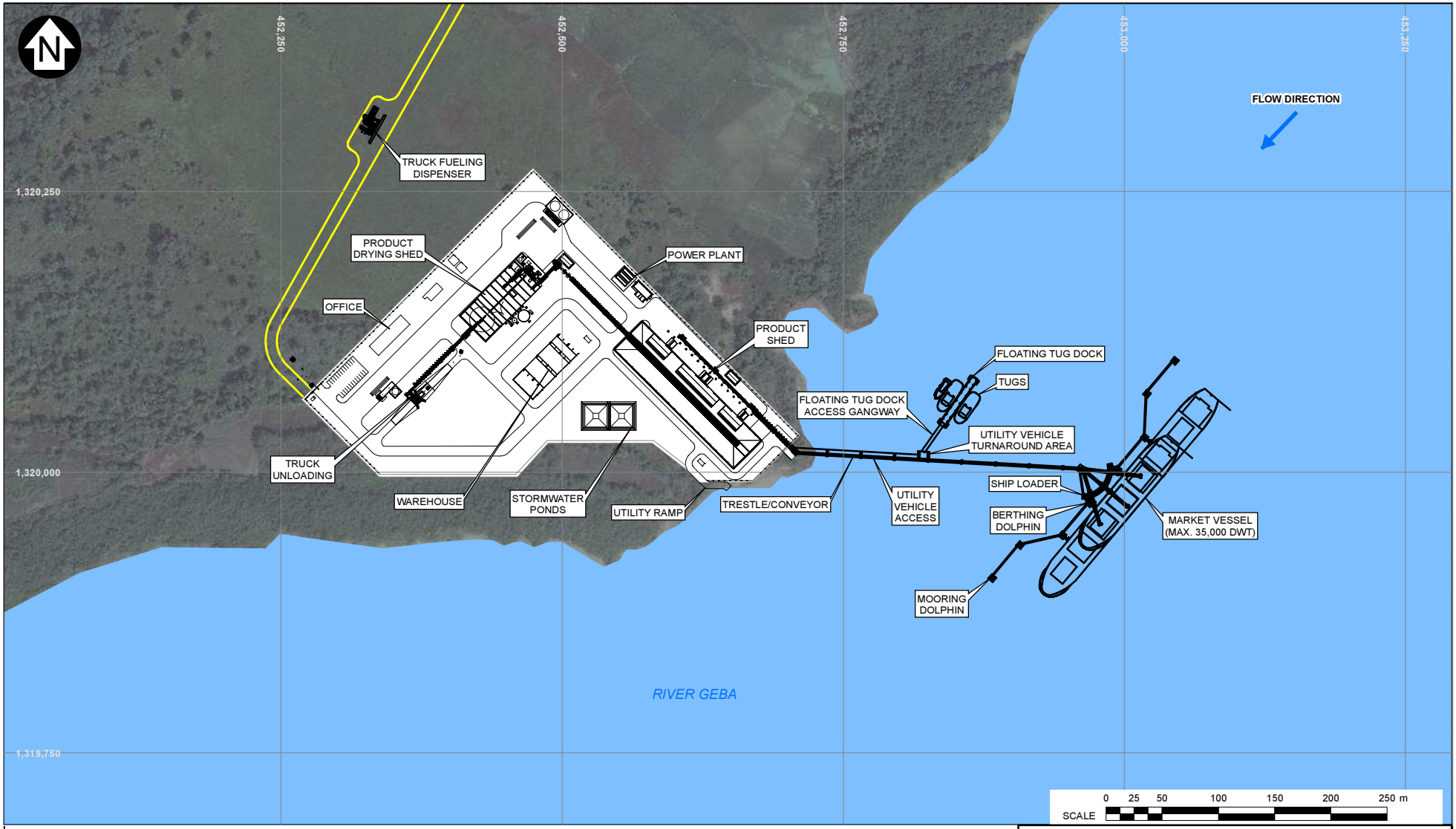
FARIM PHOSPHATE PROJECT

MINE SITE LAYOUT
YEAR 25 - NEAR END OF NORTH PIT MINING

Knight Piésold CONSULTING

P/A NO. NB301-520/2 | REF NO. 10

FIGURE 3.2 | REV 0



LEGEND:

- PROPOSED INFRASTRUCTURE
- PROPOSED ROAD
- WATER

NOTES:

1. MINE AND PORT SITE INFRASTRUCTURE AS WELL AS BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). MODIFIED BY KNIGHT PIESOLD LTD. TO SHOW PROPOSED INFRASTRUCTURE CHANGES (APRIL 24, 2015).
2. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: BISSAU UTM ZONE 28N.
3. IMAGERY: © ESRI DATA AND MAPS (ONLINE) (2015). REDLANDS, CA: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE. ALL RIGHTS RESERVED.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	08SEP'15	ISSUED WITH REPORT	RAC	SWK	RAC

GB MINERALS LTD.

FARIM PHOSPHATE PROJECT

PORT SITE LAYOUT

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB301-520/2	10

FIGURE 3.3 REV 0

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3.3 GEOCHEMISTRY OF ORE, TAILINGS AND WASTE OVERBURDEN

Geochemical testing was completed on samples of ore and product, tailings and waste overburden as outlined below.

- **Phosphate Ore and Product Geochemistry -** 156 ore samples were tested previously for mineralogy and metals (Golder, 2014b). More recently, one phosphate composite ore sample and one associated phosphate rock product sample from pilot plant metallurgical testing were analyzed for metals (Knight Piésold, 2015d). Based on the testing completed the following conclusions were made:
  - Metals in Ore - The ore is enriched in a number of metals, some of which may be of an environmental concern (i.e., silver, antimony, beryllium, cadmium, chromium, copper, lead, zinc, and possibly arsenic, strontium, thallium and uranium).
  - Phosphate Rock - The metals concentrations within the phosphate rock product appear to be similar to that of the ore, based on a single metals scan of product and the corresponding feed ore.

  The ore and phosphate rock have higher metals concentrations overall, but both are expected to have lower environmental exposure. The waste overburden contains lower metals concentrations compared to the ore or phosphate rock, but is enriched in a number of metals, some of which are of an environmental concern. The environmental exposure of the waste overburden is high compared to the ore and phosphate rock.

- **Tailings Geochemistry -** Geochemical test results for tailings are limited to a single sample derived from pilot plant testing as part of the FS (Knight Piésold, 2015e). Test results suggest the tailings will be Non-Acid Forming. As such, there is no perceived risk from acidification of the tailings and there are no specific controls required.

  However, the high sulphide content of the tailings has the potential to lead to high sulphate and saline drainage. The tailings solids contain elements with high levels of element enrichment, with bismuth, cadmium, phosphorous and selenium found to be highly enriched; silver, arsenic, fluoride, sulphur, antimony and uranium found to be significantly enriched; and calcium and chromium to be slightly enriched.

  As such the TSF must be designed and operated to fully contain the tailings solids and reduce dusting. As there are a number of environmentally significant elements which appear at elevated levels, in particular uranium, a formal engineered containment and capping system may be required.

  The tailings supernatant was found to exceed baseline surface water and groundwater concentrations for several parameters. As such, the TSF will also require controls to limit seepage to surface water and groundwater. It is likely that an engineered low permeability liner will be required across the base and sides of the facility. The water storage capacity will need to be sufficient to contain all stormwater runoff within the adopted design standard.

- **Waste Overburden Geochemistry -** The waste overburden is Non-Acid Forming based on available geochemistry information. Trace metal concentrations within the overburden waste were at or below crustal abundances with the exception of silver, arsenic, molybdenum, selenium and uranium, which were reported to exceed the crustal abundance by a factor of six in one or more samples. Distilled water extract testing results indicated that phosphate, ammonia,

ammonium, sulphate, arsenic, cadmium, chromium, iron, manganese, nickel, lead and zinc exceed the reference surface water quality guidelines, with cadmium and nickel exceeding the WHO drinking water guidelines (Golder, 2014c).

A geochemical evaluation is underway to further characterize both the tailings solids, tailings supernatant and waste overburden. The results of this testing could influence the design of waste and water management facilities. Details on the TSF and overburden disposal waste dumps are provided in Sections 3.8 and 3.9, respectively.

3.4 RADIOLOGICAL CHARACTERISTICS OF ORE, TAILINGS AND OVERBURDEN

A preliminary radiological assessment of the ore, waste overburden, surface soils and tailings was completed by Northern Environmental Consulting and Analysis (NECA, 2015). The preliminary assessment calculated exposure dose to humans based on uranium concentrations in the subject media. Results from the preliminary assessment indicate that the background radiation from uranium in the soil of the Farim area is variable, but the external doses to people in the area from the uranium are consistent with the global average.

With respect to public exposure, based on the available data for Farim, exposure to the tailings and ore could theoretically result in doses that exceed the Health Canada (2011) dose constraint of 0.3 mSv/y and the incremental dose of 1 mSv/y that are used for the protection of the public (NECA, 2015). The public would have to be exposed for a full year, however, which is unlikely as the operating mine site will not be accessible to the public. At closure, when local residents may seek to inhabit the area again, long-term exposure can be managed by constructing a suitably designed cover on the TSF that adequately shields exposure.

Doses decrease significantly with lower hours of workers, and as such, the preliminary external dose estimate for workers is considerably less than the Health Canada (2011) dose constraint for occupationally-exposed workers.

Follow up testing recommended by NECA is underway to validate the preliminary radiological assessment finding, and screening level radiological human health and ecological risk assessments will be incorporated into the ESIA (Knight Piésold, In-Progress). Results from these studies will be accounted for in future versions of the MRCP. A conservative approach has been taken in this version of the MRCP to account for the uncertainty in the preliminary assessment. The IWL and its closure cover have taken the potential radiological risks into account.

3.5 MINING ACTIVITIES

The mine consists of north and south pits. The pits will be mined in two phases with the south pit being mined from Years 1 to 8. The larger north pit will be mined from Years 8 to 26.

Overburden excavation will advance ahead of ore extraction. Overburden excavation will be completed using maximum 10 m high production benches, to a total pit depth of 70 m. Due to the depth of the deposit multiple benches of overburden will be developed and maintained in advance of the ore extraction.

The ore will be mined using a multiple bench open pit haul back mine design. This method requires storage of overburden outside the pit while the initial pit is being developed. Once a sufficient volume has been excavated, the overburden will be back-hauled and used as backfill within the mined-out

part of the open pit. The benching and excavation depths will vary depending on the actual overburden depth.

The current mine plan envisions that overburden will be stripped and removed with 12 m^3 front-end loaders matched with 97 t capacity haul trucks. The ore will be mined with 5 m^3 bucket class backhoes matched with 36 t capacity trucks to minimize mining dilution and maximize ore recovery. The ore will be hauled to a 175,000 t (dry basis) run-of-mine (ROM) stockpile adjacent to the plant, and segregated by quality. The ore will be reclaimed and carefully blended into a plant feed hopper by front-end wheel loaders with 12 m^3 buckets to achieve the desired product P_2O_5 grade.

3.6 PROCESS ACTIVITIES

3.6.1 Mine Site Process Overview

A schematic diagram of the process is shown in Figure 3.4 below. The following steps are included in the selected flowsheet:

- Ore storage and reclaiming of ROM ore
- Two stage scrubbing and screening to reject +1.18 mm material
- Sizing with hydrosizers and cyclones to separate -1.18 x 0.106 mm material to a coarse concentrate, -0.106 x 0.020 mm material to a fine concentrate material, and to reject -20 µm material to tailings
- Fine concentrate product thickening
- Product filtration, stockpile storage and reclaim
- Thickening and disposal of reject material to the TSF and return of decant water to the process plant

Tailings will include reverse amine flotation tailings, and reverse flotation tailings when pyrite is floated. Tailings will be thickened to 60% solids content and will be pumped to the TSF.

The final tailings stream (at approximately 74% solids) will be stored in the TSF. Water reclaimed from the TSF and Environmental Control Pond (ECP-1) will be returned to the process water tank. No external source of water will be required for the operation of the processing plant.

3.6.2 Port Site Process

The following describe the Port Site activities related to the handling and loading of concentrate at the Port Site.

- **Port Concentrate Unloading, Drying & Storage -** Product will be delivered by 31-t haul trucks from the Mine Site at 8% moisture content. The product will be end-dumped onto a product unloading bin. A belt feeder and conveyor will transfer the material to a stockpile located inside the product dryer shed. The covered product stockpile will have a capacity equivalent to 500 t or approximately 16 truckloads.

  Dust collectors will be installed at all material handling transfer points to prevent fine concentrate dust from entering the working environment and to minimize product loss.

  The ore is passed through a rotary dryer with air heated to 600^0C within the product dryer shed. The ore will exit the dryer at 105^0C and approximately 3% moisture. The dried product will be

conveyed to a second product storage shed in which the material will be stockpiled until it is loaded onto ships. The dried product stockpile in the product storage shed will have a live capacity of two ship loads or approximately 60,000 t.

A truck wash station is provided at the port near the entrance of the product storage area to wash the dump trucks before entering the product storage area. Water from the truck wash will pass through an oil water separator before it is directed to the stormwater management system.

- **Shiploading Product -** Bulk carrier vessels with a capacity of 35,000 DWT will berth dockside with the assistance of one or two tugs, as well as a dedicated pilot.

  When a ship is berthed, front-end loaders will transfer dried concentrate from the storage shed into three concentrate hoppers. Reclaimed concentrate from the loadout conveyor will discharge onto the port concentrate shiploader. The port concentrate shiploader will be a traversing shiploader with luffing and shuttling boom that will allow the ship to remain in one place during concentrate loading. A centralized dust collector will be installed at all material handling transfer points to prevent fine concentrate dust from entering the working environment and to minimize product loss.

  The shiploading system will have a nominal capacity of 630 t/h and maximum capacity of 1,200 t/h. Each ship will require 48 hours of loading time. A total of 38 shipments will be required each year in order to transport the planned 1.32 Mt of concentrate. On this basis, approximately one ship will be loaded every 8 days.

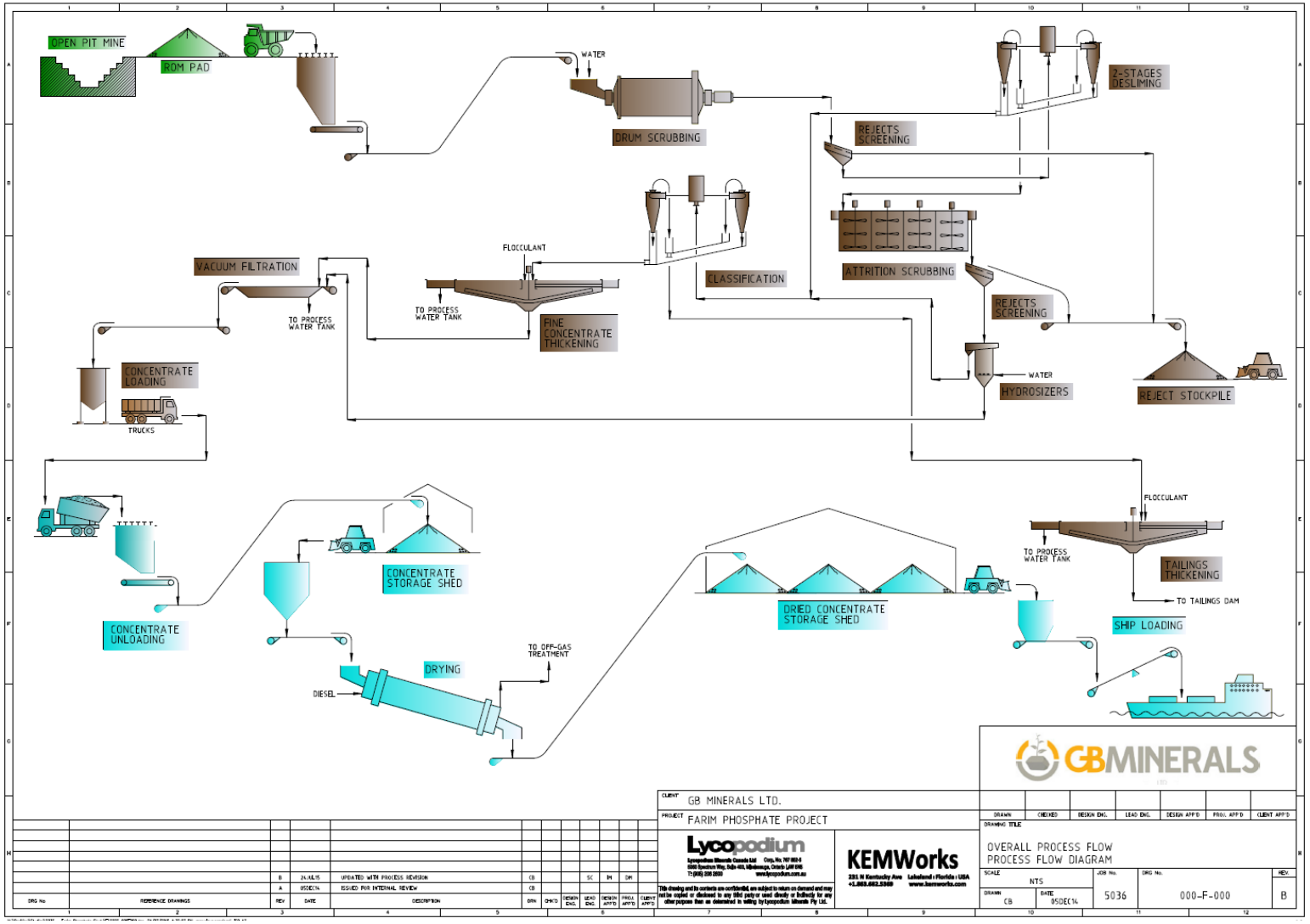


Figure 3.4 Process Block Flow Diagram

3.7 BUILDINGS AND OTHER STRUCTURES

The following subsection describes the major structures and facilities associated with the Mine Site. Figures 3.1 and 3.2 show the locations of the structures and facilities described below.

3.7.1 Mine Site Infrastructure

The following buildings and structures will be located at the Mine Site:

- **Administration Building -** A single-storey administration building will be located near the main site entrance gate. The building will have a reception area, offices, meeting rooms, a main conference room, medical clinic, kitchenette and washrooms. The offices are for managers, engineers, geologists, and clerks. A parking lot and transport and pick-up area is located adjacent to the administration building.
- **Laboratory -** A laboratory will be used to test metallurgical accounting samples from the process plant, mining and exploration operations.
- **Kitchen/Dining Hall -** A plant kitchen and dining hall will include a seating area for up to 80 people with overhead fans, kitchen, and food storage.
- **Potable Water -** Fresh water will be supplied by local wells and pumped from the raw/fire water tank through a reverse osmosis unit to produce potable water for drinking. Potable water will be distributed to potable water users for drinking, cooking, showers, and emergency eyewash stations throughout the corresponding facilities at the Mine Site.
- **Domestic Sewage -** A septic system, located at the process plant, will be utilized for sewage disposal. The septic tank sludge will be removed by a vacuum truck at regular intervals.
- **Change House/Ablutions -** Two plant change house and ablutions buildings will be constructed and they will include separate male and female showers, bathrooms, and change room with lockers.
- **Workshop/Warehouse -** The combined plant workshop/warehouse, used to store and maintain equipment and parts will house mechanical, electrical, instrumentation and general items. Internal offices will be supplied adjacent to the warehouse for warehouse and maintenance staff.
- **Security Gatehouses -** There will be a main security gatehouse as well as a separate process plant security gatehouse.
- **Truck Shop -** A truck shop will service the mining fleet and include the necessary maintenance service bays as well as an office for supervision and planning. Initially, 4 truck bays will be required, but will be progressively expanded to 6 bays as the fleet requirement increases. The building will be a steel structure with metal cladding and a concrete slab on grade. A tire yard will be located adjacent to the truck shop.
- **Fuel Supply -** Diesel fuel is required primarily for the mining fleet, rotary dryer, and the power generation plants. Diesel fuel will be shipped to the Port of Bissau, and then transported via trucks to diesel fuel storage tanks at the Mine. Two storage tanks will be designed in accordance with the American Petroleum Institute (API) ECP API 650 standard, and will be within secondary containment. One tank (10 m^3 capacity) will dispense fuel to light vehicles, and the other

tank (50 m^3 capacity) will dispense fuel to the mining fleet. Any diesel spillages around the diesel area will be collected and transported to an oil/water separator. Separated oil will be disposed and separated water will be sent to site drainage.

- **Roads -** The Mine Site roads will be constructed of crushed waste rock from an aggregate source in Saltinho, approximately two hours east of Bissau. The onsite roads are designed to connect the various process plant and Port Site areas. At the mine, the offsite gravel road is approximately 2 km in length and connects the truck load-out facility to the existing paved highway leading to Bissau.

  Two different types of haul roads will be constructed for mining activities: overburden haul roads that support a 97 t capacity end-dump truck (180 t fully loaded); and ore haul roads that support a 36 t capacity end-dump truck (approximately 72 t fully loaded).

  Heavy traffic to the IWL in Year 0 will require the construction of a permanent overburden haul road approximately 6.6 km long leading from the south pit to the IWL. This haul road will be regularly used from Years 0 through 3 and again in Years 15 through 17 to transport overburden from the pits to the WD-3 at the IWL or WD-2. It will also be used for reclamation purposes in following years. Additional overburden haul roads and ramps will be constructed in-pit in Year 0 for overburden truck access and will progress with the pit face for the life-of-mine (LOM).

  Ore haul roads must be incrementally built along the entire southern perimeter of the south pit adjacent to River Cacheu from Years 1 through 8 to allow for haulage of the ore to the processing plant. Haul roads will be incrementally built along the northern perimeter of the south pit from Years 1 through 8 on an as-needed basis to allow for additional haulage of ore to the plant. This northern haul road will likely be built to overburden haul road specifications.

- **Electrical Infrastructure -** At the Mine Site, the power plant will supply a main high voltage (HV) switchroom inside the processing plant from which power will be distributed around the site via 11 kV lines. Electricity for the Mine Site will be supplied from four onsite 1.5 MW prime rated 11kV diesel generators (3 duty, 1 standby). The main HV switchboard and other plant electrical buildings will be prefabricated switchroom buildings. On-site power lines will extend to the buildings throughout the Mine Site and extend to the truck load-out facility.

- **Pipelines -** High density polyethylene (HDPE) pipelines will transmit water and tailings to and from the TSF, as well as between the various water management facilities.

3.7.2 Port Site Infrastructure

The following buildings and structures will be located at the Port Site:

- **Administration Building -** A single-storey administration building will be located near the Port Site entrance gate. The building will have a reception area, offices, meeting rooms, a main conference room, medical clinic, kitchenette and washrooms. The offices are for managers, engineers, and wharf personnel. A parking lot and transport and pick-up area is located adjacent to the administration building.

- **Potable Water -** Fresh water will be supplied by local wells and pumped from the raw/fire water tank through a reverse osmosis unit to produce potable water for drinking. Potable water will be distributed to potable water users for drinking, cooking, showers, and emergency eyewash stations throughout the corresponding facilities at the Mine Site.
- **Domestic Sewage -** A septic system, located at the process plant, will be utilized for sewage disposal. The septic tank sludge will be removed by a vacuum truck at regular intervals.
- **Wet Concentrate Shed -** A wet concentrate shed where the product will be unloaded and dried to 3% moisture will be situated at the Port Site.
- **Dry Concentrate Shed -** There will be a dry concentrate shed where final product will be stored for shiploading. On ship arrival, the product will be unloaded via front end loaders onto a conveyor feeding the shiploader.
- **Fuel Supply -** Diesel fuel is required primarily for the road haulage fleet, product dryer, the tugs and pilot vessel, and the power generation plant. Two 600 m^3 capacity storage tanks will be within a secondary containment berm. A third 20 m^3 capacity tank will dispense fuel to vehicles, and a fourth (36 m^3 capacity) will be a day tank located at the rotary dryer. Fuel dispensing facilities will be located on the wharf at the tug dock.
- **Shipping Control Room/Sample Building -** A combined shipping control room and sample building will be used to check product moisture levels and store shipping records.
- **Kitchen/Dining Hall -** A port kitchen and dining hall will include a seating area for up to 20 people with overhead fans, kitchen, and food storage.
- **Direct Load Warf -** The primary elements of infrastructure making up the direct load wharf follow. For additional detail refer to Baird (2015).
  - Steel pile bents to support the conveyor and truss system delivering phosphate to the wharf. Bents are constructed with two 600 x 16 mm pipe piles with opposing 1H:6V batters. Three HP360 x 152 beams are welded together to form the bent cap on which the conveyor and truss system is directly attached.
  - Two steel pile supported platforms are used to support a single telescoping radial shiploader. The curved shiploader track platform is 4 m wide and approximately 47 m long on the outside arc. The platform is supported by nine bents of 600 x 16 mm pipe piles with opposing 1H:6V batters. Three HP360 x 152 beams are welded together to form the bent caps on which the superstructure is directly attached. The platform deck consists of five steel beams evenly spaced and laterally restrained with heavy-duty steel grating.
  - Four steel pile supported mooring dolphins. Each dolphin incorporates four 1,000 x 25 mm pile piles with 1H:6V vertical batters. The steel pile cap doubles as a driving template and is fabricated with 1,100 x 25 mm pile sleeves and 800 x 19 mm cross bracing. The central bollard mount consists of a 1,200 x 25 mm pipe fully grouted and sealed with 25 mm top and bottom plates. Steel grating is used as a permeable walking surface.
  - Four steel pile berthing dolphins with steel decks. The berthing dolphins are identical to the mooring dolphins except for the addition of a braced 1,000 x 25 mm vertical pile. A parallel motion fender with two 800 mm Grade 3 rubber cones and a 2.5 x 5 m fender panel is affixed to each vertical pile through field-welded brackets.
  - Steel gangways providing access to the mooring and berthing dolphins for stevedores.

- A floating wharf to moor tugs and the pilot boat. It is anticipated that all service vessels will be fuelled from the floating wharf.
- Guide piles and a graded access ramp for loading and unloading of a maintenance barge. Note this facility is recommended as there is no vehicular or heavy equipment access out to the wharf. As such, floating barge will need to be utilized in the event of breakdown. The maintenance barge will also be critical to maintain aids to navigation.
- Required aids to navigation at Ponte Chugue and along the anticipated navigation route.

- **Roads -** These will be constructed of crushed of crushed waste rock from an aggregate source in Saltinho. The on-site roads are designed to connect the various port facilities. The off-site gravel road is approximately 6 km in length and connects the port facilities to the existing paved highway.
- **Electrical Infrastructure -** At the Port Site, the power plant will have a direct feed to the Low-Voltage (LV) switchroom. Power will be supplied from three onsite 0.5 MW prime rated 04 kV diesel generators (2 duty, 1 standby).

3.8 TAILINGS STORAGE FACILITY

A paddock style TSF will store 6.4 Mt of tailings generated over the Project life.

The design incorporates a multi-zoned embankment, a compacted in situ soil-lined basin area, an underdrainage system covering the approximate extent of the supernatant pond, and an upstream toe drain. Due to the potential elevated levels of environmentally significant elements, a provisional allowance has been included to line the facility with an HDPE geomembrane, subject to further geochemical assessment of the tailings solids and supernatant liquor. The TSF is designed to fully contain the design tonnage as well as rainfall runoff arising from storm events up to and including a 1 in 100 year average return interval (ARI) storm event or wet sequence. The embankments will be constructed in stages over the life of the facility to suit the storage capacity requirements.

Tailings will be discharged into the facility by sub-aerial deposition methods via a number of single point discharge spigots located along the embankment crest. The active tailings beach will be rotated around the facility so as to maximise tailings density and maintain the supernatant pond around the central decant. The upstream toe drains and underdrainage system will drain by gravity to a collection sump located at the toe of the southern embankment. Supernatant water will be decanted from the facility via the decant tower located at the centre of the facility. Solution recovered from the toe drains, and underdrainage and decant systems will be pumped back to the plant for re-use in the process plant.

The TSF, together with waste dump WD-3a and WD-3b located outside the perimeter of the TSF, will form an integrated waste landform (IWL) for efficient reclamation and rehabilitation.

3.9 WASTE OVERBURDEN DUMPS

The Project mining plan indicates that 539 Mm^3 (loose cubic metres) of waste overburden will be produced during the mining operations.

Based on the testing to date there is potential for elevated concentrations of environmentally significant metals and compounds in a portion of the waste overburden. The relative quantities of

each lithology and their geochemical characteristics are being determined in more detail at present. In the meantime, the following design philosophy has been adopted:

- 78% (420 Mm^3 of 539 Mm^3) will be placed as in-pit overburden backfill (IOB)
- 7.5% (39.5 Mm^3) will be deposited in ex-pit waste dumps (WD-1, WD-2, WD-3a and WD-3b)
  - WDs 1, 2 and 3a will stockpile inert waste only
  - WD-3b will contain potentially leachable waste in specially designed encapsulation cells contained within inert waste
- 0.5% (3 Mm^3) of waste overburden (inert overburden only) will be used to construct the initial TSF embankments, sediment control dams and flood protection bund in the first two years of mining
- 14% (77 Mm^3) of waste overburden (inert overburden only) will be placed in three surcharge waste dumps (WD-4, WD-5 and WD-6) located within the footprint of the backfilled open pits

Table 3.2 summarizes the waste overburden disposal plan including the capacity and heights of the proposed WDs.

Water collected from the WD-1, WD-2 and WD-3a dumps will report to separate sediment control dams (SCP's) and will be discharged to the environment after reducing the sediment load to an appropriate level. Based on the current design philosophy, no seepage collection measures are proposed.

WD-3b will be designed to reduce contact water from entering the surface water and groundwater environments. A basal low permeability soil liner will be formed beneath the footprint of WD-3b and seepage/run-off flows at the base of WD-3b will report to ECP-1 by means of re-shaping the ground surface to promote drainage to the pond, or provision of a network of above-ground sand/gravel drains. Any contaminated water collected in ECP-1 will be returned to the process plant for re-use. Uncontaminated water will be returned to the plant for re-use, if required, or discharged to the environment.

Table 3.2 Waste Overburden Disposal Plan

Name	Location	Capacity (Mm^3)	Height (masl)	Comment
In-pit backfill		420	Progressive backfill both pits during operation	
Ex-pit Waste Dumps		39.5	Sum of WD-1, WD-2, WD-3a and WD-3b	
WD-1	North of south pit	9.0	30	Years 1-2
WD-2	North of south pit	8.5	30	Year 1
WD-3a	IWL	13.4	30	Years 0, 2, 3 and 15 to 17
WD-3b	IWL	8.6	40	Years 0 to 26
Construction Material		3.0	To construct initial TSF, bund, etc.	
Surcharge Waste Dumps		77.0	Sum of WD-4, WD-5 and WD-6	
WD-4	Backfilled south pit	57.0	25	Years 3, 4 and 8 to 15
WD-5	Backfilled north pit	10.4	35	Years 10 to 15
WD-6	Backfilled north pit	9.6	40	Years 15 to 17
Total		539		

3.10 TOPSOIL STOCKPILES

Topsoil will be salvaged and stored in clearly marked designated areas during operations for use in progressive reclamation and end of mine life reclamation activities. Care will be taken to ensure that topsoil is protected and handled in a manner that will preserve its quality. Stockpiles will be revegetated to maintain soil fertility and enhance physical stability until the soil can be utilized for reclamation.

3.11 SOLID WASTE MANAGEMENT

Solid wastes will be disposed of in a manner complying with local regulations. Allowable products will be disposed of in a solid-waste landfill constructed on site. Products not allowed to be disposed of in the landfill (such as solid and liquid hazardous wastes) will be transported to appropriate facilities off site.

3.12 SURFACE WATER MANAGEMENT

The site presents a unique water management challenge due to the Mine Sites proximity to the tidally influenced River Cacheu and the presence of a distinct wet season receiving heavy rainfall. Three main types of water will need to be managed at site:

- **Non-contact (clean) Water -** Water that does not come in contact with mining areas or wastes. Non-contact water includes water originating from the tidally influenced River Cacheu and its tributaries, water generated from pit perimeter dewatering wells, and runoff from stabilized or undisturbed/reclaimed areas.
- **Sediment-laden Water -** Includes runoff from disturbed areas such as the active waste dumps and construction sites. This water type will be managed to remove sediment to acceptable levels, but otherwise the quality of this water is considered to be acceptable for discharge to the environment.
- **Contact Water -** Contact water is mine effluent that may be of adverse water quality (mainly metals) without treatment. Sources of contact water at the site include pit water (groundwater seepage that bypasses the dewatering wells, as well as direct precipitation falling into the open pit), tailings supernatant, and runoff and seepage from the TSF and waste dump WD-3b.

3.12.1 Management of Non-Contact Water

To limit the amount of water that needs to be managed, measures will be implemented to minimize the movement of non-contact (clean) water into active mining areas and construction sites. Management measures include the use of clean water diversion channels and flood protection bunds:

- **Clean Water Diversion Channels -** Diversion channels will be constructed to direct non-contact (clean) water away from construction sites and active mining areas. Temporary diversion channels will be constructed as outlined in the Erosion and Sediment Control Plan (ESCP), (Knight Piésold, 2015f). Permanent diversions will be constructed to divert clean water around the open pits.

- **Flood Protection Bunds -** Flood protection bunds will be used to divert non-contact water away from each of the pits, as follows:
  - **River Cacheu Flood Protection Bund -** The footprint of the south pit lies partially within the tidal flood plain of the River Cacheu, which has a tidal range at the site of approximately 1.5 m. A flood protection bund will be constructed along the entire perimeter of the south pit where it borders the River Cacheu. This will be constructed in stages using temporary bunds. The bund will have a crest elevation of 4 m ASL and a toe width of 20 m. An erosion protection layer will be placed on the river side of the bund.
  - **North Pit Flood Protection Bunds -** The north pit will require the construction of two flood protection bunds during the initial stages of pit development, to keep the ephemeral Rio de Cavaras Marinhos and Rio de Bunja from flowing into the pit.

3.12.2 Management of Sediment-Laden Water

Sediment-laden waters will be collected and managed within the SCPs. Erosion will be minimized to the greatest extent possible to reduce the levels of sediment in runoff by following the mitigation measures outlined in the ESCP. Three sediment control ponds (SCP) have been situated within the mine site footprint to manage sediment laden waters coming from the waste dumps, open pits and construction sites, as follows:

- **SCP-1 -** Runoff from inert waste dump WD-1 and contact water from ECP-1 only if discharge criteria are met.
- **SCP-2 -** Runoff from the TSF and WD-3a (the IWL).
- **SCP-3 -** Runoff from inert waste dump WD-2.

Sediment control dams will also be required to manage runoff from the surcharge waste dumps (WD-4, WD-5 and WD-6). Water management plans for the surcharge waste dumps will require development during the next phase of engineering. It has been assumed that each of the surcharge waste dumps will require at least one pond of similar size to SCP-3. The current location and configuration of the surcharge waste dumps may need to change slightly to accommodate the required water management features.

Water will be allowed to discharge directly from the SCPs to the environment once concentrations of suspended solids meet the specific discharge requirements identified in the Water Management Plan. Contingency measures to remove sediment include the use of flocculants, and if water quality monitoring identifies exceedances of discharge criteria for other parameters (i.e., metals), the SCP water can be directed to the treatment plant prior to discharge. Small quantities of water from SCP-1 may be utilized as make-up water in the process plant.

3.12.3 Management of Contact Water

As discussed above, sources of contact water at the site includes water from the open pits, tailings supernatant, and runoff and seepage from the TSF and waste dump WD-3b. Contact water will be managed within two facilities, the TSF and ECP-1. The first priority is to return contact water to the process plant, as the process plant operates at a water deficit.

The TSF will generate a surplus of water throughout the year. During the dry season, all available tailings supernatant will be decanted and sent back to the process plant, and additional make-up water for the process plant will be derived from ECP-1 (containing contact water) and SCP-1 (containing sediment-laden water), in that order. During the wet season, there is a surplus of tailings supernatant that will require management.

Contact water is expected to require treatment before it is discharged to the environment. ECP-1 will receive the following contact water streams:

- Water from the active pit area
- Surplus tailings supernatant from the TSF (any surplus not recirculated back to process)
- Runoff and seepage from waste dump WD-3b

The water treatment plant will treat all contact water exceeding discharge criteria. Contact water meeting discharge criteria will be discharged to the River Cacheu via an outfall equipped with a suitably sized diffuser.

4 – PROGRESSIVE RECLAMATION

4.1 PROGRESSIVE RECLAMATION MEASURES

Throughout operations progressive reclamation will be carried out to the greatest extent practical. Progressive reclamation is implemented during the operation phase with the following objectives:

- Minimize physical safety concerns
- Reduce environmental impacts such as erosion and sedimentation, and corresponding water management requirements
- Reduce environmental liabilities and the corresponding amount of financial assurance required
- Provide insight for future reclamation activities

The main progressive reclamation measure to be undertaken will be the progressive backfilling of the open pits. Pit backfilling is both cost-effective for the mine plan and provides effective disposal of the majority (78%) of the waste overburden generated by the Project.

The waste overburden disposal schedule presented in Table 3.2 shows that the following progressive reclamation opportunities can be realized:

- WD-1 and WD-2 can be reclaimed in Years 2 and 3
- WD-3a and WD-3b can be reclaimed as of Year 18
- WD-4 can be reclaimed followings Years 3 and 4 and between Years 8 through 15
- WD-5 and WD-6 can be reclaimed between Years 10 and 17

After Year 17, all overburden generated at the north pit is used as pit backfill, and all other waste dumps can be reclaimed and revegetated. Waste overburden stockpiles will be constructed with stable slopes appropriate for the high rainfall of the area. Specific waste dump reclamation measures include:

- Minimal re-contouring to promote surface water runoff and physical stability (i.e., designed and constructed for closure)
- Placement of 0.4 m thick topsoil cover using stockpiled topsoil
- Revegetation in accordance with pre-determined final land-use
- Modification of surface water management features appropriate for the reclaimed waste dump

The landfill will be progressively reclaimed using the same approach applied to the waste dumps.

Once the waste dumps have been adequately stabilized and suspended solids in runoff from the dumps consistently meet applicable guidelines, it will be possible to decommission the corresponding SCPs if not used for other purposes. This includes SCP-3 at a minimum.

By the end of the operation phase:

- All waste dumps will have been reclaimed
- The filled portions of the landfill will have been reclaimed
- South pit will have been completely reclaimed (covered by reclaimed WD-4)
- Approximately 80% of the north pit will have been backfilled and reclaimed
- Dewatering wells will be decommissioned once they are no longer required

4.2 CLOSURE RESEARCH PROGRAMS AND FURTHER STUDIES

Progressive reclamation activities during the operation phase provide opportunities to refine measures outlined in the interim and final MRCPs, as follows:

- Test and refine the reclamation (i.e., sediment and erosion control) measures for later implementation
- Revise plans for final closure based on further geochemical testing and the result of ongoing site environmental monitoring (e.g., water quality, groundwater dewatering, etc.)
- Research to optimize soil salvage and placement and selection of preferred revegetation species, based on growth media and revegetation trails and revised land use endpoints

The proposed reclamation and closure research programs will be described in greater detail and submitted as part of the future MRCP updates.

5 – TEMPORARY SUSPENSION OF OPERATIONS

5.1 OVERVIEW

In the event of a temporary suspension of mining operations as defined in Section 1.5, the main objectives will be to ensure that the Mine and Port Sites are left in a safe, stable and secure state. The following is a summary of the measures that will be taken in the event of a temporary closure.

5.2 SITE ACCESS AND SECURITY

Both the Mine Site and Port Site will be fenced and the fenceline monitored during all project phases. Site entrances will be equipped with gates, which will be manned.

Under temporary suspension, a care and maintenance crew including site security will continue to monitored and restrict public access. Additional measures will be implemented within the Project sites; buildings will be locked and additional “no trespassing” signage posted if necessary to discourage unauthorized access. The fuel stations will be left empty or with only a minimum amount of fuel and secured and locked. Chemicals will be stored in appropriate containers in areas of restricted access. Unnecessary chemicals will either be shipped back to the supplier or removed from the site by a licensed contractor for disposal or reuse. Non-hazardous and hazardous wastes will be removed from the Mine and Port Sites.

5.3 OPEN PIT

As mentioned above, the entire Mine Site will be fenced to restrict public access. In the event of temporary suspension, temporary fencing and signage will be placed around the perimeter of the open pit area (the portion where active mining was being undertaken when operations were suspended).

Dewatering of the open pits will continue through a temporary suspension event, to maintain pit stability and conditions suitable to resuming mining at short notice. If temporary suspension was protracted, GB Minerals may decide to allow the active pit area to flood. It would be necessary, in this instance, to dewater the pit and inspect the stability of the pit walls upon resuming mining.

5.4 SECURING OF MECHANICAL, HYDRAULIC AND ELECTRICAL SYSTEMS

During periods of temporary suspension all mechanical, hydraulic and electrical systems will be left in a safe and secure state. Mechanical and hydraulic systems that will no longer be utilized will be placed in a no-load condition. All electrical panels will be secured and locked.

5.5 CONTROL OF EFFLUENTS

During periods of temporary suspension, the quality and quantity of mine effluents and site runoff will continue to be monitored, and the effluent treatment plant will remain operational as required to meet effluent discharge limits.

5.6 STOCKPILES

Stockpiles, including topsoil stockpiles and waste dumps, will be constructed and maintained in accordance to the design engineer's specifications to ensure physical stability. During periods of temporary suspension, and water management and sediment control measures will continue to be implemented, and opportunities to progressively reclaim stockpiles will be considered.

5.7 TAILINGS, WATER AND OTHER IMPOUNDMENT STRUCTURES

The TSF be operated in accordance with an Operations, Maintenance and Surveillance (OMS) Manual, and will continue to be operated according to the OMS Manual during temporary suspension. This will include regular inspections of the embankments and water level by site personnel, and an annual inspection of the embankments by a qualified third-party geotechnical engineer.

During temporary suspension, mining and processing will cease, and therefore supernatant in the TSF will not be pumped to the process plant as make-up water. As a consequence, it will be necessary to closely monitor water levels in the TSF and decant excess water to the ECP for possible treatment prior to discharge. These measures will be required to ensure that adequate freeboard is maintained in the TSF.

Other impoundment structures include ECP-1 and the SCPs, as well as the flood protection bunds. As with the TSF, these structures will be regularly monitored for signs of physical instability by site personnel and inspected annually by a qualified third party geotechnical engineer, in accordance with operating procedures outlined in the OMS Manual.

5.8 SCHEDULE FOR IMPLEMENTATION OF TEMPORARY SUSPENSION

The following measures will be implemented before the mine can be considered in a state of temporary suspension:

- Restrict access to the site and on site buildings and equipment
- Secure all electrical systems and place mechanical and hydraulic systems in a no-load condition
- Establish site security measures and monitoring routines
- Ensure that the fuel station is left empty (or with only a minimum amount of fuel), secured and locked
- Ensure all surface and subsurface works are in a stable condition
- Place signage and fencing around the perimeter of the open pit and any other potential hazards
- Restrict access to the open pit (barricade/fencing and signage)
- Ensure that any remaining wastes have been placed within the on-site landfill or removed from the site to a licensed landfill site or disposal facility

It is anticipated that it will take approximately 2 to 3 weeks to move the mine from full operations into a state of temporary suspension.

6 – FINAL RECLAMATION MEASURES

6.1 OVERVIEW

Reclamation and closure of the Project sites will be consistent with the high-level closure objectives presented in Section 1.4. These closure objectives will be refined as the Project proceeds and subsequent interim MRCPs are prepared, incorporating project and site conditions, as well as input from stakeholders.

Final reclamation of the Mine and Port Sites will be undertaken over a 2-year active closure period, implemented at the end of the mine life or in the event of a sudden closure.. The final and "early/sudden closure" scenarios are described in Section 1.5.

An approximate 5-year post-closure monitoring period will follow active closure, and will consist of environmental and social monitoring to ensure mine closure objectives have been met.

Figure 6.1 illustrates the proposed closure measures that will be implemented at the Mine Site. At the Mine Site: the majority of the open pits will be backfilled (a small pit pond will remain within the north pit at closure; the TSF and WD-3b capped with an engineered cover, waste dumps stabilized and revegetated; and the buildings and equipment will be removed from site. Roads will remain in-place as it is expected they will be beneficial for post-mining land uses. Post-closure, all areas will have been stabilized and revegetated. The IWL and waste dumps will remain as new landforms. The area will be made suitable for post-closure land use, which is expected to include the establishment of new settlements (or reestablishment of pre-mining communities), cashew production, wilderness areas and farming.

It is expected that post-closure, other users will wish to use the Port Site including the wharf for similar land uses. Therefore, reclamation will focus on removing project-specific infrastructure (e.g., ship loader, material handling facilities, sheds, etc.) and preparing the site to be safe to the public and accommodate future commercial/industrial land use.

6.2 OPEN PITS

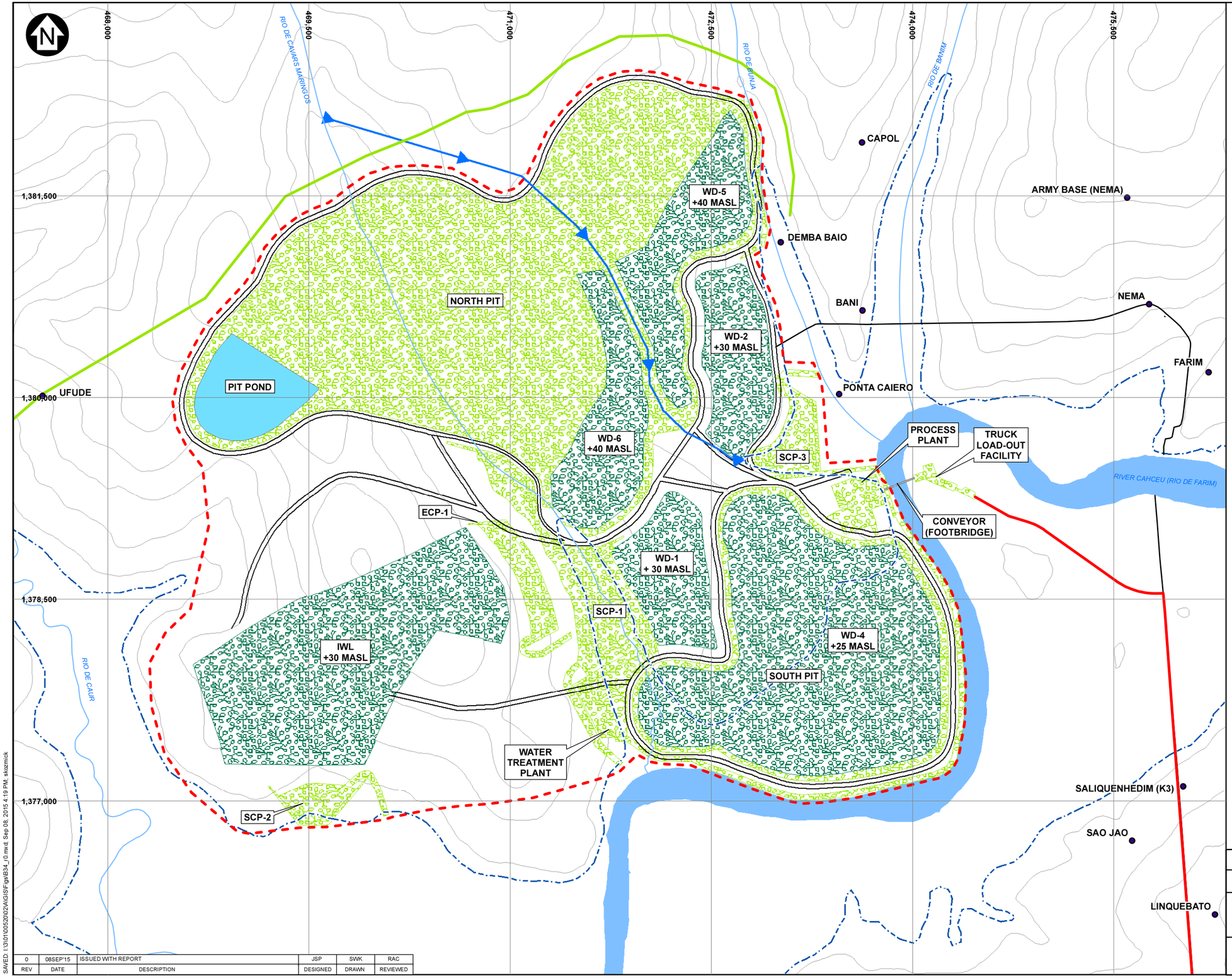
The closure objectives for the open pits are to:

- Ensure that they are chemically stable at closure to prevent potentially significant effects to groundwater and surface water resources, and consequently human health
- Return the land to conditions that are capable of supporting former land uses (i.e., agricultural) or an alternative agreed upon final land use
- Ensure that significant post-closure subsidence does not occur within the open pits, which thereby creates depressions that will fill with water

The proposed closure measures for the north and south pits are outlined below.

6.2.1 South Pit

By Year 15, the south pit will have been backfilled and the full extent of WD-4 will have been constructed and reclaimed as outlined in Section 4.



LEGEND:

- COMMUNITY
- ROAD
- HAUL ROAD
- PRODUCT TRANSPORT ROUTE
- PROPOSED BYPASS ROAD
- 100 m FENCELINE
- DIVERSION CHANNEL
- RIVER/STREAM/DRAINAGE
- WATER
- PIT POND
- RECLAIMED AREA (BLENDED INTO SURROUNDING TOPOGRAPHY)
- RECLAIMED LANDFORM

NOTES:

1. MINE INFRASTRUCTURE AND BASEMAP DATA PROVIDED BY LYCOPODIUM MINERALS CANADA LTD. (MARCH 18, 2015). UPDATED AUGUST 17, 2015 BASED ON FIGURES PROVIDED BY KNIGHT PIESOLD LTD. (PERTH).
2. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: WGS 1984 UTM ZONE 28N.
3. CONTOUR INTERVAL IS 5 METRES.
4. IWL - INTEGRATED WASTE LANDFORM
   TSF - TAILINGS MANAGEMENT FACILITY
   WD - WASTE DUMP
   ECP - ENVIRONMENTAL CONTROL POND
   SCP - SEDIMENT CONTROL POND

SCALE 250 125 0 250 500 750 1,000 1,250 1,500 m

GB MINERALS LTD.

FARIM PHOSPHATE PROJECT

MINE SITE - POST CLOSURE CONDITIONS

Knight Piésold CONSULTING

P/A NO. NB301-520/2 | REF NO. 10 | REV 0

FIGURE 6.1

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
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Adequate long-term protection of the portion of the stockpile located within the River Cacheu floodplain will be provided. This is expected to include enhancing the structural integrity of the existing flood protection bund, against which WD-4 will be constructed, during the detailed design phase. The performance of the armouring will be monitored during operations to help ensure that the bund will remain stable post-closure. .

6.2.2 North Pit

At the end of mining, a void measuring 35.4 Mm^3 will exist at the western end of the north pit, representing the open portion of the pit from the last several years of mining. At closure, the void will be allowed to fill with water allowing a small pit pond to form. The remainder of the north pit will be backfilled, covered with stockpiled soil and revegetated. Approximately 80% of the north pit will be progressively reclaimed as outlined in Section 4. It will be necessary while disposing of waste overburden in-pit during operations as well as at closure, to compact the backfill and allow for any subsequent settlement, to avoid creating a local depression within the pit footprint over time. Backfilling of the pits will be done in a manner that minimizes additional reclamation efforts post-closure (i.e., subsidence and drainage patterns will be taken into account in the landform design).

6.3 INTEGRATED WASTE LANDFORM AND WASTE DUMPS

The shared closure objectives for the IWL and waste dumps are as follows:

- Ensure long-term physically stability to protect public safety and reduce erosion and downstream sedimentation
- Ensure long–term chemical stability by limiting the influx of atmospheric water, capturing and treating seepage and adverse quality runoff and preventing metal uptake in plants and exposure to humans and animals. Prevent radiological exposure to the public (Section 3.4)
- Create landforms that are compatible with the surrounding landscape and consistent with the agreed upon sustainable post-closure land use

The IWL consists of WD-3a, WD-3b and the TSF. The facility will be designed, constructed and operated in a manner that minimizes additional effort during final closure. The waste dump component of the IWL (i.e., WD-3a and WD-3b) will be progressively reclaimed during operations as outlined in Section 4. The TSF, however, will function until the end of mine life and will require complete reclamation at closure.

To meet the above closure objectives the following measures will be implemented:

- Any remaining water will be pumped from the supernatant pond to ECP-1 or SCP-1 and treated prior to discharge if required
- Seepage and runoff will be collected and treated until water quality objectives are met
- The decant tower will be backfilled with grout or cement; and any portion of the decant tower located above final grade will be demolished to grade
- The tailings surface will be re-contoured to promote drainage, if required
- A 1.0 m thick store and release cover will be placed over the tailings isolate the waste, limit water ingress, isolate potential radioactive wastes, and prevent metal uptake by vegetation

- Placement of 0.15 m of salvaged soil above the cover to provide a growth medium for revegetation
- Revegetate the TSF with native grasses and shrubs to stabilize the surface against wind and water erosion until native and/or targeted species become established
- Construct a surface water management system to direct water off of the TSF and minimize the potential for erosion and infiltration

6.4 INDUSTRIAL INFRASTRUCTURE

Industrial infrastructure refers to the process plant, material handling facilities, truck load-out facility, power supply and distribution facilities, buildings and other structures, as well as mobile equipment.

The closure objectives for decommissioning the industrial infrastructure are to:

- Maximize salvage and re-use of infrastructure and equipment
- Maximize on-site disposal of non-salvageable infrastructure and equipment
- Identify and remove hazardous materials for disposal at an approved off-site facility
- Identify and remove any physical hazards or other potential threats to public health and safety
- Identify and remediate any surface and subsurface contamination that may have resulted from project operations

Stationary and mobile equipment with marketable value will be removed for salvage or resale. Any equipment that cannot be salvaged or sold will be decontaminated and placed within the on-site landfill. Equipment that cannot be salvaged or sold and is deemed to be hazardous waste will be disposed of at an approved off-site facility.

Buildings will be dismantled/demolished if not suitable for salvage, and will be disposed of within the landfill.

Overhead power lines and poles will be recovered for salvage, resale or disposal.

Fuel tanks will be emptied and salvaged for resale. Fuel tanks not sold will be emptied, steam cleaned, the rinseate collected and treated, and the tanks cut up for steel salvage or disposal.

Concrete foundations and slabs located above surface grade will be demolished to a depth of 1 m below grade, prior to cover/regrading of concrete left below final ground level. All exposed rebar will be removed.

Development areas previously occupied by buildings or equipment will be ripped and re-contoured to reduce compaction, enhance water infiltration and reinstate natural drainage. Topsoil will be placed over these areas, and native grasses will be used to stabilize the surface against wind and water erosion until native and/or target species become established.

6.5 ACCESS AND HAUL ROADS

It is expected that any site roads will be considered assets by post-closure land users. As such, any access or haul roads not progressively reclaimed during operation will be retained at closure for post-closure monitoring and beneficial use by the surrounding communities.

Alternatively, if stakeholder engagement finds that roads are not desired post-closure, the roads will be decommissioned as described above for development areas.

6.6 WASTE MANAGEMENT FACILITIES

Waste management facilities include waste sorting and storage facilities at both the Mine and Port Sites, as well as the on-site landfill at the Mine Site.

Progressive reclamation of the on-site landfill will take place during operations to the maximum extent possible.

The final closure objectives for the waste management facilities include:

- Ensure appropriate final disposal of wastes in accordance with the Waste Management Plan
- Protect public health and safety
- Minimize the release of gas emissions and landfill leachate

The above objectives will be accomplished by removing any remaining hazardous waste from site, testing for contamination of surrounding soils for metals, fuels and reagents, remediating contaminated areas, and closing the on-site landfill using best available technology.

To achieve the closure objectives the following closure measures will be implemented:

- Remaining non-organic, non-hazardous materials will be disposed of in the on-site landfill
- Remaining hazardous wastes will be disposed of at an off-site facility licenced to receive the same
- The concrete pads associated with the waste storage area will be broken up and buried in situ, covered with topsoil, and revegetated
- A contaminated site assessment will be conducted to investigate for contamination and the need for remedial actions
- The on-site landfill will be capped with a low permeability engineered cover and revegetated. A surface water management system will be integrated into the cover design to facilitate the drainage of water away from the landfill wastes.

6.7 WATER MANAGEMENT

The main closure objective for water management structures is to ensure that the reclamation of the water management facilities is completed in such a way that allows the on-site and off-site drainages to remain physically stable in the long term.

The north pit flood protection bunds, SCPs and ECP-1 will be present at closure. The following measures will be implemented to achieve the closure objectives:

- North Pit Flood Protection Bunds
  - The bunds will be re-contoured to match the surrounding landscape, covered with topsoil to provide a growth medium and revegetated
- SCPs and ECPs
  - Metal contaminated sediments (if any) will be excavated and deposited within the TSF at closure from ECP-1
  - Spillways will be breached and re-contoured to match the surrounding landscape and to reinstate local drainage patterns
  - The disturbed areas will be covered with salvaged soil to provide a growth medium and revegetated

6.8 PORT SITE

As described in Section 5.1, the expectation of GB Minerals is that another commercial or industrial user will seek to make use of the Port Site at the end of the Project. Therefore, closure objectives for the Port Site are to leave the site in a physical and chemically stable state that can be utilized by future users in a beneficial manner. Discussions will be held with the local communities and Government to determine if the assets can be transferred to a new user. It is assumed that the wharf and associated infrastructure would remain post-closure.

The Port Site buildings and associated infrastructure, including the electrical infrastructure, product sheds, administration and support buildings, and water management facilities would be dismantled/demolished at closure and either removed off site for salvage/resale, or decontaminated and disposed of in a landfill. The development area will be investigated for potential contamination and will be remediated if necessary.

The foundations and concrete slabs would be demolished to 1 m below grade and buried in-situ. The Port Site infrastructure pad would remain for future use.

6.9 SOCIO-ECONOMIC ASPECTS

Closure planning has historically been the responsibility of mine operations management and has focused on environmental aspects, with limited community involvement often. Modern best practices, however, include seeking to integrate feedback from local communities on establishing community development initiatives that may provide a legacy beyond the life of the mine, as well as in the establishment of closure objectives to ensure that post-closure conditions are consistent with community aspirations and livelihoods.

The Mine Closure Toolkit referenced in Section 1.3 (ICMM, 2008) encourages member companies to approach closure in a holistic manner that includes integrating stakeholder values in the design and implementation of closure, as well as addressing the social legacy of mine closure. The intent to seek community input on closure objectives is stated in Section 1.4.

The closure objectives related to the surrounding socioeconomic environment include:

- Ensuring that company commitments to the communities have been met
- Promoting the sustainability of the company`s community development initiatives, such that benefits continue to be realized beyond the life of the Project
- Mitigate the human resource impacts arising from mine closure

The specific measures to be undertaken include:

- Involving communities and key stakeholders in end land use planning and rehabilitation practices through operations, until mine closure and eventual site relinquishment
- Establishing capacity building/job creation opportunities to consider socio-economic sustainability post-closure, reducing possible ongoing dependencies/reliance on the mine
- Clearly defining the roles of the parties responsible for future management of reclaimed areas

As discussed in Section 1.4, these closure objectives are preliminary and are subject to discussion with the local communities as the Project moves forward.

7 – POST-CLOSURE MONITORING AND MAINTENANCE

Monitoring of the work completed as part of the progressive reclamation program outlined in Section 4 will be done during operations. It is assumed that the majority of the areas that have been progressively reclaimed during operations will be stable at closure. However, to monitor the success of the final closure measures, a monitoring program will be implemented during the 2-year active closure period while decommissioning is underway, and for a minimum of 5 years post-closure. The program will be conducted to verify whether or not closure objectives and other commitments identified in the ESMP have been met. Post-closure monitoring will continue beyond the initially proposed 5-year period if closure objectives have not been achieved.

Closure and post-closure monitoring and maintenance activities will include the following:

- **Reclamation Monitoring and Auditing -** Full-time monitoring of active reclamation works against the final MRCP to ensure the MRCP is being executed as written
- **Physical Stability Monitoring -** Engineered structures will be inspected regularly by site personnel and annually by a qualified third party geotechnical engineer. Structures to be inspected include the TSF/IWL, landfill, waste dumps, backfilled open pits, flood protection bunds, and diversion channels.
- **Revegetation Monitoring -** Monitoring of reclamation success against MRCP objectives and any applicable biodiversity targets and land use endpoints.
- **Water Monitoring -** Effluent quality monitoring, groundwater monitoring and surface water monitoring as described in the ESMP Water Management Plan. The water monitoring program will consist of the following elements:
  - **Effluent Quality Monitoring -** Monitoring of point discharges and runoff from mining areas and wastes.
  - **Groundwater Level and Quality Monitoring -** The re-establishment of the shallow groundwater aquifer affected by mine dewatering will be recorded to validate that post-closure groundwater conditions are suitable for other uses.
  - **Surface Water Monitoring -** Surface water samples will be collected from reference, near field and far field site on project-affected surface water bodies, including the River Cacheu and its tributaries in the vicinity of the Mine Site.

  Water quality monitoring by an independent third party will be conducted quarterly during the active closure phase bi-annually (one during each of the wet and dry seasons) during the post-closure monitoring period. Samples will be submitted to an accredited laboratory for analysis.
- **Biodiversity Monitoring -** Any monitoring requirements identified in the within the MRCP as well as any closure or post-closure monitoring identified in the Biodiversity Management Plan.
- **Human Resources, Community and Socioeconomic Monitoring -** Socioeconomic monitoring will be undertaken annually in the final year of mining, during active closure and for 3 years post-closure to document:
  - Success of the retrenchment process
  - Community health, well-being and cohesiveness
  - Success of alternative livelihood projects

Post-closure monitoring will be conducted by a third party consultant on behalf of GB Minerals. The results of environmental monitoring undertaken up to the end of active closure will be used to determine if the relinquishment criteria in Section 8 have been met.

Annual closure and post-closure monitoring reports will be provided to the applicable regulatory agencies and stakeholders until such time that relinquishment criteria have been met.

8 – RELINQUISHMENT CRITERIA

To confirm that the Mine Site closure is sufficient to relinquish responsibility from the owner, it is necessary to have measurable criteria against which to assess the effectiveness of the plan and its implementation. These criteria will identify when the standard of closure is sufficient to relinquish responsibility for a specific area. The preliminary relinquishment criteria for the Mine Site are outlined in Table 8.1. The reporting requirements are those that are expected to fulfil the monitoring requirements.

Table 8.1 Relinquishment Criteria

Element	Criteria	Monitoring	Indicators	Reporting
Physical Stability	Acceptable long term factor of safety	Visual and monitoring points	Stability assessment	Annual reclamation reports and annual dam stability reports
Soil Quality	Contamination	Soil sampling	Laboratory testing, compliance with soil quality guidelines	Contaminated site assessment report
Groundwater Supply	Groundwater fed supply wells returned to acceptable levels	Community well and monitoring borehole	Groundwater level	Annual reclamation reports
Groundwater Quality	Compliance with agreed hand back criteria	Monitoring borehole sampling	Laboratory testing, compliance with water quality guidelines	Annual reclamation reports
Surface Water Runoff	Runoff to surface water courses	Visual inspection of ponding surface water	Visual	Annual reclamation reports
Surface Water Quality	Compliance with agreed hand back criteria	Surface water monitoring point sampling	Laboratory testing, compliance with water quality guidelines	Annual reclamation reports
Vegetation Establishment	Vegetation self-sustaining	Mine facility rehabilitation areas	Visual	Annual reclamation reports
	Invasive species	Mine facility rehabilitation areas	Visual	Annual reclamation reports
Land use	Mine facilities decommissioned	Mine and Port facility rehabilitation areas	Visual/community and government feedback	Annual reclamation report
	Metal uptake in vegetation	Mine facility rehabilitation areas	Laboratory testing	Annual reclamation report
Public	Public feedback	Stakeholder Engagement	Public perception	Public consultation report

NOTES:

1. ADAPTED FROM GOLDER, 2014a.

9 – FINAL CLOSURE COST ESTIMATE

9.1 OVERVIEW

The cost estimate was prepared based on the Project Description presented in the FS prepared by Lycopodium (2015), drawing also upon a previous MRCP prepared by Golder (2014a).

A Microsoft Excel-based cost model was used to develop the cost estimate for the planned final closure. The costs are calculated by multiplying a unit rate by an assumed quantity for each activity taking into account the assumptions listed in Section 9.2. Where rates or quantities were unknown, nominal allowances were provided based on professional experience and costs for similar projects. The detailed cost estimate is presented in Appendix A. The cost estimate breakdown is based on the following categories:

- **Mine Site**
  - Open Pits
  - IWL
  - Waste Dumps
  - Process Plant
  - Truck load-Out Facility
  - Electrical Infrastructure
  - Buildings and Other Structures
  - Access and Haul Roads
  - Mobile and Stationary Equipment
  - Landfills and Waste Management
  - Water Management
- **Port Site**
  - Buildings and Other Structures
  - Electrical Infrastructure
  - Water Management
  - Waste Management
- **Post Closure Monitoring and Maintenance**

The estimated cost for final planned mine reclamation and closure at the end of the mine life, based on the assumptions listed in Section 9.2 is USD $11,179, 382

Subsequent versions of the MRCP will include an updated estimate based on detailed engineering and as-built information. Subsequent versions will include cost estimates for select periods throughout the mine life to show the variability in liability over the mine's life. GB Minerals will update the estimate and security provisions regularly.

9.2 ASSUMPTIONS

The cost estimate for planned final closure is based on the following assumptions:

- **Currency -** Costs are provided in 2015 USD.
- **Discounting -** No discounting has been applied in the estimate.
- **Third Party Costing -** Costs are based on a third party contractor executing the MRCP.
- **Unit rates -** Unit rates are based on the following:
  - Previous West African unit rates provided within the 2014 Mine Closure and Rehabilitation Plan (Golder, 2014a) and converted to 2015 USD using a conservative average US inflation rate of 2% (The World Bank, 2015)
  - Knight Piésold's previous experience on similar mining projects
  - Calculated site specific unit rates provided by Lycopodium and GB Minerals as inputs into the FS
- **Salvage and Cost Recovery -** Mobile equipment, plant components, scrap metal or other materials will be salvaged for resale to the extent possible, as a preferred alternative to on-site disposal. However, no cost recovery was assigned to salvage.
- **General and Administrative Costs -** A 15% general and administrative cost has been applied to the direct total costs.
- **Post-closure Earthworks Maintenance Costs -** An allowance of 1% of the direct total costs has been allocated for post-closure earthworks maintenance.
- **Contingency Costs -** A recommended 20% contingency has not been included.
- **Future Site Uses -** Assumptions have been made about what infrastructure will be removed from the Project sites or will remain post-closure. At the Mine Site, it has been assumed that all infrastructure and buildings will be removed, dismantled or demolished at closure with the exception of the conveyor over River Cacheu. It has been assumed that the conveyor would be repurposed and utilized by local residents as a footbridge. At the Port Site, it has been assumed that another commercial/industrial user will assume ownership and responsibility for the Port area. As such, all project-specific infrastructure (material handling facilities and sheds) will be removed and any major environmental liabilities remediated, with the wharf and industrial development area left in-place. These assumptions may change, subject to consultations with the GoGB and local stakeholders.
- **Pit Backfilling -** The north pit will not be completely backfilled at closure, a small pit pond will remain post-closure.
- **Geochemistry -** The preliminary geochemical evaluation of tailings and waste rock is representative of actual conditions, and therefore the design of mine waste and water management facilities will be adequate to ensure chemical stability of the site without the need for long-term water treatment.
- **Progressive Reclamation -** Progressive reclamation is completed as outlined in Section 4.
- **Duration of Post-Closure Monitoring -** Closure objectives will be achieved within the assumed 5-year post-closure monitoring period.

9.3 CLOSURE FUNDING OPTIONS

Funding to cover the cost of closure at any stage in the mine life, including a provision for early, or temporary closure, should be by either a cash accrual system or a financial guarantee provided by a reputable financial institution (IFC, 2007; The World Bank, 2009). The two acceptable cash accrual systems are fully funded escrow accounts (including government managed arrangements) or sinking funds.

The IFC (2007) recommends mine closure requirements be reviewed annually, and the closure funding arrangements adjusted to reflect any changes.

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11 – CERTIFICATION

This report was prepared and reviewed by the undersigned.

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Reviewed:

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Senior Environmental Scientist | Associate

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Approval that this document adheres to Knight Piésold Quality Systems:

APPENDIX A

CLOSURE COST ESTIMATE

(Pages A-1 to A-18)

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TABLE A.1

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
SUMMARY

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Activity	Comment	Unit	Unit Rate
Concrete Demolition			
	Demolition of concrete slabs after building removal, concrete buried in situ includes cutting rebar assumes 0.3 m slab thickness	m^2	$30
Buildings and Structures			
Light Plant Structures	Up to 80 kg of steel per square metre. Includes sheeting	m^2	$6
Light/medium Plant Structures	Up to 150 kg of steel per square metre. Includes sheeting	m^2	$12
Medium Plant Structures	Up to 300 kg of steel per square metre. Includes sheeting	m^2	$23
Small Building (wood frame, brick)	Excludes disposal of waste	m^2	$6
Prefabricated Buildings	Excludes disposal of waste	m^2	$19
Conveyors	Includes steel dismantling & concrete footing demolition, but excludes waste disposal	m	$90
Powerlines	low voltage pole mounted lines (i.e., 11 kV) includes dismantling and removal of poles and lines off-site	km	$8,800
Pipelines HDPE	Above ground	km	$11,000
	Buried pipelines	km	$13,500
Dismantling of Security Fencing		km	$3,600
Surface Preparation			
Shaping/levelling of Areas	Cut and fill operation and final profiling, average 0.5 m cut and fill over the entire area and a relatively flat surface	ha	$7,000
Shaping/levelling of Areas	Cut and fill operation and final profiling, average 0.75 m over area over a relatively flat surface or 0.5 m average cut to fill on slopes	ha	$10,500
Profiling of Disturbed Areas (general)	Minimal dozing to enhance site drainage	ha	$1,750
Revegetation			
	Seed and fertilizer, includes application (broadcast seeding)	ha	$2,700
	Establishment of woody species	ha	$3,600
Earthworks			
Load, Haul and Place (<1 km)	Small volumes	m^3	$2.50
Extra over rates for Overhaul outside Free Haul Distance	Small volumes	m^3/km	$1
General Ripping		ha	$1,250
Deep Ripping (heavy)		ha	$2,400

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TABLE A.2

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
SUMMARY

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Worksheet Title	Cost
Mine Site	
Integrated Waste Landform	$ 1,550,838
Waste Dumps	$ -
Process Plant	$ 494,740
Truck Load-out Facility	$ 80,980
Electrical Infrastructure	$ 192,450
Buildings and Other Structures	$ 607,940
Open Pits	$ 257,625
Haul and Access Roads	$ -
Equipment and Machinery	$ 250,000
Landfills and Waste Management	$ 173,683
Water Management	$ 2,258,900
Subtotal Mine Site	**$ 5,867,156**
Port Site	
Buildings and Other Structures	$ 437,495
Electrical Infrastructure	$ 56,300
Water Management	$ 2,680
Waste Management	$ 23,500
Subtotal Port Site	**$ 519,975**
Post Closure Monitoring and Maintenance	$ 1,713,871
Subtotal Post Closure Monitoring and Reporting	**$ 1,713,871**
Subtotal	**$ 8,101,002**
Plus General and Administrative Costs 15%	**$ 1,215,150**
Recommended 20% Contingency	**$ 1,863,230**
Total	**$ 11,179,382**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.3

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - INTEGRATED WASTE LANDFORM

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Task/Component	Comment	Quantity	Unit	Unit Rate ($USD)	Total ($USD)
Tailings Storage Facility					
Supernatant Pond					
Pump and Treat Water within Supernatant Pond	Water is pumped to the water treatment facility prior to discharge. Nominal allowance.	1	Est.	$ 100,000	$ 100,000
Decommission Decant Tower and Associated Infrastructure	Seal decant tower and pipes, concrete sections located above final grade will be broken up and buried in-situ. Nominal allowance.	1	Est.	$ 15,000	$ 15,000
Re-contour Tailings Surface to Promote Drainage	Assume final tailings beach conforms with landform design and does not require recontouring	0	ha	$ 7,000	$ -
Spread, condition and compact mine waste across tailings surface (material delivered and placed by mining)	Estimated 2 km haul distance	242,850	m^3	$ 3.50	$ 849,975
Load, haul, place and spread stockpiled topsoil over tailings surface	< 1 km haul distance	121,425	m^3	$ 2.50	$ 303,563
Revegetate Disturbed Area	Seed and fertilize	49	ha	$ 2,700	$ 132,300
Surface Water Drainage System	Allowance for 6 m wide x 0.5 m deep rip-rap lined channels	1000	m	$ 150	$ 150,000
WD-3A - Closed during Operational Phase					
WD-3B - Closed during Operational Phase					
				Total	**$ 1,550,838**

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]2 - MINE SITE - IWL

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.4

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - WASTE DUMPS

Print Sep/09/15 10:27:27

Task / Component	Comment	Quantity	Unit	Unit Rate	Total
WD-1 - Closed during Operational Phase					
WD-2 - Closed during Operational Phase					
WD-3a - Closed during Operational Phase (refer to Table A.3)					
WD-3b - Closed during Operational Phase (refer to Table A.3)					
WD-4 - Closed during Operational Phase					
WD-5 - Closed during Operational Phase					
WD-6 - Closed during Operational Phase					
				Total	**$ -**

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]MINE SITE - WDs

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.5

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - PROCESS PLANT

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
ROM pad					
Concrete Block Retaining Wall	Buried insitu	130	m^3	$80	$10,400
Concrete Slab	Buried insitu	180	m^2	$30	$5,400
ROM Bin					
ROM Bin	Assume medium plant structure	90	m^2	$12	$1,080
Dismantle Conveyor and Foundations	Concrete buried insitu	80	m	$90	$7,200
MCC					
Decommission and remove from Site for Salvage or Resale	Assume three, nominal allowance	3	Est.	$5,000	$15,000
Floatation, Scrubbing, Hydrosizing Building					
Steel Superstructure	Assume medium plant structure	750	m^2	$12	$9,000
Concrete Slab		750	m^2	$27	$20,250
Concentrates and Tailings Thickeners					
Concrete Slab		1400	m^2	$30	$42,000
Tailings Thickener	20 m	1	Est.	$8,800	$8,800
Concentrate Thickener	10 m	1	Est.	$4,250	$4,250
Reagent Area					
Removal of Tanks and Infrastructure	No information, nominal allowance	1	Est.	$10,000	$10,000
Concrete Slab		100	m^2	$30	$3,000
Tailings Pump Station					
Building	Assume Medium plant structure	230	m^2	$12	$2,760
Concrete Slab		230	m^2	$30	$6,900
Tailings Pipeline					
From BPP to IWL	Excavate and backfill tailings pipeline and decant return corridor and re-vegetate	5	km	$11,000	$ 55,000
Pressure Filter Plant					
Steel Superstructure	Assume medium plant structure	750	m^2	$12	$ 9,000
Concrete Slab		750	m^2	$30	$ 22,500
Stockpile Feed Conveyor					
Dismantle Conveyor and Foundations	Concrete buried insitu	120	m	$90	$ 10,800
Surface Rehabilitation					
General Ripping	Alleviate compaction	12	ha	$1,250	$ 15,000
Recontouring of Areas	Assume average of 0.5 m cut/fill	12	ha	$7,000	$ 84,000
Load, Haul and Place Topsoil	Assume local stockpile 0.4 m thick	48000	m^3	$3	$ 120,000
Revegetate (seed and fertilize)	Grasses for erosion protection and targeted end land use species	12	ha	$2,700	$ 32,400
				Total	**$ 494,740**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.6

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - TRUCK LOAD-OUT FACILITY

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Conveyor system					
Dismantle Conveyor from Plant Site to Load-out Facility and Foundations	To remain at closure as footbridge	-	-	-	-
Concentrate Bin	Assume medium plant structure	40	m^2	$12	$480
Weigh Scales					
Decommission and remove Weigh Scales	Nominal allowance (2 scales)	2	Est.	$2,500	$5,000
Truck Wash					
Decommission and remove Truck Wash	Nominal allowance	1	Est.	$1,000	$1,000
General Surface Rehabilitation					
General Ripping		5	ha	$1,250	$6,250
Recontouring of Areas	Minimal dozing to enhance site drainage	5	ha	$1,750	$8,750
Load, Haul and Place Topsoil	Assume local stockpile, 0.4 m thick	18400	m^3	$2.50	$46,000
Revegetate	Seed and fertilize	5	ha	$2,700	$13,500
				Total	**$80,980**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.7

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - ELECTRICAL INFRASTRUCTURE

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Overhead power lines					
Remove Overhead Powerlines	Estimated length, 11 Kv Line, assume line runs to Truck Loading Facility	9	km	$ 8,800	$ 79,200
Diesel Generators					
Decommission and remove Diesel Generators off Site for Re-sale or Salvage	(4 x 1.2 MW) Assume crane and a lowboy	4	Est.	$ 10,000	$ 40,000
Concrete Slab	Buried in situ	115	m^2	$ 30	$ 3,450
Fuel Supply					
Removal of Tanks	Assume 4 tanks, nominal allowance	4	Est.	$ 5,000	$ 20,000
Concrete Slab	Buried in situ	160	m^2	$ 30	$ 4,800
Voltage Switch and Control Rooms					
Decommission and remove Offsite for Resale or Salvage	One HV and Three LV 11 kV Switchroom, One Control Room (prefabricated)	5	Est.	$ 5,000	$ 25,000
Transformers					
Decommission and remove Offsite for Resale or Salvage	Assume 4 onsite, nominal allowance	4	Est.	$ 5,000	$ 20,000
				Total	**$ 192,450**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.8

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - BUILDINGS AND OTHER STRUCTURES

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Administration Building	39 x 12 m				
Building Demolition	Small building	470	m^2	$ 6	$ 2,820
Concrete Slab	Buried in situ	470	m^2	$ 30	$ 14,100
Ablution/change house	8 x 7 m (2)				
Building Demolition	Small building	110	m^2	$ 6	$ 660
Concrete Slab	Buried in situ	110	m^2	$ 30	$ 3,300
Laboratory	12 x 5 m				
Building Demolition	No details assume light plant structure	60	m^2	$ 6	$ 360
Concrete Slab	Buried in situ	60	m^2	$ 30	$ 1,800
Kitchen and Dining Hall	18 x 8 m				
Building Demolition	No details assume small building	140	m^2	$ 6	$ 840
Concrete Slab	Buried in situ	140	m^2	$ 30	$ 4,200
Warehouse/workshop	65 x 24 m				
Building Demolition	Steel structure medium structure	1560	m^2	$ 12	$ 18,720
Concrete Slab	Buried in situ	1560	m^2	$ 30	$ 46,800
Security gatehouse	Est. 4 x 4 m (2)				
Building Demolition	Small building	30	m^2	$ 6	$ 180
Concrete Slab	Buried in situ	30	m^2	$ 30	$ 900
Mine Truck Shop	35 x 12 m (assumed) 6 bay shop, no details				
Building Demolition	Steel structure medium structure	420	m^2	$ 12	$ 5,040
Concrete Slab	Buried in situ	420	m^2	$ 30	$ 12,600
Reagents Storage Building	6.5 x 15.5				
Building Demolition	Steel structure medium structure	460	m^2	$ 12	$ 5,520
Concrete Slab	Buried in situ	460	m^2	$ 30	$ 13,800
Mine Effluent Treatment Plant and Event Pond					
Ripping and minor regrading of footprint		18	ha	$ 1,250	$ 22,500
Load, Haul and Place Topsoil	Assume local stockpile 0.4 m thick	72000	m^3	$ 3	$ 180,000
Revegetate (seed and fertilize)	Grasses for erosion protection	18	ha	$ 2,700	$ 48,600
Mobile Treatment Plant	Nominal allowance, decommission and remove from site for salvage or resale	1	Est.	$ 1,000	$ 1,000
Septic System					
Pump Sludge and Backfill Septic Tank	Nominal allowance	1	Est.	$ 10,000	$ 10,000
Process Water Supply	411 m^3				
Process Water Tank and Associated Equipment	Nominal allowance	1	Est.	$ 5,000	$ 5,000
Raw/Fire Water Supply	288 m^3				
Raw Water Tank and Associated Equipment	Nominal allowance	1	Est.	$ 2,500	$ 2,500
Potable Water Supply	17 m^3				
Potable Water Tank and Associated Equipment	Nominal allowance	1	Est.	$ 1,000	$ 1,000
Reverse Osmosis Plant	No details, assume prepackaged unit. Decommission and remove from site for salvage or resale	1	Est.	$ 10,000	$ 10,000
Mine Re-fuelling Station					
Tanks and Distribution System	Assume two above ground tanks and distribution system, nominal allowance	1	Est.	$ 20,000	$ 20,000
Concrete Slab	Buried in situ	80	m^2	$ 30	$ 2,400
Fences					
Security fencing Mine Site	Estimated length	25	km	$ 3,610	$ 90,250
Security fencing Truck Loading Facility	Estimated length	5	km	$ 3,610	$ 18,050
Dewatering wells - (30 remaining at Yr 26)					
Decommission Dewatering Wells	Remove casing, backfill with grout or cement, and placement of a low permeability cap	30	Ea.	$ 2,000	$ 60,000
Demolition Waste					
Load, Haul, Dump of Inert Demolition Waste to On-site Landfill	Nominal allowance based on 1,000 m^3 of debris	1	Est.	$ 5,000	$ 5,000
				Total	**$ 607,940**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.9

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - ACCESS AND HAUL ROADS

Print Sep/09/15 10:32:20

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Access and Haul Roads	No allowance has been included for the removal of access or haul roads. It is assumed that the site roads will be retained for monitoring and beneficial use post-closure.	-	-	-	-
				Total	**$ -**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.10

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - MOBILE AND STATIONARY EQUIPMENT

Print Sep/09/15 10:34:31

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Mobile and Stationary Equipment - Demobilize mine fleet and plant equipment off-site	Nominal allowance	1	Est.	$ 250,000	$ 250,000
				Total	**$ 250,000**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.11

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - LANDFILLS AND WASTE MANAGEMENT

Print Sep/09/15 10:35:11

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Landfill (Assume 80% Closed during Operations)					
Closure of the On-site Landfill	Engineered cover	400	m^2	$ 20	$ 8,000
Construct Surface Water Drainage System	Allowance for 3 m wide x 0.25 m deep rip-rap lined channels	125	m	$ 75	$ 9,375
Revegetate	Seed and fertilize	0.04	ha	$ 2,700	$ 108
Waste Management Area (nominal allowance)					
Removal of Infrastructure	e.g., bins and fencing	1	Est.	$ 5,000	$ 5,000
Concrete Pad	Buried insitu	40	m^2	$ 30	$ 1,200
Miscellaneous Solid Waste, Hazardous Waste and Contaminated Soils					
Hazardous Waste Disposal	Off-site disposal by licenced contractor	1	Est.	$ 15,000	$ 15,000
Demolition Debris Removal	Nominal Allowance	1	Est.	$ 10,000	$ 10,000
Sampling and Laboratory Analysis for Soils	Analytical costs / sample, nominal allowance includes contaminated site assessment	1	Est.	$ 25,000	$ 25,000
Contaminated Soils	Off-site disposal by licenced contractor	1	Est.	$ 100,000	$ 100,000
				Total	**$ 173,683**

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]MINE SITE - LANDFILLS AND WASTE

NOTES:

1. ASSUME THAT THERE IS A LANDFILL SITE WITHIN GUINEA-BISSUA TO HANDLE HAZARDOUS WASTES AND CONTAMINATED SOIL.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.12

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - OPEN PITS

Print Sep/09/15 10:36:05

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
South Open Pit - Reclaimed during Operational Phase					
North Open Pit - (Assume 45 ha Void Remains at Closure)					
Shape final pit slopes to 5H:1V		7,500	m^3	$ 1.75	$ 13,125
Vegetate Disturbed Area	Assumed area left to revegetate at closure	35	ha	$ 2,700	$ 94,500
Construct Surface Water Drainage System	Allowance for 6 m wide x 0.5 m deep rip-rap lined channels to collect stormwater and convey it to the pit pond	1000	m	$ 150	$ 150,000
				Total	**$ 257,625**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.13

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
MINE SITE - WATER MANAGEMENT

Print Sep/09/15 10:37:06

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Flood Protection Bund - Plant Site					
Recontour/blend into Surrounding Topography	Assume berm will be blended into an area twice it's footprint	6.0	ha	$ 10,500	$ 63,000
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	12,000	m^3	$ 2.50	$ 30,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	6.00	ha	$ 2,700	$ 16,200
South Pit Flood Protection Bund - Closed during Operational Phase					
North Pit Flood Protection Bund (South West)					
Recontour/blend into Surrounding Topography	Assume berm will be blended into an area twice it's footprint	9	ha	$ 10,500	$ 94,500
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	18,000	m^3	$ 2.50	$ 45,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	9	ha	$ 2,700	$ 24,300
North Pit Flood Protection Bund (East)					
Breach Dam and Recontour/blend into Surrounding Topography	Assume berm will be blended into an area twice it's footprint	12	ha	$ 10,500	$ 126,000
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	24,000	m^3	$ 2.50	$ 60,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	12	ha	$ 2,700	$ 32,400
SCP-1					
Breach Dam and Decommission the Spillway, Recontour/blend into Surrounding Topography	Assume dam and spillway are blended into an area 1.5 times their footprint	20	ha	$ 10,500	$ 210,000
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	144,000	m^3	$ 2.50	$ 360,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	72	ha	$ 2,700	$ 194,400
SCP-2					
Breach Dam and Decommission the Spillway, Recontour /blend into Surrounding Topography	Assume dam and spillway are blended into an area 1.5 times their footprint	7	ha	$ 10,500	$ 73,500
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	36,000	m^3	$ 2.50	$ 90,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	18	ha	$ 2,700	$ 48,600
SCP-3					
Breach Dam and Decommission the Spillway, Recontour/blend into Surrounding Topography	Assume dam and spillway are blended into an area 1.5 times their footprint	7	ha	$ 10,500	$ 73,500
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	50,000	m^3	$ 2.50	$ 125,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	25	ha	$ 2,700	$ 67,500
ECP-1					
Excavate metal contaminated sediments and dispose of within the TSF		14,000	m^3	$ 2.50	$ 35,000
Breach Dam and Decommission the Spillway, Recontour/blend into Surrounding Topography	Assume dam and spillway are blended into an area 1.5 times their footprint	21	ha	$ 10,500	$ 220,500
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m	70,000	m^3	$ 2.50	$ 175,000
Revegetate Disturbed Area (seed and fertilizer)	Grasses for erosion protection	35	ha	$ 2,700	$ 94,500
				Total	**$ 2,258,900**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.14

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
PORT SITE - BUILDINGS AND OTHER STRUCTURES

Print Sep/09/15 11:17:45

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Trestle and Wharf					
	To remain at closure for beneficial use	-	-	-	-
Security Office	4 x 4 m				
Building Demolition	Small building	15	m^2	$ 6	$ 90
Concrete Slab	Buried in situ	15	m^2	$ 30	$ 450
Port Administration Building	15 x 10 m				
Building Demolition	Small building	150	m^2	$ 6	$ 900
Concrete Slab	Buried in situ	150	m^2	$ 30	$ 4,500
Port Ablutions/Change rooms					
Building Demolition	small building	470	m^2	$ 6	$ 2,820
Concrete Slab	Buried in situ	470	m^2	$ 30	$ 14,100
Wet Concentrate Storage Shed	109 x 21				
Building Demolition	light plant structure steel building with cladding	2300	m^2	$ 6	$ 13,800
Concrete Slab	Buried in situ	2300	m^2	$ 30	$ 69,000
Dry Concentrate Storage Shed	150 x 36				
Building Demolition	light plant structure steel building with cladding	5400	m^2	$ 6	$ 32,400
Concrete Slab	Buried in situ	5400	m^2	$ 30	$ 162,000
Mess Building	8 x 6				
Building Demolition	small building	50	m^2	$ 6	$ 300
Concrete Slab	Buried in situ	50	m^2	$ 30	$ 1,500
Shipping Control Room/Sample Building	6 x 3				
Building Demolition	small building	20	m^2	$ 6	$ 120
Concrete Slab	Buried in situ	20	m^2	$ 30	$ 600
Utility Ramp	Remains at closure for beneficial use				
Warehouse	25 x 50				
Building Demolition	light plant structure steel building with cladding	1250	m^2	$ 6	$ 7,500
Concrete Slab	Buried in situ	1250	m^2	$ 30	$ 37,500
Fuel Supply					
Tanks and Distribution System	Above ground tanks, secondary containment no details, nominal allowance	1	Est.	$ 15,000	$ 15,000
Concrete slab	Buried in situ	100	m^2	$ 30	$ 3,000
Fuel Distribution					
Tanks and Distribution System	Above ground tanks, secondary containment no details, nominal allowance	1	Est.	$ 10,000	$ 10,000
Concrete Slab	Buried in situ	50	m^2	$ 30	$ 1,500
Raw/Fire Water Supply					
Tank (288 m^3) and Associated Equipment	Nominal allowance	1	Est.	$ 2,500	$ 2,500
Septic System					
Pump Sludge and Remove/backfill Septic Tank	Nominal Cost, no details	1	Est.	$ 10,000	$ 10,000
Potable Water Supply					
Tank (15 m^3) and Associated Equipment	Nominal allowance	1	Est.	$ 1,000	$ 1,000
Conveyor System					
Wet and Dry Conveyor MCC	Decommission and bring off-site for salvage or re-sale	2	Est.	$ 5,000	$ 10,000
Conveyor		350	m	$ 90	$ 31,500
Fence					
Remove Security Fencing	Assumed length	1.5	km	$ 3,610	$ 5,415
Surface Rehabilitation	No costs have been included as it is assumed that the infrastructure pad will be left for future beneficial use	-	-	-	-
				Total	**$ 437,495**

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]PORT SITE - BUILDINGS AND OTHER

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.15

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
PORT SITE - ELECTRICAL INFRASTRUCTURE

Print Sep/09/15 10:38:30

Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Power lines					
Decommission and Remove Poles and Lines from Site	Estimated length, low voltage line	1	km	$ 8,800	$ 8,800
Generators					
Decommission and Remove for Sale or Salvage	3 x 0.5 MW Generators	3	Est.	$ 7,500	$ 22,500
Switch Board					
Decommission and Remove for Sale or Salvage	One LV 11 kV Switchboard	1	Est.	$ 5,000	$ 5,000
Transformers					
Decommission and Remove for Sale or Salvage	Assume 4 onsite, nominal allowance	4	Est.	$ 5,000	$ 20,000
				Total	**$ 56,300**

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]PORT SITE ELECTRICAL INFRAS

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.16

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
PORT SITE - WATER MANAGEMENT

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Stormwater Ponds					
Breach Dams and Recontour/blend into Surrounding Topography	Assume that the ponds will be blended into an area twice there footprint	0.20	ha	$ 7,000	$ 1,400
Load, Haul, and Place Topsoil	Average topsoil depth 0.2 m over 0.4 ha	80.0	m^3	$ 2.50	$ 200
Revegetate Disturbed Area	Seed and fertilize	0.40	ha	$ 2,700	$ 1,080
				Total	$ 2,680

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]PORT SITE - WATER MANAGEMENT

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.17

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
PORT SITE - WASTE MANAGEMENT

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Miscellaneous Solid Waste, Hazardous Waste and Contaminated Soils					
Inert Solid Waste Disposal	Off-site disposal, nominal allowance	1	Est.	$ 2,500	$ 2,500
Hazardous Waste Disposal	Off-site disposal by licenced contractor, nominal allowance	1	Est.	$ 1,000	$ 1,000
Test Area for Soil Contamination	Environmental sampling and analysis, nominal allowance includes contaminated site assessment	1	Est.	$ 10,000	$ 10,000
Contaminated Soils	Off-site disposal by licenced contractor, nominal allowance	1	Est.	$ 10,000	$ 10,000
				Total	**$ 23,500**

I:\3\01\00520\02\A\Report\Volume 3 - ESMP (Report 3)\Volume 3 - App 3L - MRCP (Report 10)\Appendix A Closure Costs\[Appendix A - Closure Costs Revised for ESIA - 08AUG15.xlsx]PORT SITE - WASTE

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

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TABLE A.18

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

PRELIMINARY MINE RECLAMATION AND CLOSURE PLAN
POST CLOSURE MONITORING AND MAINTENANCE

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Task/Component	Comment	Quantity	Unit	Unit Rate	Total
Earthwork Maintenance	Assume 1% of direct costs	-	%	1	$ 63,871
Social Monitoring					
Community Development and Stakeholder Management	Estimate based on another mining project in Africa	1.0	Each	$ 1,000,000	$ 1,000,000
Monitoring of Physical Stability of Mine Hazards					
Routine Inspections by Professional Engineer	Five years post closure to inspect landforms and open pit for signs of instability	5.0	Each	$ 10,000	$ 50,000
Monitoring of Chemical Stability					
Environmental Monitoring Groundwater Quality and Elevation	10 wells semi-annually for 7 years	14.0	Each	$ 15,000	$ 210,000
Environmental Monitoring Surface Water	8 samples semi-annually (reference, near field, and far field, and Open Pit (tops and bottoms) for 7 years	14.0	Each	$ 15,000	$ 210,000
Decommission Monitoring Wells	Remove casing, backfill with grout or cement, and place low permeability cap	10.0	Each	$ 500	$ 5,000
Monitoring of Biological Stability					
Terrestrial and Biological Monitoring (reclamation success and biological uptake of metals	Yearly inspections until revegetation has been proven effective assume semi annually for first two years and yearly for five	7.0	Each	$ 15,000	$ 105,000
Reporting					
Annual monitoring reports	Nominal Allowance	7.0	Each	$ 10,000	$ 70,000
				Total	**$ 1,713,871.31**

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REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	08SEP'15	ISSUED WITH REPORT NB301-520/2-10	JSP	SRA

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3N
STAKEHOLDER ENGAGEMENT PLAN

GB Minerals Ltd.
Suite 1500 - 701 West Georgia Street
Vancouver, BC V7Y 1C6

NB301-520/2-15
Rev 0
August 28, 2015

Knight Piésold CONSULTING
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ISO 9001 - FS 64925
ISO 14001 - EMS 550121
OHSAS 18001 - OHS 550122

GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

STAKEHOLDER ENGAGEMENT PLAN
NB301-520/2-15

Rev	Description	Date
0	Issued in Final	August 28, 2015

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE AND OBJECTIVES 2
1.3 REGULATORY REQUIREMENTS 3
1.3.1 Corporate Policy 3
1.3.2 Guinea-Bissau National Requirements 3
1.3.3 Applicable International Standards 4
1.4 PLAN UPDATES 5

2 – POTENTIAL PROJECT IMPACTS 6

3 – STAKEHOLDER IDENTIFICATION AND ANALYSIS 7
3.1 IMPACT MAPPING AND STAKEHOLDER IDENTIFICATION 8
3.2 DIFFERENTIALLY AFFECTED, VULNERABLE AND MARGINALIZED PEOPLES 9
3.3 GOVERNMENT AUTHORITIES 10
3.4 OTHER ORGANIZATIONS 11

4 – OVERVIEW OF PREVIOUS STAKEHOLDER ENGAGEMENT 12
4.1 STAKEHOLDER ENGAGEMENT ACTIVITIES TO DATE 12
4.2 KEY STAKEHOLDER ISSUES 15

5 – ENGAGEMENT PROCEDURES 16
5.1 ANALYZE AND TRACK STAKEHOLDERS 16
5.2 COORDINATE WITH NATIONAL GOVERNMENT 17
5.3 ENGAGEMENT METHODS 18
5.4 CONSULTATION AND DISCLOSURE OF ESIA-RELATED DOCUMENTS 18
5.4.1 Update and Briefing Sessions with Government Representatives 19
5.4.2 Community Information Committee 19
5.4.3 Community Liaison Officers 19
5.4.4 Project Information Centres 20
5.4.5 Public Education and Outreach 20
5.4.6 Open Houses and Site Tours 20
5.4.7 Disclosure of Printed Materials 20
5.4.8 Community Newsletter 21
5.4.9 Special Methods for Engaging Women 21
5.4.10 Coordinate with Project Teams 22

6 – GRIEVANCE MECHANISM 23
6.1 OBJECTIVES 23
6.2 PROCEDURE 23
6.3 RESOLUTION PROCESS 24
6.4 MONITORING AND REPORTING 27

7 – ROLES AND RESPONSIBILITIES 28
7.1 KEY PERSONNEL 28
7.2 TRAINING 29

8 – MONITORING AND EVALUATION 30

9 – REFERENCES 32

10 – CERTIFICATION 33

TABLES

Table 3.1 Stakeholder Groups 7
Table 3.2 Potentially Affected Communities 9
Table 4.1 2012 Public Consultation Meetings 13
Table 4.2 Public Consultation 2013 Schedule 13
Table 4.3 Public Consultation 2015 Schedule 14
Table 5.1 Example Stakeholder Engagement Tracking Table 17
Table 7.1 Roles and Responsibilities for SEP Implementation 28

FIGURES

Figure 1.1 Project Regional Setting 1
Figure 3.1 Administrative Regions of Guinea-Bissau 10
Figure 3.2 Administrative Districts of the Oio Region 10
Figure 6.1 Grievance Resolution Process 25
Figure 6.2 Grievance Action Form 26

ABBREVIATIONS

Farim Phosphate Project	the Project
CAIA	Célula de Avalição de Impacte Ambiental
CIC	Community Information Committee
CLO	Community Liaison Officer
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EPCM	engineering, procurement and construction management
HSSE	Health, Safety, Social and Environment
ICP	informed consultation and participation
IFC	International Finance Corporation
NGO	non-governmental organization
PAP	potentially affected persons
PIC	project information centre
PS	performance standard
SEP	Stakeholder Engagement Plan
SOP	standard operating procedure
TOR	Terms of Reference

1 – INTRODUCTION

This Stakeholder Engagement Plan (SEP) has been prepared for the Farim Phosphate Project, (Figure 1.1).

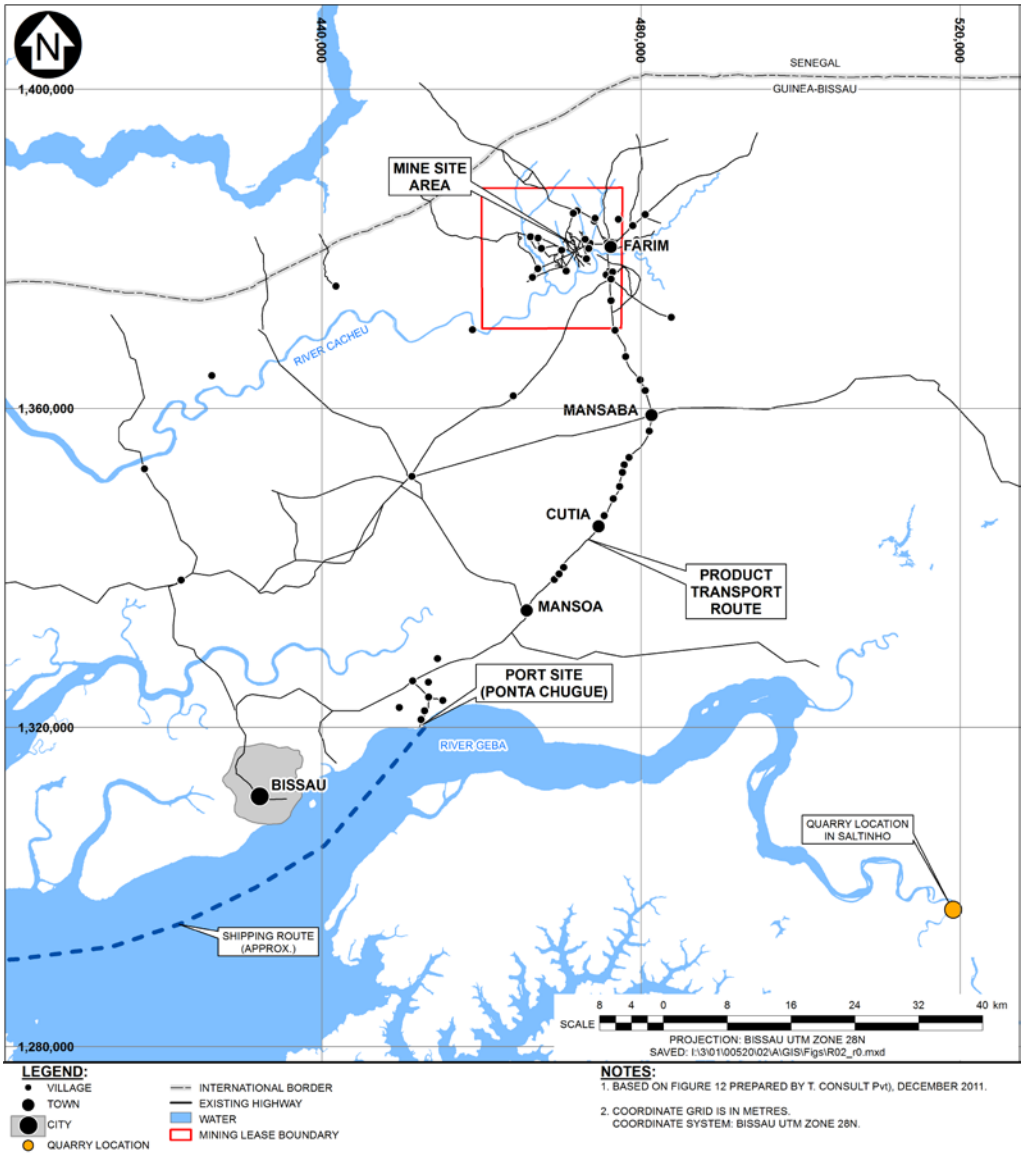

Figure 1.1 Project Regional Setting

1.1 BACKGROUND

The Project consists of construction, operation and decommissioning of a proposed open pit mining operation to exploit the Farim phosphate orebody, a process plant at the mine site to beneficiate the ore into a phosphate concentrate product, and an associated port facility to export the product to its customers.

An Environmental and Social Impact Assessment (ESIA) has been prepared that evaluates and addresses the Project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has also been prepared as part of the ESIA. The ESMP consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans and an implementation schedule and cost estimate.
- **Level 2 - Discipline-specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs)** Detailed instructions or operational standards for executing the discipline-specific management plans.

The ESMP will be an integral part of the ESIA, but will also act as a stand-alone document that will be updated as needed throughout project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The Company is fully committed to the integration of environmental and social considerations in the design and development of the Farim Project, as well as establishing and maintaining constructive relationships with all stakeholders, including the communities surrounding the Project.

The key objectives of the engagement program for the Project are to:

- Identify key stakeholders and their interests and concerns.
- Identify patterns of interaction and utilize appropriate methods and tools to engage stakeholders, particularly local communities.
- Allow for meaningful stakeholder input into the final project design.
- Build long-term relationships between GB Minerals Ltd. (GB Minerals) and the local communities.
- Develop practical mitigation strategies for unavoidable impacts.
- Ensure stakeholders have access to information on project activities in a timely manner.
- Ensure information provided can be understood and locations for consultation are accessible to all who want to attend.
- Ensure that vulnerable and disadvantaged groups are consulted.
- Establish clear mechanisms for managing stakeholders' questions, concerns, and complaints/grievances and provide appropriate conflict resolution processes.
- Manage expectations among communities and other stakeholders.
- Document formal engagement activities, maintain a relevant database and implement a records management system.

The consultation process is being designed to be fair, inclusive and considerate of differing perspectives. Individual issues and concerns are balanced with broader project objectives.

During the exploration and feasibility study phases, the main aim of stakeholder engagement has been to establish two-way communication between GB Minerals and stakeholders at national,

regional and local levels to ensure stakeholder views are incorporated into the ESIA, the Project design and the Feasibility Study.

During the upcoming construction and operation phases, stakeholder engagement activities will focus on keeping stakeholders informed about the Project activities, and engaging with them in terms of disseminating and discussing information on impacts, mitigation measures, monitoring and environmental management. An important element of stakeholder engagement through the upcoming implementation phases of the Project will be the establishment and implementation of a grievance mechanism.

This SEP describes how GB Minerals collects and disseminates information to people who are interested and/or affected by the Project throughout the life of the mine. It describes and guides stakeholder consultations and communications during the development and execution of the Project, meeting National (Guinea-Bissau) and International Finance Corporation (IFC) requirements.

1.3 REGULATORY REQUIREMENTS

The key regulations and standards relevant to the SEP are:

- Corporate policy
- Applicable National requirements
- International Standards

A summary of these requirements is provided below.

1.3.1 Corporate Policy

GB Minerals has established a corporate Environmental, Social, Health and Safety Policy that includes GB Minerals' commitment to consult with government and local communities on issues that affect them, and sets out the goals that form the basis for all engagement activities conducted by GB Minerals. The Social Policy is presented in the Level 1 Management System of the ESMP.

1.3.2 Guinea-Bissau National Requirements

Law 10/2010 (the Environmental Assessment Law) regulates environmental and social impact assessment in Guinea-Bissau. The Law details the ESIA processes to be followed, requirements for public consultation and disclosure, the components of the studies to be undertaken and resulting reports, and the government agencies that will be involved in the assessment process.

Guinea-Bissau's environmental assessment agency, Célula de Avalição de Impacte Ambiental (CAIA), prepared a Terms of Reference (TOR) to guide the preparation of an ESIA that meets the national environmental assessment requirements. The TOR notes that the participation of people and the main institutions involved in the Project is a key element of the study. This includes regional, district and municipal governments; rural communities and satellite villages of the site; public organizations; non-governmental organizations (NGOs) and sectors of socio-economic activities. The TOR directs GB Minerals' ESIA consultant to demonstrate the extent of consultations undertaken to gather the views and concerns of all interested parties.

1.3.3 Applicable International Standards

Applicable international standards include the World Bank Group's Equator Principles and the International Finance Corporation (IFC) Performance Standards. These international lender requirements are described generally in the Level 1 Management System. Specifics of these requirements in regard to stakeholder engagement are provided below.

The Farim Phosphate Project is a Category "A" project under the Equator Principles (World Bank Group, 2012). As such, the Project Sponsor is required complete an ESIA and develop action plans to avoid, minimize or manage adverse impacts. Equator Principle 5 outlines the expectations of Equator Principle Financial Institutions (EPFIs) in regard to stakeholder engagement, and Equator Principle 6 identifies the requirement to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

Similarly, the IFC Performance Standards for Social and Environmental Sustainability set out similar expectations in regard to both stakeholder engagement and the requirement to establish a grievance mechanism for both workers and other stakeholders. Performance Standard 1 (PS-1) addresses stakeholder engagement generally, and PS-5 (Land Acquisition and Involuntary Resettlement) and PS-8 (Cultural Heritage) provide further guidance specific to these issues. Below is a summary of the key messages within each of the performance standards in regard to stakeholder engagement:

- Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for successful management of a project's environmental and social impacts.
- Stakeholder engagement is an ongoing process that may involve the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to affected communities.
- The Project Owner will develop and implement a Stakeholder Engagement Plan that is scaled to the Project risks and impacts and development stage, and be tailored to the characteristics and interests of the affected communities. Where applicable, the Stakeholder Engagement Plan will include differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable.
- The Project Owner will provide affected communities with access to relevant information on: (i) the purpose, nature, and scale of the Project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.
- When affected communities are subject to identified risks and adverse impacts from a project, the Project Owner will undertake a process of consultation in a manner that provides the Affected Communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the Project Owner to consider and respond to them.
- The extent and degree of engagement should be commensurate with the Project risks and adverse impacts and concerns raised by affected communities.
- Effective consultation is a two-way process.
- The Project Owner will tailor its consultation process to language preferences of affected communities, their decision-making process, and the needs of disadvantaged or vulnerable groups.

- For projects with potentially significant adverse impacts on affected communities, the Project Owner will conduct an informed consultation and participation (ICP) process that will result in the affected communities' informed participation.
- Where there are affected communities, the Project Owner will establish a grievance mechanism to receive and facilitate resolution of affected communities' concerns and grievances about the Project Owner's environmental and social performance.

The IFC also published a good practice handbook on stakeholder engagement in emerging markets (IFC, 2007). The key principles outlined by the Good Practice Handbook include the following:

- Provide meaningful information that is tailored to the needs of the stakeholders
- Provide information in advance of consultation and decision making activities
- Ensure that information is easy for stakeholder to access
- Ensure inclusivity in representation of views, including women, minorities, vulnerable people
- Promote two-way dialogues
- Ensure that the process if free of intimidation and coercion
- Incorporate feedback into project design

The above guidance was considered in the development of this SEP.

1.4 PLAN UPDATES

This SEP has been prepared for submission to the Guinea-Bissau Government as part of the ESIA for the Project. The plan is expected to be further revised prior to initiating construction of the Project.

Management reviews of the SEP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the plan in achieving stakeholder engagement objectives, and maintaining ongoing positive relations with local communities.

2 – POTENTIAL PROJECT IMPACTS

Comprehensive information for all potential impacts of the Project to local communities and other stakeholders are presented in the ESIA. The potential impacts of the Project form the basis of potential topics that have and will continue to be discussed with stakeholders throughout the Project life. Mitigation measures to address these impacts are identified in the applicable discipline-specific management plans and in the individual impact assessment sections.

The development of the Farim Project in the Farim area is anticipated to result in considerable socio-economic benefits to Guinea-Bissau through government revenues, contract opportunities for Guinea-Bissaun companies, employment, development of mining related skills, and improvement of infrastructure. Some adverse socio-economic and environmental effects will also typically occur, including:

- Increased dust and air contaminant concentrations
- Increased noise levels
- Decreased water availability due to open pit dewatering
- Discharge of mine effluents to local watercourses
- Loss of and/or modification to natural aquatic and terrestrial habitats
- Change in landscape quality and visual amenity
- Increased traffic and risk of accidents
- Increases in communicable diseases and STIs
- Change in the social fabric of the region (demographic change, social conditions)
- Physical displacement or loss of arable land
- Loss of cultural heritage sites

3 – STAKEHOLDER IDENTIFICATION AND ANALYSIS

Stakeholders are individuals and organizations who may affect, or be affected by, the performance of a project. The IFC (2007) provides the following detailed definition of a stakeholder in the context of a development project:

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses.

Key stakeholders that are directly impacted (positively or negatively) by the Project are identified in Table 3.1.

Table 3.1 Stakeholder Groups

Stakeholder Groups	Description of Stakeholder Group
Potentially Affected Population	PROJECT AFFECTED PERSONS (PAPs) • Residents potentially affected by physical displacement (loss of housing) • Land owners/users directly affected by land acquisition • Any other person/business/entity economically displaced
	DIFFERENTIALLY AFFECTED POPULATION • Local disadvantaged groups such as women, children or the poor
	POTENTIALLY AFFECTED COMMUNITIES • See Table 3.2
Government Authorities	LOCAL GOVERNMENTS • Farim Municipality • Local Village Administrators and/or Committees • District Administrators in Bissora, Farm, Mansaba, Nhacra and Mansoa
	NATIONAL and REGIONAL GOVERNMENT • Ministry of Geology and Mining • Ministry of Environment • Ministry of Public Works • CAIA • Other relevant National Ministries and Departments • Oio Region Administration
Other Organizations Investors, Financial Institutions Media	GENERAL PUBLIC • Population of Guinea-Bissau
	BUSINESSES • Businesses within the regional area and Guinea Bissau
	NON-GOVERNMENT and QUASI-GOVERNMENT ORGANIZATIONS • Non-commercial, non-governmental and public organizations at all levels, including community-based organizations or interest groups (i.e., labour, youth, businesses, environmental, etc.)
	INVESTORS and FINANCIAL INSTITUTIONS • Current and potential investors, financial institutions
	MEDIA • Interested media organizations

3.1 IMPACT MAPPING AND STAKEHOLDER IDENTIFICATION

Stakeholder identification was undertaken several years ago in concert with previous stakeholder engagement activities on the Project (Section 4). GB Minerals, in consultation with its consultant team (Eco Progresso and Knight Piésold), conducted an updated stakeholder identification and analysis process during the preparation of this SEP in mid-2015. This included identifying the Project's anticipated zone of influence, described below for each component of the Project. The process of identifying the Project's anticipated zone of influence assisted GB Minerals in identifying its stakeholders.

Mine Site Area

The mine site will occupy and displace land currently utilized by others for residences and agriculture-based livelihoods. The mine may also interrupt village travel corridors between villages and the regional centre of Farim, as well as between villages. Additionally, dewatering of the open pits necessary for mining may affect existing household and community wells. Equipment and consumables necessary to construct and supply the mine will be delivered to the Port of Bissau, transported over the transport route discussed below, and will use the ferry crossing and pass through the Town of Farim to reach the mine site.

Surplus water from the Project will be discharged to the River Cacheu. A number of communities are located downstream of the mine site area, and these communities use the river extensively for fishing and for travel. The river is not used as a source of potable water or irrigation for agriculture, given the marine influence and tides and salinity of the water. In the context of the base river flow, the volume of water expected to be discharged will be small compared to the size of the river (less than 1% of the estimated low flow). Therefore the assimilative capacity of the river is large. Further, water treatment will be provided prior to discharge, if necessary. Therefore, the effect of the planned discharge on downstream communities, mainly through potential effects to aquatic life, is expected to be negligible.

Finally, the surrounding villages and the Town of Farim are expected to provide most of the labour to the Project. GB Minerals does not expect to need to hire from outside of the region, except where expatriates are required to provide specialized expertise necessary to run the mine. This may induce the movement of people into the area, and therefore engagement with Farim's regional and municipal leadership will be important, to plan for such potential influx in an organized and controlled manner.

In summary, stakeholders in the mine site area consist of a number of villages and the Town of Farim that are expected to be physically and socio-economically influenced by the presence of the Project. These communities have been identified in Table 3.2. Villages located downstream of the Project along the River Cacheu have not been identified as key stakeholders, but GB Minerals will engage these communities to provide information on the Project if requested to do so.

Transport Route

There are a number of villages along the transport route between Bissau or the port site and the mine site (Figure 1.1). The main interaction between the Project and these villages will be truck traffic, and therefore the primary concern to be addressed is community safety related to project traffic. The communities may also experience some socio-economic interaction with project staff and contractors travelling the highway. The communities located along the transport route between the

mine and port sites are listed in Table 3.2. These communities will be directly affected by the Project, but to a lesser extent than those villages physically or socio-economically influenced in the vicinity of the mine site.

Port Site

The access road into the Port site will pass next to several villages and the final approximate 2 km of road as well as the port site development area will displace agricultural fields. In addition, fishing and trading (mainly the selling of fish) and possibly recreational activities occur at the beach area adjacent to the proposed port location. The PAPs in this area include local villagers and fisherman, as well as people who travel from outside of the area to purchase fish for resale elsewhere. The port site area villages identified as directly affected communities are listed in Table 3.2.

Table 3.2 Potentially Affected Communities

Mine Site	Transport Route	Port Site
• Cancenha • Caurndin • Canico Lique Coroto • Tambandito • Tambato Mandinka • Ufude • Sandjal • Saliquenhe Porto • Ponta Caiero • Demba Baio • Urqui • Canico Tumanna • Bani • Nema • Farim • Capol • Saliquenhe • Sara Ioba	• Saliquenhedim (K3) • Sao Jao • Capatrice • Colimessin-Cunda • Djalicunda • Linquebato • Bironqui • Calingue Fula • Calingue Mandinga • Mansaba • Mansaba Sutu • Manbonco • Manbonco Dar • Ponta Fernando • Ndjassone • Some • Tano • Cutia • Cureyni • Cussac • Sansaunto • Mansoa • Rossum • Dugal	• N'Raga • Cunteda • Chugue • Aroté • Ancone

3.2 DIFFERENTIALLY AFFECTED, VULNERABLE AND MARGINALIZED PEOPLES

The following potentially vulnerable or disadvantaged groups have been identified in the study area:

- Women and female headed households
- Elderly and infirm
- Disabled persons, orphans and potentially war-affected residents including those who lost assets

During construction and operations, GB Minerals intends to increase its efforts to engage potentially vulnerable or disadvantaged groups that may be affected by the Farim Project and encourage their full participation in engagement activities.

3.3 GOVERNMENT AUTHORITIES

Government authorities potentially interested in the Farim Project include national, regional and local authorities. National government stakeholders include the Ministries responsible for permitting, approvals and monitoring related to the Farim Project (Table 3.1). Regional and local authorities include those from the Regions, Sectors and village administrators surrounding the mine site, transportation route and port site.

All project components are located within the Oio Region, which is one of 8 regions in the country (Figure 3.1). Farim is the capital city of the Oio Region and is administered by a Governor.

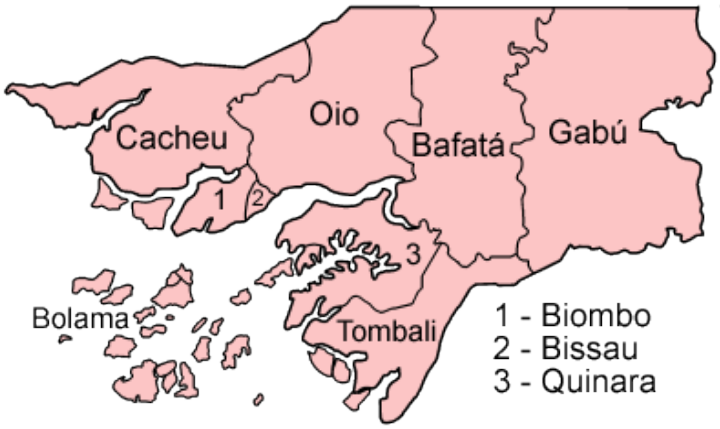

Figure 3.1 Administrative Regions of Guinea-Bissau

The Oio Region consists of 5 Districts administered by District Administers. The Mine Site is located in the Farim district, while the material supply route will transect the Mansaba, Mansoa and Nhacra districts (Figure 3.2; from Wikimedia Commons, 2015).

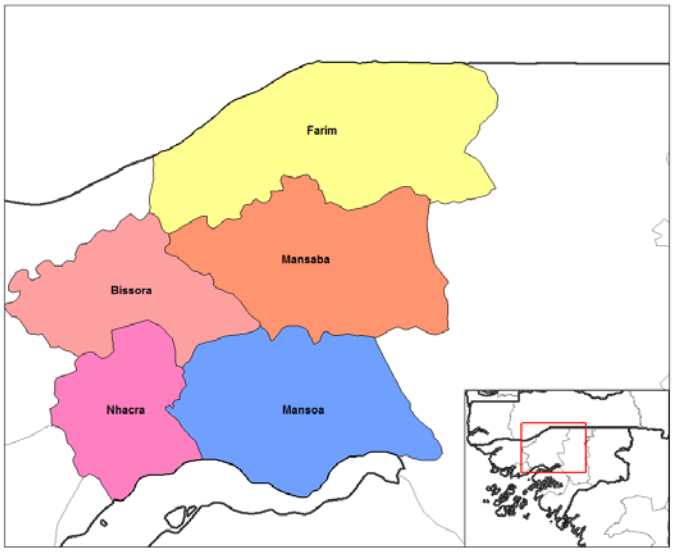

Figure 3.2 Administrative Districts of the Oio Region

At the village level of government administration, more than one household commonly reside in compounds or homesteads and share the agricultural land which they cultivate collaboratively. These households are typically headed by a ‘chief’ who is the father or the grandfather. Decision-making is primarily through consensus facilitated by the village leaders or committees. The village chief (or committee) invites the heads of families and youth representatives and, in some cases, women's representatives to meetings when matters need to be discussed and decided on. Decisions are made only after adequate discussion and when each person has had the opportunity to express their opinion. Male opinion dominates the decision-making process, in particular that of heads of families and the village head; their views are important in the deliberations and decision-making process.

Heads of villages are under the authority of the administrator of the district. The status of village head is usually held by the founding family of the village and is transferred within the family over generations.

3.4 OTHER ORGANIZATIONS

In the context of Guinea-Bissau’s economy, the Project is also expected to generate socio-economic activity in the capital city of Bissau and elsewhere, though this influence is expected to be diffuse within the public domain, and therefore no stakeholder groups have been identified related to this project influence.

Other organizations include secondary stakeholders that might be interested in or affected by the Farim Project, such as NGOs, potential investors, EPFIs, other mining companies in Bissau, and the interested international public.

4 – OVERVIEW OF PREVIOUS STAKEHOLDER ENGAGEMENT

4.1 STAKEHOLDER ENGAGEMENT ACTIVITIES TO DATE

Exploration at the Farim Phosphate Project began in the early 1980s by other parties. Following a long lull in activity, GB Minerals initiated its own explorations of the Farim deposit in 2011. Stakeholder engagement also began in 2011, with major rounds of public consultation meetings undertaken in 2012, 2013 and 2015.

The objectives of initial engagement activities have been to:

- Help identify the priority issues and interests of affected people and other key stakeholders, whilst also not unnecessarily raising expectations.
- Provide preliminary information to stakeholders about the Project.
- Obtain information and views that may assist in scoping and conducting ESIA studies and activities.
- Initiate relationships and communication channels between GB Minerals and affected communities and other stakeholders that can be built upon as the Project progresses.

GB Minerals has focused efforts on managing the expectations of local stakeholders by providing consistent messages from the outset of the engagement program and by explaining as much as is possible where uncertainties exist in project information. Due to a lack of familiarity with mining, and major development projects generally, a key challenge has been to provide information on the Project in a relatable manner to local stakeholders and to establish realistic expectations from the Project, both positive and negative.

Consultation in 2011

GB Minerals and consultant Golder Associates (UK) Ltd. attended high level meetings with government departments in Bissau and one meeting took place with village Chiefs in Farim during April 2011. 14 questionnaires were administered and 3 focus group discussions were held at that time. The primary meeting with the government was held with CAIA, a department of the Office of the Prime Minister and the lead authority responsible for evaluating the ESIA report. Discussions with the CAIA and other government departments focussed on legislation, requirements and expectations for the ESIA. The meeting with the village Chiefs established that the communities were supportive of the proposed project and that they were keen to continue to receive information. This is best achieved through public consultation.

Consultation in 2012

An independent environmental consultancy, based in Senegal, Tropica Environmental Consultants (Tropica), was appointed to undertake public consultation in March 2012 (Tropica, 2012). Tropica engaged with all identified town/village administrations and potentially affected communities for the exploration activities within the exploration licences for the Farim Project. The schedule for these 2012 consultation efforts are summarized in Table 4.1. The meetings followed a set format, starting with general introductions and a presentation of project information by the consultation team, in the form of posters.

Table 4.1 2012 Public Consultation Meetings

Date	Stakeholder Group	Venue	Number of Attendees
5 March	Citizen Workshop	Siege IBAP, Bissau	8
6 March	Government representatives from Farim	Roman Catholic Primary School Compound, Farim	65
6 March	Media	Roman Catholic Primary School Compound, Farim	5
7 March	Representatives from commission of chiefs	Saliquenhé	60
8 March	Public Meetings/surrounding villages(7)	Cabiceque	43
8 March	Public Meetings/surrounding villages(7)	Saliquenhé	60
9 March	Community Meeting	Farim	64
10 March	Community Meeting	Mansaba	51
10 March	Community Meeting	Mansoa	38
11 March	Community Meeting	Nhacra	30
		Total Number of Attendees	**424**

Consultation in 2013

A second round of public consultation meetings was held in December 2013 with the local stakeholders. The schedule of these meetings is presented in Table 4.2. The format of the meetings was consistent with previous rounds of consultation. Meetings started with general introductions, followed by a presentation of project information in the form of posters followed by an opportunity to raise questions and concern.

The GB Minerals team met the government agencies in Bissau who have responsibility for authorizing projects based on the ESIA process, then travelled to the Farim area for meetings with project-affected communities and other stakeholders. The stakeholders welcomed the opportunity to attend meetings about the Project and raise their comments and questions.

Table 4.2 Public Consultation 2013 Schedule

Date	Stakeholder Group	Venue	Number of Attendees
6 December	Representative of the Ministry of Geology and Mining	Board Room at Bissau	7
6 December	Representatives from CAIA	CAIA Office at Bissau	11
8 December	Project Workers (Dry Run)	Project Office at Farim	11
9 December	Saliquenhé Community	Seliquenhi	142
10 December	Tambato Community	Tambatu	61
10 December	Sandjal Community	Sandjal	65
10 December	Canico Community	Canico	102
11 December	Representatives from (Canico, Tumana, Orque and Sare-Ioba) surrounding Communities.	Canico Tumane	226
11 December	Ponta Capsec Community	Ponta Capsec	21
11 December	Ponta Zeca Community	Ponta Zeca	23
		Total Number of Attendees	**669**

Consultation in 2014 and 2015

A number of informal meetings have been held with key representatives of the Ministry of Mines and Energy, the Ministry of Environment, and CAIA in 2014 and 2015. Meetings have included visits to the mine site and port site areas.

GB Minerals, through its consultant Eco Progresso, held additional public consultation meetings in May and June of 2015. The schedule of these meetings is presented in Table 4.3. The consultation activities conducted in 2015 focused on informing local stakeholders on the Project, its current status and to answer questions and address concerns of stakeholders.

Meetings were conducted with regional government representatives including the Governor of Oio Region, Regional Secretary of Oio, leaders of the five sectors of Oio, traditional leaders and village leaders, local communities around the mine site, port site and along the transport route, and NGOs. PowerPoint® slides were presented at each of the meetings, and hard copies of the presentation were made available to interested participants. Question and answer sessions followed the presentations.

In addition to public meetings, GB Minerals participated in a radio show in Bissau, which included government representatives.

Table 4.3 Public Consultation 2015 Schedule

Date	Stakeholder Group	Venue	Number of Attendees
27 May	Farim Governor and other local leaders	Farim	n/a
30 May	Oio Reguib government officials from Saliquenhe, Bissora, Nhacra, Mansoa, Mansaba and Farim	Saliquenhe	n/a
10 June	Ancone, Cunteda, Aroté, Abana community members		37
11 June	Caurundin, Cancenha community members	Caurundin	22
11 June	Saliquenhe Ba community members	Saliquenhe Ba	9
	Saliquenhe Porto, Ponta Caiero, Demba Baio community members	Saliquenhe Porto	8
12 June	NGOs Nadel, ECO, AFAS, AFA-K, AMIC, RAFAF and Ajub-AMA, LSEE, the Associate FAMM APROSAL representatives of Djalicunda radios, Bombolom-FM Sol Mansi and national radio	NADEL NGO office	n/a
13 June	Regulo of Mansaba, Administrator Secretary Mansaba Sector Administrator and village chiefs from Mansaba, Calinque, Mandinga and Bironqui	Mansaba	n/a
13 June	Village representatives from Cureini, Dugal, Rossum Cutia, SOMEC Committee, Fanhe and Cussac	Monsoa	n/a
		Total Number of Attendees	**76**

4.2 KEY STAKEHOLDER ISSUES

During consultation activities undertaken in 2012, 2013 and 2015, questions were raised about potential environmental issues that would affect communities such as pollution, loss of livelihoods and disturbance of agricultural lands. Socio-economic issues were centred around employment, community development, security, health, displacement and resettlement concerns, and psychological effects.

Employment: Many participants raised the issue of employment and argued that the Project should give priority to local residents. Some stated that the Project discriminated against them by giving jobs to foreigners. The creation of employment opportunities for residents of the region. Meeting participants were hopeful that the Project will allow the young population in the region to find employment. It was clarified that preference will be given to residents of the region (those living near the mine site, along the product transport route, and near the port) when apply for jobs given they meet the qualification criteria.

Community Development: The need for community development and specifically the development of social infrastructure was raised. Participants stated that the Project can benefit local communities through creation of roads, electric power supply, schools, and hospitals.

Security: Many questions regarding security were asked during consultation.

Health and Safety: Comments made on potential impacts focused on problems associated with dust and contamination of water. Concerns over the Project were also raised, particularly the potential impacts as a result of project traffic was discussed. Potential risks to safety of pedestrians were raised, as well as the increased noise from truck traffic. Members in the meeting suggested operating the ore transport trucks during the night-time from 9:00 pm to 6:00 am to reduce the safety risks.

Displacement, Resettlement and Compensation: The launching of the Project will imply expropriation of agricultural land and displacement of villages. Several questions were asked on how and when the populations will be displaced and where they will be resettled. Compensation was a recurrent issue during consultation. Participants stated that populations including agriculturalists and pastoralists will be displaced. In turn, they would like to have clear answers on the consultation package, the modalities of compensation that will be available for them.

Continued Engagement: Participants expressed the desire to be continually informed about the Project process and any project updates. Participants noted the need to educate the local public on the Project given the inexperience with mining projects and the low literacy rates in the area. Dissemination to the village level was identified as important.

5 – ENGAGEMENT PROCEDURES

The SEP has been prepared with consideration of the potential impacts identified in the ESIA to ensure that engagement activities are focused on the environmental and social issues that are likely to affect local communities and stakeholders. Stakeholder engagement procedures have been designed to:

- Provide regular information about construction and operations activities in a pro-active and timely manner.
- Ensure the ongoing disclosure of project information in a culturally appropriate way that is commensurate with the level of education and literacy of the target audience.
- Develop key messages on local employment and training, local business development, agriculture support programs, influx related issues, environmental monitoring and community health and safety awareness.
- Achieve successful negotiations and participation related to land changes and other economic displacement issues.
- Identify new issues, concerns or needs of affected communities including resolution of community complaints in an expedited manner.
- Continue to build long-term relationships within the key stakeholders near the mine site as well as those relevant stakeholders along the transport route and at the port.
- Assess the effectiveness of environmental and social mitigation measures by using monitoring in communities and direct feedback.
- Maximize project benefits such as employment and procurement opportunities through effective engagement with local communities.

It is not practical, and usually not necessary, to engage with all stakeholder groups with the same level of intensity all of the time. This idea has been incorporated into the SEP.

5.1 ANALYZE AND TRACK STAKEHOLDERS

GB Minerals will continue to complete Meeting Records for all stakeholder engagement activities it conducts for the Farim Project. Records of stakeholder interactions shall be managed and held by GB Minerals.

Procedures for ongoing stakeholder identification, analysis and tracking as the Project advances, may involve:

- Implementing a stakeholder tracking system to record and document all engagement activities and relevant information about national, regional and local stakeholders, including comments, issues, project responses and outcomes.
- Circulating key stakeholder information to project teams, including the EPCM Contractor.
- Designated Community Relations Specialist (or other appropriate candidate) responsible for developing and implementing the stakeholder tracking system.
- The Project stakeholder engagement record will be updated to track changes as they occur. Such data may include:
  - Meeting/activity records
  - Budget expenditure documents
  - Complaints forms, log and records detailing how complaints were resolved

- Public comments books/other documents showing issues raised by stakeholders
- Commitments register for local communities
- Community relations staff reports
- Correspondence received by government or other stakeholders
- Disclosure materials disseminated
- Statistics on visitors to the Project Information Centres
- Responses provided to stakeholders by the Project
- Community attitudes and perception surveys
- Training records

An example Stakeholder Engagement Tracking Table is presented in Table 5.1.

Table 5.1 Example Stakeholder Engagement Tracking Table

Category	Description
Stakeholder/Organization	The name of the individual, main contact, with full contact details
Role/Position	Describe who this group/individual is and their relevance (e.g., government regulator, influential environmental NGO representative)
Relationship	Describe in detail what their relationship is with GB Minerals
Issue/Interest/Concern	Describe main issues (e.g., want employment, concerned about social or environmental impacts)
Importance Ranking	Describe the level of importance e.g., from 1-5, 1 not very important, 5 important
Engagement History	Describe previous contacts and dialogue held, and their outcomes
Commitments Made	Describe what was committed to during engagements
Project Responses	How issues/interests/concerns are inform management plans or other responses
Methods for Engagement	Describe how this individual/group should be engaged in the future including the level of engagement (e.g., partner, participant, observer)
Frequency/Timing	Plan for frequency of engagement
Responsibility	Who in GB Minerals is responsible to implement the engagement activity
Resources	Estimate the cost and other resources that are required to manage this relationship
Additional Information	Any additional comments or observations

5.2 COORDINATE WITH NATIONAL GOVERNMENT

GB Minerals recognizes the importance of coordinating its stakeholder engagement activities with stakeholders from local, regional and national governments. GB Minerals has already developed a good relationship with local administrators, the Ministry of Geology and Mining, CAIA and other relevant ministries. Cooperation with the government related to stakeholder engagement for the Project may include:

- Regular updates to the Ministry of Geology and Mining and relevant local authorities on engagement activities.

- Coordinating activities with various government agencies and ministries that may want to undertake engagement activities with GB Minerals and local communities.
- Making engagement records available to relevant government officials upon request.
- Regular reports to government stakeholders on community complaints received by GB Minerals and actions being taken to resolve issues.

5.3 ENGAGEMENT METHODS

Consultation at the regional and national levels with government is conducted in Portuguese, and written public disclosure materials are also presented in Portuguese. Community meetings in the vicinity of the Project areas, however, are conducted in Creole and Mandinga.

A number of engagement methods and disclosure materials are being or will be used for the Project including:

- Public meetings
- Mining awareness materials including photos, videos and printed materials
- Information leaflets, maps, posters and brochures
- Small group meetings or focus group discussions
- Project information centres
- Suggestion/comment books
- Website, correspondence, and telephone
- Mine site visits or tours
- Open houses
- Local media including radio and newspapers

GB Minerals recognizes the low literacy levels. As such, GB Minerals will investigate creative methods of providing information to people in both written and oral formats.

5.4 CONSULTATION AND DISCLOSURE OF ESIA-RELATED DOCUMENTS

GB Minerals has undertaken consultation and disclosure activities for the ESIA-related documents that have been prepared for the Farim Project. The ESIA and associated Management Plans, once finalized, will be made available in relevant formats to different stakeholder groups:

- **Local Stakeholders -** Summary materials on relevant Management Plans and the ESIA, particularly potential impacts and proposed mitigation measures which may affect local people will be disclosed locally at project information centres (PICs) and other relevant locations and in specific face-to-face meetings with local communities.
- **Regional and National Stakeholders -** Management Plans and the ESIA will be available at the GB Minerals Office in Farim as well as disclosed to relevant authorities.
- **International Stakeholders -** The ESIA will be available to relevant international stakeholders upon their request and GB Minerals agreement.

GB Minerals will advise stakeholders how they can access a copy of the Management Plans, the ESIA and other relevant documents, as well as the schedule and process for providing comments, where appropriate.

5.4.1 Update and Briefing Sessions with Government Representatives

GB Minerals will continue to hold update and briefing sessions with the Government during construction and operation of the Farim Project. These activities may include:

- Update and briefing sessions with interested government representatives in Farim.
- Public update events with the administrators and leaders of Administrative Sectors, districts, towns and villages.

The purpose of the update sessions is to provide information to government authorities on progress and performance of the Project with respect to plans and mitigation strategies, and the Project schedule. A range of materials and methods such as power point presentations and site tours will be used during the briefing sessions.

5.4.2 Community Information Committee

A village committee was organized by a local NGO several years ago. Leading up to the ESIA review period, GB Minerals intends to re-establish the village committee or establish a new Community Information Committee (CIC) with the assistance of local administrators and village chiefs. Typical characteristics of a CIC are:

- Consists of representatives from the key communities (the village administrator or a representative, a local female representative and members elected by the community), the village-based Community Liaison Officers, the Project Community Relations Specialist, and other Company representatives as required.
- Regularly scheduled meetings or as required during increased project-related activities.
- GB Minerals intends to provide transportation, per diem expenses and refreshments for all committee meetings.
- GB Minerals will monitor progress and performance of the CIC.

5.4.3 Community Liaison Officers

GB Minerals has maintained Community Relations/Programs staff to support the Project since 2011. During construction and operations, GB Minerals intends to continue to employ Community Liaison Officers (CLOs) for the Project to support engagement activities.

CLOs are Company employees who represent the Project in their respective communities and conduct a range of support activities/duties for GB Minerals, including managing the relevant Community Offices. Issues that are likely to be brought up include:

- Land use, land changes and compensation
- Recruitment and employment
- Water use, availability, quality and protection
- Road maintenance
- Student/youth issues
- Induced and informal in-migration
- HIV/AIDS and other communicable diseases
- Women and vulnerable groups

The CLOs will be based out of GB Minerals offices in Farim and Bissau.

5.4.4 Project Information Centres

GB Minerals will establish a Project Information Centre (PIC) at its office in Farim. Consideration will be given to establishing a similar centre in the vicinity of the port site. The PICs will be staffed part- or full-time by one or more CLOs, who can provide written and oral information on the Project, record visitors and comments received, and other relevant information.

5.4.5 Public Education and Outreach

GB Minerals intends to host community outreach and education events during the construction and operation of the Farim Project, at the local levels through a variety of activities. The company will consult further with community stakeholders on how to best conduct the outreach; it may include:

- Holding public education events in each of the key communities or as needed (for example, these may be held in conjunction with information sessions on employment opportunities).
- Inviting local, regional and national government representatives to attend local outreach events.
- Providing information at local events in an easy to understand way in order to update communities and the larger public about the activities and plans of the Project.
- Post relevant documents at public education and outreach events and provide a venue for feedback.
- Use these events where appropriate, to raise community awareness and promote educational activities on important topics like health and safety associated with the mine sites.
- Seek input into planning public events from local people and ask communities about what they would like to discuss about the Project and in what format.
- Target a range of different audiences, including school and youth groups, and other sections of the local communities.
- Use innovative and interactive communication tools (for example, role plays, videos and photos).

5.4.6 Open Houses and Site Tours

GB Minerals intends to utilize open houses and site tours, as required, to:

- Show representatives of the national, regional and local government authorities and other invited people the progress of the Project.
- Host invited groups, such as youth or school groups.
- Update local communities on the current state of construction or development of the Project to further enable them to contribute meaningfully to the stakeholder engagement process.

5.4.7 Disclosure of Printed Materials

Disclosure of printed materials will continue to be an important part of the engagement process in the construction and operation phases of the Farim Project. GB Minerals shall disclose regular information to stakeholders involving the following:

- Prepare and disseminate relevant printed information about the Project and in particular, construction and operations activities (for example, brochures to explain how to use the complaints procedure, or pamphlets outlining recruitment procedures).
- Materials will be provided in Portuguese and designed to provide details in a format readily understandable by local people.

- Particular attention will be given to ensuring that people with low literacy levels and other vulnerable groups receive printed information in formats that are appropriate for them.
- During construction and operations, materials may be prepared and disclosed on the following topics:
  - Construction activities at site/in each area
  - Hiring practices and employment opportunities
  - Supplier opportunities
  - Transport/traffic in the community
  - Community health and safety briefings and awareness programs
  - Ongoing compensation and resettlement activities
  - Waste and environmental issues
  - Road access restrictions/diversions
  - Land access and associated issues
  - Influx/informal in-migration issues
  - Local worker training
  - Worker camp management and the Code of Conduct
  - Complaints process

5.4.8 Community Newsletter

In order to actively engage communities during the construction and operation phases of the Farim Project, GB Minerals may establish a “community newsletter” (under the approval of the National Government). The proposed engagement process for the community newsletter includes:

- Establishing a Community Newsletter (or similar) that focuses on topics of most interest and relevance to local communities.
- GB Minerals will manage the newsletter and include input from residents to ensure that the information provided is relevant to the communities.
- Consider opportunities for the newsletter to be delivered in both written and oral format, to enable those that are not literate to also access the information.
- Distribution of the newsletter throughout the local communities and regional areas as appropriate.

5.4.9 Special Methods for Engaging Women

GB Minerals proposes to develop relevant measures to help to fully integrate women’s perspectives into its engagement activities, including:

- Seek out views of women on relevant topics (experience shows that women often have different perspectives and priorities than men and may be differentially impacted by the Project).
- Disaggregate data to allow for a better understanding of gender differences and potential impacts related to the Project.
- Attempt to collect a representative sample by gender when undertaking surveys and interviews.
- Adapt engagement activities to encourage participation of women, including potentially holding separate meetings for women, using active facilitation, and having women staff and facilitators.

5.4.10 Coordinate with Project Teams

As activities increase at the Project mine sites, it will be important for the Community Relations Team, responsible for the SEP, to interact regularly with other project teams and departments that have been formed for the Project. The proposed procedures for internal coordination related to stakeholder engagement are:

- Establish a schedule of regular meetings with relevant project Departments to discuss stakeholder engagement activities and issues.
- All project departments that interface with local communities and stakeholders will keep the community programs team informed of their activities.
- The Community Programs Team will coordinate meetings, disclosure materials and other engagement events that take place with primary stakeholders, in particular potentially affected local communities.

6 – GRIEVANCE MECHANISM

6.1 OBJECTIVES

The objectives of the Grievance Mechanism include:

- Establish and implement a complaints procedure which will facilitate stakeholders to register and GB Minerals to respond in a timely manner to grievance of people potentially affected by the Project.
- Develop and activate the procedure in a timely manner.
- Develop the procedure to be transparent and simple to understand by project affected people and include the responsibilities of each party involved.
- The process will be free to use.
- Establish a designated person who is responsible for coordinating the receipt of and response to all grievances.
- Track and respond to all grievances.
- Involve relevant project managers to help resolve grievances that relate to their technical areas.
- Apply to procedure to all project components and activities over which GB Minerals has direct control.
- Test and refine the procedure as the construction Phase progresses to ensure it is easy to use and adequate for capturing the grievances of local people.
- Provide training to project employees to direct people with grievances to the designated person or, in their absence, to another member of the Community Relations Department.

This Grievance Mechanism applies to all project activities in Guinea-Bissau for the Project during construction and operations. It also applies to all staff, contractor and sub-contractor activities associated with the Project. A compliant or grievance may be filed with the company by community representatives or workers employed by GB Minerals or its contractors.

6.2 PROCEDURE

When complaints are received, the Grievance Resolution Process, outlined on Figure 6.1 will be invoked. The Grievance Mechanism includes 6 key steps:

1. **Receive Grievances -** Company staff members will receive complaints/grievances at the Project Information Centre or other GB Minerals staff and forward it to the Community Relations Specialist. The staff member receiving the grievance is responsible for documenting and recording the grievance on the Grievance Action Form (Figure 6.2). The Grievance Action Form will be available in Portuguese and English. The grievance will be logged in a Grievance Log.
2. **Preliminary Assessment -** An initial assessment of the grievance will be conducted to assign the grievance level as characterized by the Grievance Resolution Process.
3. **Respond to Grievances -** Communication by Company staff to the Aggrieved Person to acknowledge the grievance and provide information as to expected steps and time for resolution of the grievance. This acknowledgement will be provided within seven working days of receipt of the grievance (and may be in writing or verbal but must be recorded on the Grievance Action Form). The communicated message will be approved by the Community Relations Specialist prior to delivery.

4. **Investigate and Resolve Grievances -** Company staff will investigate the underlying cause(s) of the grievance and develops actions needed to prevent recurrence of a similar grievance. The Community Relations Department will consult with the responsible person/group within the Project team to resolve the complaint and determine the corrective action. Where grievances do not require corrective action (e.g., where a grievance is not directly relevant to the Project or where the grievance is already the subject of another or previous process) the initial acknowledgement of the grievance will incorporate the response/resolution. Where relatively simple, short-term actions can resolve a problem, the objective will be for these to be addressed within 30 days of receipt of the Grievance Action Form. For issues and/or corrective actions that take longer to address, or for which the complainant(s) are not satisfied and additional complaint resolution activities are required, the objective will be to inform the complainant(s) on a regular basis of progress.
5. **Close Out Grievances -** GB Minerals will seek sign-off from the Aggrieved Person that the grievance has been resolved. Lessons learned will be shared with all Company Project teams.
6. **Follow-up with Complainants -** GB Minerals will monitor the satisfaction of the Aggrieved Person and may initiate further investigation to determine what further action may be taken.

6.3 RESOLUTION PROCESS

The objective of the grievance resolution process is to ensure there is a robust and transparent system for addressing grievances as part of the Grievance Mechanism. The grievance resolution process is a sequential process made up of four levels of resolution. Elevated levels of resolution are triggered if the grievance cannot be resolved at a lower level.

- **Level 1 -** This level of resolution is for grievances that can be resolved by CLOs directly with the complainant. This level of grievance can be dealt with through immediate corrective action.
- **Level 2 -** This level of resolution is for grievances that require input and oversight of the Community Relations Specialist and/or where grievances are deemed urgent or critical.
- ***Level 3* -** This level of resolution is for grievances that could not be satisfactorily resolved by GB Minerals alone and therefore require mediation by an external and independent party. GB Minerals may form a Community Working Group and facilitate involvement of the relevant Committees and/or local unions/organizations/associations that can mediate disputes.
- ***Level 4* -** Legal action is available to any citizen in conformance with applicable laws and irrespective of whether or not a grievance has been raised through the Grievance Mechanism. A grievance can be progressively elevated to higher levels of Government until resolution is achieved. GB Minerals does not control this level of resolution but acknowledges this process is in place and available to all stakeholders and that some complainants may choose to proceed directly to this level of resolution.

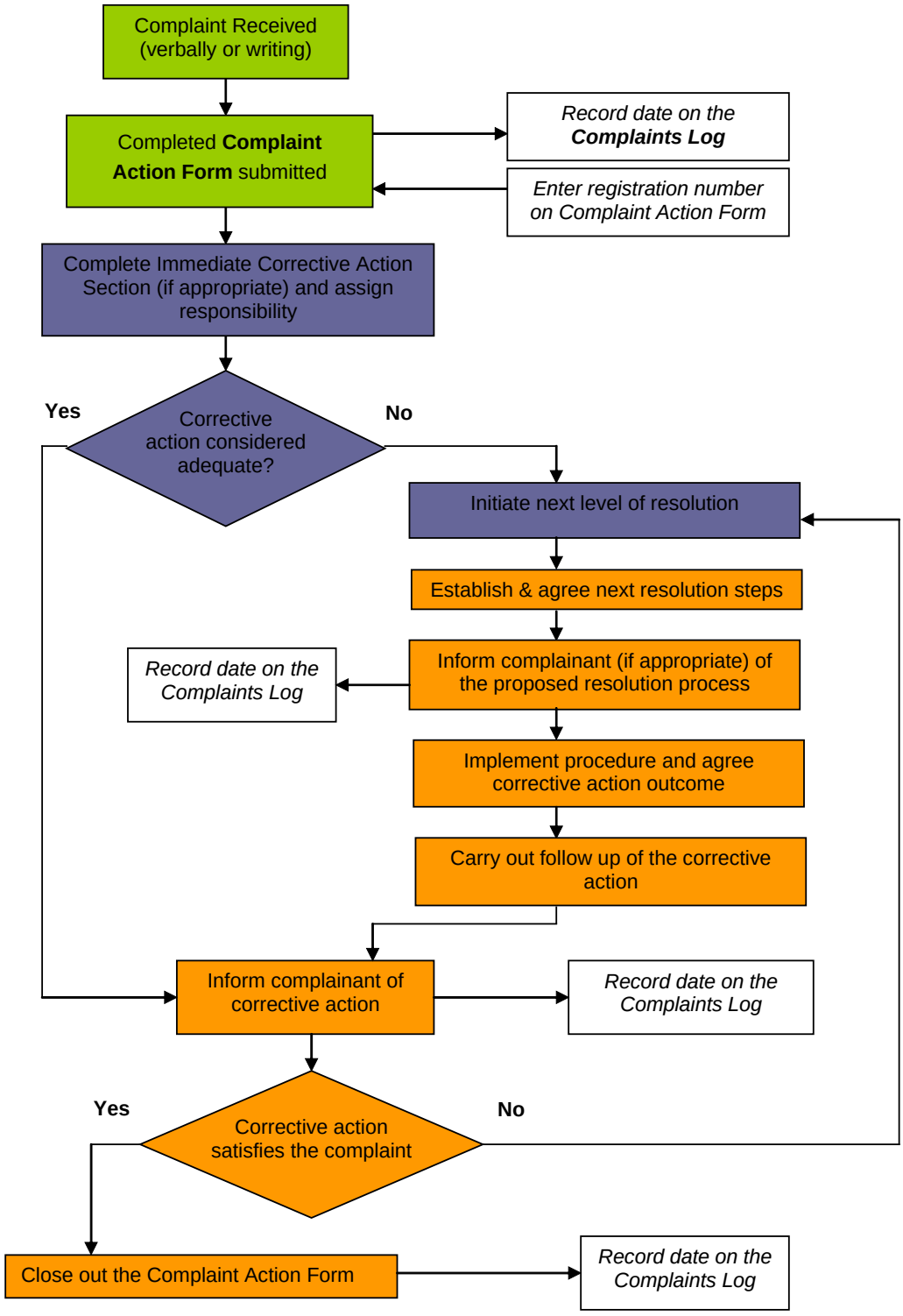

Figure 6.1 Grievance Resolution Process

PART 1: CONTACT AND REGISTRATION DETAILS *To be completed by GB Minerals*

Grievance Registration # (to be taken from the Grievance Log):_____

Date Received: _____

Location (Community/General area/Project): _____

Complainant (Name, Surname): _____

Telephone Number: _____

Address:_____

PART 2 : CLASSIFICATION (Circle) *To be completed by Complainant with help from GB Minerals where needed*

- Culturally significant, religious, heritage
- Resettlement/economic displacement
- Employment/Recruitment procedures
- Staff/contractor/supplier behavior
- Environmental
- Community health and safety
- Donation-related
- Security personnel
- Other

PART 3: GRIEVANCE DESCRIPTION *To be completed by Complainant with help from GB Minerals where needed*

PART 4: PROPOSED RESPONSE/CORRECTIVE ACTION *To be completed by GB Minerals*

Immediate Action: **Date for Completion:**

Responsible Person:
Signature:
Date:

Long Term Action: **Date for Completion:**

Responsible Person:
Signature:
Date:

Other Resolution Details:

PART 5: VERIFICATION OF CORRECTIVE ACTION *To be completed by GB Minerals*

Follow-up Details:

Closed Out:_____

Signature:_____

Date: _____

Figure 6.2 Grievance Action Form

6.4 MONITORING AND REPORTING

The CLOs will be responsible for weekly monitoring of grievances as part of the Grievance Mechanism. Monitoring of grievances will include review of the number and status of grievances and any outstanding issues to be addressed. The CLOs will be responsible for producing reports on grievances that will be sent to the Community Relations Specialist, no less than once each month. The reports may include:

- New grievances
- Grievances resolved
- Analysis of types of grievances and grievance levels
- Measures taken
- Any required follow-up
- Actions taken to reduce similar grievances

The levels and types of grievances received by the Project as well as the speed with which grievances are dealt with will also be monitored through the ESMP Monitoring Report.

The Grievance Mechanism and a summary of grievances will be reported to the community through the Town/Village/Administrative Area/Government at regular intervals that will be determined by the Government and GB Minerals.

All documents relating to grievances will be stored by GB Minerals for two years before they are archived.

7 – ROLES AND RESPONSIBILITIES

7.1 KEY PERSONNEL

The key responsibilities for implementation and adherence to this plan are identified in Table 7.1.

Table 7.1 Roles and Responsibilities for SEP Implementation

Position	Responsibility with this Plan
General Manager	Overall responsibility for adherence to this plan.
Health, Safety, Social, and Environment (HSSE) Manager	Responsible for determining resource requirements and managing the HSSE team to successfully implement the plan.
Community Relations Specialist	Primary responsibility for day-to-day implementation of the SEP including the Grievance Mechanism. Responsible for communicating human, financial and logistical resource requirements to the HSSE Manager. Responsible for managing the activities of community liaisons and participating in company interactions with communities and government agencies.
Community Liaisons	Implement the SEP under the direction of the Community Relations Specialist, including conducting and documenting stakeholder activities.

The HSSE Manager will be responsible for ensuring adequate resources are in place to implement the SEP. The Community Relations Specialist has primary responsibility for day-to-day execution of the SEP with his/her community liaisons. The Community Relations Specialist will be supported by CLOs. The respective responsibilities are presented in Table 7.1.

The Community Relations Specialist is responsible for ensuring the SEP inclusive of the Grievance Mechanism is implemented. Relevant managers are responsible for helping to resolve grievances that relate to their technical areas.

Community grievances are received and coordinated from the CLOs and/or project Information Centers near the Project sites. The Community Relations Specialist is responsible for considering and monitoring all registered community grievances until they have been responded to.

CLOs will support the implementation of the Grievance Mechanism. All employees and contractors will be trained to direct people with grievances to a member of the Community Relations Team.

Others with responsibility for the implementation of the SEP include the EPCM Contractor, responsible for integrating the SEP requirements into their operating procedures and plans.

7.2 TRAINING

The HSSE Manager and Community Liaison Specialist will provide introductory training to all staff regarding interaction with communities, individuals and co-workers. All employees and contractors will be made aware of key community issues, as well as expectations on employees and contractors when interacting with fellow employees or stakeholders from nearby communities.

Specialized training will be provided to the HSSE team, as required, to successfully implement the SEP including the Grievance Mechanism.

8 – MONITORING AND EVALUATION

Monitoring and reporting on stakeholder engagement activities will occur to ensure that engagement activities are effective and that primary stakeholders such as potentially affected local communities are meaningfully incorporated into the engagement process. Stakeholder engagement monitoring activities may include the following:

- Reporting from the Community Relations Department on:
  - Engagement activities
  - Visitors to the PIC
  - Level of participation by different stakeholder groups (e.g., women)
  - Comments from, and feedback provided to, stakeholders
  - Commitments made to local communities by the Project
  - Disclosure materials disseminated: types, frequency, and location
  - Community attitudes and perceptions
  - Community complaints and their resolution
  - Community relations staff, their duties/activities and staff changes
  - Committees, groups and partnership activities related to engagement
- The Community Relations Specialist will participate in engagement activities and inspect documentation on a regular basis, including:
  - Stakeholder engagement records
  - Budget expenditure records
  - Complaints forms, log and records detailing how complaints were resolved
  - Public comments books/other documents showing issues raised by stakeholders
  - The schedule/action plan for implementing the engagement program
  - Commitments register for local communities
  - Community relations staff reports
  - Correspondence received by government or other stakeholders
  - Disclosure materials disseminated
- The Community Relations Specialist is responsible for record-keeping
- Regular reporting will be undertaken via the ESMP Report and will include:
  - A summary of activities undertaken during the reporting period
  - Any material deviations or non-compliances to the SEP
  - Planned activities during the next reporting period
  - Any other issues of concern

Further information on social monitoring and reporting requirements and procedures are set out in the ESMP.

The stakeholder engagement activities will be periodically evaluated by GB Minerals' senior management, assisted by the HSSE team (HSSE Manager, Community Relations Specialist, CLOs). The following indicators will be used for evaluation:

- Level of understanding of the project by stakeholders
- Annual review of grievances received and how they have been addressed
- Level of involvement of affected people in committees and joint activities and in the project itself

In order to measure these indicators the following data will be used:

- Issues and management responses linked to minutes of meetings
- Feedback from primary stakeholder groups (through interviews with sample of affected people)
- Grievance log

These evaluation reports will be presented to the GB Minerals Board of Directors. A summary of the results will be provided for the ESP Monitoring Report.

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10 – CERTIFICATION

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3N
COMMUNITY DEVELOPMENT PLAN

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NB301-520/2-13
Rev 0
September 11, 2015

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GB MINERALS LTD.
FARIM PHOSPHATE PROJECT

COMMUNITY DEVELOPMENT PLAN
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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
- 1.1 BACKGROUND 1
- 1.2 SCOPE AND OBJECTIVES 2
- 1.3 REGULATORY REQUIREMENTS 2
- 1.4 PLAN UPDATES 3

2 – COMMUNITY DEVELOPMENT 4
- 2.1 PRELIMINARY ASSESSMENT OF COMMUNITY DEVELOPMENT NEEDS 4
- 2.2 COMPANY STRENGTHS 5
- 2.3 NEXT STEPS 5

3 – ROLES AND RESPONSIBILITIES 6
- 3.1 KEY PERSONNEL 6

4 – REFERENCES 7

5 – CERTIFICATION 8

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

the Project	Farim Phosphate Project
CPD	Community Development Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ICMM	International Council on Mining and Metals
IFC	International Finance Corporation
NGO	Non-government Organizations
SOP	Standard Operating Procedure

1 – INTRODUCTION

1.1 BACKGROUND

This conceptual level Community Development Plan (CDP) has been prepared for GM Minerals Ltd. (GB Minerals) for the Farim Phosphate Project, a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

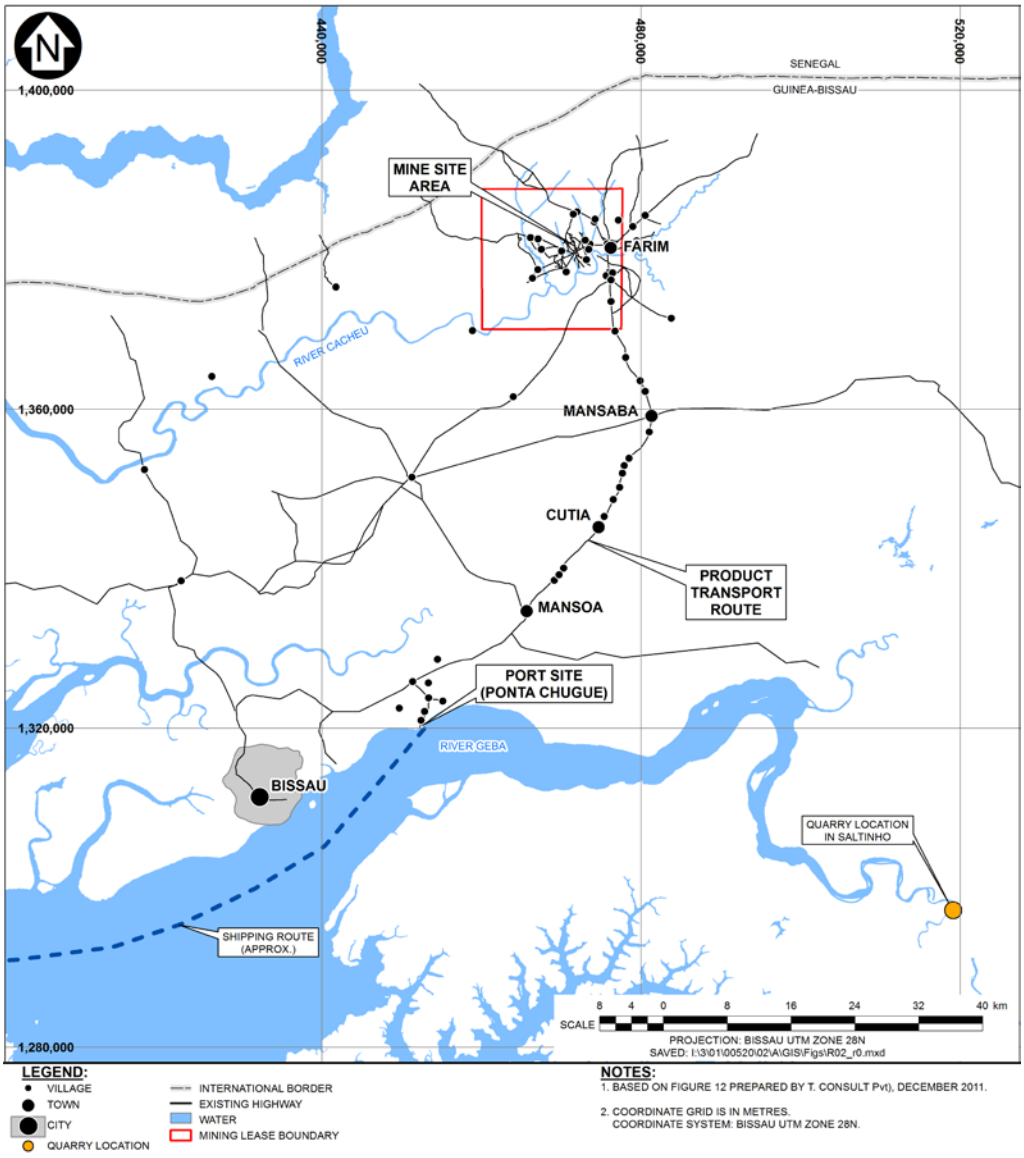

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the mine site, and the port facility needed to export the product to customers.

An Environmental and Social Impact Assessment (ESIA) was prepared that evaluates and addresses the Project's environmental and social impacts and risks. An Environmental and Social Management Plan (ESMP) has been prepared that consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA but will act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in Project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The CDP is a Level 2 discipline-specific management plan. The Plan outlines the goals, strategies, and actions to help foster sustainable development of local communities. The targets of the CDP are to:

- Foster community development initiatives in partnership with national and local governments, local communities and where appropriate non-governmental organizations (NGOs)
- Ensure sustainable community development that will allow the region to prosper following the decommissioning of the mine

GB Minerals commits to develop a sustainable CDP to help ensure social and economic stability throughout the life of its Project and following the Project's closure. This will require good dialogue with local authorities, national government, and the local people and communities potentially benefiting and/or adversely affected by the Project.

1.3 REGULATORY REQUIREMENTS

The key regulations and standards relevant to community development Plan are:

- Corporate Policy
- Applicable National requirements
- International Standards

A summary of these requirements is provided below.

GB Minerals is committed to making positive contributions to the communities near its proposed Project, as part of the Environmental, Social, Health, and Safety Policy. The Policy is provided in Volume 3, Section 3.1 of the Level 1 Management System. A detailed CDP, developed with meaningful input from relevant stakeholders and partners, is part of the company's effort to deliver mitigation measures to reduce the severity of adverse impacts resulting from the Project, and to maximize positive benefits of the Project.

Guinea-Bissau does not have national regulations pertaining specifically to community development, and there are no applicable international standards related to community development. However, but there is the following international best practice guidance which the company will consider in developing community development plans:

- ICCM Community Development Toolkit (ICCM, 2012)
- IFC Community Development Resource Guide (IFC, 2000)
- IFC Strategic Community Investment handbook (IFC, 2010)

1.4 PLAN UPDATES

This CDP Plan has been prepared as part of the ESIA. The plan is expected to be further revised prior to initiating construction of the Project, in consultation with local stakeholders. There is a linkage to the future Resettlement Action Plan (RAP) that will be developed for the Project in the near future.

Management reviews of the CDP Plan will be conducted and documented on a regular basis. This will likely involve the participation of partner and stakeholder organizations with a shared interest or involvement in community development initiatives around the Project area.

2 – COMMUNITY DEVELOPMENT

2.1 PRELIMINARY ASSESSMENT OF COMMUNITY DEVELOPMENT NEEDS

Based on the outcome of the ESIA, the following socioeconomic impacts and community development opportunities have been identified:

- **Agricultural Initiatives -** Most of the people residing in the study area rely on agriculture in combination with natural resource use to generate livelihoods. Agricultural methods are rudimentary and limited access to markets outside the region result in producers receiving limited income for their efforts, and wastage being incurred. Therefore, initiatives that can either improve the productivity of agriculture in the area, or that can improve access to markets, would provide widespread benefit to the region.
- **Other Livelihood Initiatives -** The Project will provide alternative livelihood opportunities that do not currently exist within the study area. Opportunities to enhance the employment and business opportunities of the Project will provide further livelihood opportunities that have the potential to outlast the life of the Project.
- **Combating Malaria -** The Project is located in an area of high risk for transmission of malaria, and the incidence of contracting malaria is quite high. Malaria can result in mortality of children under 5 years of age and elderly. While insecticide treated bednets (ITNs) are publicly available, the level of use is not high. Therefore, initiatives that can improve the accessibility of ITNs and other preventative measures, and initiatives that bring increased awareness of the benefits of such measures, will help improve health conditions with respect to malaria.
- **Combating Diarrhea and Other Water-borne Diseases -** The incidence of diarrhea is high, and this has been attributed to the water and sanitation conditions in the villages; primarily the lack of sanitation measures and the use of shallow groundwater wells that can become contaminated from nearby pit latrines or the lack of waste disposal facilities. Water supply and/or sanitation projects would improve upon these conditions.
- **Improved Water Supply -** The majority of wells located within the Mine Site study area run dry at the end of the dry season, and users experience water shortages for a period of one to several months a year. Pit dewatering will affect a number of well users in the vicinity of the Project, and the company will provide an alternate source of potable water as compensation. Beyond the zone of the Project's influence, measures that improve people's access to safe water will result in measurable improvements to public health.
- **Basic Education and Livelihood Training -** Low levels of literacy across the population in the study area will limit people's abilities to work on the Project or pursue alternate livelihoods. Therefore, initiatives that can promote and enhance basic education as well as vocation-specific training (the latter being planned by GB Minerals as it relates to the mine) will result in livelihood and education improvements.
- **Health Education -** Good health is both an input into one's ability to generate income and an end in itself. In developing countries generally, people often lack basic information, and sometimes have limited ability to process information, because of low education levels. Second, poverty affects people's ability to invest in health. In addition to malaria and diarrhea as the primary health concerns in the area, the Project has the potential to increase the incidence of sexually transmitted infections (STIs) including human immunodeficiency virus (HIV). Health

education initiatives improve people's understanding of health risks and preventative measures, and empower them to take more control over their health.

- **Community Resources and Infrastructure -** The Project will physically displace community resources and infrastructure (e.g., school, medical centre, mosques, etc.) and these will be compensated for (replaced) as part of the RAP. Any further measures to create or improve public infrastructure such as roads will be a benefit to the area.

In summary, there are many opportunities for the Project to contribute meaningfully to community development within the study area.

2.2 COMPANY STRENGTHS

Ideally, any initiatives established by the company should be related to their core business which will allow the company to leverage natural assets, be it human or financial. For mining companies, this often is in the areas of:

- Trades
- Administration
- Management
- Finance
- Operating and maintaining mobile and fixed machinery
- Improving local supplier and contractor capabilities

Initiatives that are not within the company's natural skillset may be outsourced to suitably qualified community groups or NGOs whose business is the area of the selected community development initiative.

The initiatives also need to be sustainable, lasting beyond the effects of the mine.

2.3 NEXT STEPS

Potential community development opportunities are described at a high level in Section 2.1, and considerations of the company's core strengths and natural assets is described in Section 2.2. Community development initiatives, however, need to be borne in the respective communities and need to rely on community resources for their execution. Therefore, the next step in developing appropriate community development initiatives is to discuss these concepts with community leaders and organizations.

3 – ROLES AND RESPONSIBILITIES

3.1 KEY PERSONNEL

The key responsibilities for implementation and adherence to this plan are identified in Table 3.1.

Table 3.1 Roles and Responsibilities for AQMP Implementation

Position	Responsibility with this Plan
Project Director	Overall responsibility for providing direction to community development initiatives, including securing corporate support and resources and liaising with community leaders and organizations
General Manager	Overall responsibility for adherence to this plan
Health, Safety, Social, and Environmental (HSSE) Manager	Day to day oversight of the execution of this plan; participation in meetings with community leaders and partners and supervision of the Community Relations Specialist
Community Relations Specialist	Day to day interaction with community leaders and partners in the development and execution of this plan.

Corporate involvement in the further development and execution of this plan will rest with the Project Director. He/she will be supported on the ground by the General Manager and HSSE Manager. The HSSE Manager together with the Community Relations Specialist and any outside support will be responsible for execution of the plan.

4 – REFERENCES

International Council on Mining & Metals (ICMM), 2012. *Community Development Toolkit.* Retrieved from: http://www.icmm.com/document/4080

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
APPENDIX 3O
CULTURAL HERITAGE MANAGEMENT PLAN

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS i

1 – INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SCOPE AND OBJECTIVES 2
1.3 REGULATORY REQUIREMENTS 3
1.3.1 National Requirements 3
1.3.2 Applicable International Standards 4
1.4 PLAN UPDATES 4

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES 5
2.1 POTENTIAL CULTURAL HERITAGE IMPACTS 5
2.2 MITIGATION MEASURES 5

3 – CULTURAL HERITAGE MANAGEMENT 8
3.1 APPROACH 8
3.2 PROCEDURES FOR ARCHAEOLOGICAL SITES 8
3.2.1 Known Archaeological Sites 8
3.2.2 Protection of Sites Outside of the Project Footprint 9
3.2.3 Draft Chance Finds Procedure 9
3.3 PROCEDURES FOR SACRED GROVES 11
3.4 PROCEDURES FOR CEMETERIES 11
3.5 PROCEDURES FOR MOSQUES 12

4 – ROLES AND RESPONSIBILITIES 13
4.1 RESPONSIBILITIES 13
4.2 TRAINING 13

5 – MONITORING AND REPORTING 14
5.1 MONITORING AND REPORTING 14

6 – REFERENCES 15

7 – CERTIFICATION 16

FIGURES

Figure 1.1 Project Regional Setting 1

ABBREVIATIONS

Farim Phosphate Project	the Project
CACR	Charter of African Cultural Renaissance
CCA	Cultural Charter for Africa
CFP	Chance Finds Procedure
CRP	Cemetery Relocation Plan
CHMP	Cultural Heritage Management Plan
EPCM	engineering, procurement and construction management
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
HSSE Manager	Health, Safety, Social and Environmental Manager
ICCROM	International Centre for the Study of the Preservation and Restoration of Cultural Property
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
MRP	Mosque Relocation Plan
SOPs	Standard Operating Procedures
SSRP	Sacred Site Relocation Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization

1 – INTRODUCTION

1.1 BACKGROUND

This conceptual level Cultural Heritage Management Plan (CHMP) has been prepared for GB Minerals Ltd. (GB Minerals) for the Farim Phosphate Project (the Project), a proposed phosphate mine located in the central northern part of Guinea-Bissau, West Africa (Figure 1.1).

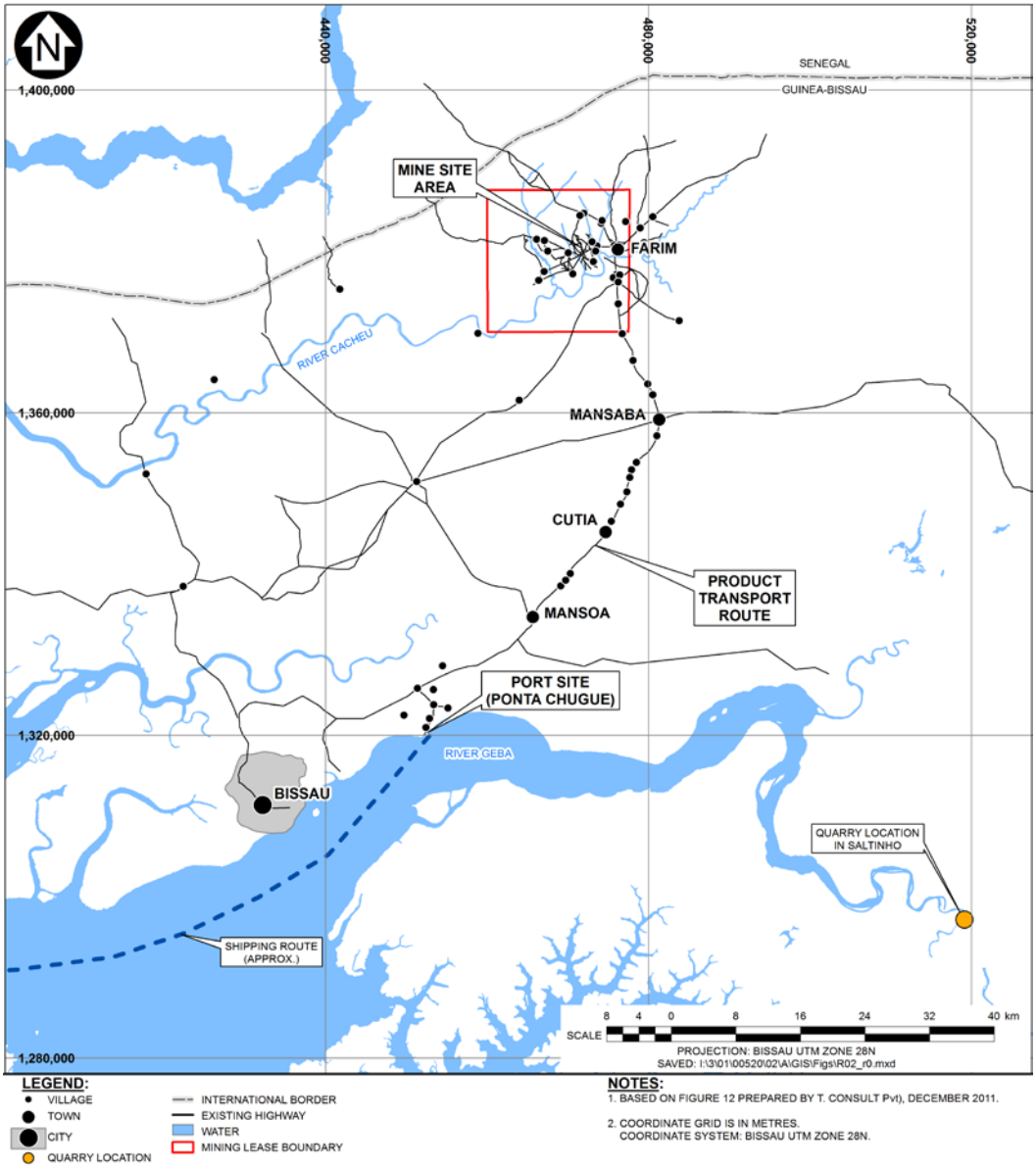

Figure 1.1 Project Regional Setting

The Project consists of construction, operation and decommissioning of a proposed open pit mine, a process plant at the Mine Site, and the port facility needed to export the product to customers.

This management plan accompanies an Environmental and Social Impact Assessment (ESIA) prepared for the Project. Accompanying the ESIA is an Environmental and Social Management Plan (ESMP) that consists of the following hierarchy:

- **Level 1 - Management System -** The common elements of the ESMP, including roles and responsibilities, the regulatory context of the Project, corporate policies and adopted thresholds, a summary of key impacts and mitigation measures, training and reporting plans and an implementation schedule and cost estimate.
- **Level 2 - Discipline-Specific Management Plans -** This is one of a number of the discipline-specific management plans developed under the ESMP.
- **Level 3 - Standard Operating Procedures (SOPs) -** Detailed instructions or operational standards for executing the discipline-specific management plans.

The ESMP is an integral part of the ESIA, but will act as a stand-alone document that will be updated as needed throughout the Project life in response to changes in project circumstances, legislation and guidance, unforeseen events, and the results of monitoring.

1.2 SCOPE AND OBJECTIVES

The CHMP is a Level 2 discipline-specific management plan. The plan is designed to ensure that the Project avoids or mitigates potential impacts of project activities on cultural resources. The CHMP outlines:

- Mitigation measures and monitoring activities that will be implemented through the life of the Project.
- Activities to identify document and excavate known cultural resources and a process for dealing with chance finds or previously unknown cultural resources.
- A process to consult with affected stakeholders to identify and implement compensation measures where avoidance and minimization are not possible.

The scope of the CHMP incudes the direct areas of influence within the Mine Site, Port Site and along the transport route spur leading from the existing road to the port. The CHMP will apply throughout the life of the Project, with a focus on the construction phase when the highest potential for impacts to cultural heritage is anticipated to occur.

The overarching objective of the CHMP is to avoid and minimize potential impacts to cultural resources due to project activities during construction, operation and decommissioning. Where avoidance and minimization are not possible, GB Minerals will consult affected stakeholders and applicable government authorities to develop appropriate compensation. The specific objectives of the CHMP include:

- Establish plans and procedures for managing known archaeological sites
- Establish plans and procedures for managing chance finds
- Define company requirements and procedures to guide the Project Management Team and Project Contractors

- Define roles and responsibilities
- Define training activities
- Define monitoring and reporting procedures

1.3 REGULATORY REQUIREMENTS

1.3.1 National Requirements

Guinea-Bissau's Constitution (Article 17.1) identifies the preservation of cultural heritage and cultural identity as an important attribute of the state and that it is key to development of society (International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), 2009).

Guinea-Bissau is also a signatory to the following international charters:

- Cultural Charter for Africa (CCA, 1974) - Adopted in 1976 and enforced in 1990, the CCA urged a systematic inventory of cultural heritage in the spheres of traditions, history and arts. The Charter of African Cultural Renaissance (CACR, 2006) replaced the CCA in 2006. The signing parties committed to defend minorities and their culture, promote cultural diversity, to protect and develop tangible and intangible heritage and use cultural heritage resources to build pan-Africanism.
- Contonou Agreement - Enforced in 2000 and revised in 2005, the Agreement calls for the preservation and enhancement of cultural heritage at international, bilateral and private levels, to promote the development of exchange information on cultural heritage of African, Caribbean and Pacific states.
- United Nations Educational, Scientific and Cultural Organization (UNESCO, 2015) - Guinea-Bissau is a signatory to UNESCO since 2006 and may use UNESCO conventions as if they were national legislation. Relevant conventions include:
  - UNESCO Convention Concerning the Protection of World Cultural and Natural Heritage (1972)
  - UNESCO Operational Guidelines for the Implementation of the World Heritage Convention (2005)
  - UNESCO Recommendation on International principles Applicable to Archaeological Excavations (1956)
  - UNESCO Declaration Concerning the Intentional Destruction of Cultural Heritage (2003)
  - UNESCO Recommendation on the Safeguarding of Traditional Culture and Folklore (1989)
  - UNESCO Recommendation for the Protection of Movable Cultural Property (1978)
  - UNESCO Recommendation Concerning the Safeguarding and Contemporary Role of Historic Areas (1976)
  - UNESCO Recommendation Concerning the Safeguarding of Beauty and Character of Landscapes and Sites (1962)

1.3.2 Applicable International Standards

International Finance Corporation's (IFC, 2012) Performance Standard 8, Cultural Heritage requires that projects:

- Protect cultural heritage from the adverse impacts of project activities and support its preservation.
- Promote the equitable sharing of benefits from the use of cultural heritage in projects.
- Protect and support cultural heritage by undertaking internationally recognized practices for the protection, field-based study, and documentation of cultural heritage.
- Maintain access to previously accessible cultural heritage sites, subject to overriding health, safety and security considerations and to possible impacts on cultural heritage from the Project.
- As part of the client's environmental and social management system, implement cultural heritage chance find procedures in the event that cultural heritage is discovered.
- Consult with local communities and incorporate this feedback to support decision-making regarding a project's interactions with cultural heritage.
- Do not remove any non-replicable cultural heritage unless:
  - There are no technically or financially feasible alternatives
  - The overall benefit of the Project outweighs the anticipated cultural heritage loss from removal
  - The removal of cultural heritage is conducted using the best available techniques
- Avoid the removal of, or significantly alter critical cultural heritage unless good faith negotiations use a process of Informed Consultation and Participation (ICP) can result in a mutually acceptable path forward.
- Respect legally protected cultural heritage features.

1.4 PLAN UPDATES

The plan is expected to be further revised prior to initiating construction of the Project, based on consultation undertaken with stakeholders during the ESIA review stage. Stakeholder input into the mitigation measures identified in this plan is crucial to ensure successful implementation as well as compliance with IFC requirements. Management reviews of the CHMP will be conducted and documented on a regular basis. The reviews will ensure monitoring results are integrated with other aspects of the Project and that changes are implemented as required. The reviews will also provide a formal mechanism to assess the effectiveness of the Plan in achieving objectives and maintaining ongoing compliance with the Project's regulatory authorizations.

2 – POTENTIAL IMPACTS AND MITIGATION MEASURES

2.1 POTENTIAL CULTURAL HERITAGE IMPACTS

Three types of cultural heritage sites have been identified in the Project area. They include:

- Archaeological sites containing potsherds or other artefacts
- Muslim cemeteries
- Intangible cultural heritage including sacred forests

The potential cultural heritage impacts have been determined and assessed in the cultural heritage impact assessment in Section 16 of the ESIA. The identified impacts include:

- Direct loss of high sensitivity cemetery at Saliquinhe Ba.
- Direct loss of low sensitivity cemeteries at Tambato and Saliquinhe Porto, and any cemeteries discovered during construction (chance finds).
- Damage caused by project activities to known medium and low sensitivity archaeological sites; including any damage to unknown archaeological sites discovered during construction (chance finds).
- Direct impacts caused by the Project's construction activities to the high sensitivity sacred forest near Saliquinhe Ba and to the low sensitivity sacred forests.
- Direct impact caused by the Project's construction activities to two high sensitivity Mosques at Saliquinhe Ba and Tambato.

The mitigation measures identified in the impact assessment are presented below.

2.2 MITIGATION MEASURES

GB Minerals will adhere to the following hierarchy when mitigating potential impacts to cultural heritage:

- **Avoidance -** The avoidance of an identified cultural heritage site will the first form of mitigation. Mitigation through avoidance can be achieved by altering the Project site layout, training workers on the importance of cultural heritage sites, having employees adhere to the Employee Code of Conduct (includes the requirement to avoid cultural heritage sites), fencing and signage around the site. Where avoidance is not feasible other forms of mitigation will be applied.
- **In situ Restoration -** This mitigation measure enables the cultural heritage resource to remain in its location, thereby maintaining its cultural integrity, value and functionality. Depending on the find and on its location it may be necessary to place signs or fencing to further protect the cultural heritage.
- **Relocation -** In instances where the cultural heritage cannot remain in its found location, the relocation of the cultural resource will be attempted. This requires documentation of the cultural heritage resource in its original location and the restoration of the cultural resources functionality in a different location.
- **Removal -** If in-situ restoration or relocation is not possible, the found cultural heritage resource will be removed. Removal will be done by a professional archaeologist in accordance to best practice procedures.

- **Compensation -** If none of the above mentioned mitigation measures are feasible and where the affected communities are using the tangible cultural heritage for long-standing cultural practices, compensation for the loss of that cultural resource will be offered. Negotiations for adequate compensation will be made between GB Minerals, the appropriate government authorities, and the affected communities.

Mitigation measures specific to the cultural heritage impacts of the Project are described below.

Direct Loss of Cemeteries

- Develop a Cemetery Relocation Plan (CRP) to be included in the ESMP. Relocation of the cemeteries should be undertaken by a grave relocation/cultural heritage consultant.
- Sympathetic and full disclosure of the Project's impacts on the high sensitivity cemetery to the community of Saliquinhe Ba and low sensitivity cemetery of Tambato.
- Consultation to take place between the village chief/religious and community elders and relatives of the deceased to:
  - Determine the full extent of the cemeteries
  - Establish the area to be lost as a result of the Project
  - Establish the locations of the known burial sites
  - Agree on the most appropriate means and timing for the exhumation of the remains
- Treatment of the remains during and following exhumation to be undertaken in consultation with stakeholders and utilizing best available practices to limit any damage to the remains.
- The provision of new burial locations for the remains and grave markers to be agreed with the village chief/elders and, where possible, the direct relatives of the deceased. The timing and structure of the ceremony for re-interment to be discussed and agreed with the relatives and/or community.

Damage to Archaeological Sites

- Conduct data recovery or rescue excavations of known medium sensitivity archaeological sites prior to the start of construction. These excavations to be conducted by a professional archaeologist(s).
- Implementation of the Chance Finds Procedure (CFP) as described in Section 3.2.3 of this Plan. Provide training to all employees and subcontractors on identifying/recognizing cultural heritage resources; the CFP notification requirements and procedures; and subsequent handling of any archaeological remains that are identified during construction activities.
- Low sensitivity archaeological sites do not need to be subjected to data recover or rescue excavations, but should be managed through an archaeological site monitoring program developed before construction activity begins.
- Rescue excavations or alternative mitigation measures for chance finds discovered during construction activities as may be appropriate.

Impact to Sacred Forests

- Develop a Sacred Site Relocation Plan (SSRP) to be included in the ESMP. The relocation processes and rituals should be undertaken by the local community and religious leaders.
- Sympathetic and full disclosure of the Project's impacts on the high sensitivity sacred site to the community of Saliquinhe Ba (SS-1).
- Consultation to take place between the village chief/religious and community elders to:
  - Determine the full extent of the sacred forests
  - Establish the area to be lost as a result of the Project
  - Agree on the most appropriate means and timing for the relocation of the sacred forests (relocation referring usually to moving spirits as well as any ritual huts or offering jars from one tree or grove to another though the appropriate ritual ceremony and conditions)
- The provision of new sacred forest locations to be agreed with the village chief/elders. The timing and structure of the ceremony for the sacred site relocation to be discussed and agreed with the community.

Relocation of Mosques

- Develop a Mosque Relocation Plan (MRP) to be included in the ESMP). The actual mosque relocation processes and rituals should be undertaken by the local community and religious leaders with support from the Project.
- Sympathetic and full disclosure of the Project's impacts on the mosques at Saliquinhe Ba and Tambato.
- Consultation to take place between the village chief/religious and community elders to agree on the most appropriate means and timing for the relocation of the mosques.
- The provision of new mosque locations to be agreed with the village chief/elders. The timing and structure of the ceremony for the sacred site relocation to be discussed and agreed with the community.

Chance Finds

A CFP will include provisions for a qualified archaeologist to assess and document any potential chance finds and a consultation process with local, regional, and/or national cultural heritage stakeholders to develop mitigation plans for any significant chance finds. Low sensitivity archaeological sites do not need to be subjected to recovery/rescue excavations, but should be managed through the archaeological site monitoring program developed before construction activity begins.

3 – CULTURAL HERITAGE MANAGEMENT

3.1 APPROACH

The approach for cultural heritage management is to ensure that cultural heritage issues are managed consistently across all activities related to the Project and procedures and plans are in place to mitigate for known archaeological sites, chance finds and other cultural resources. GB Minerals will work closely with the relevant authorities and stakeholders to develop and implement compensation activities where impacts cannot be avoided. The approach for cultural heritage management includes provision for:

- Maintaining close consultation with the appropriate government agency.
- Preserving of sites in situ wherever avoidance is possible.
- Protecting sites with cultural materials by excavation, salvaging, analyses and recordings if impacts are unavoidable.
- Testing and collection activities will be completed by an approved plan and conducted by qualified professionals.
- Involving both archaeologists and local communities for site interpretation of cultural resources.
- Including cultural heritage awareness as part of induction training of new employees, emphasizing GB Minerals' policies and required protection of archaeological sites.
- Prohibiting employees from visiting known cultural heritage sites and from collecting artifacts (as defined in the Code of Conduct).
- Monitoring activities at locations that may require special attention.
- Implementing a chance find procedure in case materials not previously identified are found.

3.2 PROCEDURES FOR ARCHAEOLOGICAL SITES

The following subsections outline the procedures to be followed in managing known archaeological sites and chance finds.

3.2.1 Known Archaeological Sites

GB Minerals will implement activities to ensure that known archaeological sites are mapped, documented and protected to the extent possible prior to construction as part of the clearance work to be conducted prior to breaking ground, and by implementing mitigation measures as identified in Section 2.2, throughout the life of the Project.

Any known archaeological sites within the Project footprint that are deemed to be of little significance, do not require salvaging. Nevertheless, the CFP (discussed in Section 3.2.3) will be employed around these known sites in case artefacts not previously found are identified. An onsite archaeologist will also monitor activities around these sites during the peak construction periods.

Low sensitivity archaeological sites do not need to be subjected to recovery/rescue excavations, but should be managed through an archaeological site monitoring program developed before construction activity begins.

3.2.2 Protection of Sites Outside of the Project Footprint

Any known archaeological sites that may be located outside of the Project footprint are not anticipated to be impacted by project activities; nevertheless the CHMP outlines procedures for the protection of these sites during construction, operations and decommissioning from unplanned indirect disturbance. The procedures include:

- Provide cultural heritage awareness training to all employees and contractors and promote the protection of cultural heritage sites.
- Provide fencing and demarcation of sites if required.
- The engineering, procurement and construction management (EPCM) Contractor and sub-contractors will be provided with geo-referenced coordinates for all known sites.
- A Cultural Heritage or Archaeologist Monitor will monitor activities within proximity of these sites during the peak construction phase.

3.2.3 Draft Chance Finds Procedure

Project activities have the potential to uncover cultural heritage resources that have not been previously identified by the archaeological surveys. To address this possibility, GB Minerals will develop a formalized CFP, based on the steps outlined below and in consultation with the appropriate government agency and a qualified archaeologist. This procedure will outline the steps to be taken if a Chance Find is identified during project activities and include activities such as:

- All employees should respect the cultural and social significance of any chance finds during the life of the Project and will be strictly prohibited from interfering with or disturbing cultural heritage sites and artefacts.
- A qualified Archaeologist will be assigned during the construction phase to carry out the task of site identification for known archeological sites and to implement the CFP.
- A detailed CFP will be formalized in consultation with the appropriate local, regional and/or national cultural heritage stakeholders.
- Intrusive site activities such as open pit excavation and earth works within the Mine Site will be carefully monitored.
- All personnel involved in land clearance and excavation will be responsible for managing archaeological protection.
- If archaeological artefacts (relics, bricks, bones, ceramics, graves, etc.) are encountered, activities will halt immediately and the site will be isolated and clearly marked and the Health, Safety, Social and Environmental (HSSE) Manager will be informed immediately.
- A qualified archaeologist will assess the significance of the suspected chance find.
- The HSSE Manager will liaise with the relevant ministry to determine the need for further investigation and appropriate action.
- Any subsequent investigation or excavation works will be conducted by a suitably-qualified archaeologist.

If further detailed excavation works are required (as determined under the guidance of the relevant national and regional authorities):

- Any necessary permits and licenses for archaeological investigation will be obtained.
- Archaeological chance finds will be discussed with the local community to establish local significance.
- Mapping will be carried out to identify the likely spatial extent of archaeological site.
- Trial pits will be dug by hand excavation.
- The excavation process and the different archaeological material (ceramics, stones, charcoal, seeds, bones, etc.) will be registered in detail using photographs and field diaries.
- Any material found in the pits will be treated (washed and tagged) and later classified in accordance with accepted criteria.
- Samples of material may be sent to specialized laboratories for additional testing.

3.2.3.1 Archaeological Work Specifications

Any future archaeological work that will be carried out for the Project will be preceded by the preparation of a work specification that outlines what work will be undertaken. The following procedures will be followed by Company staff:

- An Archaeological Work Specification Form will be completed by each archaeologist or work team.
- Each individual specification will be submitted for approval by the HSSE Manager prior to the commencement of activities.
- Archaeological work specifications will be developed with the construction teams that may be impacted by their implementation.
- GB Minerals will keep the EPCM Contractor informed of cultural heritage work that will be conducted for the Project.

3.2.3.2 Archaeological Excavation or Retrieval

If archaeological excavation or retrieval processes are required for chance finds of cultural sites within the Project footprint the following additional procedures will apply:

- An archaeological work specification must be completed.
- Work must be completed by a qualified archaeologist or work team.
- Activities may be monitored by representatives of the local communities and a Cultural Resources Monitor or Archaeologist.
- Consideration will be given to supplementing excavation work with non-destructive means of investigation (e.g., geophysical survey, remote sensing, geochemical survey, field scanning).
- Arrangements will be made with local communities and authorities if storage or relocation of the artefact is required.
- Relocated items will be recorded within the Cultural Heritage Database.
- Records (written, graphic, electronic and photographic as appropriate) will be made for all works.
- A post-excavation assessment report will be produced.

3.2.3.3 Documenting Sites that Cannot be Relocated

Some types of cultural heritage resources (e.g., ethnographic stone pits) cannot be excavated, salvaged and relocated. Procedures for documenting these sites will involve the following:

- Consultation with all relevant parties (e.g., local communities and authorities) to determine if these items should be destroyed in situ.
- Prior to destruction, the items will be documented to record the physical extent of the item and the physical environment in which the item is located.
- Photographs may be taken and added to the record.

3.3 PROCEDURES FOR SACRED GROVES

The development of the Project will result in the loss of four sacred groves or forests. To ensure adequate mitigation of the loss of these cultural features the following procedures will be followed by GB Minerals:

- GB Minerals will develop, in consultation with the affected stakeholders, and with the support of a licenced archaeologist and if necessary, relevant government department, the SSRP prior to the start of construction.
- The SSRP will outline the procedures GB Minerals will undertake to protect and or relocated any applicable sacred groves or forests.
- Until such as time that the SSRP has been developed procedures identified in Section 3.2 will apply to sacred groves.

3.4 PROCEDURES FOR CEMETERIES

The development of the Project will result in the loss a high sensitivity cemetery at Saliquinhe Ba and the loss of low sensitivity cemeteries at Tambato and Saliquinhe Porto. To ensure adequate mitigation of the loss of these cultural features the following procedures will be followed by GB Minerals:

- GB Minerals will develop, in consultation with the affected stakeholders, and with the support of a licenced archaeologist and if necessary, relevant government department, the CRP prior to the start of construction.
- The CRP will outline the procedures GB Minerals will undertake to protect and or relocated any cemeteries, including ones discovered during construction (chance finds).
- Until such as time that the CRP has been developed procedures identified in Section 3.2 will apply to cemeteries.

3.5 PROCEDURES FOR MOSQUES

The development of the Project will result in the impacts to two high sensitivity mosques at Saliquinhe Ba and Tambato. To ensure adequate mitigation of the loss of these mosques the following procedures will be followed by GB Minerals:

- GB Minerals will develop, in consultation with the affected stakeholders, and with the support of a licenced archaeologist and if necessary, relevant government department, the MRP prior to the start of construction.
- The MRP will outline the procedures GB Minerals will undertake to relocated the applicable mosques in a manner that is respectful of religious rituals.
- Until such as time that the MRP has been developed procedures identified in Section 3.2 will apply to mosques.

4 – ROLES AND RESPONSIBILITIES

4.1 RESPONSIBILITIES

Overall responsibility for the implementation of this CHMP will rest with the HSSE Manager. Others with responsibility for the implementation of this Plan include:

- The EPCM Contractor is responsible for the integration of these procedures and requirements into their operating procedures and plans.
- The HSSE Manager and Environmental Superintendent are responsible for monitoring activities.
- The Mine Manager is responsible for ensuring that these procedures and requirements are implemented for mine operations.

4.2 TRAINING

Company employees and contractors will be provided with basic training on cultural heritage awareness as part of induction training of new employees, emphasizing GB Minerals policies and required protection of archaeological sites. As part of GB Minerals' policies, employees will be prohibited from visiting known cultural heritage sites within the Project Mine Site and Port Site, and from collecting artefacts.

Employees will be required to report any suspected new archaeological sites to Managers, who will in turn notify the HSSE Manager, who will notify the appropriate government agency and retain qualified archaeologists to investigate the suspected sites. Additional specialist training will be provided to staff directly involved in the CHMP activities.

5 – MONITORING AND REPORTING

5.1 MONITORING AND REPORTING

Monitoring and reporting on cultural heritage management activities will occur to ensure that procedures are effective. Cultural heritage monitoring procedures may include:

- The EPCM Contractor will report on a monthly basis to the HSSE and General Manager on the implementation of this Management Plan during the construction phase, including:
  - The ”Watching briefs” they participate in at specific areas/construction sites
  - The erection and maintenance of demarcation fencing around sites
  - The protection of sites by careful siting of access routes or facilities
  - Induction training including cultural heritage awareness given to staff
  - Cultural heritage-related complaints and actions taken
  - Cases of damage to, or disruption of, cultural heritage properties and actions taken
- HSSE Manager will conduct routine inspections of site activities in consultation with the Construction/Mine Manager to assess the potential for chance finds at work sites and any other cultural heritage issues that may arise.
- HSSE Manager and/or Environmental Superintendent will conduct an inspection of any cultural heritage field activities and documentation that are implemented as a result of a chance find or other event that results in archaeological field work. The inspection will include:
  - Details of all work specifications prepared and implemented
  - Monitoring/”watching briefs” conducted at specific construction and other sites
  - Consultation with local communities related to cultural resources
  - Communication and cooperation with the EPCM Contractor and the applicable government agency
  - How the cultural heritage database is being maintained
  - Information dissemination regarding cultural heritage
  - Performance of the EPCM Contractor in managing cultural resources at specific construction sites
  - Cultural heritage-related complaints and actions taken
  - Cases of damage to, or disruption of, cultural heritage properties and actions taken

The HSSE Manager is responsible for record-keeping.

Regular reporting will be undertaken via the ESMP Report that will be prepared and submitted to the General Manager. Reporting may include:

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

Further information on monitoring and reporting requirements and procedures is set out in the Monitoring Plan and in the Environmental and Social Management System.

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FARIM PHOSPHATE MINE, GUINEA-BISSAU

RESETTLEMENT POLICY FRAMEWORK

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EXECUTIVE SUMMARY

GB Minerals Ltd. (GB Minerals) proposes to establish the Farim Phosphate Project (the Project) in Guinea-Bissau. The Project is a proposed open-pit phosphate mine next to the Farim village and the River Cacheu, and a product export facility (Port) at Ponta Chugue on the River Geba.

The establishment of the Project will require the resettlement of an estimated 175 households, which will be physically displaced by the mine infrastructure. In addition, land acquisition of approximately 3000 hectares will be required.

This Resettlement Policy Framework (RPF) established the principles and requirements for the development and implementation of a Resettlement Action Plan (RAP) consistent with the requirements of local law and international best practices standards, as defined by the International Finance Corporation. There is considerable overlap between the two documents; however the requirements established in the RPF are likely to undergo further refinement in the RAP.

A key component of the RPF is the definition of an Eligibility and Entitlement Framework, which defines which persons or groups are deemed eligible for resettlement assistance and/or compensation. The type of entitlement or rights to compensation varies by individual or group but include:

- Replacement of lost homestead property and residential structures,
- Replacement of lost agricultural land,
- Compensation for lost annual crops and productive trees,
- Replacement of community resources and infrastructure,
- Exhumation and reburial of graves,
- Protection or relocation of sacred sites and religious buildings,
- Re-establishment of businesses,
- Moving and other forms of assistance.

Detailed consideration will be needed in the RAP in terms of where the displaced households will be located. This includes making provision for suitable replacement land and amenities, while ensuring effective integration with the host community.

In addition, resettlement should be treated as a sustainable development programme where ideally resettled household by benefit from livelihoods restoration and further development programmes. Potential strategies are provided in the RPF and are expected to undergo further refinement in the RAP.

The implementation of resettlement is complex. Significant resources as well as the provision for the right organisational structures will be required. Consistent with international best practice, the cost of resettlement should be seen as an upfront cost and should be fundamentally integrated into the overall mine development programme to ensure that sufficient time is given for the planning and implementation of resettlement prior to construction of the Project.

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Project Background 1
1.2 Aims and Objectives 1
1.3 Definition of a Resettlement Policy Framework 1
1.4 Limitations and Assumptions 1

2 LEGAL AND INTERNATIONAL GOOD PRACTICE FRAMEWORK 2

2.1 National Laws, Regulations and Standards 2
2.2 International Good Practice Standards 4
2.2.1 World Bank Safeguards and Operational Policies 4
2.2.2 IFC Performance Standards 5

3 SCOPE OF RESETTLEMENT 6

3.1 Mine Site 6
3.1.1 Physically Displaced Households 6
3.1.2 Economically Displaced Households 6
3.2 Port and Port Access Road 9
3.2.1 Physically Displaced Households 9
3.2.2 Economically Displaced Households 9
3.3 Minimising Resettlement 10
3.4 Summary of Scope of Resettlement 10

4 SOCIO-ECONOMIC PROFILE 11

4.1 Settlements and Households 11
4.2 Household Demographics 11
4.3 Housing Profile 12
4.4 Secondary Structures 13
4.5 Basic Services 14
4.6 Community or Public Facilities 14
4.7 Land-Use 15
4.8 Land Tenure 17
4.9 Livelihoods 18
4.9.1 Agriculture 18
4.9.2 Trees 19
4.9.3 Livestock 20
4.9.4 Natural Resource Use 20
4.10 Cultural Resources 21

5 ELIGIBILITY AND ENTITLEMENT FRAMEWORK 24

5.1 Eligibility Framework 24
5.1.1 Eligible People or Households 24
5.1.2 Vulnerable Individuals and Households 25
5.1.3 Host Site Community or Households 25
5.2 Entitlement Framework 25

6 ASSET INVENTORY AND VALUATION 31

6.1 General Approach 31
6.2 Valuation Guidelines for Asset Categories 31

6.2.1 Homestead Structures and other Fixed Property 31
6.2.2 Farmland, Crops and Trees 32
6.2.3 Businesses 32
6.2.4 Community Infrastructure 33

7 LIVELIHOOD RESTORATION & DEVELOPMENT 34

7.1 Livelihoods Restoration 34
7.2 Livelihoods Development 35

8 HOST SITE 37

8.1 Host Site Selection Criteria 37
8.2 Host Site Selection Process 37
8.3 Host Communities and Land-Right Holders 39
8.4 Special Considerations 39

9 STAKEHOLDER ENGAGEMENT 40

9.1 Stakeholder Engagement and Participation Programme 40
9.2 Resettlement Working Group 41
9.3 Grievance Mechanism 41

10 IMPLEMENTATION PLAN 43

10.1 Resettlement Action Plan Development 43
10.1.1 Stakeholder Engagement and Resettlement Working Group 43
10.1.2 Household Validation Survey 43
10.1.3 Eligibility and Entitlement Framework 43
10.1.4 Entitlement Specifications 45
10.1.5 Identification of Host Site and Village 45
10.1.6 Livelihoods Restoration and Development Framework 45
10.1.7 Vulnerable Groups 45
10.1.8 Establish a Resettlement Action Plan 46
10.2 Resettlement Implementation Phase 46
10.2.1 State Agreements 46
10.2.2 Cut-Off Date and Development Moratorium 46
10.2.3 Asset Inventory and Valuation 47
10.2.4 Negotiation of Entitlement Contracts 47
10.2.5 Construction and Relocation 48
10.2.6 Compensation Payments 48
10.2.7 Monitoring and Evaluation 48
10.3 Resettlement Phasing 50
10.4 Organisational Roles and Responsibilities 51
10.5 Budget 53
10.6 Schedule 53

11 CONCLUSION 62

12 REFERENCES 63

LIST OF FIGURES

Figure 3.1: Mine Layout and Villages 7
Figure 4.1: Land Use Map 16
Figure 4.2: Cultural Features Map 23
Figure 9.1: Generic Grievance Process 42
Figure 10.1: Resettlement Process Flow Diagram 44

LIST OF TABLES

Table 2.1: IFC Performance Standards 5
Table 3.1: Physical Displacement 6
Table 3.2: Land-Use Budget (Mine Site) 8
Table 3.3: Land-Use Budget (Port and Access Road) 9
Table 3.4: Estimated number of households to be resettled 10
Table 3.5: Land-Use Budget (Mine Site and Port) 10
Table 4.1: Number of Households per Village 11
Table 4.2: Population and Household Size 12
Table 4.3: Relations Profile 12
Table 4.4: Primary Structures 13
Table 4.5: Secondary Structures 14
Table 4.6: Land-Use Budget (Mine Site) 15
Table 4.7: Land Tenure of Farmland 17
Table 4.8: Farm numbers by Village 18
Table 4.9: Land area under cultivation by crop type 18
Table 4.10: Tree Holdings by Village 19
Table 4.11: Major livestock holdings by Village 20
Table 4.12: Natural Resource Harvesting by Village 20
Table 4.13: Estimated Number of Graves by Village 21
Table 4.14: Verified Cultural Resources 22
Table 5.1: Eligibility Framework 24
Table 5.2: Entitlement Framework 26
Table 8.1: Host Site Selection Criteria 38
Table 10.1: Monitoring Parameters 49
Table 10.2: Proposed villages to be affected by resettlement and project phasing 50
Table 10.3: Scenario 1 Cost Estimate 54
Table 10.4: Scenario 2 Cost Estimate 56
Table 10.5: Generic Implementation Schedule 61

1 INTRODUCTION

1.1 PROJECT BACKGROUND

GB Minerals Ltd. (GB Minerals) proposed to establish the Farim Phosphate Project (the Project) in Guinea-Bissau. The Project is a proposed open-pit phosphate mine next to the Farim village and the River Cacheu, and a product export facility (Port) at Ponta Chugue on the River Geba.

1.2 AIMS AND OBJECTIVES

The aim of the Resettlement Policy Framework (RPF) is to establish a guideline for resettlement planning and implementation for the Project. Specific provisions made in the Resettlement Policy Framework include establishing:

- A socio-economic baseline of households that may be resettled.
- The scope (numbers) of households that may be resettled.
- An initial quantum and costing for resettlement.
- An eligibility and entitlement framework.
- A framework for livelihoods restoration and community development.
- A procedure for determining the location of a host community.
- An implementation plan.

1.3 DEFINITION OF A RESETTLEMENT POLICY FRAMEWORK

There is a differentiation between a RPF and a Resettlement Action Plan (RAP). The RPF is a policy document and is generally prepared at the initiation of the Project, while the RAP is a detailed implementation plan drafted in consultation with affected households and stakeholders.

This document is defined solely as a RPF, but provides additional detail normally provided in the RAP. This includes the provision of a socio-economic baseline, but excludes any community or stakeholder engagement that is required to upgrade it to a full RAP.

Hence, the preparation of the RPF does not supersede the need for a RAP. Rather the RPF establishes the initial quantum of resettlement and a framework for developing a detailed RAP. There is considerable overlap between the two documents; however the requirements established in the RPF are likely to undergo further refinement in the RAP.

1.4 LIMITATIONS AND ASSUMPTIONS

The following assumptions and limitation apply:

- No asset or land inventory has been undertaken; therefore assets and land holdings figures are considered to be estimates only.
- No stakeholder engagement or discussions directly concerning resettlement were permitted to be undertaken in preparation of this RPF. This will form a critical requirement in the RAP development phase.

2 LEGAL AND INTERNATIONAL GOOD PRACTICE FRAMEWORK

This chapter establishes the national laws, regulations and international good practice standards considered applicable to resettlement and compensation. The RPF has been prepared to ensure conformance with the relevant laws and standards.

2.1 NATIONAL LAWS, REGULATIONS AND STANDARDS

There are no national laws, regulations or standards directly concerning resettlement. However, there are a number of Acts that indirectly make provision for resettlement aspects, specifically around land. The most pertinent Acts are presented below.

The Constitution, 1996

Article 12 of the Constitution establishes that all land is held by the State under trust for the citizens of Guinea-Bissau. All soils, sub-soils, water, minerals, energy, forests and community infrastructure is held by the State.

Article 13 of the Constitution permits the State to give, via a concession, to concessions, individuals or collections the right to the exploration of State property if it serves the public interest or promotes social development.

The constitution however does not establish explicit requirements in terms of how such land rights are granted and how current customary or formal land-right holders are protected from any acquisition or expropriation requirements, nor any specific requirements for fair and just compensation.

Land Law, Law No. 5/98

The Land Law establishes that all land belongs in the public domain and held under trust by the State. Rights to land are generally conferred to persons whom actively utilise the land under the fundamental concept of “the land belongs to those whom take advantage”. Inversely, the State may remove land rights where the land is not been actively utilised.

Land-use rights are generally conferred based on customary use and the establishment of concessions by the State. The major aim of the Land Law is the integration of customary land rights into the formal legal framework as well as recognising local customary practices in managing land-use.

Article 6 of the Land Law establishes that local communities may exercise power in terms of the management of land based on the respective uses and customs, covering the total area under their historical and territorial limits, including inhabited areas, cultivation or grazing, communal areas, pasture, surface and marine resources, sacred forests and other social, cultural and economics ends.

The utilisation of customary land is further defined in Article 18 which permits private use of customary land by individuals or collectives resident in the territorial limits of the local community. Hence, customary land is held either by the local community, or in most cases

private or exclusive land-use rights are granted to an individual based on agreements with the local authorities and local customs.

This is reflected in the study area, where all rural land is located on customary land managed by local communities. However, land right holdings are normally held by the *founding families* whom transfer rights to individuals based on set agreements. Such agreements are generally witnessed, but not allocated, by local community chiefs. Once the land rights are transferred, the *founding families* no longer have a claim to the land.

Article 4(2) allows the State to confer rights to the private use of land to nationals or foreigners, individuals or collection, where it permits social and economic development. Such private rights are granted under a concession, and not under customary systems. The establishment of the mine will require the establishment of a concession consistent with this Law.

The requirement in terms of the transfer of land from customary tenure to a concession, as will be required for the mine, is not well developed. Article 21 permits the conversion of customary use rights to private use or concession via an administration license/contract. In addition, the Land Law does not make provision of acquisition or expropriation of land which is often a critical requirement in terms of resettlement.

Mining and Minerals Code, Law No. 3/2014

This law has the objective of regulating the prospecting, exploration and commercialisation of minerals in Guinea-Bissau. The law does not establish direct regulations concerning resettlement; however it is indirectly covered under a number of articles including:

- **Article 13 (3):** The mining right holder cannot exercise their mining rights, without consent from the exclusive land-use right holder, within 100m of the following:
    - Where there exists a house or structures legally occupied or inhabited.
    - Land that has been cleared or prepared, or any other form, for farming of agricultural products, or where agricultural products have been planted.
    - A location used as a cattle dip, tank or dam of any volume of water.
    - That is occupied by a village, without written permission from the Chief or competent district authority in which the village is situated.
- **Article 14 (3):** Where the mining right holder requires the exclusive use of land in the mining right area, the holder can enter into an agreement with the land rights holder, or competent authorities of the Republic.
- The above can be established via a Access Contract, that is established voluntarily or via arbitration, between the mining right holder and an individual or community that has surface-land rights recognised by the Government to the land under the mining right, or which is necessary to gain access to the land covered in the mining right.
- **Article 14 (4):** If an agreement cannot be reached (in terms of the above) the mining right holder may approach the Minister, whom can order that the parties enter into arbitration.
- **Article 14(7):** In the execution of a mining-right, where there are impacts on the land-use right holders, crops, trees, structures, livestock or existing works; the mining rights holder, by virtue of the operations that have been undertaken, is subject to the payment of indemnities in terms of the civil law.

Environment Law, Law No. 1/2011

The Environment Law does not make specific provision for land acquisition or resettlement. However, it does establish safeguards and other legal requirements with respect to the social environment in Section 2.

Section 2 makes specific reference to the protection of the local landscape, as well as the cultural, natural and built environment. It makes further provision for the regulation of pollution and contamination (of noise, residues and effluent, chemical products, radioactive substances) and their potential impacts on the local social environment.

Article 38 of the law guarantees the needed participation of local communities in the adequate utilisation of, as well as policy development and management of natural resources. This generally reinforces the requirement that any resettlement programme actively promote community engagement.

Environmental Assessment Law, Law No. 10/2010

The law seeks to promote sustainable development via the management of natural resources which contributes to the quality of human life. The law makes specific and explicit reference to aspect of resettlement and compensation.

Article 4 establishes the requirement for a Compensation and Resettlement Plan where there is involuntary physical and economic resettlement. This plan includes methods for the indemnification for the resettlement of resident population's or the acquisition of land by a project, programme, plan or policy.

The law does not, however, provide specific regulations in terms of the Compensation and Resettlement Plan content or due process requirements. It is however assumed that the Compensation and Resettlement Plan will form one of the technical components to the Environmental Impact Assessment, and will be a requirement for obtaining the Environmental License.

The Law, under Article 14, establishes the requirements for public participation. The requirements include that the Proponent will ensure that opinions of potentially affected populations are obtained. This includes the publication of key documentation, notification procedures and public meetings.

2.2 INTERNATIONAL GOOD PRACTICE STANDARDS

2.2.1 World Bank Safeguards and Operational Policies

The World Bank Group has established environmental and social safeguard policies to prevent and mitigate undue harm to people and their environment in the development process.

The Operational Policy (OP/BP 4.01) explicitly requires that both natural and social aspects be considered in an integrated way. This operational policy is supported by a number of additional policies including Environmental Action Plans (OP 4.02), indigenous peoples (OP

4.10), physical cultural resources (OP 4.11) and involuntary resettlement (OP 4.12), and monitoring and evaluation (OP 13.60), amongst others.

Specific to resettlement, the World Bank requires that any involuntary resettlement be in conformance with its safeguard policies, notably Operational Policy No. 4.12 on Involuntary Resettlement[1].

The World Bank Group Operational Policies also references, and is fully complimentary with the IFC Performances Standards. Conformance with one set of standards implies conformance with the other.

2.2.2 IFC Performance Standards

The International Finance Corporation (IFC) functions as the private investment arm of the World Bank, and has established a number of performance standards on social and environmental sustainability. These standards generally form the basis for any internationally-funded project, and have become a global benchmark for good practice.

The IFC established eight Performance Standards (See Table 2.1) to be used to identify, assess, manage and monitor risk for proposed development projects. These are further supported by a General Environmental, Health and Safety (EHS) Guidelines (IFC, 2007a) and a number of industry-specific guidelines, including mining (IFC, 2007b).

Table 2.1: IFC Performance Standards

Title
PS 1: Assessment and Management of Environmental and Social Risks and Impacts
PS 2: Labour and Working Conditions
PS 3: Resource Efficiency and Pollution Prevention
PS 4: Community Health, Safety and Security
PS 5: Land Acquisition and Involuntary Resettlement
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
PS 7: Indigenous People
PS 8: Cultural Heritage

Source: IFC, 2012

[1] WB OP 4.12, October 2001.

3 SCOPE OF RESETTLEMENT

The development of the Project would result in the physical and economic displacement of households. In developing the RPF, a detailed review of the overall scope of the resettlement was undertaken and is summarised below.

3.1 MINE SITE

3.1.1 Physically Displaced Households

Households are defined as physically displaced where they are affected by the displacement, loss or destruction of their place of residence, due to the residence being located within the active mine area and associated ancillary development.

Based on the mine design criteria (Issued on 15 March 2015), the active mine area includes (1) two open pits, (2) two dumps, (3) the processing plant, and (4) port facilities (See Figure 3.1). In such areas, the presence of households is considered to be a fundamental incompatible land-use; hence the household will need to be resettled.

Four villages are located in the active mine area – namely Saliquenhe, Cabisseki, Tambato Mandinka and Saliquenhe Porto/Ponta Zeca. The former three villages are entirely located within the proposed Northern Open Pit Area, while the latter is located within the proposed South Open Pit Area.

The total estimated number of households located within the three villages is 209 (See Table 3.1). This estimate will be verified upon conclusion of the household survey, however the estimate is considered to be fairly accurate, and no significant variation is expected.

Table 3.1: Physical Displacement

Village Name	Estimated No. of Households
Saliquenhe	76
Cabisseki / Ponta Capsec	8
Saliquenhe Porto/ Ponta Zeca	14
Tambato Mandinka	22
Total	**120**

3.1.2 Economically Displaced Households

Households that are affected by the loss of assets or access to assets that leads to loss of income sources or livelihoods, but does NOT necessarily result in the direct loss of a place of residence are defined as economically displaced.

This definition includes households located outside of the active mine area, but whose location or proximity may result in the loss of agricultural land and natural resources, limits accessibility, or results in undue community health and safety risks. Economically displaced households may be divided into two main categories as follows:

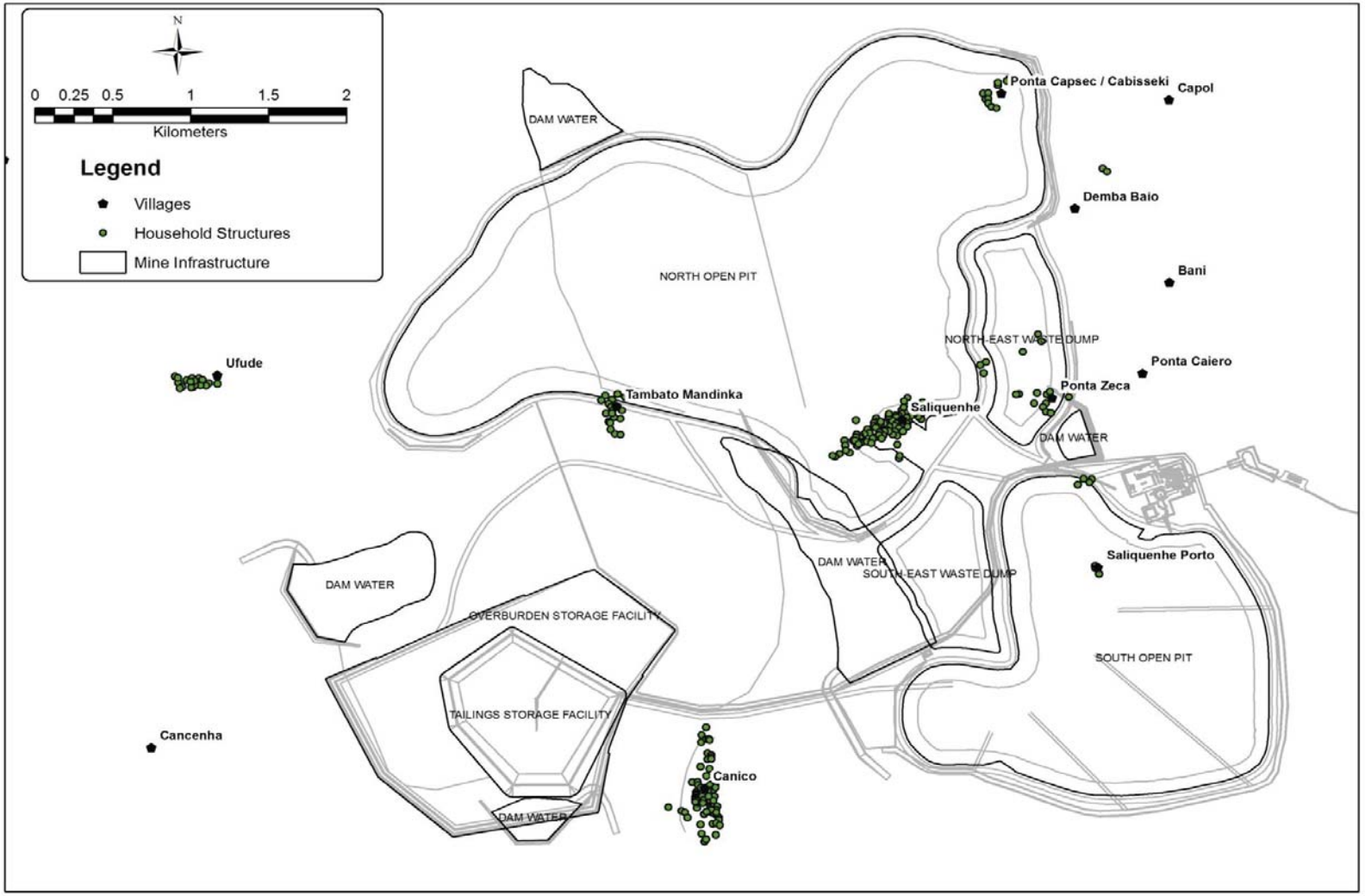

Figure 3.1: Mine Layout and Villages

Category A: Households that are economically displaced to such an extent that effected livelihoods restoration is not possible at their existing locations, and therefore will need to be resettled, or where impacts are of sufficient magnitude where they cannot be mitigated. These households would form part of the resettlement process, consistent with the physically displaced households.

Based on the mine layout provided in late May 2015, Canico Tumanna (containing an estimated 55 households) is likely to be significantly economically displaced, and will need to be resettled for the following reasons:

- There will be significant land acquisition by the mine of land around the village. This will result in the loss of agricultural land held by Canico Tumanna households. Mine infrastructure as well as the Cacheu River will surround the village therefore there is little scope for the provision of replacement land at the villages' current location.
- Household are significantly dependant on natural resources, and the land acquisition requirement noted above will further restrict access and availability of natural resources.
- Mine infrastructure as well as the Cacheu River will surround the village therefore accessibility and trade links will be significantly restricted unless public access is granted through the mine.
- The village is located in proximity to mine infrastructure and therefore community safety risks will be a significant concern.
- The air, noise and water pollution impacts are currently unknown, and community health risks have not been established.

Category B: Households that are economically displaced, with respect to the loss of land or communal resources. Households either fall under Physical Displacement (See Section 3.1.1) or suitable replacement resources may be provided at their existing locations, or where livelihoods restoration is possible **without** the need for relocation.

This category of economically displaced households is considered limited where agricultural land is acquired by the Project. The land acquisition area is estimated to be a total of 3 000 hectares covering the mine infrastructure (See Figure 3.1).

No Asset Inventory and Valuation Study was undertaken as part of this RPF. Land-use mapping was thus undertaken, using Google Earth Imagery, to generate an estimate of the total area by land-use type. The land-use budget is summarised in Table 3.2.

Table 3.2: Land-Use Budget (Mine Site)

Land-Use	Area (hec)
Rice Farms	280
Farmland/Grazing-Land/Clear Felled Area	584
Cashew Monoculture	238
Secondary Forest	1304
Floodplain	266
Mangroves	198
Village/Town	79
Total	**2949**

No estimate can be made of the number of households that fall under this category. It is assumed that the majority of the land-use is undertaken by the neighbouring villages; hence many of the households will fall under either Physical Displacement or Category A Economic Displacement categories.

3.2 PORT AND PORT ACCESS ROAD

3.2.1 Physically Displaced Households

Households that will be affected by the displacement, loss or destruction of their place of residence that is located within the Port Facility or within the Port Access Road servitude are defined as physically displaced.

Based on the port site layout provided in late May 2015, no households are likely to be relocated. This will be dependent on the final access road design and servitude requirements.

3.2.2 Economically Displaced Households

Households that are affected by the loss of assets or access to assets that leads to loss of income sources or livelihoods, but does NOT necessarily result in the direct loss of a place of residence are defined as economically displaced.

The establishment of the port and access road will require the acquisition of land under agriculture. There is however sufficient land available to permit the provision of replacement land. Hence there is no requirement to relocate households due to the loss of income or livelihoods.

However, local households will lose agricultural land and assets related to land acquisition for the port and access road. This is commensurate with Category B Economic Displaced households (See Section 3.1.2)

No Asset Inventory and Valuation Study was undertaken as part of this RPF. Land-use mapping was thus undertaken, using Google Earth Imagery, to generate an estimate of the total area by land-use type. The land-use budget is summarised in Table 3.3.

Table 3.3: Land-Use Budget (Port and Access Road)

Land-Use	Area (hec)
Cashew Monoculture	0.0
Farmland/Grazing-Land/Clear Felled Area	6.2
Floodplain	0.6
Mangroves	6.7
Rice Farms	4.3
Secondary Forest	6.2
Homesteads	0.5
Total	**24.5**

3.3 MINIMISING RESETTLEMENT

There is little scope for minimising resettlement and compensation requirements, under the May 2015 mine and port layouts. Physically displaced households are located directly within the mine pits that form the economic basis of the Project, and therefore the only viable option if the Project is to proceed is further design/engineering changes or resettlement.

3.4 SUMMARY OF SCOPE OF RESETTLEMENT

In summary, approximately 175 households from 5 villages within the mine site will likely need to be relocated (See Table 3.4). In addition, approximately 3000 hectares of land will need to be acquired by the Proponent (See Table 3.5). Of this total area, approximately 37% is under active cultivation by local communities.

Table 3.4: Estimated number of households to be resettled

Village Name	Estimated No. of Households
Saliquenhe	76
Cabisseki / Ponta Capsec	8
Saliquenhe Porto/ Ponta Zeca	14
Tambato Mandinka	22
Canico	55
Total	**175**

Table 3.5: Land-Use Budget (Mine Site and Port)

Land-Use	Area (hec)
Cashew Monoculture	238
Farmland/Grazing-Land/Clear Felled Area	590
Floodplain	266
Mangroves	198
Rice Farms	284
Secondary Forest	1310
Village/Town	80
Total	**2966**

4 SOCIO-ECONOMIC PROFILE

A socio-economic household survey was undertaken for the development of the social-economic baseline, Environmental and Social Impact Assessment (ESIA), and the RPF. The survey covered 308 potentially directly and indirectly affected households.

Only the households likely to be affected by resettlement have been included under this chapter. This totals 175 of the 308 households. This allows the establishment of a socio-economic profile of the affected households, and forms the basis for the determination of entitlements.

4.1 SETTLEMENTS AND HOUSEHOLDS

Settlements in the Project Area are comprised of clusters of households in rural villages or small hamlets. There are five villages located within the active mine area and these will likely require resettlement (See Figure 3.1).

These settlements vary in terms of the number of households they support (See Table 4.1). Saliquenhe and Canico are the largest villages supporting 76 and 55 households respectively. While the combined total households for Cabisseki / Ponta Capsec, Saliquenhe Porto/ Ponta Zeca and Tambato Mandinka is 44. These figures align with the initial household estimates provided in the original ESIA (Golder, 2014).

Table 4.1: Number of Households per Village

Village	Number of Households
Saliquenhe	76
Cabisseki / Ponta Capsec	8
Saliquenhe Porto/ Ponta Zeca	14
Tambato Mandinka	22
Canico	55
Total	**175**

4.2 HOUSEHOLD DEMOGRAPHICS

Defining a household, as a sociological unit, is complex in many rural communities. This is particularly so in the current situation. Most households in the five villages reside in family compounds that support one or more large residential structures and smaller secondary structures.

Families residing on the family compound may comprise of large or multiple-generations of the same family. This results in a high total population of 3188 individuals for only the total 175 households resident in the 5 resettlement affected villages (See Table 4.2), or an average of 18 persons per household. This is high by rural African standards where the norm is closer to seven persons per household.

The household is generally headed by a *chief* whom, in nearly all households, is the parochial male of the family. The practice of marrying multiple wives is common with 57% of male household-heads taking more than one wife.

Table 4.2: Population and Household Size

Village	Number of Households	Total Population	Ave. Household Size
Saliquenhe	76	1442	18
Cabisseki / Ponta Capsec	8	129	16
Saliquenhe Porto/ Ponta Zeca	14	276	19
Tambato Mandinka	22	400	18
Canico	55	941	17
Total	**175**	**3188**	**18**

The largest proportion of the total population is made up of the children of the household head, accounting for 47% of the total population (See Table 4.3). This is significant in terms of the large household size, where there in an average of 8.5 children per household head. The children of the household head have an average age of 12 years, however a significant portion of adult children whom have remained resident in the family compound.

Table 4.3: Relations Profile

Relationship to Household Head	Number	Percent of Total Population
Homestead head (HH)	175	5
Spouse of HH	399	13
Son/daughter of HH	1500	47
Son-in-law/daughter-in-law of HH	123	4
Grandchild of HH	272	9
Parent of HH	67	2
Parent-in-law of HH	81	3
Brother/sister of HH	296	9
Cousin	22	1
Grandparent of HH	6	0
Adopted/foster/step child	34	1
Other relative	174	5
Not related but dependent	14	0
Tenant	23	1
No Data	2	0
Total	**3188**	**100**

4.3 HOUSING PROFILE

Satellite imagery mapping of the resettlement-affected communities indicate that there are an estimated 215 fixed residential structures. This is generally consistent, if lower than the estimated number of residential structures (238) identified during the household survey. It is likely that secondary structures are being claimed as primary structures.

The main residential structures are generally comprised of one or more large structure in the family compound that function as multi-functional residential structures or are used for sleeping only. In the latter, other household functions are undertaken out-doors or using secondary structures. On average, each household has 1.36 of these main residential structures.

Tenure allocated to homesteads for purposes of residence is via local customary systems and in the majority of cases (78% of all households) this form of tenure is based on the sharing of family/ancestral homesteads without any rental or payment required.

There is a limited range of materials used for the construction of primary residential structures – which are often termed traditional materials. Floors are made of compacted earth, while only 2% of resettlement-affected households have concrete foundations. Walls are near exclusively constructed of mud blocks.

There is greater variety of materials utilised in the construction of residential roofs. Approximately 32% of all residential structures are roofed with locally-sourced palm leaves or grasses, while the remaining 68% of households utilise corrugated iron sheets.

The residential structures vary in size however, and this is generally linked to household size and wealth. The average footprint per structure in the larger villages of Saliquenhe and Canico, is 105 and 107m^2 respectively (See Table 4.4). This larger structural footprint is probably linked to the established nature of the villages, which in turn has allowed the growth of family compounds. The village of Saliquenhe Porto/ Ponta Zeca also has a commensurate average footprint, while Cabisseki / Ponta Capsec and Tambato Mandinka have significantly smaller average structure footprints of 82 and 85m^2 respectively.

Table 4.4: Primary Structures

Village	No. of Structures	Ave Area (m^2)	Total Footprint (m^2)
Saliquenhe	105	105	11025
Cabisseki / Ponta Capsec	12	82	984
Saliquenhe Porto/ Ponta Zeca	22	104	2288
Tambato Mandinka	28	85	2380
Canico	71	107	7597
Total	**238**	**-**	**24274**

4.4 SECONDARY STRUCTURES

Secondary structures cover all non-residential structures that support household livelihoods. The range of secondary structures utilised by the five resettlement-affected villages is summarised in Table 4.5.

Table 4.5: Secondary Structures

Secondary Structure	Village					Total
	Saliquenhe	Cabisseki / Ponta Capsec	Sali. Porto/ Ponta Zeca	Tambato Mandinka	Canico	
Livestock Enclosure / Corral	8	3	4	1	14	30
Pig Sty	0	7	24	1	2	34
Chicken/Duck/ Poultry Coup	70	6	14	0	37	127
Bird Shelter	2	0	3	0	8	13
Barn	19	2	16	3	22	62
Grain Storage	21	2	8	3	17	51
Rabbit Hutch	1	0	1	2	0	4
Goat Pen	7	3	0	4	12	26
Other	14	0	3	4	7	28
Total	**142**	**23**	**73**	**18**	**119**	**375**

4.5 BASIC SERVICES

There is no formal basic services provision at the five resettlement-affected villages. In terms of energy supply, fuel used for cooking is largely limited to locally sourced wood, while lighting is a mixture of candles and paraffin.

All villages have a number of wells of which the majority are buckets wells while a smaller proportion are hand-pump wells. All wells function as critical fresh-water sources, as local surface water is saline. Water for domestic needs is solely sourced from groundwater. Groundwater is sourced using hand-dug wells, deep wells or manual pumps linked to boreholes. There is no significant variation reported from the survey in the use of wells and boreholes during the rainfall and dry seasons.

The household survey indicates that local households do suffer water stress from local groundwater availability during the months of April and May; however water stress is significantly reduced for the remainder of the year.

There is no formal sanitation infrastructure, and approximately 70% of households utilise a homestead pit latrine which is not improved with any form of ventilation. Much of the remaining households utilise either the local bush (20%) or some form of improved pit latrines (10%)

There are no formal or community-run waste management facilities in the five villages. The majority of households buy or burn their waste, or dispose of the waste in the local bush.

4.6 COMMUNITY OR PUBLIC FACILITIES

There is a limited range of community or public facilities located in the five resettlement-affected villages. The smaller villages of Cabisseki / Ponta Capsec, Saliquenhe Porto/ Ponta Zeca and Tambato Mandinka have negligible community facilities – limited to one grass hut school at Tambato Mandinka. The larger village of Saliquenhe supports one Mosque, clinic

and school; while Canico Tumanna has one closed school and Mosque. No community infrastructure is likely to be impacted by the Port site and associated access road.

4.7 LAND-USE

The study area is comprised of rural land-uses only. Land-use mapping and ground-truthing established a range of rural land-uses (See Figure 4.1) as summarised below:

1. **Towns:** Comprise of the town of Farim only. Farim comprises an urban area of moderate to high density households, with low density peri-urban households. The town supports small-scale businesses, informal trade and local administration.
2. **Villages:** Comprise of clusters of rural households. This covers both small to medium sized villages as well as small hamlets. The land around the villages is generally extensively cleared for farmland or grazing-land.
3. **Farmland/Grazing-Land:** Farmland is comprised of tilled land used to grow a limited range of annual crops. Grazing land is comprised of cleared land that permits the establishment of grasses and grazing during the rainfall season, and left fallow during the dry season. Farmland and grazing land in many cases cannot be differentiated and therefore have been combined as a common land-use class.
4. **Cashew Monoculture:** Comprise of secondary forest that has been cleared for the establishment of Cashew trees. The extensive clearing results in a near-monoculture of Cashew, with limited other vegetation being present.
5. **Secondary Forest / Cashew:** Comprise of transformed forest interspersed with low to moderate density of Cashew trees. Greater diversity of indigenous vegetation than noted in the Cashew Monoculture land-use category.
6. **Floodplains:** Comprise of low-lying land located near the Cacheu River, which is flooded on a seasonal basis. Land-use varies including salt harvesting, existing and abandoned rice-farms, floodplain-grasslands, sedges and mangroves.
7. **Rice Farms:** Comprise of rice-farms located on tributaries of the Cacheu River. These are differentiated from the floodplain rice-farms based on their location and local hydrological conditions.
8. **Mangroves:** Specialist vegetation community which is established where there are sufficient riverine tidal movements to allow the movement of both fresh and salt water. Much of the Mangroves found in the study area located on the Cacheu River.

The proportion of land under the different land-use types was determined via land-use mapping using Google 2015 imagery, and the establishment of a land-use budget for the approximate 3000 hectares of land to be acquired by the Project (See Table 4.6).

Table 4.6: Land-Use Budget (Mine Site)

Land-Use	Area (hec)
Rice Farms	280
Farmland/Grazing-Land/Clear Felled Area	584
Cashew Monoculture	238
Secondary Forest	1304
Floodplain	266
Mangroves	198
Village/Town	79
Total	**2949**

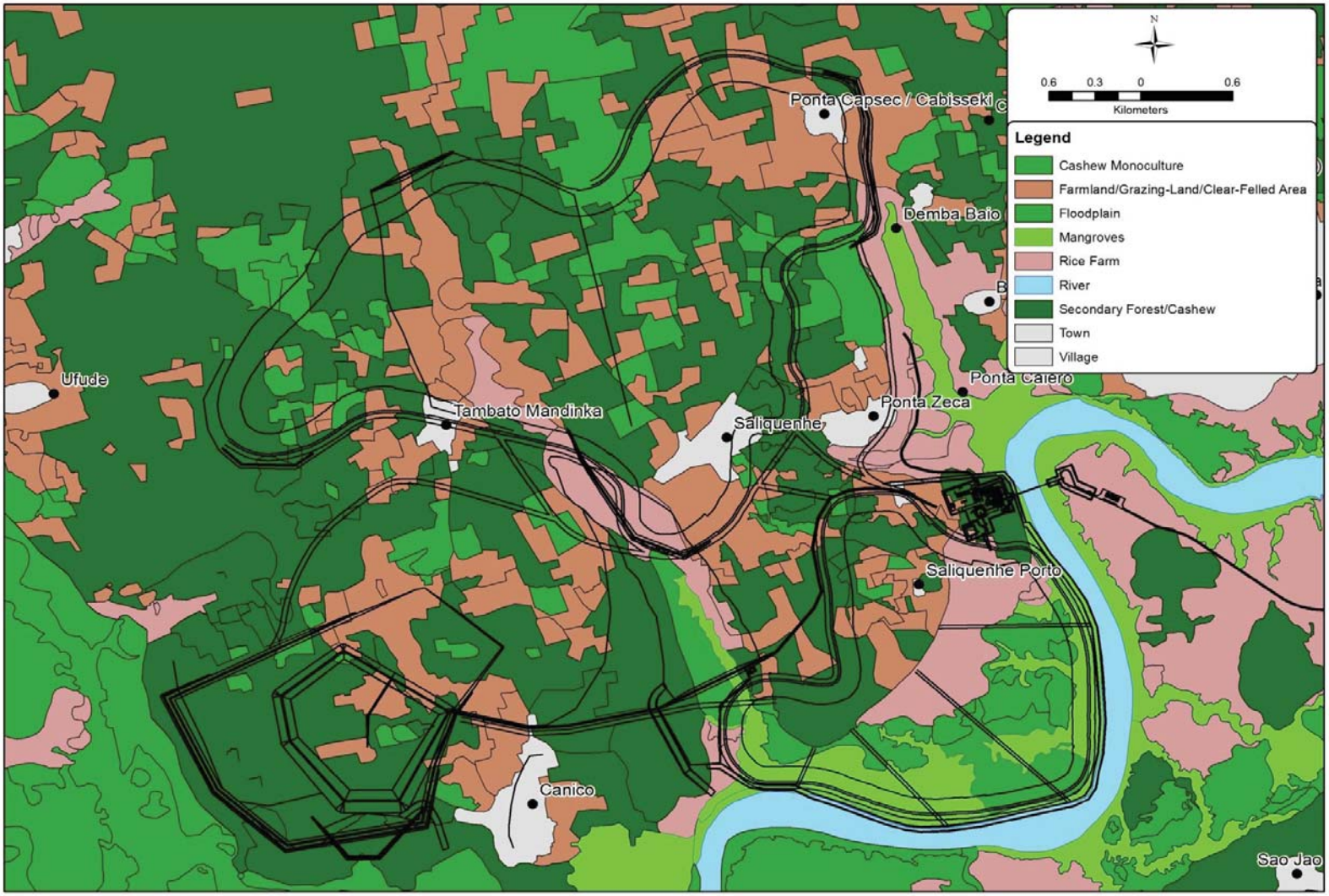

Figure 4.1: Land Use Map

The greater proportion of the land that will be acquired will be secondary forest. Secondary forest is important to local communities in the provision of natural resources, additional land for the establishment of agricultural plots or Cashew orchards. This has resulted in significant transformation of local natural forest.

The remaining major land-uses include Farmland/Grazing-Land/Clear Felled Areas, Rice Farms and Cashew Monoculture – totalling approximately 1102 hectares, or 37% of the total land acquisition area. Farming practices are highly mobile in the region with rotational systems of farming adopted. Fallow farms are either allowed to regenerate or are used for grazing or the establishment of Cashew orchards.

4.8 LAND TENURE

The Land Law establishes that all land belongs in the public domain and held under trust by the State. However, the Law also establishes the foundation for the integration of customary land rights into the formal legal framework as well as recognising local customary practices in exercising power in the management and utilisation of land.

All rural land that would need to be acquired by the Project falls under customary land managed by local communities. However, land-right holdings are normally held by the founding families of the respective villages, via customary tradition. This form of family tenure is based on lineage or clan and unites all the descendants of a particular ancestor or group of ancestors who are identified as founders of that family or clan.

The family nature of tenure is reflected in the households survey (See Table 4.7) where 36% of all land-holdings are claimed as shared by the family. This relates to the sub-division of family land to sons in order to support the natural growth of households. No transaction costs are incurred related to the sharing of land between family members.

Responsibility for the management of family land is vested in a head of family assisted by other family members. The right to allocate portions of family land to members of the defined family is vested in the head of family. Although usufruct rights to land are vested in the family, some family groups or individuals may hold varying degrees of lesser interests in specific portions of family land.

Table 4.7: Land Tenure of Farmland

Village	Land Tenure Status			
	Shared	Private	Rented	None
Saliquenhe	108	159	0	0
Cabisseki / Ponta Capsec	5	29	0	0
Saliquenhe Porto/ Ponta Zeca	24	35	4	0
Tambato Mandinka	27	52	0	0
Canico	101	180	0	1
Total	**265**	**455**	**4**	**1**

There are however customary rules in terms of obtaining excusive land-use rights from the founding families, where the chief of the family may transfer rights to individuals based on set agreements. Such agreements are generally witnessed, but not actually actively

allocated, by local community chiefs, and done only verbally. Once the land-rights are transferred, the founding families no longer have a claim to the land. This form of customary but exclusive land-use right is the dominant tenure status for 62% of all claimed farmland (See Table 4.7)

In addition, land-tenure can also be held under trust by the local community, or land that is not specifically held by a family/clan. This does not seem to be a common form of tenure, however interviews with local village Chiefs indicates there is some community land which is shared between households for farming.

4.9 LIVELIHOODS

4.9.1 Agriculture

Informal agriculture is undertaken as a key livelihood by all households located in the five resettlement-affected villages. Half of the agricultural produce output is solely utilised for household consumption, while a smaller proportion of produce is directly allocated for the purposes of cash trade (8.5%). The remaining 40% of agricultural produce is selectively used for consumption, with household surpluses traded for cash income.

The total number of agricultural fields claimed by resettlement-affected households is 718, or 4.1 fields per household (See Table 4.8). However, there are variations in the average number of fields per household for each village, with the lowest average being 3.4 at Saliquenhe and the highest of 5.1 fields per household at Canico.

Table 4.8: Farm numbers by Village

Village Name	Estimated No. of Households	No of Fields	Ave Farms per HH
Saliquenhe	76	264	3.4
Cabisseki / Ponta Capsec	8	34	4.3
Saliquenhe Porto/ Ponta Zeca	14	63	4.5
Tambato Mandinka	22	77	3.5
Canico	55	280	5.1
Total	**175**	**718**	**-**

There is a diversity of crops cultivated on the farmland reported as developed (See Table 4.9). The dominant crop is rice and maize, which account for 54% and 22% of all claimed fields, while the remaining 24% of the land supports a range of mixed vegetables, beans and cereals.

The household survey suggests that approximately 1 036ha is under some form of cultivation (See Table 4.9). Caution is however required with these numbers, as there is a generally poor understanding of the true area being cultivated by local households and these values are considered to be elevated.

Table 4.9: Land area under cultivation by crop type

Crop Type	No of Fields	Ave Area	Total Area
Rice	393	1.3	510.9
Beans	43	1.1	47.3
Maize	165	1.8	297

Crop Type	No of Fields	Ave Area	Total Area
Pumpkin	11	1.6	17.6
Peanut	26	2.1	54.6
Sweet Potato/Potato	16	1	16
Yam	15	1.4	21
Cassava	16	1.5	24
Millet/Sorghum/Fonio	22	1.7	37.4
Sesame	11	1	11
Total	**718**	**-**	**1036.8**

4.9.2 Trees

The cultivation of trees functions as another critical livelihood for resettlement-affected households. The two dominant species cultivated is Cashew and Mango, which in combination account for 94% of all productive trees claimed by resettlement-affected households (See Table 4.10).

Table 4.10: Tree Holdings by Village

Village Name	Tree Species								
	Cashew	Coconut	Orange	Lemon	Mango	Palm	Banana	Cibe	Guava
Saliquenhe	18 031	0	182	1 234	5 139	65	170	125	9
Cabisseki / Ponta Capsec	4 703	7	1	32	190	27	0	0	0
Saliquenhe Porto/ Ponta Zeca	3 003	1	0	243	951	103	7	0	0
Tambato Mandinka	5 600	1	48	18	925	41	21	0	1
Canico	14 600	14	24	297	3 771	212	3	258	48
Total	45 937	23	255	1 824	10 976	448	201	383	58

Cashew is by far the more critical tree, and forms a central pillar in terms of cash income. Many households have established Cashew orchards, where there is a near mono-culture of Cashews in specific rows. The dominance of Cashew is linked to the established market links between the resettlement-affected villages and Farim, as well as larger economic links in Guinea-Bissau. Cashew is the one of the central commodities for the local villages and is critical in sustaining household cash income.

Similarly, Mangoes are also claimed in significant numbers. Mangoes also function as important trade commodities although not to the same extent as Cashews. Markets links, both locally and regionally are not as well developed for Mango as for Cashews.

The remaining trees species constitute a minor percentage of the total trees claimed by households. These are likely to be utilised for household subsistence or as a minor trade commodity.

The understanding of the number of trees held per household is not well understood by households, specifically in terms of Cashews and Mangoes. This is particularly the case, where the household is aware of the number of fields that support orchards, but do not

know the specific number of trees. Caution is thus needed in terms of the number of claimed trees as they are likely to be exaggerated.

4.9.3 Livestock

Nearly all resettlement-affected households rear livestock. Goats and chickens are most commonly owned, and are used for both household subsistence and trade. Cattle are also reared although these are generally limited to fewer and wealthier households. Some pigs are reared however this is limited due to the significant presence of Muslim households in the potentially resettlement affected villages.

Table 4.11: Major livestock holdings by Village

Village Name	No. of HHs with Livestock		Goat	Sheep	Cattle	Chicken	Pigs
	No	%					
Saliquenhe	76	100	278	232	88	927	0
Cabisseki / Ponta Capsec	8	100	84	56	41	121	41
Saliquenhe Porto/ Ponta Zeca	14	100	174	21	147	335	159
Tambato Mandinka	22	100	89	89	12	305	0
Canico	53	96	261	273	438	886	0
Total	**175**	**-**	**886**	**671**	**726**	**2574**	**200**

4.9.4 Natural Resource Use

Local communities are dependent on natural resources to support or sustain local livelihoods. The most common forms of natural resource harvesting include the collection of wild fruits and vegetables, medicinal plans and collecting firewood. The latter is an important requirement due to the limited alternative forms of sources of fuel for cooking.

Table 4.12: Natural Resource Harvesting by Village

Resource Collection	Village					Total
	Cabisseki / Ponta Capsec	Canico	Saliquenhe Porto/ Ponta Zeca	Saliquenhe	Tambato Mandinka	
Hunting	2	8	3	6	5	24
Collecting Sand for Construction	2	13	6	21	5	47
Collecting Fodder	0	13	4	19	3	39
Collecting Wild Fruit/Vegetables	5	39	10	57	15	126
Collecting ingredients for traditional drinks	0	4	4	6	0	14
Collecting Wood for Carpentry	1	3	2	5	1	12
Collecting Wood for Artisanal Items	0	5	3	3	4	15
Collecting Medicinal Plants	1	32	11	48	11	103
Extraction of Palm Oil	2	18	3	19	9	51
Collecting Honey	0	3	0	1	0	4
Collecting Firewood	2	44	12	61	22	141

Collecting Wood for Charcoal Production	3	13	4	20	20	60
Fishing	5	25	13	22	8	73
Salt Production	5	51	12	67	21	156

Another critical form of natural resource harvesting is salt production. Approximately 89% of resettlement affected households engage in some form of salt production. This is undertaken nearly exclusively by females along the floodplains of the River Cacheu. Salt is stored in large grass vats lined with plastic before being sold at either Farim, or traders that travel to the local villages.

4.10 CULTURAL RESOURCES

A separate cultural specialist report has been prepared as part of the ESIA submission. As such this section discusses the specific cultural resources directly affected by the Project. Specifically, any form of land clearing or construction would likely lead to their destruction unless protected or relocated.

There are sixteen verified cultural resources located in the active mine area (ERM, 2015). In addition, there are an additional nine unverified sites (Golder, 2014) that may contain additional cultural resources. The majority of the findings are low to moderate level sensitive isolated sherds or ceramic scatter.

High sensitivity cultural resources, for the purposes of this RPF, will include three Muslim cemeteries linked to the three major villages affected by resettlement – namely Tambato, Saliquenhe and Canico. In addition, there is one sacred forest located in proximity to Saliquenhe.

There are six cultural sites in proximity to the Port facility and associated access road. This includes low to medium sensitivity ritual area, offering trees and ceramic scatter. Based on current design drawing, none of these sites are likely to be directly affected. As such, they are not included in this RPF.

Analysis of the household survey indicates that the resettlement affected households make claim to approximately 1 519 graves (See Table 4.13). Of the total graves, 95% are located at local community cemeteries (which include separate Christian and Muslim cemeteries). The remaining graves are located at family cemeteries located at or near the homestead.

Table 4.13: Estimated Number of Graves by Village

Village	Cemetery	Homestead	Near Homestead	Total
Saliquenhe	596	0	0	596
Cabisseki / Ponta Capsec	26	26	0	52
Saliquenhe Porto/ Ponta Zeca	120	25	25	170
Tambato Mandinka	180	0	0	180
Canico	521	0	0	521
Total	**1 443**	**51**	**25**	**1 519**

The household survey indicates that no individual families make claim to sacred sites or features. The findings of the cultural study and in conjunction with the household survey, suggests that all cultural important resources are support at the community level.

Table 4.14: Verified Cultural Resources

Ref.	Description	Sensitivity
Verified Sites		
1	**Sacred Forest:** This is an important forest. The surrounding population uses it. Ritual happens here during times of difficulty or celebration.	High
2	**Excision Site:** Site where excision rituals take place. It is composed of two sacred trees. The first is called Dialla, the second is called Santonwkoto.	Low
6.1	**Muslim Cemetery (Tambato):** The grave markers are simple wooden branches, stuck upright into the ground. There are about 50 graves here.	High
6.9	**Muslim Cemetery (Saliquenhe):** This is an old cemetery which contains the remains of a well-known imam (Fode Biyaya). He was the first imam of the Saliquenhe Ba mosque. He died in the early 20th century. Pilgrims from Dakar, Bissau, Gambia come pray here during an annual celebration called Gamou.	High
7.7	**Muslim Cemetery (Canico):** This is a Muslim cemetery for the Mandingo people living in Canico.	High
10.1	**Low density ceramic scatter with no other material:** Ceramic found near sacred site. Probably associated with the site. Not likely to be a settlement. Limited archaeological context.	Low
10.9	**Medium to high density ceramic scatter with no other material:** The ceramics here are fairly dense and cover a wide area. Located in a recently ploughed field. Site extents seem to taper off before reaching the tree line. The ceramics are of different size and function. Some diagnostic sherds. Likely dating to early medieval period.	Medium
11.7	**Single isolated sherd:** Very low sensitivity, possible not a site but just a random sherd.	Low
12.5	**High density of iron slag with no other material:** Indicates intensive local iron smelting activities. Probably not Iron Age, but more likely medieval in date. Important for regional and national history.	Medium
13.3	**Single isolated sherd:** Very low sensitivity, possible not a site but just a random sherd.	Low
14.1	**Low to medium density ceramic scatter with no other material:** Ceramics suggest a small settlement. They appear to be historic (recent) in date.	Low
14.9	**High density ceramic scatter and glass:** Large site. House mounds visible. The high density of ceramics suggests intensive domestic settlement. Presence of historic (pre-20th century) glass fragments mixed in with the ceramics suggests that this site dates to the early-middle colonial period.	Medium
15.7	**Low density ceramic scatter:** No other material. Probably modern ceramics associated with Canico village. Not a very sensitive site.	Low
16.5	**Low density ceramic scatter, with no other material:** Just a few sherds. Not enough material present to indicate sub-surface remains. No diagnostic sherds found. Limited sensitivity.	Low

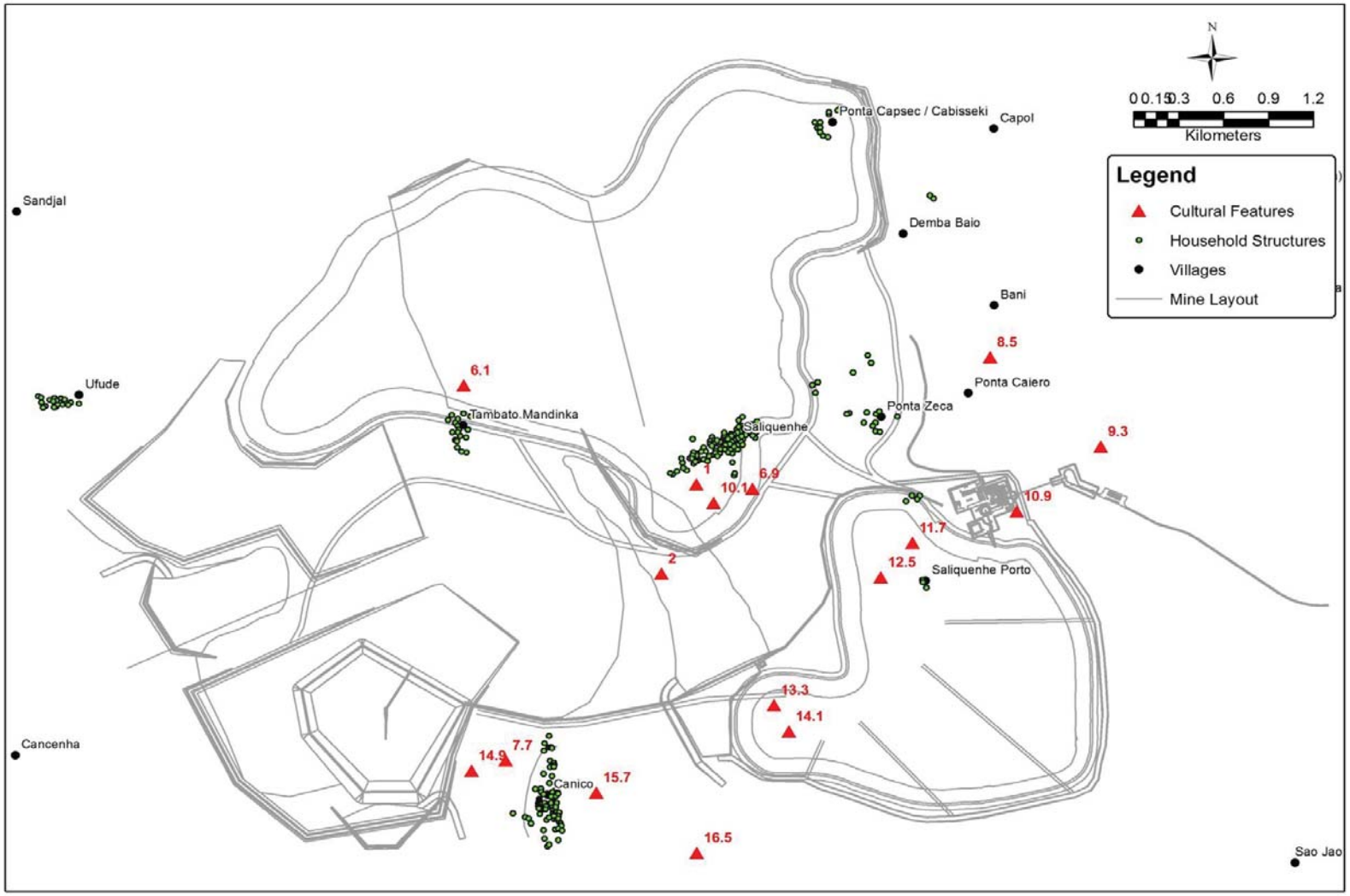

Figure 4.2: Cultural Features Map

5 ELIGIBILITY AND ENTITLEMENT FRAMEWORK

This chapter establishes the framework and working rules required to determine eligibility for resettlement and/or compensation. Thereafter, the chapter establishes the specific entitlement options for each asset category that is affected.

5.1 ELIGIBILITY FRAMEWORK

Eligibility for the purposes of this document is defined as persons, groups of persons or families whom are granted rights to claim fair and equitable compensation for physical and/or economic displacement as a direct result of the Project. The basis for determining whom is eligible for resettlement and/or compensation is determined via the **Eligibility Framework** (See Table 5.1).

Table 5.1: Eligibility Framework

Category	Description
1	**Physical Displacement: The displacement, loss or destruction of the place of residence of a household that reside within the Active Mine Area, the Port Facility, the Port Access Road Servitude, or for the establishment of any ancillary development.**
2	**Economic Displacement: The loss of assets or access to assets that leads to loss of income sources or livelihoods, but does NOT necessarily result in the direct loss of a place of residence.**
2.1	Loss of community or individual-held land for annual-crop cultivation, cultivation of Cashew or grazing of livestock.
2.2	Households that, due to the land acquisition, may have to surrender natural resources or are denied continued access to existing natural resources.
2.3	All households which are denied access or mobility due to the loss of access roads and paths, and do not have recourse to other access routes

5.1.1 Eligible People or Households

Eligibility will be determined at the household level, and where the household head holds legal or customary rights to assets or investments, land or property that may be lost as a result of the project activities.

The definition of a single household is complex. A household, under the eligibility criteria, is deemed to cover those who are mutually economically dependent and whom reside in a common homestead, but not exclusively so.

In many cases, a single homestead or compound may support multiple households or families. This often comprise of multiple generations of the same family including the patriarch father and sons residing in separate structures.

In situations where homesteads are divided into multiple households there remains a complex interdependency in terms of sharing of land resources, often without clear lines of inheritance. Multiple households may farm common plots or separate plots.

Where multiple households are located on a single homestead, this RPF defines a household as one or more of the following:

- A family under whom the household head has customary rights to all land and assets.
- A family that resides on the same property of another family member, where the family head is an adult (above the age of 18 years), has inherited structures, retains their own structures, is married, or has children.
- A polygamous family, where each wife resides at a separate homestead, the residence and individuals held under each wife will be defined as a separate household.
- Female-headed households at the time of the asset survey are deemed eligible, without exception with suitable proof of asset holdings and dependants or family members.

5.1.2 Vulnerable Individuals and Households

Marginalised people (including squatters, migrants, nomadic people and refugees) are provided special protection under the RPF. A household, irrespective of their status or whether they have formal titles, customary or legal rights or not, squatter or otherwise encroaching illegally on land, are eligible for compensation, if they occupied the project area before the establishment of the development moratorium.

In addition, vulnerable people are those who by virtue of any characteristic not of their making may be more adversely affected by resettlement than others, and who may be limited in their ability to claim or take advantage of resettlement assistance and related development benefits. Specifically, as defined by the IFC, vulnerable people include, but are not limited to those defined in Section 10.1.7.

5.1.3 Host Site Community or Households

Also eligible for protection are those in any of the host resettlement sites whose infrastructure and/or resources will be disturbed. These would include both individuals as well as households. This may not be applicable given that resource areas are not extinguished in any of the villages.

5.2 ENTITLEMENT FRAMEWORK

The **Entitlement Framework** (See Table 5.2) establishes the specific rights and entitlements to replacement assets or compensation. These rights are granted to any persons, household or groups whom will lose proven assets, as determined during the Asset Inventory and Valuation Study (See Chapter 6).

The framework established the specific rights per asset category, and well as differentiating the potential compensation entitlement granted to physically and economically displaced households.

The framework is however a generic set of entitlements. To align with IFC requirements, the framework will need to be reviewed, amended and ratified by affected households, via a Resettlement Working Group (RWG), prior to finalisation. This will need to be done during the preparation of the RAP.

Table 5.2: Entitlement Framework

Ref	Category	Eligible Groups	Qualifying Criteria	Eligibility
1.	Homestead Plot	Physical Displacement	1. Homestead plot located within the land acquisition footprint (physical displacement) 2. Homestead plot owned by a person/household, as verified by either written agreement with customary authorities, or where a verbal confirmation is provided by customary authorities in terms of granting of customary rights.	**Replacement Options** 1. Replacement residential plot at host village, **Cash Compensation Options (Option 1 only)** 1. Cash compensation at replacement cost under conditions that an alternative plot already exists. **Other Assistance** 1. Clearing and preparation of land. 2. Assistance in obtaining land tenure. 3. Costs for transfer of land rights. 4. Assistance in moving. 5. Moving ceremony
2.	Primary Structures	Physical Displacement	1. All structures that function as residential units that provide shelter, that include walls, floors, roof, doors and windows, and are located within eligible homesteads. 2. All structures located on homesteads owned by a person/household, as verified by either written agreement with customary authorities, or where a verbal confirmation is provided by customary authorities in terms of granting of customary rights.	**Replacement Option** 1. Replacement residential structure(s) equal in size of current residential structure, and of better build quality. **Cash Compensation Option** 1. Cash compensation at full replacement cost under conditions that demonstrate that cash will be used for purposes intended. **Other Assistance (Option 1 only)** 1. Assistance in terms of building permits 2. Assistance in moving.
3.	Secondary Structures	Physical Displacement	1. All non-residential structures that is located within eligible homesteads. 2. All secondary structures located on homesteads owned by a person/household, as verified by either written agreement with customary authorities, or where a verbal confirmation is provided by customary authorities in terms of granting of customary rights.	**Replacement Option** 1. Replacement pit latrines **Compensation Option** 1. Cash compensation at full replacement cost for all secondary structures (excluding pit latrines) **Other Assistance** 1. Assistance with moveable assets that make up secondary structures to new dwelling site

Ref	Category	Eligible Groups	Qualifying Criteria	Eligibility
4.	Agricultural Plots	Physical Displacement	1. Agricultural plots owned by physically displaced households, irrespective if they are actively being utilised, or are fallow. 2. Agricultural plots that, due to the physical relocation of the homestead, can no longer be accessed. 3. Agricultural plots owned by a person/household, as verified by either written agreement with customary authorities, or where a verbal confirmation is provided by customary authorities in terms of granting of customary rights.	**Replacement Options** 1. Replacement land of equal size and productivity at the host site. **Compensation Options** None **Other Assistance** 1. Provision of a minimum of 1 hectare of land to households with no land or less than the minimum amount 2. Clearing and preparation of land. 3. Assistance in obtaining land tenure. 4. Costs for transfer of land rights.
		Economic Displacement	1. Agricultural land owned by households that will NOT be resettled, but will permanently loss access to existing fields, irrespective if they are actively being utilised, or are fallow. 2. Agricultural plots owned by a person/household, as verified by either written agreement with customary authorities, or where a verbal confirmation is provided by customary authorities in terms of granting of customary rights.	**Replacement Options** 1. Replacement land of equal size and productivity near the homestead. **Compensation Options** None **Other Assistance** 1. Provision of a minimum of 1 hectare of land to households with no land or less than the minimum amount. 2. Clearing and preparation of land. 3. Assistance in obtaining land tenure. 4. Costs for transfer of land rights.
5.	Annual Crops	Physical Displacement and Economic Displacement	1. Crops located on all affected agricultural land or gardens as determined under Reference 2.	**Compensation Options** 1. Cash compensation at government established values or market replacement value, whichever is the greater. **Other Assistance** 1. Allowance for the harvesting of crops prior to relocation where this is feasible.

Ref	Category	Eligible Groups	Qualifying Criteria	Eligibility
				2. Provision of a disruption allowance in the form of cash. 3. Provision of replacement seeds.
6.	Trees	Physical Displacement and Economic Displacement	1. Productive planted trees located on all affected agricultural land, homesteads or gardens as determined under Reference 2.	**Compensation Options** 1. Cash compensation at government established values or market replacement value, whichever is the greater.
				Other Assistance 1. Provision of Saplings for Planting at the Replacement Fields.
7.	Community Structures	Physical Displacement	1. All functioning community / public structures located within the land acquisition footprint (physical displacement). 2. All functioning community / public structures, located at host sites, which will be placed under additional pressure due to local population increase.	**Replacement Options** 1. Replacement of community structures, to equal or better condition, at host site(s). Or 2. Upgrading of existing community structures at host site(s) to support host and resettlement population.
8.	Basic Services	Physical Displacement and Economic Displacement	1. Households that are denied or significantly restricted access to water sources (boreholes or wells) and access roads within the land acquisition footprint. 2. Households that are denied or significantly restricted access to water sources (boreholes or wells) and access roads at the host site(s).	**Replacement Options** 1. Provision of basic services the host site(s) consistent with any agreements made with the Resettlement Working Group, while ensuring, at minimum: a. Water that is reliable, clean and sufficient in volume for drinking, washing, cleaning irrigation and livestock watering. b. Provision of suitable access roads to continue or improve mobility and links to Farim Town.
9.	Communal Resource Land	Physical Displacement and	1. Communal land located within the land acquisition footprint, activity utilised as agricultural plots or other community functions.	**Replacement Options** 1. Provision or strategic value added enhancements, of communal natural resources / grazing areas at

Ref	Category	Eligible Groups	Qualifying Criteria	Eligibility
		Economic Displacement	2. Communal land held by the local authorities under customary laws, and without any disputed claim by an individual/household or group to the land.	the host site(s) sufficient to support both the host site and resettled population.
10.	Graves	Physical Displacement	1. Graves, plots wholly or partially located within the land acquisition footprint, and belong to a household being resettled (physical displacement) 2. Graves, due to the physical relocation of the homestead, can no longer be accessed.	**Replacement Options** 1. Exhumation, transport and re-internment at a formal community cemetery(s) at the host site(s). Or 2. Exhumation, transport and re-internment at the household residential plot at the host site(s).
				Other Assistance • Costs related to any agreed cultural ceremonies. • Costs related to any permits required for the exhumation, transport and re-burial of graves.
		Economic Displacement	1. Graves, plots wholly or partially located within the land acquisition footprint, and belong to a household that is NOT being resettled (economic displacement) 3. Graves that can no longer be accessed due to mining safety requirements.	**Replacement Options** 1. Exhumation, transport and re-internment at a formal community cemetery(s) at the existing community. Or 2. Exhumation, transport and re-internment at the household residential plot at the existing community.
				Other Assistance • Costs related to any agreed cultural ceremonies. • Costs related to any permits required for the exhumation, transport and re-burial of graves.
11.	Religious Buildings	Physical Displacement	1. Religious building or structures that is not claimed by any individual as part of his/her household, but held by the community or specific group. 2. All functioning religious structures located within the land acquisition footprint (physical displacement).	**Replacement Options** 1. Relocation of existing religious sensitive resources to a new site/venue at the host site(s). Or 2. Replacement with new structures, to equal or better condition, at host site(s).

Ref	Category	Eligible Groups	Qualifying Criteria	Eligibility
			3. All functioning religious structures, located outside of the land acquisition footprint, but would become dysfunctional due to loss of people from catchment area.	**Other Assistance** 1. Allowance for a religious moving ceremony. 2. Support in moving all moveable assets
12.	Sacred / Archaeological/ Historical Sites	Physical Displacement and Economic Displacement	1. Sites, identified by local leaders, which are located wholly or partially located within the land acquisition footprint. 2. Sites, identified by local leaders, which due to the physical relocation of local households, can no longer be accessed.	**Replacement Options** 1. Relocation of existing resources to a formal community shrine/venue at the host site(s), or existing community
				Other Assistance 1. Costs related to any agreed cultural ceremonies, shrines or the preservation of historical or cultural resources, at the host site(s)
13.	Businesses	Physical Displacement	1. Businesses operated from a homestead, with non-movable business assets, which are located within the land acquisition footprint. 2. Businesses operated from a separate and distinct structure, with non-movable business assets, which are located within the land acquisition footprint.	**Replacement Options** 1. Replacement building to an equal floor area as existing business premises, at the host site(s)
				Compensation Option 1. Cash compensation of replacement value of structure and non-movable assets.
				Other Assistance 1. Compensation for loss of livelihood for transition period; 2. Moving costs/shifting allowance. 3. Transitional allowance for employees in lieu of temporary loss of employment.

6 ASSET INVENTORY AND VALUATION

The provision of fair and just compensation is linked to a detailed inventory of household assets and their value. Hence a critical component of any resettlement is a detailed Asset Inventory and Valuation Study. This chapter provides a framework for detailed valuation procedures that should be developed in the RAP and in consultation with local stakeholders.

6.1 GENERAL APPROACH

The valuation of assets that would be lost during resettlement is a sensitive issue, and therefore should be done with suitable care and rigour. This is of particular relevance in cases where compensation may include multiple options such as in-kind replacement (land and structures) or monetary compensation. The general approach to the valuation procedures is summarised below:

- **Identify Eligibility under National Guidelines:** All relevant legislation, policy and valuations guidelines defined by the State will need to be identified. This should form the basis for the identification of eligibility to compensation and valuation methodology.
- **Asset Survey:** A detailed land and asset survey is undertaken to determine asset holdings per affected household or community. This is allied to the registration of the right-holder to land or owner of assets.
- **Valuation Methodology:** The valuation process should involve the assessment of national guidelines, international best practice and local market research. The outcomes of this process should be a set of practical and measurable values/rates for each asset category.
- **Entitlement Contracts:** Contracts should be produced for affected individuals that will contain a summary of all their assets, adopted compensation rates or options and final valuations.

6.2 VALUATION GUIDELINES FOR ASSET CATEGORIES

The following sections provide generic valuations of different assets categories. These valuations function solely as a guide and will need refinement during the preparation of the RAP.

6.2.1 Homestead Structures and other Fixed Property

The valuation of homestead primary residential and secondary structures should make provision for the following:

- Undertake a detailed asset inventory of all assets found at individual households.
- Determine values or compensation options for dwelling structures and other fixed property. Options may include rebuild and/or cash payment as per the Entitlement Framework.
- Determine compensation packages for each affected individual according to valuations and preferred options. This package should be signed by the affected individual and a community representative.

- Where there is dispute within the household such dispute should be referred to a grievances and disputes committee.
- The valuation of physical structures should be based on the following general criteria:
    - Survey of physical structures (size, build, materials) and all its related structures and support services.
    - Determine average replacement costs of different types of structures based on information on the cost, quantity, and type of materials used for construction (e.g. bricks, rafters, bundles of straw, doors).
    - Costs for transportation and delivery of these items to acquired/replacement land or building site.
    - Estimates of construction of new buildings including labour required.

The valuation will form the basis for cash compensation of lost structures, if this option is made in the final RAP. The primary and recommended option is however the replacement of the primary dwelling structures of the household *in lieu* of a cash payment. Replacement building generally far exceeds the value of existing structures due to improved build quality.

Secondary, or non-residential structures, may be compensated with cash based on the valuation findings, or costs for replacement materials and labour required to re-establish the structure at the host sites.

6.2.2 Farmland, Crops and Trees

All land belongs to the State; hence there is no market-related form of valuation. Local households are fundamentally dependant on land hence the provision of replacement land is seen as the only viable option in sustaining livelihoods and food security. Once-off cash compensation for land is to be actively discouraged.

A land-holding and use survey will be required under the Asset Inventory and Valuation Study. The requirements for this survey include:

1. Delineate all actively farmed and fallow lands located in the active mine areas.
2. Identify and register land-right holders to the delineated farmland.
3. Forward any potential conflicting land-rights holders to the Resettlement Working Group for adjudication.
4. Survey all annual crops or economic trees located on actively farmed land.
5. Determine fair compensation rates for surveyed crops and economic trees based on information obtained through comparing market rates with Government rates.

It is expected that cash compensation will be provided based on the findings of the Asset Inventory and Valuation Study. International Best Practice usually allows any standing crop to be harvested even if the family may have physically moved to their new location

6.2.3 Businesses

The Asset Inventory and Valuation will cover all business entities, not located at the homestead, that are affected by resettlement. The valuation would need to consider the following guidelines:

- Determine and survey all commercial businesses and describe function, intensity of use, locational importance and its market catchment.
- The valuation should be based on the cost of re-establishing the commercial activity at a new location. This may include costs for:
    - Lost net income and where business profits may be affected.
    - Acquisition of new land.
    - Material and construction costs of replacement structures.
    - Costs of transfer.

Ideally the replacement of commercial businesses should be undertaken in consultation with the business owner.

6.2.4 Community Infrastructure

Where infrastructure is impacted, the valuation of community structures and resources will require additional consultation with local authorities, relevant state departments, local community leaders, committees or individuals that have responsibility over any community structures or natural resources.

7 LIVELIHOOD RESTORATION & DEVELOPMENT

This chapter establishes a framework for the restoration of existing livelihoods, while promoting community development via sustainable development measures. Links are made to the Community Development Plan provided in the ESIA.

7.1 LIVELIHOODS RESTORATION

Livelihoods restoration is aimed at the restoration of livelihoods that are disrupted or lost due to physical and economic displacement. The restoration of livelihoods should ensure that existing livelihoods are restored to a similar level, or ideally improved. Proposed strategies include:

1. **Replacement Agricultural Land:** Individual household land-holdings under agricultural production will be replaced with land of equal size and productivity to current land holdings. The replacement land will be located in proximity to where the household is resettled.

   Sufficient land will be provided to allow for continued rotational-based farming practices, where existing land-holdings may be rotated on a 4 year active farming / 4 year fallow cycle.

   The determination of replacement land-holdings will be determined during the Asset Inventory and Valuation Study (See Chapter 6). This should make provision of a land-holding, utilisation and ownership inventory, prior to resettlement or compensation.

2. **Replacement Cashew Orchards:** Individual household land-holdings under Cashew mono-culture will be replaced with land of equal size and productivity to current land holdings. The replacement land will be located in proximity to where the household is resettled.

   The determination of replacement land-holdings will be determined during the Asset Inventory and Valuation Study (See Chapter 6). This should make provision of a land-holding, utilisation and ownership inventory, prior to resettlement or compensation.

   In addition, the Project should explore the establishment a community nursery in advance of the resettlement process, with focus on propagating Cashew saplings. A minimum productive age of 4 years should be reached prior to planting at the replacement Cashew orchards.

3. **Replacement Rice Farms:** Individual household land-holdings under rice cultivation will be replaced with land of equal size and productivity to current land holdings. In addition, the replacement land will display the same hydrological conditions, or better, to support continued rice farming.

   The determination of replacement land-holdings will be determined during the Asset Inventory and Valuation Study (See Chapter 6). This should make provision of a land-holding, utilisation and ownership inventory, prior to resettlement or compensation.

It is acknowledged that rice farming is generally unproductive in the area due to salt water intrusion into farmed areas. Where suitable hydrological conditions cannot be sourced, alternative livelihoods strategies are to be explored (See Section 6.2).

4. **Replacement Salt Farms:** The siting of the host site(s) should make provision for continued access to the Cacheu River floodplains to permit the continued practice of salting farming. Where this cannot be provided, alternative livelihoods strategies are to be explored (See Section 6.2).

5. **Fishing Practices:** The siting of the host site(s) should make provision for access to the Cacheu River to permit continued artisanal fisheries. Where this cannot be provided, alternative livelihoods strategies are to be explored (See Section 6.2).

6. **Replacement of Businesses and Trade:** Local businesses are generally informal and based at the homestead. Business owners that will lose formal business premises due to resettlement will have replacement structure constructed at the host site(s).

   Trade links between the affected villages and Farim is critical in supporting household cash income from agricultural and Cashew fruit surplus. The siting of the host site(s) should make provision for continued and readily accessible trade links by ensuring the location is not isolated or of greater distance from Farim.

7. **Replacement of Natural Resource Base:** The siting of the host site(s) should make provision for access to natural areas to permit the continued harvesting of natural resources. Where this cannot be provided, alternative livelihoods strategies are to be explored (See Section 6.2).

7.2 LIVELIHOODS DEVELOPMENT

Resettlement should not only support livelihood restoration, but result in actual improvements in livelihoods. Under this principle a range of potential development initiatives may be adopted. These strategies will need further refinement during the RAP development phase and in consultation with relevant stakeholders. The potential strategies include:

1. **Conservation Farming:** The provision of training in conservation farming technique suited to local conditions. This may be supported by specialist agronomists or non-governmental organisations with suitable local expertise.

2. **Household Gardens Development:** The provision of agricultural extension and inputs for the improvement of household vegetable gardens. This may be linked to improved market links and local content procurement by the mine.

3. **Establishment of Markets and Improved Market Links:** Income is primarily generated by the sale of Cashew and vegetables. There are no markets located in the resettlement affected villages, and there is potential for the establishment of a market at any proposed resettlement village(s). This should be allied to improved market links.

4. **Establishment of Small-Scale Businesses/Entrepreneurs:** Provision of training, micro-credit and other supports to individual small-scale businesses or entrepreneurs. The support should be based on a viable business plan, and potentially linked to the local content procurement by the mine.

5. **Local Content:** Provision of support structures that allow the mine to procure goods and services from local people or communities. This may include support to local producers or entrepreneur so that they may meet the required standards.

6. **Local Employment:** Promote employment of resettlement-affected persons by the mine and contractors as a priority in any established preferential employment or employment policies. This further supports legislated requirements for the employment of nationals over foreigners.

The above initiatives specifically target livelihoods development for resettlement affected households. The initiatives should form a subset of a wider Community Development Programme.

8 HOST SITE

Where physical relocation of households is required, the resettlement process will need to identify a suitable host site. The process of identifying and screening of potential host sites must be systematic, and include consultation with affected households and the host community.

This RPF does not establish potential host site(s), as this generally falls under the RAP. In addition, the selection of host sites is generally determined by the Proponent with input from the Resettlement Working Group (RWG). This chapter thus provides a framework for the process of identification and screening of potential host sites.

8.1 HOST SITE SELECTION CRITERIA

The host site should provide sufficient land and resources to allow the reinstatement of the livelihoods of affected households. This should be undertaken without undue prejudice or impacts on any host community or existing land-uses.

A number of site selection criteria have been determined (See Table 8.1 overleaf). These criteria, once accepted by the relevant parties, should form the basis for the identification of one or more host sites.

8.2 HOST SITE SELECTION PROCESS

The selection of one or more host sites should include a detailed evaluation and engagement process. Land-use is often a complex matter hence sufficient time is required to ensure that issues around land-use conflict, planning and permitting is resolved. A generic process is summarized below:

1. **Engagement:** Consistent with the requirements for stakeholder engagement (See Chapter 9), the selection of host site(s) will be discussed with affected households, relevant authorities and the RWG. Special provision must be made for engagement with any host communities or land-right holders.
2. **Ratification of Host Site Selection Criteria:** The host site selection criteria (See Table 8.1) will be reviewed as part of the engagement process, and refined based on feedback. The criteria should be ratified by the relevant parties.
3. **Technical Evaluation of Host Sites:** The identification of potential host sites will be undertaken via a detailed technical evaluation. This may be undertaken by specialists contracted by the Proponent (including agronomists, town planners etc.) or a technical evaluation committee formed under the RWG.
4. **Ratification of Host Sites:** Consistent with the requirements for stakeholder engagement (See Chapter 9), the recommended host site(s) will be presented to the affected households, relevant authorities and the RWG for discussion, and where needed further refinement. Agreement will need to be reached in terms of the final host sites.
5. **Planning and Permitting:** Upon ratification of the host sites, and as part of the RAP implementation, detailed land-use planning and permitting will be required. The key permitting requirements will likely include an Environmental Impact Assessment and land registration under the Land Law, No 5/98.

Table 8.1: Host Site Selection Criteria

Category	Criteria
Land	The host site shall provide sufficient land to replace current landholdings, in equal size, in order to ensure the reinstatement of existing agricultural practices.
	The host site shall provide land with similar or better productive capacity of current landholdings in order to ensure the reinstatement of existing agricultural practices.
	The host site shall provide sufficient land to permit the existing practice of shifting cultivation with an average cycle of 3-4 years of active farming and 4-7 years of allowing the field to remain fallow.
	The host site shall provide sufficient land of lower productive capacity (and not utilised for agriculture) to support livestock grazing. This shall be in addition to land provided for agriculture.
	The host site should provide sufficient land to allow for the internal growth of the affected population. This does not include the immigration of non-affected households.
Accessibility and Mobility	The host site shall, based on its location, result in the improvement in access to and from the host village, including improved access to main roads and local centres.
Public Infrastructure and Services	The host site shall, based on its location, result in the improvement in access to existing public infrastructure and services, or allow for the development of sustainable services at the host village.
Domestic Water Needs	The host site shall provide sustainable access to groundwater resources to support domestic and livestock watering needs, throughout all seasons.
Livelihoods and Natural Resources	The host site shall provide suitable natural (defined as open terrain that has been transformed, but not actively utilised and has a low conservation value) areas to allow for the harvesting and utilisation of natural resources.
	The host site shall provide suitable access to the River Cacheu to permit the continued, and ideally improved, access of local artisanal fishers to the river.
	The host site shall provide suitable access to the floodplains of the River Cacheu to permit the continued salt farming.
	The host site shall provide suitable access to Farim in order to reinstate, or ideally improve, market and trade links for the sale of agricultural goods and natural resources.
Land Tenure and Use	The host site shall allow the reinstatement of land tenure rights equal to better than those rights currently held by households under customary and formal law.
	The host site shall avoid the economic and physical displacement of land-users or households located within the Host Site to the maximum extent possible. Any affected land-users or households will form part of the resettlement process.
	The host site shall, to the maximum extent possible, avoid potential conflict with existing ancestral or exclusive (individual) land-holdings.
Community Cohesion	The host site shall allow for the affected households to remain as a single community, and shall avoid splitting households through multiple host sites.
Host Community	The host site will be located where there are minimal existing communities so as to avoid potential stress and conflict on existing agricultural land, community resources and services.

8.3 HOST COMMUNITIES AND LAND-RIGHT HOLDERS

A key consideration in the selection of host sites is the potential impact on host communities and land-right holders. The acquisition of land for the host sites, and well as the relocation of households to a new community may result in conflict over the provision of compensation, loss of host community land to the resettled community and claims over Project benefits.

Host communities and land-right holders form part of the Eligibility and Entitlement Framework (See Chapter 5) and are grated the same rights and compensation afforded to households that are either physically or economically displaced.

8.4 SPECIAL CONSIDERATIONS

The establishment of a host site(s) as well as an associated resettlement village is complex and timing consuming, both of which need to be factored into the overall RAP development and implementation schedule. Some of the key considerations in the identifying and adoption of host site(s) include:

- Difficulty in findings unutilised land where resettled households can be relocated, without conflict with host communities.
- The need to undertake a separate Environmental Impact Assessment process, where the change in land-use triggers the listed activities in the EIA law.
- Negotiations and transfer of land-rights with existing customary land-right holders may be complex and prone to speculation and abuse.
- An undocumented and often complex structure of customary land-rights to be systemised prior to negotiations.
- Need for land-use planning, authorisation and cadastral surveying prior to utilisation.

9 STAKEHOLDER ENGAGEMENT

This chapter establishes the requirement with respect to stakeholder engagement during the resettlement and compensation process. Consultation with affected people and stakeholders is mandatory and is a corner-stone in ensuring due-process.

9.1 STAKEHOLDER ENGAGEMENT AND PARTICIPATION PROGRAMME

Participation of and consultation with the affected community and authorities is vital to the success of the resettlement and compensation programme. The process thus should ensure that affected persons are meaningfully consulted and are granted real opportunities to participate in planning and implementing of the resettlement.

Stakeholder engagement is generally initiated during the ESIA process and on a continual basis as part of the Stakeholder Engagement Plan (SEP). Special provision is however required in terms of targeted engagement with the resettled-affected stakeholders on resettlement matters. The major phases of when stakeholder engagement is required are as follows:

1. **Resettlement Notification:** This initial phase allows for the timely dissemination of information regarding the project and its resettlement component. Targeted community meetings should be undertaken at each affected community, as well as any host site communities. Special meetings should be convened for national and local authorities, as well as the first Resettlement Working Group (RWG) meeting.
2. **Entitlement Framework and Livelihoods Restoration:** A second round of engagement will be required to present a draft of the entitlement framework and livelihoods restoration plan. This will allow feedback from stakeholders on the rights provided and allow for amendments prior to the finalisation.
3. **Host Site(s) Selection Process:** A third round of engagement will be required to present the findings of the host site(s) selection process. Focus must be placed on the host communities and land-right holders, in additional to other key stakeholder.
4. **Resettlement Action Plan:** The fourth and final round of engagement will be required to present the RAP to all relevant stakeholders. Amendments may be required based on feedback, before the action plan is accepted by the key authorities. It is expected that the RWG should also accept the plan prior to finalisation.

Stakeholder engagement during the resettlement process is an iterative process. Significant flexibility will be required in terms of organising the type, number and timing of meetings on a needs basis. Suitable provision of personnel and resourcing is required to support ongoing engagement throughout the resettlement process.

The Proponent will thus, under its organisational responsibilities (See Section 0), need to establish a resettlement planning and implementation team, with suitable provision of Community Liaison Officers (CLOs) for the duration of the resettlement planning and implementation programme.

9.2 RESETTLEMENT WORKING GROUP

A RWG will be established during the preparation of the RAP, and function for the duration of the resettlement implementation. The RWG will function as a primary consultative forum for the Project, with a mandate that includes:

- To act as the primary channel of communication and cooperation between the various stakeholders involved in the resettlement process,
- To act as a focus group forum in which the Proponent can consult on various resettlement aspects,
- To function as a forum where government departments may discuss and confirm procedures and policies relevant to resettlement,
- To debate the Entitlement Framework, and make recommendations as to how it is best structured to ensure equity to all parties,
- To function as the court of first appeal to solve any grievance that arises relating to the resettlement process,
- To assume primary responsibility for assisting the Proponent, if the Project proceeds, in overseeing the resettlement processes in all its phases.
- To review and comment on the RAP

The RWG is constituted as an advisory body and its recommendations will not be binding on the Proponent. However, recommendations by the RWG are duly recorded and become a matter of public record. Where representatives of government departments make recommendations, they are deemed to be in accord with State policy and law.

The RWG, at minimum, should comprise of the following members:

- Representative of the Proponent,
- Representative of the Ministry of Natural Resources and Energy,
- Representative of the Ministry of Agriculture,
- Representative of the Land Commission (Regional),
- Representative of the regional and local administration,
- Representatives (one) from each of the resettled and host villages
- Female representative (one) from each of the resettled and host villages.

The RWG may establish Sub-Committees to address technical or particular issues on behalf of the RWG. These Sub-Committees will function as advisory bodies to the RWG, and all recommendations must be ratified by the RWG.

9.3 GRIEVANCE MECHANISM

Following international good practice, a grievance mechanism will be developed and implemented by the Proponent. The mechanism will provide a credible and accessible means for PAPs to raise any grievances, issues or objections specific to resettlement. In turn, the mechanism will ensure a systematic means of recording and addressing grievances. A generic grievance process is depicted in **Error! Reference source not found.**.

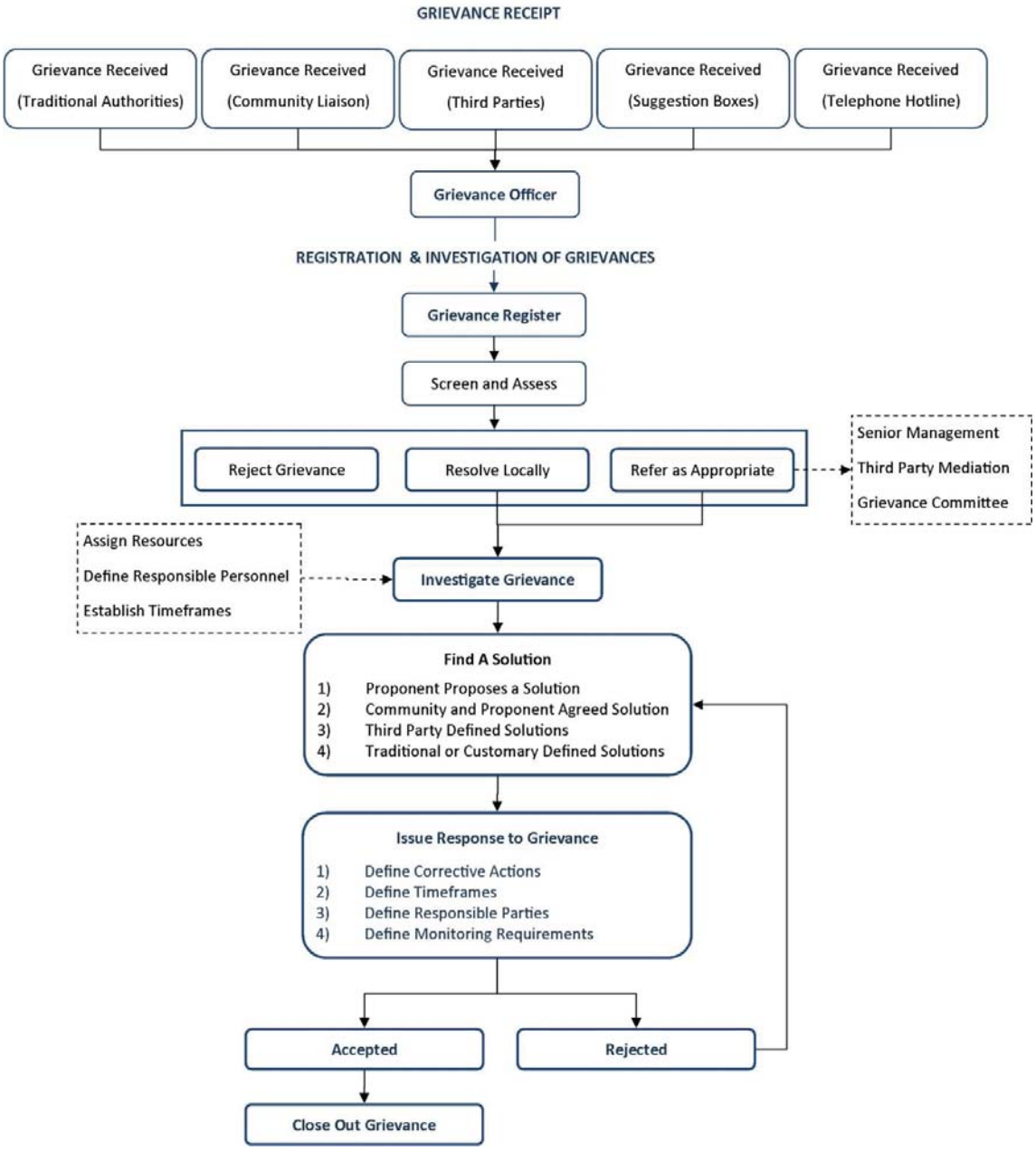

Figure 9.1: Generic Grievance Process

10 IMPLEMENTATION PLAN

This Chapter establishes a RAP development and implementation programme, as well as a preliminary costing and schedule for resettlement. Further refinement will be required in the detailed Resettlement Action Plan (RAP).

10.1 RESETTLEMENT ACTION PLAN DEVELOPMENT

This RPF will be upgraded to a comprehensive RAP prior to implementation of any resettlement. The generic approach to the development of the RAP is depicted in **Error! eference source not found.**. Specific tasks include those detailed below.

10.1.1 Stakeholder Engagement and Resettlement Working Group

The Proponent will ensure sufficient engagement with all relevant stakeholders that would form part of the resettlement process. The recommended approach to stakeholder engagement is detailed in Section 9.1 of this report.

In addition, on-going engagement and collaborative decision-making will be promoted via the formation of a RWG. The recommended approach to the RWG is detailed in Section 9.2 of this report.

10.1.2 Household Validation Survey

A household survey was undertaken in the preparation of this RPF and the overarching ESIA, in May 2015. The household is considered to have a limited *shelf-life*, and the baseline data is considered valid for a period not extending for more than two years.

Where there is any significant delay in project implementation, and the household survey undertaken in 2015 is considered to be out-of-date, the Proponent will undertake a household validation survey.

10.1.3 Eligibility and Entitlement Framework

The eligibility and entitlement framework provided in Chapter 5 of this report will be made public during the stakeholder engagement process and via the RWG. The rights provided in the framework will reviewed and amended based on feedback from the engagement and recommendations made by the RWG.

The review of the eligibility and entitlement framework is expected to be a negotiated process, which will require iterative approach to stakeholder engagement. It is likely that multiple iterations of the framework will need to be developed. Suitable time will need to be provided to support this process.

It is expected that written acceptance be obtained from the relevant State authorities and the RWG prior to the finalisation and ratification of the eligibility and entitlement framework

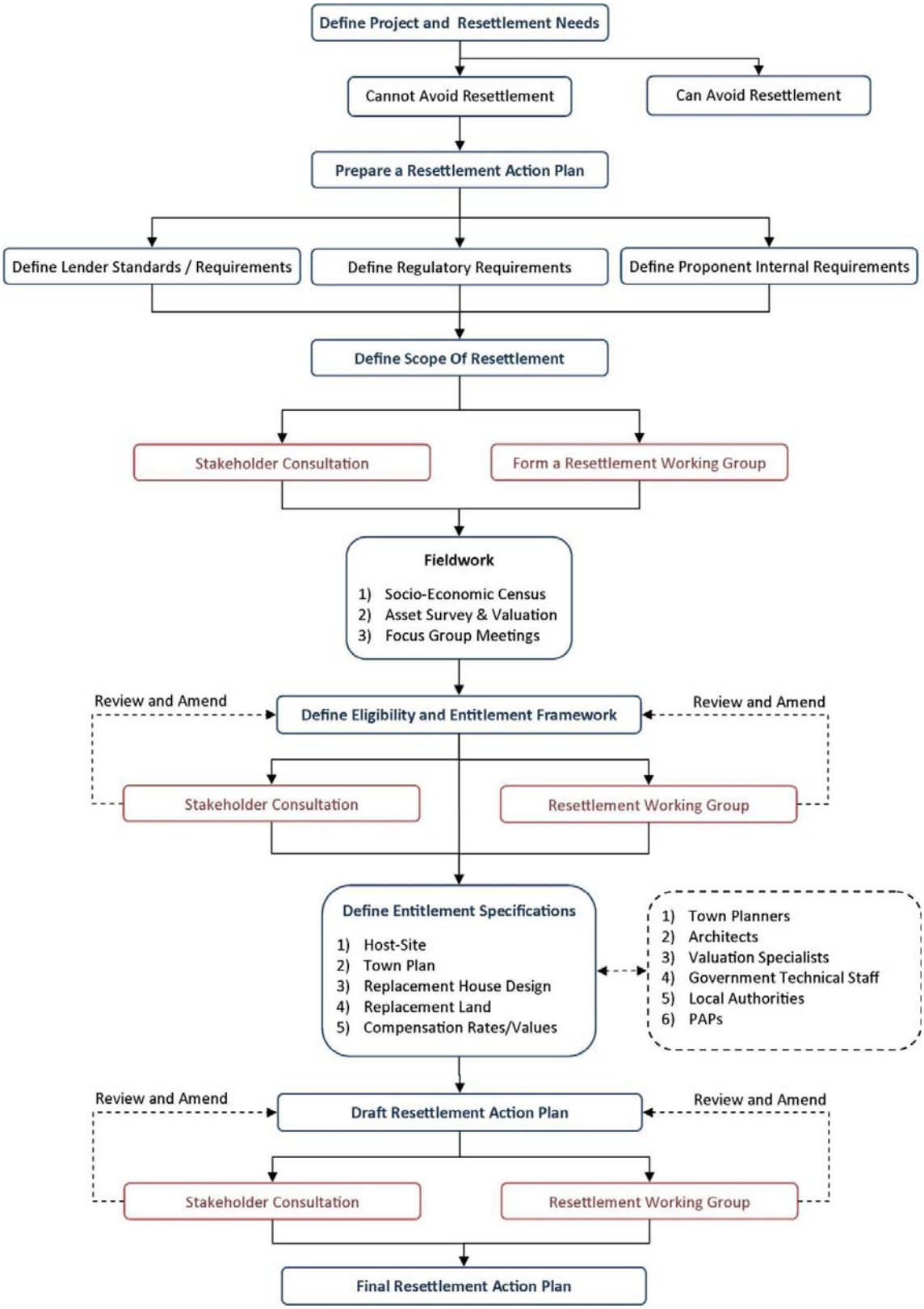

Figure 10.1: Resettlement Process Flow Diagram

10.1.4 Entitlement Specifications

In cases where the entitlement framework makes provision for the replacement of household or community assets, the Proponent will establish suitable entitlement or design specifications. Specifications may include, depending on the final entitlement framework, the following:

- Land tenure secured for replacement land for individuals and communal land,
- Town plan for resettlement village (where applicable),
- Replacement structure design and building standards,
- Replacement structure design for community facilities (where applicable),
- Engineering design for any agreed public amenities,
- Engineering design for replacement or new community access roads.

The establishment of the technical specifications may be undertaken by the Proponent via the contracting of specialists, or via technical evaluation groups established under either the relevant State departments or the RWG.

10.1.5 Identification of Host Site and Village

Resettlement requires the physical relocation of people to a new site or location – generally termed the Host Site or Host Village. The process of identifying and selecting potential host sites should consistent with the provisions made in Chapter 8 of this report.

The establishment of the technical specifications may be undertaken by the Proponent via the contracting of specialists, or via technical evaluation groups established under either the relevant State departments or the RWG

It is expected that the identification of the host site be undertaken in consultation with resettlement-affected households, any applicable host communities and the relevant state officials.

10.1.6 Livelihoods Restoration and Development Framework

The Proponent, in consultation with resettlement-affected households, the RWG and the relevant State authorities, will develop a livelihoods restoration and development framework. Further detail is provided in Chapter 6 of this report.

10.1.7 Vulnerable Groups

The RAP will need to make special provision for the protection of vulnerable peoples or groups. Vulnerable groups include People who by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status may be proportionally more adversely affected by resettlement than others and who may be limited in their ability to claim or take advantage of resettlement assistance and related development benefits.

During the development of the RAP, the Proponent will need to identify and profile vulnerable groups via any household validation survey (See Section 10.1.2), via the

stakeholder engagement process and in consultation with the RWG. Potential vulnerable groups may include:

- Female-headed households and women in general,
- Children-headed households,
- People with disabilities,
- Disproportionally poor households,
- Households entirely comprised of the elderly (above the age of 60),
- Ethnic minorities

10.1.8 Establish a Resettlement Action Plan

The findings of the above tasks will be presented in a RAP. This plan will be made available to the public for review and comments consistent with the Stakeholder Engagement process (See Chapter 9 of this report). It is expected that the RAP be reviewed and accepted by the relevant State authorities and the RWG prior to finalisation.

There is no separate legal mechanism for the licensing or authorisation of the resettlement process. However it is expected that the RAP be formally authorised by the relevant State authorities, consistent with any mining conventions established between the mining right holder and the national authorities

10.2 RESETTLEMENT IMPLEMENTATION PHASE

10.2.1 State Agreements

The Proponent will be required to establish suitable conventions or agreements with national state and local administration authorities in terms of resettlement. These agreements should make provision for those required under the Mining Law including state conventions and access contracts. Such agreements should make provision for suitable legal mechanisms for:

- Establishing the principles and procedures for resettlement,
- Land acquisition and compensation measures,
- Procedure for the vacating and transfer of land rights.
- Establishment and enforcement of the development moratorium,
- Role and responsibilities of the State and the Proponent in terms of resettlement.

One of the key requirements is to obtain formal and legal recognition of the land acquisition process and the establishment of a development moratorium. This prevents uncontrolled influx of people or speculative development prior to the resettlement. Enforcement is often a mandate of local or traditional authorities' therefore fixed formal agreements is essential.

10.2.2 Cut-Off Date and Development Moratorium

In order to define individual, household, family, group or entity with respect to eligibility, a suitable cut-off date needs to be established. Any new household or development established after the cut-off date would not be eligible for resettlement and compensation. This prevents potential speculative development and in-migration of opportunists.

The cut-off date is linked to the formal notification of a development moratorium – or a statement that from the cut-off date, all eligible persons or groups are to cease any form of development, including establishing households, structures, fields etc. Any assets developed after the announcement of the development moratorium would not be compensated.

The establishment of the development moratorium is very time sensitive, as it places significant pressures on local households. If there is a significant time gap between the moratorium and the actual relocation, then households often suffer from lack of productivity of agricultural fields and household structures become dilapidated from lack of maintenance.

The establishment of a cut-off date and moratorium on development will need to be undertaken as part of the RAP implementation. This should only occur when the Project is given the formal Go-Ahead, and the need for resettlement is confirmed. The establishment of the cut-off date should follow a sequence of steps as follows:

1. Formal public notification of the Project Go-Ahead and confirmation of resettlement,
2. Definition of an agreed Cut-Off Date and Development Moratorium with the RWG,
3. Notification of eligible households of the Cut-Off Date and Development Moratorium,
4. All household assets to be surveyed within 2 months of the notification, which includes a Household Census and Asset Inventory and Valuation Study, allied with a land-holding census (See Section 10.2.3)
5. Sign-off of the surveys by individual household heads and local chiefs.
6. Ongoing monitoring and enforcement of the development moratorium by the Client and local authorities.

As no cut-off date has been established, households are not restricted in continuing to development new structures or fields. No restriction should be placed on households until the formal Cut-Off Date and Development Moratorium is established.

Customary rights are confirmed with the local authorities (the Chief) during the time of the socio-economic and asset survey. Any disputes in terms of eligibility, at the time of the RAP implementation, will need to be forwarded to the RWG or defined Disputes Committee for adjudication.

10.2.3 Asset Inventory and Valuation

Upon the establishment of a development moratorium and cut-off date, the Proponent will undertake a detailed Asset Inventory and Valuation Study of all resettlement-affected households, assets and associated land-holdings. This will be consistent with the general approach provided in Chapter 6.

10.2.4 Negotiation of Entitlement Contracts

A formal compensation schedule, made up of compensation agreements for each household, will be prepared by the Proponent. The compensation agreement will be established based on the findings of the valuation study and consistent with the eligibility framework.

The compensation agreements will be reviewed by the state or local administration, as specifically affected households will be permitted to review and verify their individual compensation packages. Where there is agreement, the affected households will be advised to sign a consent form/compensation claim form, which will serve as a no objection to resettlement and/or compensation payment.

10.2.5 Construction and Relocation

The Proponent will likely function as the primary organisation for the funding and management of all construction activities related to resettlement. This includes any construction of replacement structures, resettlement village and community facilities etc. as agreed during the development of the RAP.

Provision will therefore be needed for sourcing suitably experienced EPC contractors, provision of funding and oversight of construction. Project construction can take place after all households receive their money and have been given time to vacate the compensated land and assets, hence the timing of construction is critical to the overall mine schedule.

10.2.6 Compensation Payments

Compensation payments will be made consistent with the entitlement agreements established for each household. To facilitate this process, affected households are generally assisted with opening back accounts. Once payments are processed, the affected household will be required to sign-off their confirmation of payment and acceptance of the compensation amount.

10.2.7 Monitoring and Evaluation

Monitoring and evaluation will be undertaken during the resettlement and compensation process. The aim of monitoring is to assess whether the requirements of the RAP is being met. Monitoring and evaluation will be undertaken at two levels – Internal and External Monitoring.

Internal monitoring will be undertaken by the Project proponent (or agency elected to implement the RAP) as part of its internal performance monitoring system. The aim and objective of internal monitoring will include:

- Ensure that due process has been followed in the implementation of the RAP,
- Track performance/progress against the RAP requirements and timeframes,
- Highlight key non-compliances/issues that need to be resolved,
- Recommend solutions with respect to non-compliance/issues.
- Report to senior management within the Project on the above

Personnel undertaking the monitoring will have sufficient expertise to ensure the process is suitably robust for external auditing or peer review purposes. Where deemed necessary, the Project may appoint and external expert to undertake the monitoring on the Project's behalf.

Monitoring of the progress of implementing the RAP will be undertaken monthly, from the establishment of the moratorium until the conclusion of the relocation of households, replacement of land and payment of compensation, and conclusion of the defects liability period on buildings. Parameters for monitoring are listed in Table 10.1.

Table 10.1: Monitoring Parameters

Category	Monitoring Parameter
Programme Management	1. Actual versus Predicted RAP Implementation Schedule. 2. Actual versus Predicted Household Relocation Implementation Schedule. 3. Actual versus Predicted Replacement Land Implementation Schedule. 4. Actual versus Budgeted Cost Expenditure.
Asset Replacement	1. Outstanding versus Concluded Agreements with the State on Community Facilities 2. Number of Signed to Unsigned Compensation Packages. 3. Actual versus Predicted Resettlement Village Construction Schedule. 4. Actual versus Predicted Community Facilities Construction Schedule. 5. Actual versus Predicted Replacement Housing Construction and Handover Schedule. 6. Actual versus Predicted Irrigated Land Preparation Schedule. 7. Actual versus Predicted Irrigated Land Handover Schedule. 8. Outstanding grievance related to replacement of assets and land
Compensation	1. Number of Signed to Unsigned Compensation Packages 2. Actual versus Predicted Compensation Payment Schedule 3. Outstanding grievance related to compensation values
Livelihood Restoration	1. Livelihood restoration and development programmes initiated. 2. Programme Spend versus Predicted Budget. 3. Number of Actual versus Predicted Project Beneficiaries
Engagement	1. Actual versus Predicted RWG Meetings 2. Outstanding versus Concluded Agreements with the RWG. 3. Actual versus Predicted Community Meetings
Demographic Change	1. Demographic profile 2. Education levels 3. Skills level. 4. Changes to status of women, children and vulnerable groups. 5. Access to primary and other healthcare. 6. Access to potable water. 7. Changes in nutritional status. 8. Employment levels. 9. Access to livelihoods and resources. 10. Homestead asset profiles including homestead structures. 11. Homestead land holding. 12. Security of tenure for affected households. 13. Income levels and sources. 14. Livestock ownership. 15. In-migration and population changes. 16. Health facility usage.
Other	1. Appointment of internal staff and resourcing, 2. Completion of census and socio-economic surveys, asset valuations etc., 3. Outstanding and completed grievances

External monitoring and evaluation will be undertaken during the implementation of the resettlement by an independent entity with appropriate resettlement experience. The timing of the external monitoring should be undertaken in line with the auditing requirements established as part of the Mining License, specific lender requirements or annually, whichever is the shorter period.

Upon conclusion of the resettlement, a Close-Out Audit is to be prepared by an external specialist. The overall aim of the audit will be to verify that resettlement and livelihood restoration activities have been undertaken consistent with the requirements of the RAP and any specific government and funder requirements.

10.3 RESETTLEMENT PHASING

A review of the scope of resettlement against the proposed mine/project schedule (See Table 10.2) permitted the determination of whether resettlement can be undertaken in phases, and the nature of risks associated with phased-resettlement.

Table 10.2: Proposed villages to be affected by resettlement and project phasing

Village Name	Project Year	No of Households
Saliquenhe Porto/ Ponta Zeca	0-3	14
Saliquenhe	8-10	76
Cabisseki / Ponta Capsec	15-16	8
Tambato Mandinka	21-24	22
Canico	-	55
Total	-	175

Saliquenhe Porto/ Ponta Zeca are located in proximity to the South Pit and the Processing plant and will be affected by construction in the first three years of the Project. Resettlement will therefore be required immediately for the 24 estimated households.

Saliquenhe is a large village which will be located on the north pit, and will be impacted in year 8-10 of the mine. However, impacts are likely to commence earlier due to land-acquisition requirements and associated loss of agricultural land.

A key further consideration is the potential growth of Saliquenhe if the village is resettled at a later date. Explosive growth and influx is a material risk in mining projects, and often such growth is concentrated on villages located on the boundary of the mine. Influx is difficult to contain, and therefore the potential for the rapid growth of this village is very likely.

Furthermore, the enforcement of a development moratorium and speculative development over a period of 10 years is difficult. A development moratorium on internal growth cannot be enforced over a decade as this will result in significant impacts on resident people. Speculative development is highly probable as enforcement cannot be strictly guaranteed by the local authorities over time.

Considering the above risks and the potential for significant escalation of household numbers and associated resettlement costs, it is recommended that Saliquenhe is resettled immediately.

For the same reasons highlighted above, it is recommended that Cabisseki / Ponta Capsec and Tambato Mandinka are also resettled immediately. The villages have a combined household number of 23 therefore the cost implications are not considered substantive.

The village of Canico is not located directly within the two pits and therefore is not linked to any particular mine sequence. Impacts are predominately related to land-take for the waste dumps, which is expected to be established early in the mine sequence. Hence it is recommended that Canico be resettled immediately.

There is little rationale for the phasing of resettlement as the risks of long term population growth and speculative development is considered to outweigh the initial cost implications.

A further benefit of resettling all the villages is that it creates a "sterile area" – an area cleared of villages and land-use in proximity to the active mining area. This sterile area can be enforced directly by the Proponent in terms of speculative development and community safety, without direct reliance on the State or local authorities.

10.4 ORGANISATIONAL ROLES AND RESPONSIBILITIES

The Proponent

The Proponent is the primary responsible organisation for the implementation of the resettlement. The Proponent will provide the financial resources necessary for the resettlement and compensation process and should provide significant additional managerial and technical expertise. The roles and responsibilities of the Ministry can be broken down into three distinct phases, as follows.

1. **Pre-Implementation Phase**
    a. Provide for public notification of the intent to resettle.
    b. Initiate the stakeholder engagement process with focus on the resettled communities.
    c. Establish the RWG
    d. Agree on the Entitlement Framework and establish entitlement specifications.
    e. Undertake a household registration and eligibility validation process.
    f. Prepare a Land Holding Inventory.
    g. Prepare the Asset Inventory and Valuation Study Report.
    h. Identify and investigate host site options.
    i. Develop a Livelihoods Restoration and Development Programme.
    j. Prepare the RAP.
2. **Implementation Phase**
    a. Prepare the Entitlement Contracts for each individual affected household.
    b. Co-ordinate the design and construction of the resettlement village.
    c. Co-ordinate the design and construction of the replacement households.
    d. Co-ordinate in the design and construction of the replacement community infrastructure.
    e. Ensure the ordered and legal handover of replacement homesteads and homes.
    f. Ensure the ordered and legal payment of cash compensation.
    g. Ensure the ordered and legal handover of replacement agricultural land.

h. Ensure the implementation of the Livelihoods Restoration and Development Programme.
i. Establish a socio-economic monitoring programme for the affected households.
j. Organise and attend engagement meetings and providing support and input.
k. Organise and attend ongoing RWG meetings at suitable intervals.
l. Address compensation and resettlement grievances.

3. Resettlement Closure Phase

a. Finalise any outstanding compensation or replacement requirements.
b. Finalise and close-out outstanding grievances.
c. Provide on-site resources for the duration of the defects liability period for buildings.
d. Transition the Livelihoods Restoration and Development Programme into an operational, long-term support programme.
e. Appoint an independent specialist to undertake a Close-Out Audit.

The above tasks will require considerable preparatory work; and much of the administrative and financial requirements will fall onto the Proponent. It is recommended that the pre-implementation phase is commenced within two years prior to the intent to commence construction of the Dam.

The implementation of the resettlement should be done via the establishment of a dedicated resettled team, mandated to undertake the roles and responsibilities of the Proponent. Suitable technical and managerial skills will be required.

The State

The State will function as the primary authorising and support agent to the Proponent on resettlement matters. However, much of the implementation requirements will remain with the Proponent. State responsibilities will include:

1. The authorisation and permitting of resettlement activities, where applicable.
2. To provide guidance to the Proponent on legal or procedural matters.
3. To enter into legal agreements/conventions with the Proponent on resettlement and land acquisition requirements.
4. Supporting the Proponent in the acquisition of land and establishment of a concession consistent with local law.
5. To support to the Proponent in providing development assistance to relocated households.
6. Ensuring that the moratorium on development, once it is formally announced, is observed;
7. Ensure compatibility of the resettlement process with overall development visions for the area.

Resettlement Working Group / Customary Authorities

The RWG will functions as the primary consultative forum between all parties and specifically for resettlement affected communities. The primary responsibilities of the RWG include:

- To act as the primary channel of communication and cooperation between the various stakeholders involved in the resettlement process,
- To act as a focus group forum in which the Proponent can consult on various resettlement aspects,
- To function as a forum where government departments may discuss and confirm procedures and policies relevant to resettlement,
- To debate the Entitlement Framework, and make recommendations as to how it is best structured to ensure equity to all parties,
- To function as the court of first appeal to solve any grievance that arises relating to the resettlement process,
- To assume primary responsibility for assisting the Proponent, if the Project proceeds, in overseeing the resettlement processes in all its phases.
- To review and comment on the RAP.

10.5 BUDGET

A preliminary costing has been prepared for the resettlement based on the initial quantum of affected households. Two costing scenarios have been established as follows:

- **Scenario 1 – Provision of replacement structures to predefined construction standards:** This scenario is consistent with IFC requirements; however it is the more costly scenario, accounting for nearly 60% of the entire resettlement costs.
- **Scenario 2 – Provision of cash compensation only for primary structures:** This scenario provides cash compensation to households to the value of local materials and labour required to construct new primary home structures. The Proponent will provide support and guidance to households in the construction process.

Scenario 1 and 2 costing estimates are provided in Table 10.3 and Table 10.4 overleaf. Costing assumptions and limitations are included after the costing.

10.6 SCHEDULE

A preliminary schedule required for the development and implementation of a RAP is provided in Table 10.5 overleaf. This schedule is a generic timetable based on the nature and scale of the proposed resettlement process. Further refinement is required during the development of the RAP.

Table 10.3: Scenario 1 Cost Estimate

SCENARIO 1 - PROVISION OF REPLACEMENT BUILDINGS TO DEFINED CONSTRUCTION STANDARDS				
Replacement Housing -Primary Structures	**Number of Structures**	**Main Structure Built Cost per m^2**	**Ave (m^2)**	**Grand Total**
Saliquenhedin	105	97	105	$1 069 425.00
Cabisseki/Ponta Capsec	12	97	82	$95 448.00
Saliquenhe Porto/ Ponta Zeca	22	97	104	$221 936.00
Tambato Mandinka	28	97	85	$230 860.00
Canico	71	97	107	$736 909.00
Total	**238**			**$2 354 578.00**

Secondary Structures	**Number**	**Cost**	**Total Cost**
Secondary Structures	375	$50.00	$18 750.00
VIP Toilet (1 per Household)	0	$0.00	$0.00
Total			**$18 750.00**

Community Infrastructure	**Number**	**Cost**	**Total Cost**
Schools	1	$23 699.00	$23 699.00
Churches	2	$12 998.00	$25 996.00
Clinic	1	$0.00	$0.00
Replacement Water (Wells)	Lump Sum	$25 000.00	$25 000.00
Total			**$74 695.00**

Cultural Resources	**Number**	**Cost**	**Total Cost**
Graves - Ceremonial Costs	0	$0.00	$0.00
Graves - Re-internment	0	$0.00	$0.00
Total		**Lump Sum**	**$75 000.00**

Tree Compensation		**USD**	**Units**	**Total Cost**
	Banana	$5.00	201	$1 005.00
	Coconut	$32.00	23	$736.00
	Orange	$17.00	255	$4 335.00
	Lemon	$17.00	1 824	$31 008.00
	Mango	$10.00	1 185	$11 850.00
	Palm	$9.00	448	$4 032.00
	Cibe	$10.00	383	$3 830.00
	Guava	$13.00	58	$754.00
	Cashew	$20.00	23 800	$476 000.00
Total				**$533 550.00**

Crops and Land				
		Area (Hec)	USD	Total Cost
	Land Rights Transfer	805.9	0	$0.00
	Fields (Rice)	280	$646.00	$180 880.00
	Fields (Beans)	47.3	$240.00	$11 352.00
	Fields (Maize)	297	$350.00	$103 950.00
	Fields (Pumpkin)	17.6	$1 011.00	$17 793.60
	Fields (Peanut)	54.6	$1 300.00	$70 980.00
	Fields (Sweet Potato/Potato)	16	$1 034.00	$16 544.00
	Fields (Yam)	21	$1 034.00	$21 714.00
	Fields (Cassava)	24	$520.00	$12 480.00
	Fields (Millet/Sorghum/Fonio)	37.4	$375.00	$14 025.00
	Fields (Sesame)	11	$600.00	$6 600.00
	Land Preparation	805.9	$150.00	$120 885.00
	Seed starter pack	175	$125.00	$21 875.00
Total				**$599 078.60**

Contingency / Allowances (10%)	**$350 595.66**

Transport/Moving Allowance	HH	Cost	Total Cost
	175	$200.00	**$35 000.00**

Livelihood restoration	**$175 000.00**

Resettlement Management				
	Resource	**Years**	**Cost Per Annum**	
	Resettlement Manager @ USD 150000	3	150000	$450 000.00
	Construction Supervisor	1.5	120000	$180 000.00
	Architect Fees	1	20000	$20 000.00
	1 x Livelihoods Officer	3	25000	$75 000.00
	2 x Community Liaison Officers	3	10000	$30 000.00
	Town Planning Scheme	1	20000	$20 000.00
	Logistics and Support @ USD 45000	3	15000	$45 000.00
Others	Survey team -Asset Register	1	75000	$75 000.00
Consultants	Phase 2 RAP	1	200000	$200 000.00
Total				**$1 095 000.00**

Total	**$5 311 247.26**

Cost per HH	**$30 349.98**

Table 10.4: Scenario 2 Cost Estimate

SCENARIO 2 - PROVISION OF CASH COMPENSATION FOR THE LOSS OF RESIDENTIAL STRUCTURES				
	Number of Structures	Cost per m^2	Ave (m^2)	Grand Total
Saliquenhedin	105	47	105	$518 175.00
Cabisseki/Ponta Capsec	12	47	82	$46 248.00
Saliquenhe Porto/ Ponta Zeca	22	47	104	$107 536.00
Tambato Mandinka	28	47	85	$111 860.00
Canico	71	47	107	$357 059.00
Total	**238**			**$1 140 878.00**

Secondary Structures	**Number**	**Cost**	**Total Cost**
Secondary Structures	375	$50.00	$18 750.00
VIP Toilet (1 per Household)	0	$0.00	$0.00
Total			**$18 750.00**

Community Infrastructure	**Number**	**Cost**	**Total Cost**
Schools	1	$23 699.00	$23 699.00
Churches	2	$12 998.00	$25 996.00
Clinic	1	$0.00	$0.00
Replacement Water (Wells)	Lump Sum	$25 000.00	$25 000.00
Total			**$74 695.00**

Cultural Resources	**Number**	**Cost Per Unit**	**Total Cost**
Graves - Ceremonial Costs	0	$75.00	$0.00
Graves - Re-internment	0	$200.00	$0.00
Total			**$75 000.00**

Tree Compensation		**USD per unit**	**Units**	**Total Cost**
	Banana	$5.00	201	$1 005.00
	Coconut	$32.00	23	$736.00
	Orange	$17.00	255	$4 335.00
	Lemon	$17.00	1 824	$31 008.00
	Mango	$10.00	1 185	$11 850.00
	Palm	$9.00	448	$4 032.00
	Cibe	$10.00	383	$3 830.00
	Guava	$13.00	58	$754.00
	Cashew	$20.00	23 800	$476 000.00
Total				**$533 550.00**

Crops and Land				
		Area (Hec)	**USD**	**Total Cost**
	Land Rights Transfer	805.9	0	$0.00
	Fields (Rice)	280	$646.00	$180 880.00
	Fields (Beans)	47.3	$240.00	$11 352.00
	Fields (Maize)	297	$350.00	$103 950.00
	Fields (Pumpkin)	17.6	$1 011.00	$17 793.60
	Fields (Peanut)	54.6	$1 300.00	$70 980.00
	Fields (Sweet Potato/Potato)	16	$1 034.00	$16 544.00
	Fields (Yam)	21	$1 034.00	$21 714.00
	Fields (Cassava)	24	$520.00	$12 480.00
	Fields (Millet/Sorghum/Fonio)	37.4	$375.00	$14 025.00
	Fields (Sesame)	11	$600.00	$6 600.00
	Land Preparation	805.9	$150.00	$120 885.00
	Seed starter pack	175	$125.00	$21 875.00
Total				**$599 078.60**

Contingency / Allowances (10%)	**$229 225.66**

Transport/Moving Allowance	**HH**	**Cost**	**Total Cost**
	175	$200.00	**$35 000.00**

Livelihood Restoration	**$175 000.00**

Resettlement Management				
	Resource	**Years**	**Cost Per Annum**	Total Cost
	Resettlement Manager @ USD 150000	3	150000	$450 000.00
	Construction Supervisor	0	120000	$0.00
	Architect Fees	0	20000	$0.00
	1 x Livelihoods Officer	3	25000	$75 000.00
	2 x Community Liaison Officers	3	10000	$30 000.00
	Town Planning Scheme	1	20000	$20 000.00
	Logistics and Support @ USD 45000	3	15000	$45 000.00
Others	Survey team -Asset Register	1	75000	$75 000.00
Consultants	Phase 2 RAP	1	200000	$200 000.00
Total				**$895 000.00**

Total	**$3 776 177.26**

Cost per HH	**$21 578.16**

The following assumptions apply to the following costing:

- All prices were developed using USD.
- **Primary Structures:** No asset survey was undertaken. Individual residential building footprints were determined during the household survey. Figures should be considered as general estimates only. Estimates were verified using Satellite Imagery (Google Earth).
- **Primary Structure Replacement Cost (Scenario 1):** Replacement cost was determined using a standard construction rate provided by GBM (Date: 17/06/2015) stating USD 97 per square meter under scenario 1 specifications
    - All existing housing will be surveyed to determine "floor area" and number of rooms.
    - Floor area is defined as the built area of floor under roof, measured in metres squared, within structures used as primary dwellings in which people reside. Floor area does not include eaves, toilets, external showers, external washing areas, temporary structures, storage structures, animal pens and spiritual houses.
    - The replacement housing provided will have at least an equivalent floor area and same number of rooms as that currently occupied by those to be resettled.
    - All labour and materials will be paid for by the Proponent and will not be deducted from other compensation entitlements.
    - Under this option, the replacement building will be constructed as follows:
        - a concrete base;
        - concrete brick construction;
        - roof sheeting (zinc);
        - a single gutter leading to a water tank;
        - a ventilated pit latrine located at a distance from the house;
        - at least one door in steel frame;
        - glass windows or shutters in wooden or steel frames as per beneficiary request;
        - mosquito mesh over windows/shutters and ventilation holes; and
        - a painted exterior
- **Primary Structure Replacement Cost (Scenario 2):** Under this scenario, households are paid cash compensation and permitted to reconstruct their new households using local materials. Cash compensation values are determined by the household footprint and a value of USD 47 per square metre, as provided by GBM (Date 25/06/2015) under scenario 2 specifications as follows:
        - Compacted earth/clay foundation
        - Mud block walls
        - Corrugated iron sheet roofing.
- **Secondary Structures:** All non-residential secondary structures will be compensated with cash. A standard value of USD 50 has been costed, however this may vary based on the outcomes of the Asset Inventory and Valuation study.
- **Pit Latrines:** Each resettled household will be provided with a replacement pit latrine. The latrine will be a ventilated pit latrine located at a distance from the house. This structure will have a concrete base, gum poles and a roof of treated poles and walls of baked brick or reeds. The costing is integrated with the primary structures so no separate line item is provided.

- **Community Infrastructure:** The following costing assumptions are made in terms of replacement community infrastructure:
    - **Replacement school:** The Saliquenhe School has an estimated area of 167m^2 and constructed of bricks and plaster, zinc roofing and concrete base. There is one informal Madrasa school located at Tambato and one additional school at Canico. Both have been excluded from costing as they are abandoned or no a formal structure. Assuming Scenario 1 is adopted, the costing is calculated as 167m2 x USD 97 per m^2 = USD 16 199. Provision has been made for three pit latrines at a lump sum of USD 7 500. The total cost for the replacement school is estimated at USD 23 699.
    - Mosques: Two confirmed Mosques are located at Saliquenhe and Canico which will need to be replaced. Both Mosques are estimated at 8x8metres in dimension (excluding verandas), constructed of bricks/plaster, zinc roof, concrete foundation and wooden doors. Both mosques include an estimated 1x1m, two story tower. Assuming a total footprint of 134m^2 and a costing of USD 97 per m^2, the total replacement value for both structures is USD 25 996.
- **Graves Re-internment:** It is assumed that all costs related to the exhumation, relocation and re-interment of graves and re-establishment of the local community cemeteries is costed under the EMP. No cost provision for cultural features has been made under the preliminary resettlement budget.
- **Tree Numbers:** There is a very poor understanding on the number of tree holdings by individual households; hence number may be actively exaggerated. Both Mango and Cashew numbers are considered elevated and can only be verified via a detailed Asset Inventory and Valuation Study. The Cashew numbers have been moderated based on the estimated areas under Cashew monoculture and an estimated 100 Cashew trees per hectare, rather than household claims.
- **Tree Numbers:** The number of claimed mangoes is considered to be elevated. Under the costing these number have been moderated on the understanding that Mangoes are largely restricted to towns or settlements. Tree density is estimated to be between 5 (in smaller settlements) to 15 (in larger settlements) trees per hectare. According to the land budget the total land under village occupation is 79 hectares. Assuming 15 trees per hectare this equates to 1 185 trees. This is deemed a general estimate only to moderate to elevated trees claims made by the households, and is not linked to any asset survey.
- **Trees Compensation Rates:** No tree compensation rates were made available from the relevant authorities to the Proponent. Compensation rates were sourced from Mozambique due to the similar socio-economic, economic and cultural conditions with Guinea-Bissau.
- **Land Tenure Transfer Costs:** Based on the land tenure arrangement in Guinea-Bissau, it is assumed there are no costs associated with land-rights transfers.
- **Land under Cropping:** There is a very poor understanding by local households in terms of their land holdings. Land-holding areas are therefore considered estimates and are likely to be elevated. Crop and land-holdings can only be verified via a detailed Asset Inventory and Valuation Study; hence these figures should be treated as indicative only.
- **Crop Compensation Rates:** No crop compensation rates were made available from the relevant authorities to the Proponent. Crop compensation rates where determined using market rates for each crop per metric tonne. Average crop yields

(in metric tonnes) per hectare were determined to establish a unit cost per area of land under farming.

- **Rice Fields:** The number of claimed rice fields and their total associated area is considered to be an overestimate. Under the costing the total land under rice cultivation has been moderated on the land-use mapping and associated land-use budget. The total land under rice cultivation has been reduced from 510ha to 280. This will need to be verified as part of the detailed Asset Inventory and Valuation Study.

Table 10.5: Generic Implementation Schedule

Phase	Task	Schedule															
		Year -3				Year -2				Year -1				Year 0			
		QT1	QT2	QT3	QT4	QT1	QT2	QT3	QT4	QT1	QT2	QT3	QT4	QT1	QT2	QT3	QT4
Pre-Construction																	
RAP Phase	Public notification of the intent to develop																
	Initiate the stakeholder engagement process																
	Establish the Resettlement Working Group																
	Agree on the Entitlement Framework																
	Household registration and Census																
	Asset Inventory and Valuation Study																
	Land Holding Inventory																
	Soil and land capability study of the Host Site.																
	Host Site, Resettlement Village and Town Plan																
	Livelihoods Development Programme																
	RAP Report (including review and authorisation)																
Construction																	
Implementation	Prepare Entitlement Contracts																
	Design/Construction of the resettlement village																
	Design/Construction of the replacement houses																
	Design/Construction of the community facilities																
	Handover of replacement homes																
	Payment of cash compensation.																
	Handover of replacement agricultural land																
	Livelihoods Development Programme																
	Monitoring and Evaluation																
	Organise and attend engagement meetings																
	Organise and attend ongoing RWG meetings																
	Address grievances																
Operations																	
Finalise Outstanding Issues																	
Closure Audit																	
Livelihoods Development Programme (Long-Term)																	

11 CONCLUSION

GB Minerals proposes to establish the Farim Phosphate Project (the Project) in Guinea-Bissau. The Project is a proposed open-pit phosphate mine next to the Farim village and the River Cacheu, and a product export facility (Port) at Ponta Chugue on the River Geba.

The establishment of the Project will require the resettlement of an estimated 175 households, which will be physically displaced by the mine infrastructure. In addition, land acquisition of approximately 3000 hectares will be required.

This Resettlement Policy Framework (RPF) established the principles and requirements for the development and implementation of a Resettlement Action Plan (RAP) consistent with the requirement of local law and international best practices standards, as defined by the International Finance Corporation. There is considerable overlap between the two documents; however the requirements established in the RPF are likely to undergo further refinement in the RAP.

A key component of the RPF is the definition of an Eligibility and Entitlement Framework, which defines which persons or groups are deemed eligible for resettlement assistance and/or compensation. The type of entitlement or rights to compensation varies by individual or group but include:

- Replacement of lost homestead property and residential structures,
- Replacement of lost agricultural land,
- Compensation for lost annual crops and productive trees,
- Replacement of community resources and infrastructure,
- Exhumation and reburial of graves,
- Protection or relocation of sacred sites and religious buildings,
- Re-establishment of businesses,
- Moving and other forms of assistance.

Detailed consideration will be needed in the RAP in terms of where the displaced households will be located. This includes making provision for suitable replacement land and amenities, while ensuring effective integration with the host community.

In addition, resettlement should be treated as a sustainable development programme where ideally resettled household by benefit from livelihoods restoration and further development programmes. Potential strategies are provided in the RPF and are expected to undergo further refinement in the RAP.

The implementation of resettlement is complex. Significant resources as well as the provision for the right organisation structures will be required. Consistent with international best practice, the cost of resettlement should be seen as an upfront cost and should be fundamentally integrated into the overall mine development programme to ensure that sufficient time is given for the planning and implementation of resettlement prior to construction of the Project.

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