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ENVIRONMENTAL IMPACT ASSESSMENT

FOR PROPOSED EXPANSION OF MINING OPERATIONS IN NORTHERN MANCHESTER BY JAMALCO

For: JAMALCO

Halse Hall
Clarendon

Submitted to: NEPA

10-11 Caledonia Avenue
Kingston 5

September 2005

Document No.: CD*PRJ 1023/05

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INTRODUCTION

This EIA Report provides component details for a segment of the 2.8 million metric tonne per year efficiency upgrade at Jamalco. The upgrade project has received blanket approval from NEPA, however specific components are being addressed in greater detail. This EIA seeks approval for the following:

1. Establishment of mining operations in North Manchester

2. Establishment of a bauxite loading station and associated infrastructure (offices, sewage treatment plant, fuel storage, vehicle and equipment maintenance, water storage, etc.) at Green Vale, Manchester

3. Upgrade, rehabilitation and construction of a railroad corridor from Green Vale in Manchester through Williamsfield and Porus terminating at the existing St. Jago Railhead in South Manchester.

4. Installation of a water supply line from Evergreen, Manchester to Green Vale, Manchester to provide well water for NWC to treat and supply local communities and for mining operations

5. Temporary trucking of bauxite from Green Vale, Manchester to St. Jago Railhead in Manchester (preferred option) or trucking from Green Vale to the alumina refinery at Halse Hall in Clarendon in the event of special conditions (e.g. as flooding at Harmons, which has happened before).

BACKGROUND

Jamalco is a 50/50 joint venture Alumina refining company owned by the Government of Jamaica and Alcoa Minerals of Jamaica LLC. The operations comprise the Clarendon Alumina Works refinery located in Halse Hall, Rocky Point Port Facilities, the Lands and Mining operations in Woodside and South Manchester respectively, and a Traffic office in Kingston.

Clarendon Alumina Works is currently a two-digester refinery with a production capacity of 1.27 million tonnes of alumina annually. Bauxite is currently mined in Harmons Valley, South Manchester and transported to the refinery via rail. Shipping facilities are located at Rocky Point and commodity movement between the refinery and the port is via rail, which is operated by Jamalco. The operation currently employs approximately 600 persons and is managed by Alcoa Minerals of Jamaica for the joint venture.

Between the third quarter of 2005 and 2008, the facility will be upgraded to produce 2.8 million tonnes of alumina annually. The refining and port operations will be modified/expanded in order to facilitate this upgrade. The mining and residue handling operations will also be upgraded to meet the refinery's increase demand for bauxite and residue disposal storage space respectively.

Currently the 1.27 Mtpa of smelter grade alumina is produced from 4.5 Mtpy of bauxite, which is sourced solely from the mines in Harmons Valley. This bauxite is transported by trucks to the South Manchester railhead in St. Jago, from where the ore is transported by rail to the refinery.

It is expected that the Harmons deposits will be depleted in the third quarter of 2007, and as such, bauxite will be required from other permitted mining areas such as North Manchester.

LOCATION AND SETTING

The mining activities proposed in the North Manchester area, inclusive of the mines, loading station and portions of the transportation corridor will be undertaken within the boundaries of Special Exclusive Prospecting License (SEPL) 530 (as depicted in Figure 1-1). The areas available for mining are found throughout the SEPL extending from Skiddaw and Heavitree in the northwestern corner across to Devon and Ticky Ticky in the northeastern corner, through Green Vale and Mile Gully leading to Medina and Chudleigh in the soutwestern and southeastern corners respectively.

The Transportation Corridor includes all roadways, haul roads and means of conveyance including the railroad tracks that will facilitate the movement of bauxite from the mining areas to the refinery for processing. It is proposed that sections of railroad tracks that were abandoned by the Jamaica Railroad Corporation (JRC) will be upgraded and

refurbished along with the addition of some new areas of track. The northern transportation corridor will extend from the new Loading Station in Green Vale through Mile Gully, Williamsfield, Porus, St Jago to the refinery in Halse Hall, Clarendon.

GREEN VALE LOADING STATION

A new railcar loading station will be established in Green Vale, Figure 1-2. This loading station is designed, and will be built with all the appropriate amenities and facilities necessary to operate the facility comfortably and within the rules and regulations of all relevant authorities. The facility will include; office buildings, canteen and change rooms, mobile equipment service area, fuel storage/dispensing area, sewage treatment system, weather station, security post and parking areas to service an estimated maximum workforce of 100 individuals at peak operation. The loading station is being established to transport bauxite from North Manchester mining operations to the Jamalco plant in Halse Hall, Clarendon. The existing Jamalco rail network will be extended/upgraded to allow service between the Green Vale loading station and the refinery. Sections of the railroad in North Manchester have been abandoned for over 20 years by the Jamaica Railroad Corporation (JRC). Bauxite delivery to Green Vale will be by trucks from local mine sites.

The loading station will require clearance of approximately 53 acres, demolition of some structures, major excavation and filling to proposed site levels, implementation of drainage and retaining walls, and the realignment of roadways.

WATER SUPPLY TO COMMUNITY AND MINING AREA

The North Manchester Mines and the Green Vale Loading Station will require a capacity for 700,000 gallons of water per day with required storage of 2,500,000 gallons at the loading station. Amongst other uses, this water will be used for dust suppression on mine roads. Plans are in progress between Jamalco, The National Irrigation Commission (NIC) and the National Water Commission (NWC) for the provision of potable water to the communities in the area.

A new well is proposed for the Evergreen area (Water Resources Authority is involved in the selection of the location) in proximity to the existing Windalco well. A feasibility study (Evaluation of Water Availability and Water Quality for Mile Gully, Manchester) was

completed by the WRA in April 2005, which indicated the availability of water resources within the underlying aquifer to provide the volume and quality of water needed for the area. The study took into consideration growth, etc. up to a period of 2025. There is a small (1½ inch main) supply of water from the existing well in Evergreen, with the new well, the proposal is to upgrade to a 8"-12" main which be adequate to supply the communities and the mining operations.

The plan is for NIC to make the water available, Jamalco will provide the resources to get the water into Green Vale, while the NWC will be responsible for the storage, treatment and distribution to residents of the area. A new booster pump station is proposed for the Derry area close to the existing Windalco reservoir from which the pipeline will continue to the loading station at Green Vale where a reservoir will be established. Figure 1-3 shows the layout and routing of the proposed water supply.

Jamalco will establish a storm water collection and storage system at Green Vale using artificial ponds, with the water being used for dust suppression on the haul roads.

TRANSPORTATION

The rail system from St. Jago to Green Vale (See Plate 1-1) will be rehabilitated, upgraded and extended to support the efficient transport of bauxite from the North Manchester mines to the refinery in Clarendon. Railroad operation will be 6-7 days per week, 24 hours per day. Rolling stock inventory will be established to support the North Manchester mines. Sidings along the rail system will be redesigned, upgraded and/or extended to accommodate the rail system required logistics and maintenance requirements.

The rail communication system will be upgraded to allow safe and effective use of the rail system by Jamalco and by others.

New transmitter boxes will be installed at a new tower and back-up tower, plus new equipment will be placed at the JRC Kingston control center and a duplicate control center at the refinery.

The locomotive/railcar maintenance and repair shop at the refinery will be upgraded to support the rolling stock required for the operation. Figure 1-4 shows the proposed railroad corridor with details of the rehabilitation, upgrade and new construction.

POLICY, LEGISLATION AND REGULATIONS

TABLE EXEC. 1: SUMMARY NATIONAL LEGISLATION AND RESPONSIBLE AGENCIES

LEGISLATION	INSTITUTION RESPONSIBLE
NRCA Act, 1991	Natural Resources Conservation Authority
Wildlife Protection Act, 1945	Natural Resources Conservation Authority
Watershed Protection Act, 1963	Natural Resources Conservation
Mining Act, 1975	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Minerals (Vesting) Act, 1947	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Bauxite & Alumina (Special Provisions) Act, 1978	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Bauxite & Alumina Encouragement Act, 1950	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Town & Country Planning Act, 1987	Town Planning Department
Forestry Act, 1937	Forestry Department
The Water Resources Act/UWC Act, 1959	Water Resources Authority
Ja. National Heritage Trust Act, 1985	Jamaica National Heritage Trust
Ja. Railway Corporation Act	Jamaica Railway Corporation
Beach Control Act, 1956	Natural Resources Conservation Authority
Public Health Act, 1985	Ministry of Health/Environmental Control Division
Disaster Preparation & Emergency Management Act, 1993	Office of Disaster Preparedness and Emergency Management
National Solid Waste Management Authority Act, 2001	National Solid Waste Management Authority
Manchester Parish Provisional Development Order, 1974	Town Planning Department

ENVIRONMENTAL IMPACTS

POTENTIAL IMPACTS & PROPOSED MITIGATIVE STEPS

TABLE EXEC. 2: IMPACT AND MITIGATION TABLES

Action		Potential Impact	Mitigative Steps
Sedimentation	Mining	Minor Negative	Channel run-off to storm water ponds for sedimentation
	Construction Activities (Loading Station, road and railroad)		Channel run-off to storm water ponds for sedimentation and regular road maintenance
	Rehabilitation	Major Positive	Rehabillitation will be done to off-set any potential sedimentation problems through the use of contouring and revegatation.
Conclusion: With proper systems and monitoring in place this potential impact can be kept at a minor negative should it occur.			
Leaching	Mining	Minor Negative	Minimize exposed stockpiles; construct Storm Water Run-off Collection Pond. Collected pond water will be used for dust suppression.
	Rehabilitation	Major Positive	Rehabillitation will be done to off-set any potential leaching.
Conclusion: Bauxite is a chemically stable soil of neutral pH. Therefore will be no exposure of any mineral substance which will be dissolved by rain to critically change the soil pH			

Action		Potential Impact	Mitigative Steps
Fugitive Emissions	Mining	Major Negative	Supplement natural moisture content of ore, fast cleaning up of spilled bauxite, limiting stockpile time at mine site and sprinkling with water if necessary. Jamalco will adhere to Government of Jamaica Standards, ISO 14001 Principles and Jamalco's Spill and Release Protocols. This is not an expensive mitigation that is already practiced
	Transportation of ore to Plant, spillage on roadways, unattended stockpiles, blending activities	Minor Negative	Jamalco will adhere to Road Traffic laws for transportation of materials on public roads. Maintain and irrigate haul roads, cover trucks, limit time stockpiles are unattended, quick cleanup of spilled materials. Standard procedures at Jamalco that will be maintained
	Construction Activities (Loading Station, road and railroad)	Minor Negative	Properly plan and coordinate activities, educate and use contractors who are trained and will comply with Jamalco's principles and standards, monitor activities closely Monitoring of contractors is ongoing and incurs no new costs
	Rehabilitation	Major Positive	Rehabilitation activities including recontouring of mined out areas and revegetation will significantly reduce, if not eliminate the potential for emissions. Haul roads (where practical) may be converted to parochial roads or will be rehabilitated also.
Conclusion: With proper systems and monitoring in place this potential impact can be kept as a minor negative. It is practically impossible to eliminate this impact and Jamalco will conduct periodic monitoring of the ambient air quality throughout the mining area and surrounding communities for particulate matter.			

Action		Potential Impact	Mitigative Steps
Noise & Vibration	Mining	Minor Negative	Mining activities will be primarily away from major residential areas and settlements. In areas where blasting will be required, blasting surveys will be conducted. We will comply with the laws governing the use and storage of explosive and use expertise to localise the effects of blasting. Active monitoring of noise levels in communities and continuous communication will be practiced throughout.
	Transportation by Rail and Truck	Minor Negative	Implement and enforce train speeds to minimize noise. Upgrade tracks to better accommodate weight of ore. Train and monitor truck drivers in maintaining speed limits, use of compression, horns, etc. Utilise dedicated haul roads as much as possible. Jamalco will comply with all rules and regulations related to road and rail transportion. These are activities that are part of Jamalco's principles and protocols for this type of activity and will incur no additional cost to implement.
	Loading Station Operations	Minor Negative	Remote location of load station will offer buffer from communities and settlements. Equipment will be acoustically engineered to reduce noise impacts and monitoring of noise levels will be conducted at fence lines. Jamalco will meet National and Alcoa Standards for noise.
Conclusion: It is practically impossible to eliminate impacts related to noise and vibration from occurring. However, based on implementation of procedures, protocols, proper planning, training and monitoring of employees and their activities, this impact can be maintained easily as a minor negative.			

Action		Potential Impact	Mitigative Steps
Loss of Biodiversity	Mining and Load Station Siting	Major Negative	Jamalco has signed a Memorandum of Understanding with the Forestry Department to develop a land cover revegetation and habitat creation plan through technologies involving preservation and creative conservation. Jamalco is committed to maintaining the guidelines from the Bauxite Mine Rehabilitation Standards & Guidelines (1994). While cost has not yet been fully determined, the expansion budget of Jamalco has made accommodation for implementation of this MOU.
	Rehabilitation	Major Positive	Through the MOU with Forestry, the area will be rehabilitated with native vegetation that will over time recolonize.
Conclusion: The loss of biodiversity is an unavoidable negative impact of mining activities. Systems have been put in place to assess, identify and preserve any rare, endemic or otherwise valuable species that may be found in the mine areas. While it is agreed that bauxite soils do not support high levels of diversity in vegetation because of its infertility, care has been taken to complete the necessary assessments and to identify and preserve all valuable features of the lands biodiversity. Jamalco has significant experience in rehabilitation and revitalization of mined out areas and has developed and continues to conduct research and development work on its science & technology.			

Action		Potential Impact	Mitigative Steps
Subsistence Farming	Mining	Major Negative	Farmers who leased lands from Jamalco or the Government will be relocated to other available lands and assistance will be provided by Jamalco in re-establishing their plots. The replacement situation will be the same or better than before.
	Rehabilitation	Major Positive	In many cases, affected lands will be returned to a condition where it can be used for various types of farming activities. Animal husbandry and tree crops may be two of the more suitable options.

Conclusion:

The displacement of farmers is an unavoidable impact. Jamalco has always worked with the people of the communities in which they operate to ensure that any negative impact caused by the operation has a suitable remedy or solution. This situation will be no different.

Action		Potential Impact	Mitigative Steps
Loss of natural features such as habitats, niches and species	Site Clearance and Preparation	Major Negative	Bauxite is found in the open fields between the hillocks. Areas to be cleared will therefore be kept to the open fields. All precautionary measures will be put in place to ensure habitats on hillocks are not affected.
	Mining Operations	Major Negative	During mining operations all steps will be put in place to ensure heavy machinery and workers do not damage the hillocks and the habitats therein. This may include at a minimum red tagging at foot of hillocks.
	Rehabilitation	Major Positive	Jamalco has signed a Memorandum of Understanding with the Forestry Department to develop a land cover revegetation and habitat creation plan through technologies involving preservation and creative conservation. Jamalco is committed to maintaining the guidelines from the Bauxite Mine Rehabilitation Standards & Guidelines.

Conclusion:

The loss of biodiversity is an unavoidable negative impact of site clearance and mining activities. Systems have been put in place to assess, identify and preserve any rare, endemic or otherwise valuable species that may be found in the mine areas. While it is agreed that bauxite soils do not support high levels of diversity in vegetation because of its infertility, care has been taken to complete the necessary assessments and to identify and preserve all valuable features of the lands biodiversity. The biological diversity of the hillocks will be maintained at all cost, as these areas hold the major floral and faunal species of the region, as well as providing niche communities for the various species known to inhabit the area.

Jamalco has significant experience in rehabilitation and revitalization of mined out areas and has developed and continues to conduct research and development work on its science & technology.

Action		Potential Impact	Mitigative Steps
Water Supply	Mining Operations	Minor Negative	Rehabilitation will lessen impact on the watershed through reintroduction of vegetation. Ore deposits are well above the water table and mining should not impact groundwater. Artificial ponds will be constructed to hold stormwater for reuse in dust suppression activities. The control of fugitive dust will allow for the protection of tanks and open water catchment.
	Potable Consumption (Communities)	Major Positive	Jamalco will work with NIC and NWC to provide potable water to communities and settlements in North Manchester
Conclusion: While mining activities will have a potential minor negative impact on water supply, Jamalco will be providing potable water solutions to communities in the area through the provision of potable water in conjunction with the NIC and NWC. At present the majority of communities rely on rain water or water delivered by trucks.			

Action		Potential Impact	Mitigative Steps
Waste Management	Mining	Minor Negative	Waste materials will be sorted and managed in keeping with Jamalco standards. Certain vegetative matter and mining rejects will be used as backfill during mine rehabilitation. Vehicle maintenance waste from mining equipment will be managed in keeping with Jamalco standards and procedures.
	Loading Station	Minor Negative	Defined waste collection areas with proper labelling and instructions will be located at the mining offices. Jamalco will utilize its existing waste collection protocols and will continue to manage and dispose of all grades of waste in keeping with its current standards and procedures. Proper training and direction will be provided to all employees in waste handling and management at the site. All waste generated at Green Vale will be transported to and disposed at the Clarendon Alumina Works LAndfill for proper disposal.
Conclusion: Generation of solid waste is unavoidable. The quality of the systems, standards, procedures and training is the determining factor in how well the management programme works. Jamalco has a solid reputation for proper handling and management of all varieties of waste materials at all its operations.			

Action		Potential Impact	Mitigative Steps
Sewage	Mining	No Impact	Sewage generated at the mines will be managed through the use of portable chemical toilets or the construction of temporary facilities. These will be managed using Jamalco's time tested approaches and within the regulations. Minimal Cost and recognised aspect of the mining operation
	Loading Station	No Impact	A tertiary level sewage treatment system will be designed and constructed at the loading station. The proven SRC biodigester system is proposed. Cost – approx. JA$ 4M – 6M
Conclusion: Sewage handling, treatment and disposal resulting from Jamalco's operations will not present any negative impacts to the environment or communities within the project area.			
Labour	Mining	Major Positive	Increased employment will be welcomed in the communities. No mitigation required.
	Loading Station	Major Positive	Increased employment opportunities and support for satellite businesses.
Conclusion: The proposed hiring of approximately 100 new employees for mining and load station positions represents a major positive impact to these communities. Additional employment in areas of transportation (consideration is being given to the utilization of smaller over-the-road trucks rather than large 100 tonne trucks sub-contracted from the surrounding areas) to move bauxite from mines to load station among other informal job and opportunity creation will be important to the communities in the area.			

Action		Potential Impact	Mitigative Steps
Aesthetics	Mining	Major Negative	Aesthetics in the mining areas will be affected significantly. Mitigation involves minimize the clearance of areas only to what is absolutely necessary. Jamalco's track record and commitment to a proper rehabilitation and revitalization program along with their MOU with the Forestry Department.
	Bauxite Transportation	Minor Negative	The proposed RopeCon conveyor will be visible and may detract from the natural look of the area. However, 70% of the structure is reusable and will be removed from the landscape upon completion of mining activities.
	Rehabilitation	Major Positive	Through the MOU with Forestry, Jamalco will work to rehabilitate the mined areas with a view to restore them to a similar look as existed prior to mining.
Conclusion: The impacts related to aesthetics are reversible. Jamalco's commitment to rehabilitation and revitalization will ensure that the mined out areas are returned to visual and physical usefulness in keeping with local and their own corporate rehabilitation guidelines.			
Archaeological & Historical Heritage	Mining	No Impact	All known and identified archaeological or historical heritage resources will be avoided or preserved. Any unknown resources or artefacts unearth will be managed as directed by the Jamaica National Heritage Trust (JNHT) approved guidelines for managing archaeological and historical heritage items discovered during such activities, It includes specific methods of operation including necessary contacts and procedures to follow.
Conclusion: A lot of work has gone into the identification of heritage resources in the mining area, Jamalco is committed to the preservation of all such items and will work with the JNHT to this end.			

Action		Potential Impact	Mitigative Steps
Residential Relocation	Mining	Minor Negative/ Minor Positive	The negative impacts surround change of traditions and lifestyle. Housing solutions provided by Jamalco have been consistently of high quality, cost and standard and will remain so. In most cases relocated individuals are placed in better living conditions than before. Dialogue will be maintained between those likely to be relocated to assist in their reintegration with as little disturbance as possible.
	Railroad Rehabilitation and Upgrade	Minor Negative/ Minor Positive	Housing solutions provided by Jamalco have been consistently of high quality, cost and standard and will remain so. In most cases relocated individuals are placed in better living conditions than before. Dialogue will be maintained between those likely to be relocated to assist in their reintegration with as little disturbance as possible.
	Rehabilitation	Major Positive	Upon completion of rehabilitation activities, many of the rehabilitated lands will be suitable for residential developments and will be a benefit to the development of the communities.
Conclusion: Circumstances will occur that require relocation of residents of the various communities impacted through mining and railroad upgrade. The best possible situation is for dialogue and implementation of Jamalco's proven relocation programme. This may be an unavoidable impact, however, suitable mitigation is readily available.			

Action		Potential Impact	Mitigative Steps
Utility Relocation	Mining	Minor Negative	Displaced utilities will be replaced in a timely manner, with service that is the same or better than before. This includes potential electricity, water and road impacts. All efforts will be made to minimize disruption to the communities. Where possible the replacement will be put in place before the existing service/utilizing is impacted.
	Railroad Rehabilitation and Upgrade	Minor Negative	Displaced utilities will be replaced in a timely manner, with service that is the same or better than before. This includes potential electricity, water and road impacts. All efforts will be made to minimize disruption to the communities. Where possible the replacement will be put in place before the existing service/utilizing is impacted.
Conclusion: In many cases this is an unavoidable impact. Where service can be maintained or restored with the least amount of discomfort it shall be done. With effective management, this impact may not be realized as a negative.			

Action		Potential Impact	Mitigative Steps
Natural and Stormwater Drainage	Mining	Major Negative	Natural drainage regimes will be impacted during mining. This is unavoidable and through Jamalco's mine rehabilitation programme the mined out areas will be restored to a usefulness incorporating both natural and stormwater drainage.
	Transportation Rehabilitation and Upgrade	Minor Negative	Rehabilitation and upgrade of the railroad corridor will involve soil movement in some areas that will impact upon natural or designed drainage areas. These are unavoidable impacts, however, care will be taken to insure that where necessary new drainage regimes are designed into the works and that the solutions are suitable for the relevant areas of interest.
	Loading Station Construction	Major Negative	Many areas of natural drainage will be modified to construct the loading station. This is unavoidable. The comprehensive plans and designs will take drainage into consideration as it is important to the stability of the areas and to the protection of surrounding communities.
	Rehabilitation	Major Positive	Rehabilitation plans will incorporate designs for natural drainage and stormwater management.
Conclusion: While It will be impossible to eliminate impacts related to drainage, Jamalco possesses the technology and know-how to properly design and construct alternative drainage solutions that will serve to eliminate potential problems. In some cases, flood prone areas can be alleviated through this process.			

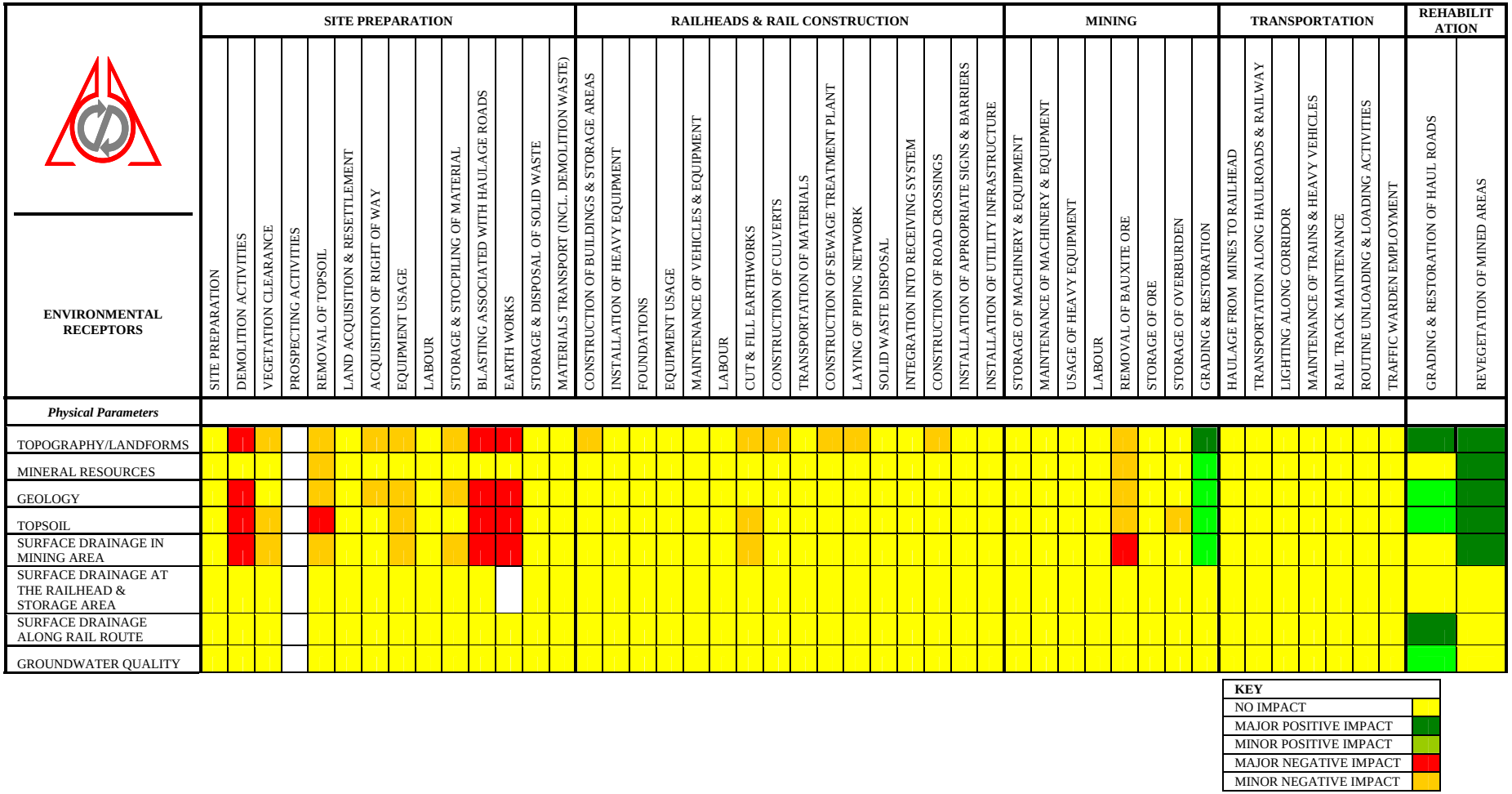
Action		Potential Impact	Mitigative Steps
Transportation and Travel Disruption	Mining	Minor Negative	Mining areas are usually away from public roadways and where necessary bypass roads are always constructed to service or avoid the surrounding communities. Road realignment at the Loading Station at Green Vale will be done to limit traffic disruption and to regularise the movement of vehicles through the community in light of the station being located as proposed. This will be designed to minimise walking distances and the temptation and risk associated with crossing active railroad tracks.
	Transportation Rehabilitation and Upgrade	Minor Negative	Sections of the railroad corridor are used by other bauxite companies. Jamalco will coordinate all work on the corridor with these companies to insure no or very little impact on their service. In two areas (the bridge where the train goes under the Melrose Bypass, and a small rail bridge near Broadleaf), there is the potential for traffic disruption during work on bridges. In both cases, solutions will be fully constructed prior to making any changes to the existing situation to limit any disturbance to users.
	Temporary Transportation of bauxite by Truck	Minor Negative	The use of trucks to transport bauxite for a temporary period will add to the congestion on roadways. However, Jamalco has made a concerted effort to reduce the frequency of movement, and the number of trucks to 10; and will not dispatch trucks during peak hours. Appropriate signs and flag men will be placed at strategic locations to minimise disruption.
Conclusion: Temporary transportation disruption will occur with this project. However, all systems are in place from the early planning stages to limit this disruption. Constructing bypass roads, constructing solutions fully before making changes and limiting the number of trucks on the roads will go a long way towards limiting transportation and travel disruptions. Jamalco will comply with the laws and regulations of Jamaica regarding traffic management, including the operation of vehicles on public roads.			

Action		Potential Impact	Mitigative Steps
Infrastructure Improvements in Communities	Water Supply	Major Positive	Jamalco is working with NIC, WRA and NWC to provide potable water to the communities in the project area. No mitigation required.
	New School – Mile Gully	Major Positive	The Government of Jamaica through the Ministry of Education will be constructing a new school in the Mile Gully area and Jamalco will be actively participating in the process. Positive impact no mitigation required.
	New and Improved Roadways	Major Positive	Jamalco will construct bypass roads, upgrade existing roads and build bridges/tunnels at key locations to alleviate impacts associated with travel disruption, delays and poor road condition. Positive impact no mitigation required.
Conclusion: These are positive impacts associated with the project. In many ways, the implementation of this project is a win-win situation.			

Action		Potential Impact	Mitigative Steps
Socio-Economic Benefits	Permanent Employees	Major Positive	Jamalco will employ a maximum of 100 new employees at the Green Vale Loading Station/Mining Operations. Many of these persons will come from the surrounding communities. A positive impact, no mitigation required.
	Truckers	Major Positive	Private truckers will be hired for hauling bauxite from both the mines and during the temporary period to St. Jago. Many operators will be from local communities. No mitigation required.
	Temporary Workforce	Major Positive	Jamalco will hire skilled/unskilled employees during preparation and construction activities to provide various services. Employees will be sourced from local communities for these positions. This includes work at the loading station, railroad. Positive impact, no mitigation required.
	Indirect Benefits	Major Positive	Stimulate economy of area through physical, economic and social development. Sub-regional development will impact various other townships externally.
Conclusion: These are positive impacts associated with the project, which are in keeping with the Government's integrated development, policies and plans facilitated by improvements such as Highway 2000 and South Coast Development Plans. In many ways, the implementation of this project is a win-win situation.			

POTENTIAL IMPACTS IDENTIFIED

GENERAL



ENVIRONMENTAL RECEPTORS	SITE PREPARATION														RAILHEADS & RAIL CONSTRUCTION															MINING								TRANSPORTATION							REHABILITATION	
	SITE PREPARATION	DEMOLITION ACTIVITIES	VEGETATION CLEARANCE	PROSPECTING ACTIVITIES	REMOVAL OF TOPSOIL	LAND ACQUISITION & RESETTLEMENT	ACQUISITION OF RIGHT OF WAY	EQUIPMENT USAGE	LABOUR	STORAGE & STOCPILING OF MATERIAL	BLASTING ASSOCIATED WITH HAULAGE ROADS	EARTH WORKS	STORAGE & DISPOSAL OF SOLID WASTE	MATERIALS TRANSPORT (INCL. DEMOLITION WASTE)	CONSTRUCTION OF BUILDINGS & STORAGE AREAS	INSTALLATION OF HEAVY EQUIPMENT	FOUNDATIONS	EQUIPMENT USAGE	MAINTENANCE OF VEHICLES & EQUIPMENT	LABOUR	CUT & FILL EARTHWORKS	CONSTRUCTION OF CULVERTS	TRANSPORTATION OF MATERIALS	CONSTRUCTION OF SEWAGE TREATMENT PLANT	LAYING OF PIPING NETWORK	SOLID WASTE DISPOSAL	INTEGRATION INTO RECEIVING SYSTEM	CONSTRUCTION OF ROAD CROSSINGS	INSTALLATION OF APPROPRIATE SIGNS & BARRIERS	INSTALLATION OF UTILITY INFRASTRUCTURE	STORAGE OF MACHINERY & EQUIPMENT	MAINTENANCE OF MACHINERY & EQUIPMENT	USAGE OF HEAVY EQUIPMENT	LABOUR	REMOVAL OF BAUXITE ORE	STORAGE OF ORE	STORAGE OF OVERBURDEN	GRADING & RESTORATION	HAULAGE FROM MINES TO RAILHEAD	TRANSPORTATION ALONG HAULROADS & RAILWAY	LIGHTING ALONG CORRIDOR	MAINTENANCE OF TRAINS & HEAVY VEHICLES	RAIL TRACK MAINTENANCE	ROUTINE UNLOADING & LOADING ACTIVITIES	TRAFFIC WARDEN EMPLOYMENT	GRADING & RESTORATION OF HAUL ROADS	REVEGETATION OF MINED AREAS
SURFACE WATER QUALITY DOWNSTREAM OF MINE																																											
REGIONAL AIR QUALITY																																											
AMBIENT NOISE & VIBRATION																																											
WINDS																																											
RAINFALL																																											
GASEOUS EMISSIONS/ ODOUR																																											
NOISE AND DUST																																											
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TERRESTRIAL ECOSYSTEMS																																												
VEGETATION																																												
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OTHER FAUNA																																												
RARE, ENDANGERED OR ENDEMIC SPECIES																																											
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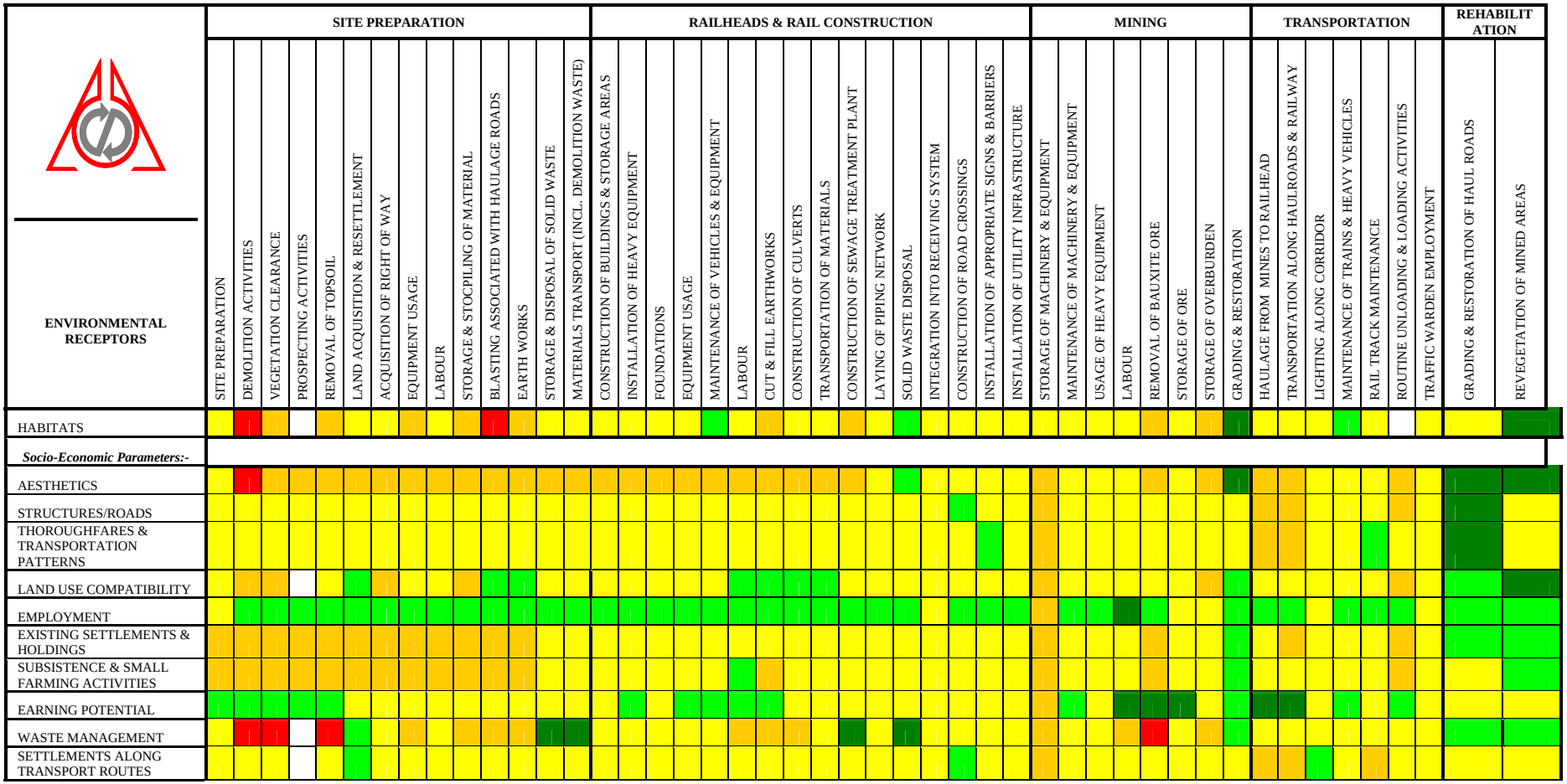
KEY
NO IMPACT
MAJOR POSITIVE IMPACT
MINOR POSITIVE IMPACT
MAJOR NEGATIVE IMPACT
MINOR NEGATIVE IMPACT


SITE PREPARATION
RAILHEADS & RAIL CONSTRUCTION
MINING
TRANSPORTATION
REHABILITATION
ENVIRONMENTAL RECEPTORS
SITE PREPARATION
DEMOLITION ACTIVITIES
VEGETATION CLEARANCE
PROSPECTING ACTIVITIES
REMOVAL OF TOPSOIL
LAND ACQUISITION & RESETTLEMENT
ACQUISITION OF RIGHT OF WAY
EQUIPMENT USAGE
LABOUR
STORAGE & STOCPILING OF MATERIAL
BLASTING ASSOCIATED WITH HAULAGE ROADS
EARTH WORKS
STORAGE & DISPOSAL OF SOLID WASTE
MATERIALS TRANSPORT (INCL. DEMOLITION WASTE)
CONSTRUCTION OF BUILDINGS & STORAGE AREAS
INSTALLATION OF HEAVY EQUIPMENT
FOUNDATIONS
EQUIPMENT USAGE
MAINTENANCE OF VEHICLES & EQUIPMENT
LABOUR
CUT & FILL EARTHWORKS
CONSTRUCTION OF CULVERTS
TRANSPORTATION OF MATERIALS
CONSTRUCTION OF SEWAGE TREATMENT PLANT
LAYING OF PIPING NETWORK
SOLID WASTE DISPOSAL
INTEGRATION INTO RECEIVING SYSTEM
CONSTRUCTION OF ROAD CROSSINGS
INSTALLATION OF APPROPRIATE SIGNS & BARRIERS
INSTALLATION OF UTILITY INFRASTRUCTURE
STORAGE OF MACHINERY & EQUIPMENT
MAINTENANCE OF MACHINERY & EQUIPMENT
USAGE OF HEAVY EQUIPMENT
LABOUR
REMOVAL OF BAUXITE ORE
STORAGE OF ORE
STORAGE OF OVERBURDEN
GRADING & RESTORATION
HAULAGE FROM MINES TO RAILHEAD
TRANSPORTATION ALONG HAULROADS & RAILWAY
LIGHTING ALONG CORRIDOR
MAINTENANCE OF TRAINS & HEAVY VEHICLES
RAIL TRACK MAINTENANCE
ROUTINE UNLOADING & LOADING ACTIVITIES
TRAFFIC WARDEN EMPLOYMENT
GRADING & RESTORATION OF HAUL ROADS
REVEGETATION OF MINED AREAS
HABITATS
Socio-Economic Parameters:-
AESTHETICS
STRUCTURES/ROADS
THOROUGHFARES & TRANSPORTATION PATTERNS
LAND USE COMPATIBILITY
EMPLOYMENT
EXISTING SETTLEMENTS & HOLDINGS
SUBSISTENCE & SMALL FARMING ACTIVITIES
EARNING POTENTIAL
WASTE MANAGEMENT
SETTLEMENTS ALONG TRANSPORT ROUTES
KEY
NO IMPACT
MAJOR POSITIVE IMPACT
MINOR POSITIVE IMPACT
MAJOR NEGATIVE IMPACT
MINOR NEGATIVE IMPACT

ENVIRONMENTAL RECEPTORS	SITE PREPARATION														RAILHEADS & RAIL CONSTRUCTION															MINING								TRANSPORTATION							REHABILITATION	
	SITE PREPARATION	DEMOLITION ACTIVITIES	VEGETATION CLEARANCE	PROSPECTING ACTIVITIES	REMOVAL OF TOPSOIL	LAND ACQUISITION & RESETTLEMENT	ACQUISITION OF RIGHT OF WAY	EQUIPMENT USAGE	LABOUR	STORAGE & STOCPILING OF MATERIAL	BLASTING ASSOCIATED WITH HAULAGE ROADS	EARTH WORKS	STORAGE & DISPOSAL OF SOLID WASTE	MATERIALS TRANSPORT (INCL. DEMOLITION WASTE)	CONSTRUCTION OF BUILDINGS & STORAGE AREAS	INSTALLATION OF HEAVY EQUIPMENT	FOUNDATIONS	EQUIPMENT USAGE	MAINTENANCE OF VEHICLES & EQUIPMENT	LABOUR	CUT & FILL EARTHWORKS	CONSTRUCTION OF CULVERTS	TRANSPORTATION OF MATERIALS	CONSTRUCTION OF SEWAGE TREATMENT PLANT	LAYING OF PIPING NETWORK	SOLID WASTE DISPOSAL	INTEGRATION INTO RECEIVING SYSTEM	CONSTRUCTION OF ROAD CROSSINGS	INSTALLATION OF APPROPRIATE SIGNS & BARRIERS	INSTALLATION OF UTILITY INFRASTRUCTURE	STORAGE OF MACHINERY & EQUIPMENT	MAINTENANCE OF MACHINERY & EQUIPMENT	USAGE OF HEAVY EQUIPMENT	LABOUR	REMOVAL OF BAUXITE ORE	STORAGE OF ORE	STORAGE OF OVERBURDEN	GRADING & RESTORATION	HAULAGE FROM MINES TO RAILHEAD	TRANSPORTATION ALONG HAULROADS & RAILWAY	LIGHTING ALONG CORRIDOR	MAINTENANCE OF TRAINS & HEAVY VEHICLES	RAIL TRACK MAINTENANCE	ROUTINE UNLOADING & LOADING ACTIVITIES	TRAFFIC WARDEN EMPLOYMENT	GRADING & RESTORATION OF HAUL ROADS	REVEGETATION OF MINED AREAS
TRAFFIC FLOWS ALONG TRANSPORT ROUTES																																											
FOREIGN EXCHANGE EARNINGS																																											
IMPROVED QUALITY OF LIFE																																											
WORKER HEALTH & SAFETY																																											
PUBLIC HEALTH & SAFETY																																											

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MAJOR POSITIVE IMPACT
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PROJECT DESCRIPTION

1 PROJECT DESCRIPTION

1.1 INTRODUCTION

This EIA Report provides component details for a segment of the 2.8 million metric tonne per year efficiency upgrade at Jamalco. The upgrade project has received blanket approval from NEPA, however specific components are being addressed in greater detail. This EIA seeks approval for the following:

1. Establishment of mining operations in North Manchester

2. Establishment of a bauxite loading station and associated infrastructure (offices, sewage treatment plant, fuel storage, vehicle and equipment maintenance, water storage, etc.) at Green Vale, Manchester

3. Upgrade, rehabilitation and construction of a railroad corridor from Green Vale in Manchester through Williamsfield and Porus terminating at the existing St. Jago Railhead in South Manchester.

4. Installation of a water supply line from Evergreen, Manchester to Green Vale, Manchester to provide well water for NWC to treat and supply local communities and for mining operations

5. Temporary trucking of bauxite from Green Vale, Manchester to St. Jago Railhead in Manchester (preferred option) or trucking from Green Vale to the alumina refinery at Halse Hall in Clarendon in the event of special conditions (e.g. as flooding at Harmons, which has happened before).

1.2 BACKGROUND

Jamalco is a 50/50 joint venture Alumina refining company owned by the Government of Jamaica and Alcoa Minerals of Jamaica LLC. The operations comprise the Clarendon Alumina Works refinery located in Halse Hall, Rocky Point Port Facilities, the Lands and Mining operations in Woodside and South Manchester respectively, and a Traffic office in Kingston.

Clarendon Alumina Works is currently a two-digester refinery with a production capacity of 1.27 million tonnes of alumina annually. Bauxite is currently mined in Harmons Valley, South Manchester and transported to the refinery via rail. Shipping facilities are located at Rocky Point and commodity movement between the refinery and the port is via rail, which is operated by Jamalco. The operation currently employs approximately 600 persons and is managed by Alcoa Minerals of Jamaica for the joint venture.

Between the third quarter of 2005 and 2008, the facility will be upgraded to produce 2.8 million tonnes of alumina annually. The refining and port operations will be modified/expanded in order to facilitate this upgrade. The mining and residue handling operations will also be upgraded to meet the refinery's increase demand for bauxite and residue disposal storage space respectively.

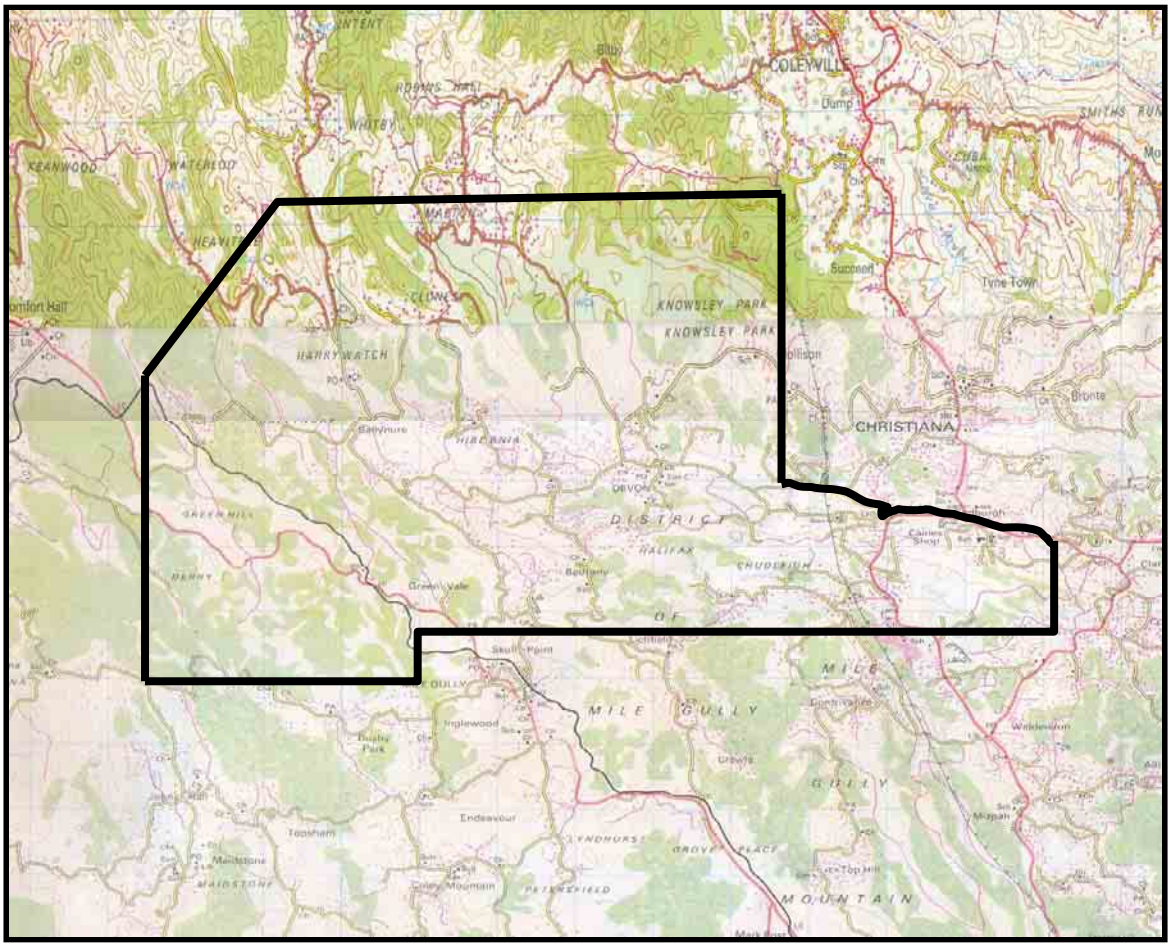
Currently the 1.27 Mtpa of smelter grade alumina is produced from 4.5 Mtpy of bauxite, which is sourced solely from the mines in Harmons Valley. This bauxite is transported by trucks to the South Manchester railhead in St. Jago, from where the ore is transported by rail to the refinery.

It is expected that the Harmons deposits will be depleted in the third quarter of 2007, and as such, bauxite will be required from other permitted mining areas such as North Manchester.

1.3 LOCATION AND LAYOUT

The mining activities proposed in the North Manchester area, inclusive of the mines, loading station and portions of the transportation corridor will be undertaken within the boundaries of Special Exclusive Prospecting License (SEPL) 530 (as depicted in Figure 1-1). The areas available for mining are found throughout the SEPL extending from Skiddaw and Heavitree in the northwestern corner across to Devon and Ticky Ticky in the northeastern corner, through Green Vale and Mile Gully leading to Medina and Chudleigh in the soutwestern and southeastern corners respectively.

FIGURE 1-1: SEPL 530 Boundaries



The Transportation Corridor includes all roadways, haul roads and means of conveyance including the railroad tracks that will facilitate the movement of bauxite from the mining areas to the refinery for processing. It is proposed that sections of railroad tracks that were abandoned by the Jamaica Railroad Corporation (JRC) will be upgraded and refurbished along with the addition of some new areas of track. The northern transportation corridor will extend from the new Loading Station in Green Vale through Mile Gully, Williamsfield, Porus, St Jago to the refinery in Halse Hall, Clarendon.

1.4 PREPARATORY WORK AND MINING ACTIVITIES

1.4.1 BAUXITE MINING AND LOAD STATION

1.4.1.1 BAUXITE MINING AREA

The planned North Manchester mining area is bounded by coordinates listed in the duly approved Special Exclusive Prospecting Licence No. SEPL 530. The description of the Licence approximately defines an area of 74 km^2 in the Waterloo, Devon and Chudleigh areas of the Parish of Manchester. The Licence has been staked with a metal corner beacon situated at the approximate false coordinate intersection of 170 000m North and 186 000m East on sheets 7 and 11 of the 1:50,000 (metric edition) topographical map Jamaica. (See Figure 1-1)

Based on the findings of exploratory drilling and testing conducted throughout SEPL 530, various deposits of bauxite ore have been identified. The bauxite identified in this area cannot be processed efficiently by itself due to the poor settling characteristics of the digested residue. The idea is to blend this bauxite ore with ore from South Manchester, a combination that has shown improvement in the settling characteristics. An additional benefit of blending is that higher levels of phosphorous pentoxide (P_2O_5) have been recognised when compared with South Manchester ore alone, which is better for processing.

The blended bauxite from North and South Manchester will minimize undue disruptions to the refinery, while allowing the plant to meet its production targets and gain valuable knowledge for future processing operations. It is anticipated that initially (while blending with South Manchester) mining activities in the area will supply approximately 4.7 Mt/y of bauxite at 20% moisture content. However, all the bauxite demand for producing 2.8 Mt/y of alumina would come from North Manchester.

Bauxite reserves identified in North Manchester are similarly located in terms of geology as other areas in Manchester and Northern Clarendon previously mined by Jamalco. Therefore, no new technology or technique will be required to remove the ore for processing. Resulting from years of experience, improved methodologies have been incorporated that will assist in the minimization of negative impacts related to mining, including dust suppression.

1.4.1.2 LOAD STATION

A new railcar loading station will be established in Green Vale, Figure 1-2. This loading station is designed, and will be built with all the appropriate amenities and facilities necessary to operate the facility comfortably and within the rules and regulations of all relevant authorities. The facility will include; office buildings, canteen and change rooms, mobile equipment service area, fuel storage/dispensing area, sewage treatment system, weather station, security post and parking areas to service an estimated maximum workforce of 100 individuals at peak operation. The loading station is being established to transport bauxite from North Manchester mining operations to the Jamalco plant in Halse Hall, Clarendon. The existing Jamalco rail network will be extended/upgraded to allow service between the Green Vale loading station and the refinery. Sections of the railroad in North Manchester have been abandoned for over 20 years by the Jamaica Railroad Corporation (JRC). Bauxite delivery to Green Vale will be by trucks from local mine sites.

The loading station will require clearance of approximately 53 acres, demolition of some structures, major excavation and filling to proposed site levels, implementation of drainage and retaining walls, and the realignment of roadways.

FIGURE 1-2: PROPOSED LOADING STATION IN GREENSVALE

1.4.1.3 STOCKPILES/SCREENING/LOADING

Loading of bauxite ore will occur in a similar fashion as is presently used at the St. Jago railhead with front-end loaders loading railcars from bauxite stockpiles via a screen (grizzly) with 14" openings and hopper system. Space will be created for a total stockpile area to sustain 100,000 tonnes of bauxite in up to three stockpiles separated by bauxite grades. Limestone reject (estimated at 8% of mined ore by volume) from grizzlies will be allowed to spill to a 50,000 tonne stockpile at the loading area where it will be removed from the site for use in backfilling mined areas.

1.4.1.4 RAW/POTABLE WATER SUPPLY

The North Manchester Mines and the Green Vale Loading Station will require a capacity for 700,000 gallons of water per day with required storage of 2,500,000 gallons at the loading station. Amongst other uses, this water will be used for dust suppression on mine roads. Plans are in progress between Jamalco, The National Irrigation Commission (NIC) and the National Water Commission (NWC) for the provision of potable water to the communities in the area.

A new well is proposed for the Evergreen area (Water Resources Authority is involved in the selection of the location) in proximity to the existing Windalco well. A feasibility study (Evaluation of Water Availability and Water Quality for Mile Gully, Manchester) was completed by the WRA in April 2005, which indicated the availability of water resources within the underlying aquifer to provide the volume and quality of water needed for the area. The study took into consideration growth, etc. up to a period of 2025. There is a small (1½ inch main) supply of water from the existing well in Evergreen, with the new well, the proposal is to upgrade to a 8"-12" main which be adequate to supply the communities and the mining operations.

The plan is for NIC to make the water available, Jamalco will provide the resources to get the water into Green Vale, while the NWC will be responsible for the storage, treatment and distribution to residents of the area. A new booster pump station is proposed for the Derry area close to the existing Windalco reservoir from which the pipeline will continue to the loading station at Green Vale where a reservoir will be established. Figure 1-3 shows the layout and routing of the proposed water supply.

Jamalco will establish a storm water collection and storage system at Green Vale using artificial ponds, with the water being used for dust suppression on the haul roads.

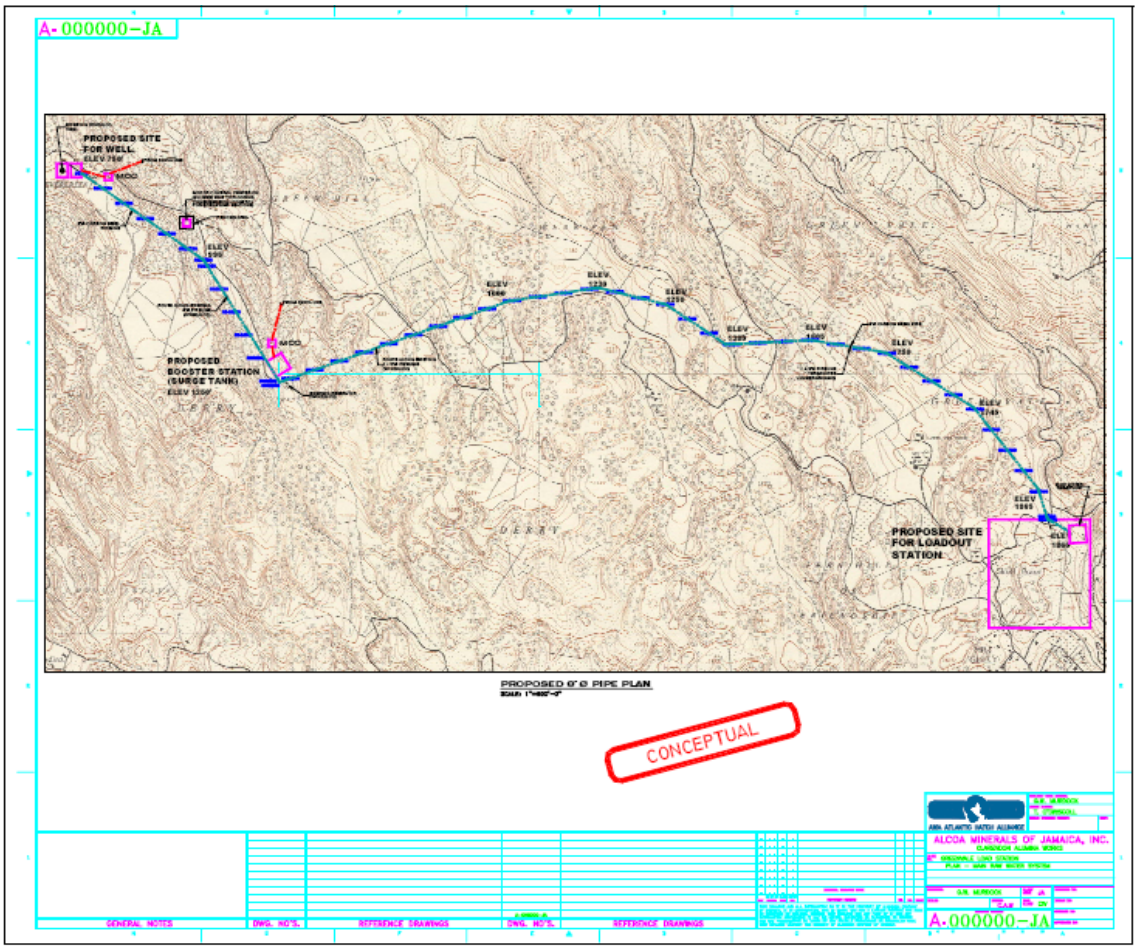


FIGURE 1-3: PROPOSED ROUTE FOR WATER SUPPLY

1.4.1.5 POWER

As the Green Vale Loading Station will be remote from the Jamalco refinery (which produces electricity) it is not feasible to connect it to the refinery power system. A connection will be made to the National Grid through the Jamaica Public Service Company (JPSCo) at a point and in such a manner that it can be powered from that network with a minimum of disruption. Discussions with the JPSCo are ongoing to determine the point of common coupling (PCC) and division of responsibility and details for construction of the new line, protection and metering requirements and PCC substation high voltage equipment. A standby generator and transformer building will be included at the loading station. Preliminary determinations indicate that sufficient capacity exists in the area to supply the station.

1.4.1.6 MINE FACILITIES

Facilities at Green Vale loading station will be designed to accommodate mining in North Manchester using combinations of 20 to 50 tonne trucks with a peak workforce of 100 people .The Green Vale Loading Station will also include facilities to support the North Manchester Mine and the loading station operations:

- O*ffice building*- to include two offices for supervising personnel male/female change rooms, office for contractors, a medical facility and parking for an ambulance.
- *Canteen/Change room facilities* for peak workforce of 100 individuals.
- *Mobile equipment shed* – with change room facilities
- *Fuel bay* - Diesel Storage and dispensing facility for 50,000 gallons for mine equipment and off-loading and storage for fuel for load station locomotives. All existing Alcoa Environmental Health & Safety protocols will be implemented at the station.
- *Miscellaneous* -Parking facilities for a workforce of 100, Security fence and security post at each entry point to loading station ,Contractor Lay Down area to accommodate 100 pieces of heavy equipment

- Weather station to include precipitation, evaporation and dust monitoring, Telecommunications/Local area network
- Sewage treatment system
- Landscaping including trees to act as dust buffer.

Figure 1-2 provides details of the layout at the proposed loading station.

1.5 RAIL SYSTEM

The rail system from St. Jago to Green Vale (See Plate 1-1) will be rehabilitated, upgraded and extended to support the efficient transport of bauxite from the North Manchester mines to the refinery in Clarendon. Railroad operation will be 6-7 days per week, 24 hours per day. Rolling stock inventory will be established to support the North Manchester mines. Sidings along the rail system will be redesigned, upgraded and/or extended to accommodate the rail system required logistics and maintenance requirements.

PLATE 1-1: MILE GULLY RAIL STATION (NOT IN OPERATION FOR PAST 20 YEARS)

The rail communication system will be upgraded to allow safe and effective use of the rail system by Jamalco and by others.

New transmitter boxes will be installed at a new tower and back-up tower, plus new equipment will be placed at the JRC Kingston control center and a duplicate control center at the refinery.

The locomotive/railcar maintenance and repair shop at the refinery will be upgraded to support the rolling stock required for the operation. Figure 1-4 shows the proposed railroad corridor with details of the rehabilitation, upgrade and new construction.

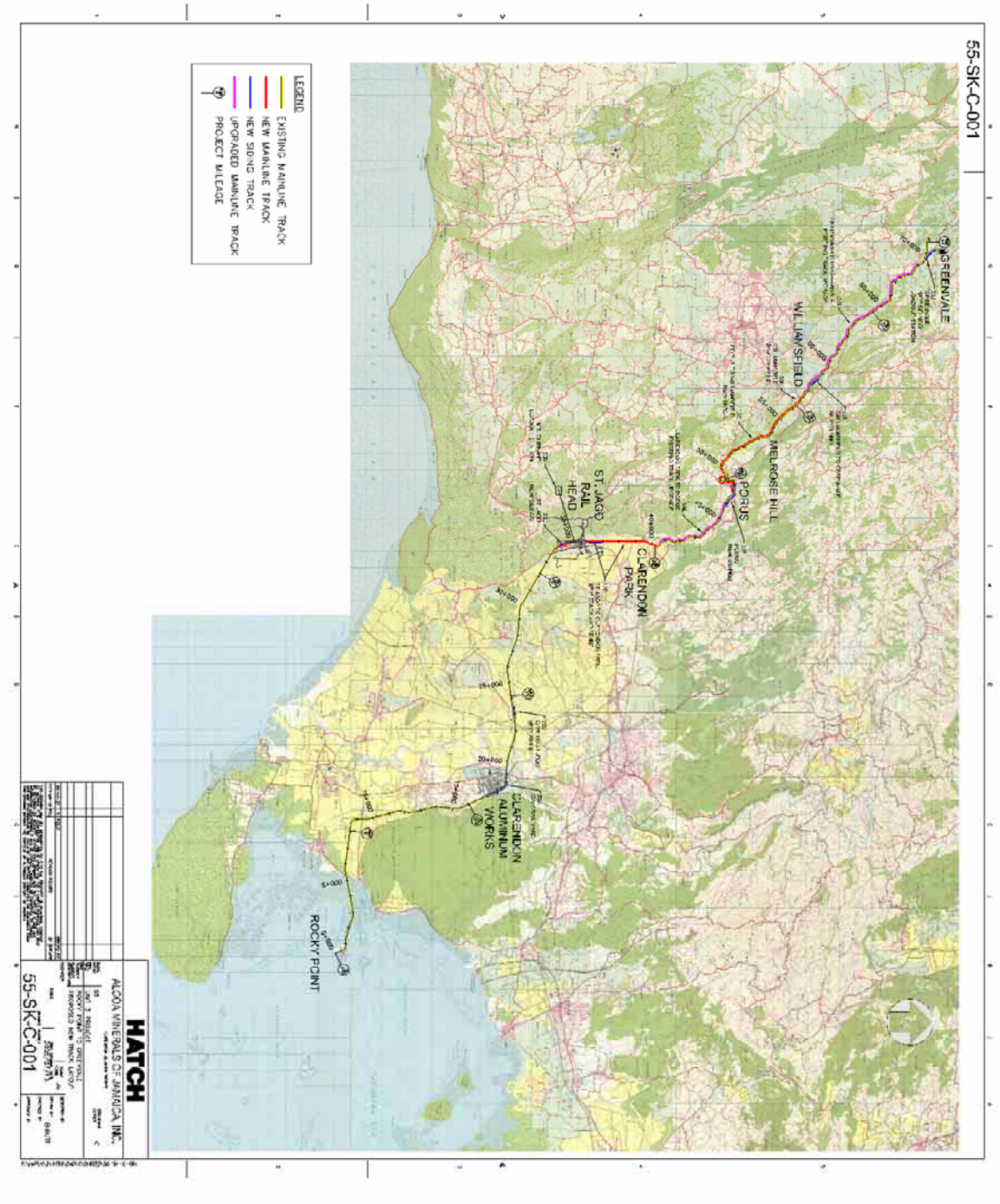


FIGURE 1-4: PROPOSED RAIL CORRIDOR FROM GREEN VALE TO PORT

1.5.1 TRANSPORTATION CORRIDOR FROM MINE TO RAILHEAD

1.5.1.1 ORE TRANSPORTATION SYSTEMS

The development of the North Manchester mining area will require the rehabilitation and improvement of the abandoned government rail network that traverses the area and the construction of haul roads, by-pass roads and upgrading of a few parochial roads. The plan is as follows:

- Utilise dedicated haul roads to transfer bauxite ore from the mines using 50 tonne trucks, to the loading station at Green Vale.
- Screen, stockpile and load processed ore at the Green Vale loading station into rail cars for transport via rail to the existing St. Jago railhead.
- The existing 80 lb/ft rails along the existing Clarendon Park to Porus and Williamsfield to Green Vale railroad corridors will be upgraded with 115 lb/ft rails to improve the carrying capacity of the rail lines and offer better protection against potential derailment.
- New sidings (train pull-off areas) will be established at various locations along the corridor to accommodate two-way traffic. One train will be able to pull off the main track to allow another to pass. During railroad construction, temporary access roads will be required to facilitate the movement of supplies and employees.
- From Williamsfield to Porus, a second set of track will be laid to facilitate ease of movement of trains since rails will be shared with the Windalco Company, Jamaica Railroad Corporation and other stakeholders in that area. Three structures have been identified that will need modification or replacement to accommodate the second set of tracks. These are: 1. Bridge where the train goes under the Melrose Bypass (approx. rail mile – 34.5), that will need modifications; 2. An abandoned haul-road bridge from the Windalco Network (approx. rail mile – 33.7) that will be removed; 3. A small rail bridge near Broadleaf (approx. rail mile – 31) that will need to be enlarged (See Plate 1-2 below). New sidings are proposed for Porus.

PLATE 1-2: SMALL BRIDGE NEAR BROADLEAF WHICH NEEDS TO AND WILL BE ENLARGED AND UPGRADED

- From Clarendon Park to St. Jago, a new single track rail line will be constructed with passing loop, new sidings and associated structures.

- The distance by rail between the proposed Green Vale loading station and the existing St. Jago Railhead is 22 rail miles. This offers a secure and less intrusive means of transportation that will be beneficial to the company and the public. It is anticipated that several crossings will have to be built to traverse drainage areas, streams and roadways along with bridges to allow smooth flow of traffic. In some areas, residences will have to be relocated, utilities and roadways will have to be diverted to facilitate the project. In cases of relocation and diversion of utilities, Jamalco will provide solutions that are the same or better than what was previously there. Construction of the upgraded rail network is anticipated to take 18 months.

- Due to the demands for bauxite ore from North Manchester it is anticipated that mining operations will need to commence prior to the completion of the railroad network. As a temporary solution, Jamalco seeks to utilise standard over-the-road 25-30 tonne dump trucks to transport mined ore to the St. Jago Railhead and/or the refinery as necessary.

- To provide the least disruptive temporary transportation option, Jamalco proposes to utilize a maximum of 10 over-the-road dump trucks that will make an average of 4 trips each per day travelling a route that will go from Green Vale to Williamsfield via Mile Gully and Kirkvine main roads and onto the old Melrose Hill road. Upon reaching the junction with the Melrose by-pass, the trucks will merge into south bound traffic, travel through Porus to Toll Gate where the trucks will turn right onto the parochial road leading to St. Jago and the established railhead there. At the railhead, the bauxite from North Manchester will be blended with that from South Manchester, reloaded into a railcar for the trip to the refinery on the established and existing railroad system. It is estimated that trucks will have to be utilised for approximately 18 months while work on the railroad network from Mile Gully is completed. The use of 10 trucks is a significant concession on the part of Jamalco to reduce the impacts on the public thoroughfare. Figure 1-5 shows the proposed truck route and its relation to other features of the project including the St. Jago Railhead and the refinery at Halse Hall.

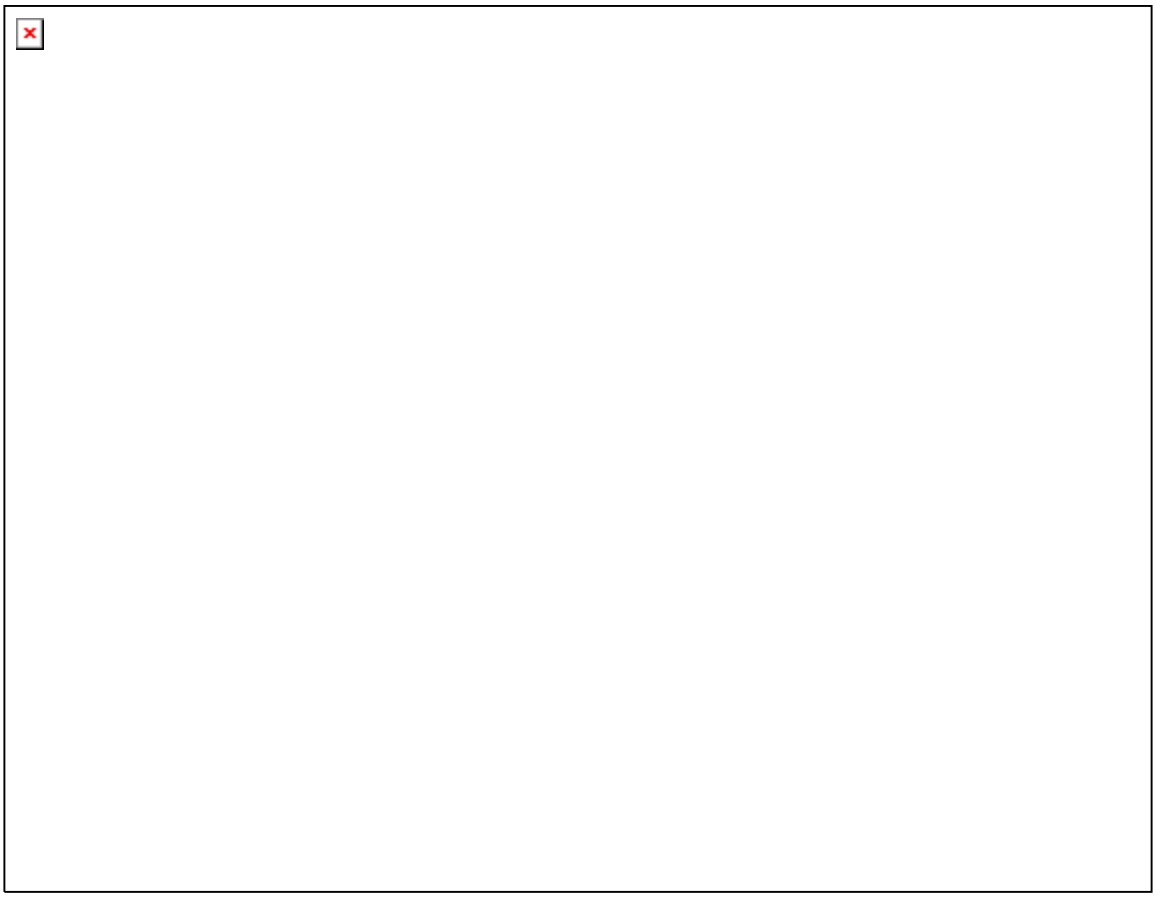


FIGURE 1-5: PROPOSED TRUCK ROUTE

- Mitigative measures will be implemented throughout the project and specifically during the temporary transportation period to alleviate potential impacts that may arise. These impacts will be expounded upon in the Impact Identification and Mitigation sections of this report

1.5.1.2 HAUL-ROADS

Jamalco has transitioned away from the construction of large haul-roads to support 100 Ton trucks, and today has developed an effective model where highway trucks will be used on smaller roads to transport the bauxite. This approach was developed in the old mining area of Mocho and significant knowledge has been gained during the time of the company's operations in that community. This is a direct result of Alcoa's core values, which are designed to provide environmental and economic benefit to the communities. Some of the improved opportunities are:

1) Road conditions have significantly improved when compared to those which existed before mining activities began. The improvements have also resulted in the reduction and in some instances the elimination of dusting issues.

2) Improved road signs

3) Opportunity of residents to earn a livelihood from the trucking activities

4) Reduced trucking hours.

5) In areas where the existing road is not adequate, the company has worked, and will continue to work in tandem with the Parish Council to improve the road condition. Proposed haul road locations in the mining area are shown on Figure 1-5

1.6 SEWAGE TREATMENT

A new sewage treatment facility will be constructed at Green Vale to service the employees and contractors there. While no final decision has been taken on the size of the sewage treatment plant to be installed at the facility, the company will install an adequate treatment plant and implement approved operating and monitoring procedures to ensure that local and corporate standards are met or improved upon. During

construction activities, portable, mobile chemical toilets will be utilized to satisfy the needs of workers. These toilets will be supplied, handled and disposed by a company licensed and permitted to do so. The location of the proposed sewage treatment system is shown on Figure 1-2.

1.6.1 SEWAGE TREATMENT SYSTEM – LOADING STATION

A Bio-digester Septic Tank (BST) sewage treatment facility designed by the Scientific Research Council of Jamaica has been proposed for the Loading Station at Green Vale. The system is being designed as a gravity flow unit that will allow for primary, secondary and tertiary level post treatment (through a reed bed system). Final disposal of treated waste water is proposed to a holding pond that based on analytical results can be used for dust control along the haul roads. The system is being designed to meet or exceed the current sewage effluent standards set by NEPA and the Water Resources Authority (WRA).

The concept of the BST is an onsite sanitation unit that provides for disposal of toilet (black) wastewater as well as sullage (kitchen and bathroom wastewater). It provides an environmentally sound treatment method for sewage as organic and pathogen loads are significantly reduced in the process. The BST relies on the bio-organic breakdown of organic waste under anoxic conditions and produces biogas (anaerobic digestion). The BST is not a “standard septic tank” and should not be confused as such.

Benefits of the BST include:

- High treatment efficiency through longer retention and favourable conditions, under normal conditions persons have no contact with the waste stream
- Low maintenance system with life span in excess of 20 years
- System produces biogas that can be used for cooking, water heating, refrigeration and electric power generation
- Clean (odourless) discharge with significant reduction in pathogens, small quantity of sludge produced (no need for frequent withdrawal)

1.7 NATURAL HERITAGE RESOURCES

Jamalco takes a particular interest in preserving existing and potential historical sites within the project area. The operations are guided by and must comply with the local Jamaica National Heritage Trust Act, Alcoa's strict Environment, Health and Safety Standards. In addition to those historical items already identified, all effort will be made to identify, locate and document, buildings, structures, sites and any other natural phenomena that can be considered significant from a cultural heritage perspective. Mining operations will be designed to avoid or manage appropriately (through direction from the Jamaica Heritage Trust) all such features that may be encountered. Several known heritage resources have been identified and documented within or close to SEPL 530 and are included on Figure 1-1 and those will be protected.

POLICY, LEGISLATION AND REGULATIONS

2 POLICY, LEGISLATION AND REGULATIONS

2.1 POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

This section provides a background on Alcoa's (Jamalco) Environmental Policy and International & National Policies, Legislation and Regulations applicable to the proposed upgrade and expansion of the Jamalco facility (Plant, Port and Mines).

2.1.1 ALCOA'S POLICIES, PRINCIPLES AND GUIDELINES

2.1.1.1 ALCOA'S ENVIRONMENTAL POLICY

The Jamalco facility, under the management of Alcoa, strives to meet or exceed all environmental policies and regulations locally and within its corporate structure. As such, the facility is operated under strict guidance and guidelines to insure compliance at all levels of operation. The following information is derived from the existing Jamalco Environmental Policy Document.

It is Alcoa's policy to operate world-wide in a manner which protects the environment and the health of our employees and of the citizens of the communities where we have an impact.

- ✓ We will comply with all applicable environmental laws, regulations and permits, and will employ more restrictive internal standards where necessary to conform with the above policy.
- ✓ We will anticipate environmental issues and take appropriate actions which may precede laws or regulations.
- ✓ We will work with government and others at all levels to develop responsible and effective environmental laws, regulations and standards.
- ✓ All Alcoans are expected to understand, promote and assist in the implementation of this policy.

2.1.1.2 ALCOA'S ENVIRONMENTAL PRINCIPLES

In support of Alcoa's Environmental Policy, the following principles have been developed to provide additional direction on specific issues. The implementation plan, which follows, provides details on how the Policy and Principles will be carried out.

- ✓ *We will support Sustainable Development*
- ✓ Alcoa will incorporate sustainable development into our operations by integrating environmental considerations into all relevant business decisions. We will achieve cleaner production through programs of waste minimization and pollution prevention with specific and measurable reduction targets.
- ✓ *We will practice responsible use of natural resources*
- ✓ Alcoa will utilize the best available information to plan and execute all projects that involve extraction of raw materials, or which may restrict the use of natural resources or impact ecosystems.
- ✓ *We will utilize techniques accepted as best practices on a worldwide basis for resource extraction, resource use, waste management, and rehabilitation of ecosystems disturbed by our activities.*
- ✓ *We will use energy wisely*
- ✓ Alcoa will strive to maximize efficient energy use, conserving non-renewable resources.
- ✓ *We will practice sound environmental management*
- ✓ Alcoa will integrate environmental management fully with business and operating management to ensure that long-term and short-term environmental issues are considered together with market and economic aspects when decisions are made about new and existing facilities, processes, products, services, acquisitions and divestitures.
- ✓ *We will provide training and information*

- ✓ Alcoa will sponsor training in the environmental area. We will also provide employees, suppliers, customers and neighbors with information needed to understand and help us achieve the goals of our environmental policy.

- ✓ *We will audit our operations and report findings*

- ✓ Alcoa will audit each of its operations on a regular basis to identify strengths and weaknesses of the location's environmental management process and to identify actions that need to be taken to prevent environmental problems or correct environmental deficiencies. Appropriate management, including the Alcoa Board of Directors, will be informed of the audit findings.

- ✓ *We will sponsor activities to improve the science of environmental protection.*

- ✓ Alcoa will sponsor and conduct research and development (including application of emerging technologies) to improve our ability to predict, assess, measure, reduce, and manage environmental impacts of our operations. We are committed to continuous improvement in all aspects of our environmental performance.

- ✓ *We will develop and adhere to high standards.*

- ✓ Alcoa will develop and implement worldwide environmental standards and best practices with emphasis on areas that are unique to our business.

- ✓ *We will report on our activities*

- ✓ Alcoa will communicate promptly and openly with individuals and communities regarding the environmental aspects and impacts of our operations, as well as with concerned parties who request such information. Alcoa will also provide an annual Environmental Health and Safety report that describes our programs, plans and performance. The report will be made available to shareholders and the public.

2.1.1.3 ALCOA'S BAUXITE MINE REHABILITATION STANDARDS & GUIDELINES

The following guidelines are adapted from Bauxite Mine Rehabilitation Standards & Guidelines (1994). These are standard practices to which the client is committed to maintaining at the proposed bauxite railhead, storage areas, mining sites and transportation corridors in southern Manchester and Clarendon.

- During land clearing, utilization of existing resources on the site must be maximized. These may include timber, buildings and produce.
- If the existing vegetation can assist in the rehabilitation process it should be harvested and redistributed in a timely manner on the areas being rehabilitated.
- Burning as a means to remove vegetation should be used as a last resort and should be considered only after harvesting, habitat and burying options have been considered.
- Land area cleared should be the minimum for efficient mining (pits and infrastructure) and rehabilitation.
- Topsoil and remaining vegetation debris must be harvested from the entire area to be mined and either stored where it can be recovered or utilized immediately on other areas being rehabilitated.
- Whenever topsoil is stored it should be done so for the least possible time to minimize the loss of biological activity and nutrients.
- If there are potentially toxic substances in the overburden and mine waste, they should be handled in such a way as to minimize the impact on the rehabilitation and the surrounding areas.
- In some circumstances, in addition to topsoil, subsoil horizons and/or a portion of the overburden may need to be harvested and re-spread on the rehabilitated areas in order to successfully establish the desired vegetation. Topsoil and subsoil/overburden should be re-spread as separate strata and not mixed together.

- Clearing of additional vegetation for storage of topsoil and/or overburden should be minimized.

- Finished slope angles in reshaping will depend on aesthetics, final land use, soil characteristics and safety. Reshaped terrain should conform to the natural landscape.

- All slopes must be stable. If erosion is likely to occur then erosion control works should be put in place

- Compression resulting from the mining, reshaping and soil placement process must be relieved (e.g. by ripping, plowing and sub-soiling etc.) where rehabilitation plans require water infiltration and plant root penetration. During this operation care must be taken to ensure that unfavorable sub-soil materials are not brought to the surface and excessive topsoil burial does not occur.

- soil nutrient and pH levels must be adjusted where this is necessary to achieve rehabilitation objectives

- Where regeneration of native vegetation is the objective, nutrient and pH levels should closely match pre-existing conditions. Soil conditioners should be considered to ameliorate adverse conditions.

- Topsoil must be replaced as the final soil profile. The thickness and area to which the topsoil is returned must provide the maximum value to the end use of the rehabilitated area.

- The topsoil should be evenly spread over the area.

- Where native vegetation is to be re-established, only propagules of the indigenous plant species should be used. Preferably, these should be collected from the areas being cleared or other local provenances.

- Revegetation strategies should be based on a high level of understanding of local climatic conditions and ecological processes. Re-established plant communities should eventually duplicate the natural ecological processes and functions of the original vegetation.

- Fauna return should be encouraged by natural means through the creation of suitable habitat rather than by physical re-introduction. Keystone species may need to be transferred where they are absent or inadequately represented in surrounding areas.

- Artificial barriers such as perimeter roads and fences, which inhibit flora or fauna recolonization, should be removed as soon as practical.

Implementation of these policies, principles and guidelines within Alcoa, begins with the CEO who is ultimately responsible for assuring conformance with Alcoa's Environmental Policy Worldwide. The technical guidance and support will be provided by the environmental staff and other support groups.

At Jamalco, local implementation of these policies, principles and guidelines is the responsibility of the location manager, business unit managers, staff support groups, operating managers, sponsoring managers, environmental affairs staff, government affairs staff, Alcoa personnel and other staff groups.

2.2 LOCAL POLICIES, LEGISLATION AND REGULATIONS

2.2.1 POLICY, LEGISLATION, REGULATIONS & STANDARDS

The following represents descriptions of applicable legislative requirements with which activities of this proposed upgrade must comply:

- Agenda 21
- Natural Resources Conservation Authority (NRCA) Act, 1991
- Wildlife Protection Act, 1945
- Watershed Protection Act, 1963
- Mining Act, 1975
- Minerals (Vesting) Act, 1947
- Bauxite and Alumina (Special Provisions) Act, 1978
- Bauxite and Alumina Encouragement Act, 1950
- Town & Country Planning Act, 1987
- Forestry Act, 1937
- Water Resources Act/Underground Water Control Act, 1959
- Jamaica National Heritage Trust Act, 1985
- Jamaica Railway Corporation Act
- Beach Control Act, 1956
- Public Health Act, 1985
- Disaster Preparedness & Emergency Management Act, 1993
- National Solid Waste Management Authority Act, 2001
- Occupational Safety & Health Act, 2003 (DRAFT)
- Manchester Parish Provisional Development Order, 1974

2.2.1.1 AGENDA 21

In June 1992, Jamaica participated in the United Nations Conference for Environment and Development (UNCED) in Rio de Janeiro, Brazil. One of the main outputs of the conference was a plan of global action, titled Agenda 21, which is a “comprehensive blueprint for the global actions to affect the transition to sustainable development” (Maurice Strong). Jamaica is a signatory to this convention. Twenty seven (27)

environmental principles were outlined in the Agenda 21 document. Those relevant to this project, which Jamaica is obligated to follow are outlined below:

The United Nations hosted the EARTH SUMMIT '92 and from this conference twenty - seven (27) environmental principles were outlined. Not all of these principles are applicable to the project but those deemed relevant and appropriate are outlined below.

2.2.1.2 NATURAL RESOURCES CONSERVATION AUTHORITY ACT, 1991

The Act is the overriding legislation governing environmental management in the country. It also designates National Parks, Marine Parks, Protected Areas and regulates the control of pollution as well as the way land is used in protected areas.

This Act requires among other things, that all new projects or expansion of existing projects which fall within a prescribed description or category must be subjected to an Environmental Impact Assessment (EIA).

The regulations require that eight (8) copies of the EIA Study Report must be submitted to the Authority for review. There is a preliminary review period of ten days to determine whether additional information is needed. After the initial review the process can take up to ninety days for approval. If on review and evaluation of the EIA the required criteria are met, a permit is granted.

Specifically, the relevant section(s) under the Act which addresses the proposed mining activities are:

s.10: (1) Subject to the provisions of this section, the Authority may by notice in writing require an applicant for a permit of the person responsible for undertaking in a prescribed area, any enterprise, construction or development of a prescribed description or category-

(a) to furnish the Authority such documents or information as the Authority thinks fit; or

(b) where it is of the opinion that activities of such enterprise, construction or development are having or are likely to have an adverse effect on the environment, to submit to

the Authority in respect of the enterprise, construction or development, an EIA containing such information as may be prescribed, and the applicant or, as the case may be, the person responsible shall comply with the requirement.

s.12: Licenses for the discharge of effluents etc.

s.17: Information on pollution control facility

s.18: Enforcement of Controls – threat to public health or natural resources

s.32-33: Ministerial Orders to protect the environment

s.38: Regulations

2.2.1.3 WILDLIFE PROTECTION ACT, 1945

This act involves the declaration of game sanctuaries and reserves, game wardens, control of fishing in rivers, protection of specified rare or endemic species. The Act also provides for the protection of animals and makes it an offence to harm or kill a species which is protected. It stipulates that, having in one's possession "whole or any part of a protected animal living or dead is illegal.

This Act has to be considered for the proposed project, ecological assessments will determine if rare or endangered species will be impacted.

2.2.1.4 WATERSHED PROTECTION ACT, 1963

This Act governs the activities operating within the island's watersheds, as well as, protects these areas. The watersheds which are designated under this Act include Rio Minho, Cane River and Rio Nuevo watersheds areas.

Determinations will be made to identify any potential impacts that this project may have on the various watershed areas and will propose mitigative actions where impacts are identified.

2.2.1.5 MINING ACT, 1975

The Mining Act regulates the activities of the mining sector including the various intricacies involved in the granting of licenses, prospecting rights and regulations, compensation payments and the utilization of special lands under a mining lease.

This Act is of special importance to the proposed mining activities and would be administered by the Jamaica Bauxite Institute (JBI).

2.2.1.6 MINERALS (VESTING) ACT, 1947

The Minerals (Vesting) Act, through the Minister, has the power to declare that all minerals being in, on or under any land or water, whether territorial waters, rivers, or inland sea, are vested in and are subject to the control of the Crown. As such this Act governs the extent to which royalties are payable to landowners.

2.2.1.7 BAUXITE AND ALUMINA (SPECIAL PROVISIONS) ACT, 1978

This Act makes provision for the power of the Minister (s) to declare on behalf of the Government to confirm agreements and arrangements between Government and Bauxite Producers, the power to declare persons “Bauxite Producers” and the power to transfer or vest lands of Bauxite Producers. The Act identifies exemptions from approval consents, Transfer Tax, Stamp Duty and Fees of land being owned by a Bauxite Producer for the production of bauxite.

It also gives the Minister power to ensure that orders or regulations are consistent with agreements made and finally it enforces that Income Tax shall be payable against production levees and to be paid in United States currency.

2.2.1.8 BAUXITE AND ALUMINA ENCOURAGEMENT ACT, 1950

This Act authorizes a company to produce bauxite and alumina. It also identifies the power of the Minister on behalf of the Government, to approve the expansion of the alumina industry in Jamaica. In addition, the Act identifies exemption of customs duty for articles/materials used in the production of bauxite, as well as, specific circumstances for payments of General Consumption Tax and conditions for exemption from excise and customs duty. Special provisions are also made for exemptions from Income Tax.

2.2.1.9 TOWN & COUNTRY PLANNING ACT, 1987

This Act governs the development and use of land. Under this law the Town Planning Department is the agency responsible for the review of any plans involving industrial development. The law allows for specific conditions to be stipulated and imposed on any approved plans. This planning decision is based upon several factors, these include;

- the location of the development
- the nature of the industrial process to be carried out
- the land use and zoning
- the effect of the proposal on amenities, traffic, etc.

This Act is applicable to the proposed plant and port upgrades and mining activities.

2.2.1.10 FORESTRY ACT, 1937

This Act provides for the management and the declaration of Forest Reserves on Crown Lands and regulates activities in Forest Reserves. This Act will be reviewed to determine if the upgrade activities (particularly mining) will impact on Forest Reserves and to what extent.

2.2.1.11 WATER RESOURCES ACT; THE UNDERGROUND WATER CONTROL ACT, 1959

The Underground Water Control Act of 1959 is the legal instrument and is enforced by the Water Resources Authority (WRA). The Water Resources Act is expected to provide for the management, protection, controlled allocation and use of water resources of Jamaica. Thus the water quality control for both surface and ground water are regulated by this Act.

If the proposed facility intends to utilize any existing ground water, permission would be needed, in the form of an issued license for this activity. Under this Act exploratory activities such as the boring/drilling of wells for the purpose of searching for underground water without the written consent would be a violation.

In addition, any activity which negatively influences the quality of existing water, whether ground or surface, would be relevant to this Act.

The proposed project will impact on:

- Ground water resources as it proposes, to increase ground water extraction rates.

2.2.1.12 JAMAICA NATIONAL HERITAGE TRUST ACT, 1985

The Act is administered by the Jamaica National Heritage Trust, formerly the Jamaica National Trust. This Act provides for the protection of important areas, including the numerous monuments, forts, statues, buildings of historic and architectural importance in Jamaica.

In the approved mining area (SEPL 530), several historic sites and buildings have been identified within the general area of this project, these include several churches, schools, Great Houses and natural features of significant importance to our heritage.

During this project, an Archaeological and Heritage Retrieval Plan will be implemented to protect any historical or archaeologically significant item encountered.

2.2.1.13 JAMAICA RAILWAY CORPORATION ACT

This Act provides for rules and regulations governing the Jamaica Railway Corporation, its operations and infrastructure. The Act speaks to issues related to land acquisition for expansion of the railway (Part III Section 19), dealing with disruptions of service, etc as occasioned by the railway (Part II Section 9, Section 14), Construction of railways by persons other than the Corporation (Part II Section 18)

2.2.1.14 THE PUBLIC HEALTH ACT (1974)

This Act controls and monitors pollution from point sources. Any breaches of this Act would be sent through the Central Health Committee which takes action through the Ministry of Health, Environmental Control Division (E.C.D.). The ECD has no direct legislative jurisdiction, but works through the Public Heath Act to monitor and control pollution from point sources. Action against any breaches of this Act would be administered by the Central Health Committee. The functions of the department include:

- The monitoring of waste water quality, including regular water quality analysis, using water standards published by NEPA;
- Monitoring of occupational health as it relates to industrial hygiene of potentially hazardous working environments;
- Monitoring of air pollutants through its laboratory facilities.

In addition, there are various sections of this legislative instrument which governs and protects the health of the public. Relevant sections under the Public Health Act of 1985, are Sections 7.- (1) *A Local Board may from time to time, and shall if directed by the Minister to do so, make regulations relating to (o) nuisances* and 14.- (1) *The Minister may make regulations generally for carrying out the provisions and purposes of this Act, and in particular, subject to section 7, but without prejudice to the generality of the foregoing, may make regulations in relation to (d) air, soil and water pollution.*

Aspects of the project related to odour have been considered since odour is a part of the Air Emissions regulations to be promulgated in 2004.

2.2.1.15 DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT ACT, 1993

The principal objectives of the Act is to advance disaster preparedness and emergency management measures in Jamaica by facilitating and coordinating the development and implementation of integrated disaster management systems. Jamalco has established procedures and guidance documents in place in terms of disaster preparedness and emergency management.

2.2.1.16 NATIONAL SOLID WASTE MANAGEMENT AUTHORITY ACT, 2001

The National Solid Waste Management Authority (NSWMA) under this Act has the responsibility to manage and regulate the solid waste sector. It includes requirements for licences for operators and owners of solid waste disposal facilities (in addition to permit requirements of NEPA).

2.2.1.17 OCCUPATIONAL SAFETY & HEALTH ACT, 2003 (DRAFT)

This Act oversees the prevention of injury and illness resulting from conditions at the workplace, the protection of the safety and health of workers and the promotion of safe and healthy workplaces.

Sampling of sections from the Draft Act that are relevant to this project, include:

4. (1) This Act applies to all branches of economic activity and to all owners, employers and workers in all such branches.

5. (1) The owner of every industrial establishment or mine which carries on business on or after the appointed day shall, subject to subsection (8), apply to the Director in the prescribed form to be registered under this Act.

18. (1) Provides a description of the duties of employers, outlining the need for quality work areas and work environments, procedures and guidelines that will result in safe and healthy workplaces.

19. (1) discusses the duties of employers at construction sites in terms of employee safety and health during work activities.

25. (1) an employer shall make or cause to be made and shall maintain an inventory of all hazardous chemicals and hazardous physical agents that are present in the workplace.

26. (1) this section provides guidelines and procedures for employers to follow in terms of identification of hazardous chemicals. This includes labeling and identification protocols.

30. (1) Basically, this section of the Act requires an employer to provide training of its employees with a potential for exposure to hazardous chemicals or physical agents.

It is expected that this Draft Act will be Gazetted in the near future. As such, it is important that Jamalco have an understanding and appreciation for its contents.

2.2.1.18 MANCHESTER PARISH PROVISIONAL DEVELOPMENT ORDER, 1974

This document provides the development plan for the Parish of Clarendon. It clarifies the role and responsibility of the local planning authority and provides guidance on how development of the parish should proceed. All activities in this proposed upgrade of the Jamalco operations that requires local planning authority approval will be properly identified and the appropriate permits and licenses will be secured.

In terms of mining, the Order indicates that there are "widespread and substantial deposits of bauxite occur at various places within the Parish and it is intended that these should not in any way be rendered incapable of extraction as a result of urbanization".

Special note: The Jamaica Bauxite Institute (JBI) is the regulatory agency monitoring the bauxite industry, and as such their policies will extend to any development on bauxite owned lands.

2.2.2 SUMMARY OF THE LEGISLATION AND RESPONSIBLE AGENCIES

TABLE 2-1: NATIONAL LEGISLATION AND RESPONSIBLE AGENCIES

LEGISLATION	INSTITUTION RESPONSIBLE
NRCA Act, 1991	Natural Resources Conservation Authority
Wildlife Protection Act, 1945	Natural Resources Conservation Authority
Watershed Protection Act, 1963	Natural Resources Conservation
Mining Act, 1975	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Minerals (Vesting) Act, 1947	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Bauxite & Alumina (Special Provisions) Act, 1978	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Bauxite & Alumina Encouragement Act, 1950	Ministry of Agriculture & Mining Jamaica Bauxite Institute Mines and Geology Division
Town & Country Planning Act, 1987	Town Planning Department
Forestry Act, 1937	Forestry Department
The Water Resources Act/UWC Act, 1959	Water Resources Authority
Ja. National Heritage Trust Act, 1985	Jamaica National Heritage Trust
Ja. Railway Corporation Act	Jamaica Railway Corporation
Beach Control Act, 1956	Natural Resources Conservation Authority
Public Health Act, 1985	Ministry of Health/Environmental Control Division
Disaster Preparation & Emergency Management Act, 1993	Office of Disaster Preparedness and Emergency Management
National Solid Waste Management Authority Act, 2001	National Solid Waste Management Authority
Manchester Parish Provisional Development Order, 1974	Town Planning Department