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ENVIRONMENTAL IMPACT ASSESSMENT



FOR
PROPOSED EXPANSION OF
MINING OPERATIONS IN
SOUTHERN MANCHESTER
BY JAMALCO

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

This EIA Report provides component details for a segment of the approved 2.8 million metric tonne per year efficiency upgrade at Jamalco. The upgrade project has received blanket approval from NEPA. However, specific components are now being addressed in greater detail. This EIA report has been completed in keeping with the approved Terms of Reference for the project (included as Appendix I) and seeks approval for the following:

1. Establishment of mining operations in South Manchester. The mine area will extend from Mt. Oliphant in the East to Woodlands in the West, Green Pond in the North and Bossue in the South with bauxite deposits being accessed by haul roads.
2. Establishment of a bauxite loading station and associated infrastructure (bauxite stockpiles, offices, sewage treatment plant, fuel storage, vehicle and equipment maintenance, water storage, etc.) at Mt. Oliphant, Manchester
3. Installation of a new aerial conveyor system (RopeCon) with associated infrastructure to transport bauxite from the new Mt. Oliphant loading station to the existing St. Jago Railhead.

LOCATION AND LAYOUT

The mining activities proposed in the South Manchester area will be undertaken within the boundaries of the SML 130 (as depicted in Figure 1-1).

The overall project will involve access to 45 million tonnes of bauxite on the South Manchester Plateau. The mine area will extend from Mount Oliphant in the East to Woodlands in the West, Green Pond in the North to Bossue in the south, and will have bauxite deposits being accessed by haul roads. The required bauxite throughput delivered to St. Jago will be 1200 tons per hour (tph) after screening to remove the estimated 5% by volume of limestone which exists in the ore.

LOAD STATION

A new bauxite loading station will be established at Mount Oliphant to centralize the management and handling of bauxite coming from the mines. A centralized loading station designed and built with all the appropriate amenities and facilities necessary to carry out the required functions will serve to streamline operations and provide an atmosphere for high quality operations and compliance with the rules and regulations of all relevant authorities.

Jamalco proposes to install a new method of conveying bauxite from the South Manchester mines to the St. Jago railhead, the “RopeCon” conveyor system. RopeCon represents the latest innovation in bulk material handling from the world leader in long distance continuous conveyor systems – Doppelmayr. The system is adaptable and can accommodate single conveyor lengths up to 20,000 m, on tower spacing up to 2,000 m apart, with capacities up to 10,000 tonnes/hour.

SUMMARY OF THE LEGISLATION AND RESPONSIBLE AGENCIES

TABLE 0-1: 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

LEGISLATION	INSTITUTION RESPONSIBLE
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
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 1-1: IMPACT AND MITIGATION TABLES

Action	Potential Impact	Mitigative Steps
Sedimentation	Mining	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	Rehabilitation will be done to off-set any potential sedimentation problems through the use of contouring and revegetation.
Conclusion:		
With proper systems and monitoring in place this potential impact can be kept at a minor negative should it occur.		
Leaching	Mining	Minimize exposed stockpiles; construct Storm Water Run-off Collection Pond. Collected pond water will be used for dust suppression.
	Rehabilitation	Rehabilitation will be done to off-set any potential leaching.
Conclusion:		
Bauxite is a chemically stable soil of neutral pH. Therefore there 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
<p>Fugitive Emissions</p>	Mining	<p>Fast cleaning up of spilled bauxite, limiting stockpile time at mine site and sprinkling with water if necessary.</p> <p>This is not an expensive mitigation and is already practiced</p>
	Transportation of ore, spillage on roadways, unattended stockpiles, blending activities	<p>Properly maintain and irrigate haul roads, cover trucks on public roads, limit time stockpiles are unattended, establish weather stations.</p> <p>Standard procedures at Jamalco that are included in the designs and costing for the project</p>
	Construction Activities	<p>Properly plan and coordinate activities, use contractors who are aware and respect Jamalco's principles and standards, monitor activities closely</p> <p>Monitoring of contractors is ongoing and incurs no new costs</p>
	Rehabilitation	<p>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.</p>
<p>Conclusion:</p> <p>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.</p>		
<p>Noise & Vibration</p>	Mining	<p>Mining activities will be primarily away from major residential areas and settlements. Where blasting will be required, proper procedures for clearance, warning, etc will be followed. Monitoring of noise levels will be done from time to time to verify maintenance of standards.</p>

Action	Potential Impact	Mitigative Steps
<p>Transportation by Truck, Conveyor and Rail</p>	<p>Minor Negative</p>	<p>Implement and enforce truck speeds to minimize potential for noise and vibration. Train and monitor truck drivers in maintaining speed limits, use of compression, horns, etc. Utilise dedicated haul roads as much as possible. The RopeCon system will not contribute to major noise formation as it rolls on Teflon rollers for minimal noise impact.</p> <p>The RopeCon system is budgeted for in the upgrade project and the other items are standard procedures for Jamalco and will not incur much cost to implement.</p>
<p>Loading Station Operations</p>	<p>Minor Negative</p>	<p>Remote location of load station will offer buffer from communities and settlements. Monitoring of closest communities will be conducted. Equipment will be designed and sourced to limit the impacts of noise and vibration.</p>
<p>Conclusion:</p> <p>It is practically impossible to eliminate impacts related to noise and vibration from occurring. However, based on implementation of procedures, protocols, proper planning, design of equipment, training and monitoring of employees and their activities, this impact can be maintained easily as a minor negative.</p>		
<p>Loss of Biodiversity</p>	<p>Mining and Load Station Siting</p> <p>Major Negative</p>	<p>Jamalco has a MOU with the Forestry Department to develop revegetation and habitat creation through technologies involving creative conservation. Jamalco is committed to maintaining the guidelines from the Bauxite Mine Rehabilitation Standards & Guidelines (1994).</p> <p>While cost has not yet been fully determined, the expansion budget of Jamalco has made accommodation for implementation of this MOU.</p>

Action	Potential Impact	Mitigative Steps
Rehabilitation	Major Positive	<p>Through the MOU with Forestry and the rehabilitation principles of Jamalco, mined areas will be rehabilitated and where possible work will be done to revive the same or similar biodiversity as existed prior to mining</p> <p>Jamalco will establish nurseries, etc and this is also considered in the budget for the project.</p>
<p>Conclusion:</p> <p>The loss of biodiversity is an unavoidable negative impact of mining activities. Systems must be 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 must be taken to complete the necessary assessments and to identify and preserve all valuable features of the lands biodiversity.</p> <p>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.</p>		
Subsistence Farming	Mining	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	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.
<p>Conclusion:</p> <p>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.</p>		

Action	Potential Impact	Mitigative Steps
<p>Loss of natural features such as habitats, niches and species</p>	<p>Major Negative</p>	<p>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.</p>
	<p>Major Negative</p>	<p>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.</p>
	<p>Major Positive</p>	<p>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.</p>
<p>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.</p>		
<p>Water Supply</p>	<p>Minor Negative</p>	<p>While a few areas have piped water, water from catchment such as tanks and drums are the primary sources. To protect these water sources from dust, Jamalco is aware that it must exercise due care in its haul road maintenance program to limit the amount of dust that gets entrained and may end up in the drinking water of residents.</p>

Action	Potential Impact	Mitigative Steps
	Potable Consumption	Jamalco is always willing to work with the relevant Authorities to seek out solutions to benefit the communities in which they work.

Conclusion:

While mining activities may have a potential minor negative impact (dust) on water supply in catchment, Jamalco is committed to the vigilant and aggressive monitoring and management of its mining operations and haul roads to minimize fugitive dust formation. Mobile sprinklers and proper stockpile management should go a long way in containing this impact.

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. Vehicle maintenance waste from mining equipment will be managed in keeping with Jamalco standards and procedures and will be taken to the refinery for inclusion in the waste streams there.
	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. Sensitive waste streams (used oil, batteries, etc.) will be taken to the refinery for proper management.

Conclusion:

Generation of solid waste is unavoidable. The quality of the systems, standards, procedures and training in place 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 in Jamaica. This project will be managed no differently.

Action	Potential Impact	Mitigative Steps
<p>Sewage</p> <p>Mining</p>	<p>No Impact</p>	<p>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. Licensed sewage handling contractors will be hired to properly dispose of waste generated.</p> <p>Minimal Cost and recognised aspect of the mining operation</p>
<p>Loading Station</p>	<p>No Impact</p>	<p>A tertiary level sewage treatment system will be designed and constructed at the loading station. The proven SRC BST system is proposed. Details are provided in the body of the report.</p> <p>Cost – approx. J\$ 4M – 6M</p>
<p>Conclusion:</p> <p>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.</p>		
<p>Labour</p> <p>Mining</p>	<p>Major Positive</p>	<p>Increased employment will be welcomed in the communities. Satellite business opportunities will benefit. No mitigation required.</p>
<p>Loading Station</p>	<p>Major Positive</p>	<p>Increased employment opportunities and support for satellite businesses.</p>
<p>Conclusion:</p> <p>The proposed hiring of approximately 200 temporary employees during construction activities and approximately 50 permanent 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.</p>		

Action	Potential Impact	Mitigative Steps
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 demonstrates their commitment.
Aesthetics	Bauxite Transportation	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	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.
<p>Conclusion: All impacts related to aesthetics are unavoidable, but reversible. Jamalco's commitment to rehabilitation and revitalization will ensure that the mined out areas are returned to a visual and physical usefulness in keeping with local and their own guidelines.</p>		
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. Jamalco will notify the JNHT immediately of any such occurrence.
<p>Conclusion: A lot of work has gone into the identification of heritage resources in the mining areas. Jamalco is committed to the preservation of all such items and will work with the JNHT to this end.</p>		

Action	Potential Impact	Mitigative Steps
<p>Residential Relocation</p>	<p>Mining</p>	<p>Dislocation can result in a negative as well as a positive impact. 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 similar or better living conditions than before. Illegal squatters will be managed through legal means.</p>
	<p>Transportation upgrade (RopeCon)</p>	<p>Dislocation can result in a negative as well as a positive impact. 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 similar or better living conditions than before. Illegal squatters will be managed through legal means.</p>
	<p>Rehabilitation</p>	<p>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.</p>
<p>Conclusion: Circumstances will occur that require relocation 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 in some cases, however, suitable mitigation is readily available. Depending on the individual situation, this impact could be positive or negative.</p>		
<p>Utility Relocation</p>	<p>Mining</p>	<p>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 is impacted.</p>
	<p>Transportation Upgrade (RopeCon)</p>	<p>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 is impacted.</p>

Action	Potential Impact	Mitigative Steps
<p>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. If managed well, this impact may not be realized as a negative.</p>		
<p>Natural and Stormwater Drainage</p>	Mining	Major Negative
	Transportation Upgrade (RopeCon)	Minor Negative
	Loading Station Construction	Major Negative
	Rehabilitation	Major Positive
<p>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.</p>		
<p>Transportation and Travel Disruption</p>	Mining	Minor Negative
<p>Mining areas are usually away from public roadways and where necessary bypass roads are always constructed to service the surrounding communities. Mines will be serviced by dedicated haul roads.</p>		

Action	Potential Impact	Mitigative Steps									
Transportation Upgrade (RopeCon)	Major Positive	The implementation of the RopeCon system will keep the equivalent of 48 dump trucks (25 tonnes capacity) per hour off the roadway throughout the communities and with that the associated stresses on environment, communities and infrastructure.									
<p>Conclusion: Minimal 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, implementing RopeCon and limiting the number of trucks on the roads will go a long way towards limiting transportation and travel disruptions.</p>											
<p>Socio-Economic Benefits</p> <table border="1" data-bbox="639 827 1073 1388"> <tbody> <tr> <td data-bbox="639 827 794 1062">Permanent Employees</td> <td data-bbox="639 1062 794 1339">Major Positive</td> <td data-bbox="639 1339 794 1929">Jamalco will employ approximately 50 permanent employees at the Mt. Oliphant Loading Station and mining operations. Many will come from the surrounding communities. A positive impact, no mitigation required.</td> </tr> <tr> <td data-bbox="794 827 919 1062">Truckers</td> <td data-bbox="794 1062 919 1339">Major Positive</td> <td data-bbox="794 1339 919 1929">Private truckers will be hired for hauling bauxite from the mines. Many operators will be from local communities. No mitigation required.</td> </tr> <tr> <td data-bbox="919 827 1073 1062">Temporary Workforce</td> <td data-bbox="919 1062 1073 1339">Major Positive</td> <td data-bbox="919 1339 1073 1929">Jamalco will hire approximately 200 temporary employees during preparation and construction activities to provide various services. Many employees will be sourced from local communities for these positions. Positive impact, no mitigation required.</td> </tr> </tbody> </table>			Permanent Employees	Major Positive	Jamalco will employ approximately 50 permanent employees at the Mt. Oliphant Loading Station and mining operations. Many will come from the surrounding communities. A positive impact, no mitigation required.	Truckers	Major Positive	Private truckers will be hired for hauling bauxite from the mines. Many operators will be from local communities. No mitigation required.	Temporary Workforce	Major Positive	Jamalco will hire approximately 200 temporary employees during preparation and construction activities to provide various services. Many employees will be sourced from local communities for these positions. Positive impact, no mitigation required.
Permanent Employees	Major Positive	Jamalco will employ approximately 50 permanent employees at the Mt. Oliphant Loading Station and mining operations. Many will come from the surrounding communities. A positive impact, no mitigation required.									
Truckers	Major Positive	Private truckers will be hired for hauling bauxite from the mines. Many operators will be from local communities. No mitigation required.									
Temporary Workforce	Major Positive	Jamalco will hire approximately 200 temporary employees during preparation and construction activities to provide various services. Many employees will be sourced from local communities for these positions. Positive impact, no mitigation required.									
<p>Conclusion: There are positive impacts associated with the project which need to be mentioned. In many ways, the implementation of this project is a win-win situation.</p>											

PROJECT DESCRIPTION

1 PROJECT DESCRIPTION

1.1 INTRODUCTION

This EIA Report provides component details for a segment of the approved 2.8 million metric tonne per year efficiency upgrade at Jamalco. The upgrade project has received blanket approval from NEPA, however specific components are now being addressed in greater detail. This EIA report has been completed in keeping with the approved Terms of Reference for the project (included as Appendix I) and seeks approval for the following:

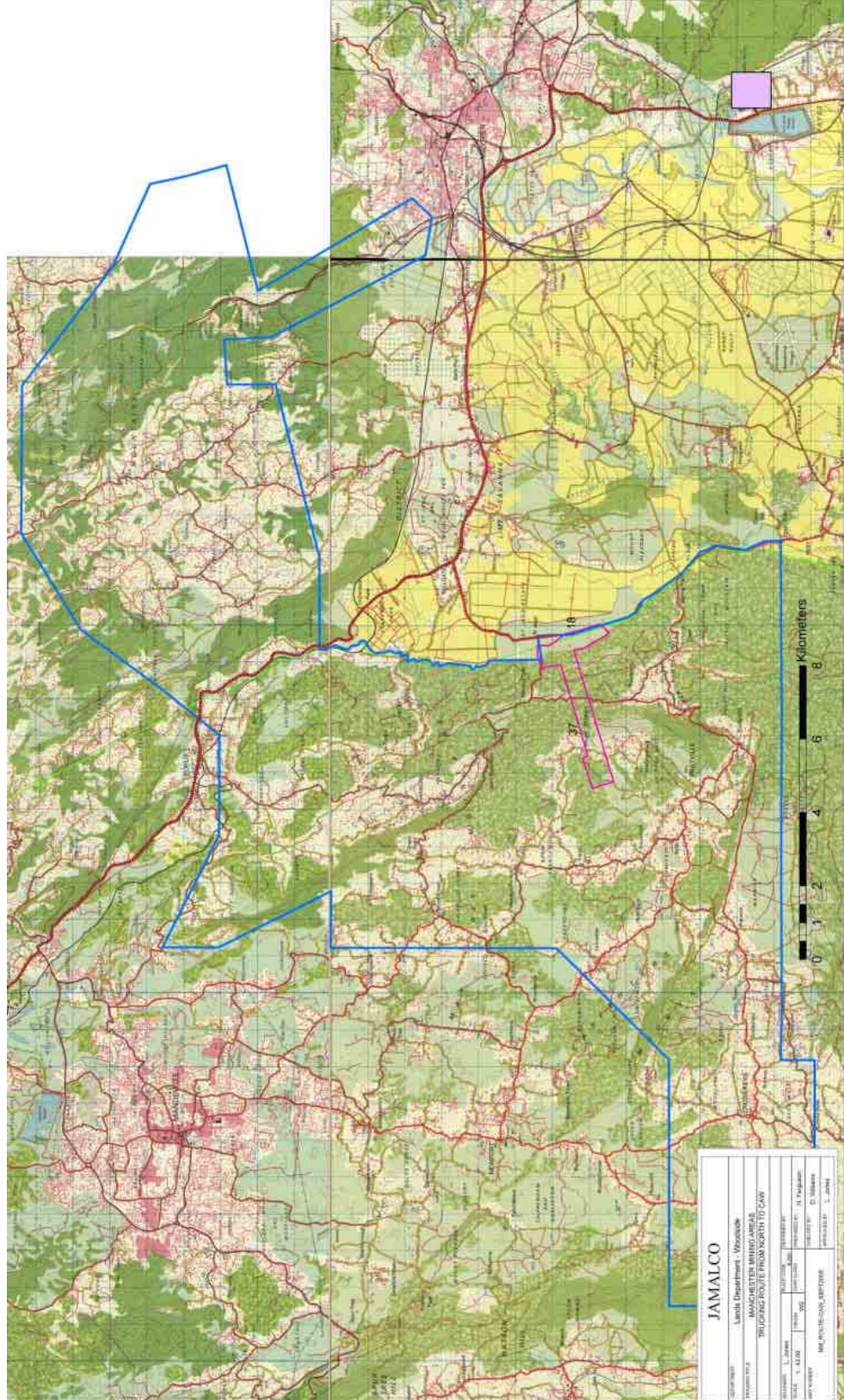
1. Establishment of mining operations in South Manchester. The mine area will extend from Mt. Oliphant in the East to Woodlands in the West, Green Pond in the North and Bossue in the South with bauxite deposits being accessed by haul roads.
2. Establishment of a bauxite loading station and associated infrastructure (bauxite stockpiles, offices, sewage treatment plant, fuel storage, vehicle and equipment maintenance, water storage, etc.) at Mt. Oliphant, Manchester
3. Installation of a new aerial conveyor system (RopeCon) with associated infrastructure to transport bauxite from the new Mt. Oliphant loading station to the existing St. Jago Railhead.

1.2 LOCATION AND LAYOUT

The mining activities proposed in the South Manchester area will be undertaken within the boundaries of the SML 130 (as depicted in Figure 1-1 below).

The overall project will involve access to 45 million tonnes of bauxite on the South Manchester Plateau. The mine area will extend from Mount Oliphant in the East to Woodlands in the West, Green Pond in the North to Bossue in the south, and will have bauxite deposits being accessed by haul roads. The required bauxite throughput delivered to St. Jago will be 1200 tons per hour (tph) after screening to remove the estimated 5% by volume of limestone which exists in the ore.

FIGURE 1-1: SML_130 – P ROPOSED MINING AREA WITH LOADING STATION HIGHLIGHTED



The area consists of a few Sub-regional centers, such as, Cross Keys and Plowden Hill with the majority of communities representing District Centers. Jamalco proposes to utilize small scale site specific mining techniques to locate, remove and transport the bauxite to the railhead without causing major impacts or nuisances to the public. Well maintained haul roads will connect the mines, loading station and the new aerial ore transport system (RopeCon) proposed for the area. The RopeCon system will take the bauxite from the loading station in Mt. Oliphant to the St. Jago Railhead where it will be transported by train to the refinery.

The SML in relation to identified deposits of bauxite is shown on Figure 1-1 above. This map shows the location of bauxite deposits that Jamalco has access to under the SML, however, the company will use testing, its experience and sound judgement in deciding which areas are mined and which ones will be left in a natural state. Areas with historical or cultural heritage resources will be given special attention, and decisions will be made on a case-by-case basis on how best to handle those situations. Issues related to population density and the need for relocation will also be addressed on a case-by-case basis.

1.3 BAUXITE MINING AND LOAD STATION

1.3.1.1 BAUXITE MINING AREA

The SML extends from Belmont in the Northeast to Victoria Town in the Southeast, Plowden Hill in the Southwest and Little Hampton in the Northwest.

The South Manchester Plateau bauxite deposits are located at an average elevation of 1800 ft above and to the West of the existing St. Jago railhead. A severe escarpment having natural slopes of up to 45 degrees separates the mining areas from the railhead.

The bauxite ore that has been identified in South Manchester is of good quality and can be processed at the refinery without enhancement. It is proposed that due to the lower quality of the bauxite from North Manchester, that both ores be blended to enhance the processability of the North Manchester ore and better streamline the quality of ore that reaches the refinery.

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.

1.3.1.2 *LOAD STATION*

A new bauxite loading station will be established at Mount Oliphant to centralize the management and handling of bauxite coming from the mines (See Figure 1-2). A centralized loading station designed and built with all the appropriate amenities and facilities necessary to carry out the required functions will serve to streamline operations and provide an atmosphere for high quality operations and compliance with 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 for equipment and to service an estimated maximum workforce of 120 individuals at peak operation. The loading station is being established to transport bauxite coming from the mines, via the new RopeCon system, across the escarpment to the St. Jago railhead. From the St. Jago railhead the bauxite will be transported by train to the refinery at Halse Hall.

The area reserved for the loading station is approximately 50 acres and is used primarily for subsistence farming. The company will continue to have dialogue with the farmers with a view to assist in the sustainance of their farming practices in areas which will not be directly impacted by mining activities. Some farmers will be relocated to other areas and the reserved area will be cleared of trees and shrubs, the site will be levelled and drainage systems put in place to accommodate the features of the station

FIGURE 1-2: SML 130 LOADING STATION WITH ROPECON ROUTE AND HAUL ROADS HIGHLIGHTED

1.3.1.3 STOCKPILES/SCREENING/LOADING

The Mt. Oliphant loading station will include storage space for two 50,000 tonne bauxite stockpiles, one 50,000 tonne limestone rejects stockpile, screening equipment, belt loading and the conveyor control building. With the establishment of the Mt. Oliphant loading station, the screening operation at St. Jago will become redundant as screening will be done at the loading station.

Raw/Potable Water

The South Manchester Mine and the Mount Oliphant Loading Station will require approximately 700,000 gallons of water per day for general facility uses such as, changing rooms, bathrooms, vehicle washing and also for dust suppression on mine roads. There are existing production wells in the area that Jamalco has access to that have more than enough capacity to satisfy the facility demands. Jamalco is actively in discussion with the National Irrigation Commission to negotiate and determine appropriate arrangements for the supply of potable water. Wells are located as close as the Retrieve and Mango Tree communities in proximity to the proposed location of the Mt. Oliphant Loading Station, and all indications are that capacities are more than sufficient to service the mining operations,.

Storm water runoff will be collected in an onsite artificial pond that will be used for dust suppression on the haul roads. This pond will be the sedimentation control point at the station as drainage features of the site will be directed there. The facility shall include a loading bay for mine water trucks to be loaded with raw water.

1.3.1.4 POWER

Electrical power for the project will be supplied from the JPSCo national grid system. The design requirements for the project expect power supply in the order of 69 KV.

Jamalco has incorporated a unique feature in the designs for South Manchester which involves the regeneration of electricity using the new bauxite transportation system (RopeCon). Under the weight of the bauxite and the influence of gravity, the belt turns an electromagnetic turbine to generate electricity. The turbine on the proposed RopeCon system will produce 1.2 MW of electricity which will be fed to the national grid system for credit from JPSCo. .

An onsite diesel powered generator will be the supplemental power source for the operation. Discussions with the JPSCo are ongoing to determine the point of common coupling (PCC) and division of responsibility and details for that connection.

1.3.1.5 MINE FACILITIES

Facilities at the Mount Oliphant loading station will be designed for mining and transportation of bauxite using 25-50 tonne trucks with a peak estimated workforce of approximately 120 persons. . The Mount Oliphant Loading Station will include facilities to support the South Manchester Mine and the loading station operations, these include:

- *Office 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 120 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 120, 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, sewerage treatment system and landscaping to include trees to act as dust buffer.

1.4 ROPECON CONVEYOR SYSTEM

The South Manchester mining project will involve access to 45 million tonnes of bauxite on the Plateau. A pre-engineering study for this project resulted in the proposal for the installation of a regenerative aerial conveyor system and associated infrastructure to link the South Manchester Plateau with the existing St. Jago railhead. This option was selected because it offered the least negative environmental impacts, met the material handling requirements, the lowest security and health and safety risk and a low maintenance cost (over the anticipated lifespan of the mine).

Jamalco proposes to install a new method of conveying bauxite from the South Manchester mines to the St. Jago railhead, the “RopeCon” conveyor system. RopeCon represents the latest innovation in bulk material handling from the world leader in long distance continuous conveyor systems – Doppelmayr. The system is adaptable and can accommodate single conveyor lengths up to 20,000 m, on tower spacing up to 2,000 m apart, with capacities up to 10,000 tonnes/hour.

The system proposed for South Manchester will comprise 10 support towers starting at a ground elevation of approximately 1750 ft in Mt. Oliphant, extending in a straight alignment to a ground elevation of approximately 150 ft at St. Jago. The maximum line inclination will be 45 degrees and the system is designed to transport 14,500 tonne per day of bauxite from the mining area to the railhead at an average delivery rate of 1200 tonnes per hour. In comparison, it would require the services of 48 dump trucks of 25 tonne capacity every hour (which is unrealistic) to match that performance. The proposed operation schedule is 7 days per week, 12 hours per day, inclusive of regular scheduled maintenance.

The system will be installed with minimum impact on the environment and communities through the use of limited access roads leading to the tower foundations and a 50 feet wide easement along the route. All access roads and easements will be rehabilitated immediately upon completion of construction except for a single gated access road which will be maintained to allow access to the re-lift station, main tower and anchor cables for maintenance.

The RopeCon system has a unique maintenance feature in that maintenance personnel can inspect and attend to the components via a side car that runs along the conveyor.

Where the RopeCon system crosses a roadway, standard steel baskets will be placed underneath the belt to catch any material that may fall off. The entire length of the conveyor will be hooded to protect against the effects of wind and rain. The RopeCon system is one of the quietest bulk material handling conveyor systems in the world. This is accomplished through careful selection of materials of construction, which include teflon wheels which account for the quiet nature of the system. The system is light blue in color to blend in with the natural background and aircraft warning lights which will be positioned atop the towers. The RopeCon system is modular and adaptable, therefore upon completion of mining activities in South Manchester, the system can be removed from the landscape and reused elsewhere or stored.

The benefits of the RopeCon system include:

- ✚ Combination of two proven technologies; aerial ropeway and conventional belt conveying
- ✚ Eliminates the need for large numbers of trucks driving through communities to the St. Jago Railhead.
- ✚ Small footprint, only 10 towers will be required with a limited number of access roads .
- ✚ Designed to generate 1.2MW of electrical power during normal operation
- ✚ Reduces or eliminates many environmental or health and safety issues related to other methods of transportation
- ✚ Teflon rollers will be used on the cables to provide quiet operation of the conveyor.
- ✚ The conveyor will be hooded to prevent dispersion and where the conveyor crosses a roadway a steel basket will be suspended under the system
- ✚ Conveyor structure is modular so that it can be used elsewhere when mining ends in the area (not a permanent fixture on the landscape).
- ✚ Low maintenance when compared to other options considered.

See Figure 1-2 for the routing of the RopeCon system proposed.

Examples of RopeCon Systems Around the World



Examples of RopeCon Systems Around the World



1.4.1 TRANSPORTATION CORRIDOR FROM MINE TO REFINERY

1.4.1.1 ORE TRANSPORTATION SYSTEMS

The development of the South Manchester mining area will require 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 25-50 tonne trucks, to the loading station at Mount Oliphant.
- ✚ Screen, stockpile and load processed ore at the Mount Oliphant loading station onto the RopeCon conveyor system for transport to the existing St. Jago railhead.

- ✚ The distance between the proposed Mount Oliphant loading station and the existing St. Jago Railhead (as the crow flies) is 3.2 km. The RopeCon system offers a secure and less intrusive means of transportation which will be beneficial to the public and the company.
- ✚ From the St. Jago Railhead, blended bauxite will be loaded into railcars as is presently done for transportation to the refinery in Halse Hall.

1.4.1.2 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.

1.5 SEWAGE TREATMENT

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 Mount Oliphant. 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)

1.6 REHABILITATION STANDARDS

1.6.1.1 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.

1.7 NATURAL HERITAGE RESOURCES

The Company's activities take a particular interest in preserving existing and potential historical sites within the development area. The operations are guided by and must comply with Alcoa's World Alumina strict Environment, Health and Safety Standards. In addition to those 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.

1.7.1 MOU WITH FORESTRY DEPARTMENT

Jamalco has signed a Memorandum of Understanding with the Forestry Department of the Ministry of Agriculture to facilitate collaborative activities between the parties in relation to the development and implementation of a "Land Care Management Plan" for segments of the mining area to govern the process of reclamation, rehabilitation and monitoring of mined out lands (and any others identified) in accordance with predetermined post mining land uses.

This MOU will see to the preservation of species for use in the rehabilitation of mined out areas.

A draft copy of this historical collaboration is included in the report as Appendix III: Reforestation plan in Jamaica –Memorandum of understanding between Ministry of Agriculture- Forestry Department and Alcoa.

1.8 LAND ACQUISITION AND RESETTLEMENT

The Company has developed a comprehensive Land Acquisition and Resettlement program over the thirty years of operation on the island. The program continues to benefit from improved methodology and strategy in clearing mining lands while creating as minimal an impact on the existing social structure of the affected communities. In developing the South Manchester Resource areas the company's present thinking is to utilize available government owned lands as the first areas that would be mined. This presents two important opportunities to the future development of the area:

1. Minimal social disturbance as government lands are sparsely populated and in most cases free of any settlement(s).
2. Provision of suitable lands (after rehabilitation and certification) for resettlement of residents from other potential mining areas.

The company approaches this process with an open mind and as such, feels that residents must also have the option to exercise their right to choose where they would like to be resettled. For a more comprehensive overview of Jamalco's Land Acquisition and Resettlement methods please refer to the Jamalco publication "You and Jamalco" (© Jamalco 2000 – included as Appendix II: 'Jamalco and you' Q & A Booklet This represents an easy and simple guide for residents to understand the issues that will impact on their lives and what are their available options.

The company feels that the utilization of suitable available lands in the proposed mining areas for resettlement will minimize the negative issues of community dislocation.

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.

2.2 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
- 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 SML of South Manchester, 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 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 Health 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.

2.2.1.14 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.

2.2.1.15 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).

2.2.1.16 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.

2.2.1.17 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.