

EXECUTIVE SUMMARY

Background

The National Solid Waste Management Programme (NSWMP) being implemented by the Government of Jamaica through the Ministry of Local Government and Community Development (MLGCD) is intended to improve the management of solid waste throughout Jamaica. The development of the proposed Riverton City Landfill will entail a) the conversion of the existing dump into a non-conforming landfill and b) the construction of a sanitary landfill, including leachate ponds, on land immediately adjacent to the dump. The objective of the proposed project is to develop the existing Riverton dump into a regional controlled landfill serving the designated watershed.

The project includes the following components:

- Closure and sealing off, of the existing waste dump at Riverton
- Construction in stages of a new controlled landfill to the west of the active area
- Construction of leachate ponds
- Establishment of solid waste transfer stations

The proposed landfill site is located west of and immediately adjacent to the existing waste disposal site. The area planned for development is 70 ha. Originally part of lands cultivated for sugar cane, the area has been taken out of production due to soil salinisation. The proposed landfill will serve a watershed comprising four parishes – Kingston & St. Andrew (KMA), St. Catherine, Clarendon and St. Thomas. By the year 2015 the landfill is expected to receive approximately 1030 tonnes of waste daily and to serve a population over 1.5 million.

The Project

The development/engineering works at the proposed landfill will include:

- 1) The grading, filling and compaction of the base of new land fill areas to facilitate storm run-off and leachate flow management.
- 2) The construction of an earth fill berm on the perimeter of the landfill area, in order to confine and manage the hazards of contaminated storm run- off and leachate flow and to maximize the fill capacity of the site.
- 3) The installation of leachate and storm drainage systems including holding and evaporation ponds for potentially contaminated storm run-off and leachate.
- 4) The construction of a perimeter access road and access roads for the support facilities.
- 5) The construction and installation of the support facilities and utilities.

Data Collection and Analysis

Presentation of data on the existing environment provided the baseline against which impacts were evaluated. Data collection and analysis was done utilizing standard research techniques for the physical, biological and social aspects and included:

- Site Reconnaissance and Field Work
- Analysis of Maps, Plans and Aerial Photographs
- Literature Review
- Desk Top Research
- Interviews
- Field Studies and Data Collection
- Laboratory and Desk Top Analyses

Legislation

Legislative considerations were also investigated and included a presentation of the National Solid Waste Management Authority Act (2001). This is “an act to provide for the regulation and management of solid waste; to establish a body to be called the

National Solid Waste Management Authority and for matters connected therewith or incidental thereto". Also of relevance is the Environmental Permit and License System (P&L), introduced in 1997, is a mechanism to ensure that all developments in Jamaica meet required standards in order to minimize negative environmental impacts. The P&L System is administered by the Applications Section of NEPA. Permits are required for new developments which fall within the list of prescribed categories. Under the system, "solid waste treatment and disposal facilities" and "hazardous waste handling" are listed as prescribed categories.

Physical Environment

The maximum daily temperature ranges from 29.6 °C to 31.9 °C and the minimum temperature ranges from 22.3 °C to 25.6 °C with highest temperatures in July and August. The relatively narrow range in temperature reflects the moderating influence of the sea. The 30- Year mean rainfall for the Riverton area is 1108 mm and the monthly mean ranges from a low of 30 mm to a high of 263 mm. The annual evaporation is higher than the annual rainfall. This implies there is a water deficit or extremely dry climatic conditions at the site. The wind data for the period 1981 to 1990 show that the most predominant wind directions are from the east and east-south-easterly. These are the prevailing sea-breeze directions and reflect the effects of the mountains which lie along an east-west axis.

The general area for the proposed expansion is fairly flat and the elevation is approximately 1.5 m above mean sea level. The land slopes gently towards the coast at Hunts Bay. Sand mining at the western end of the proposed site has created some depressions on and close to the site. The soil at the site is relatively thin, less than 0.2 m. Typically it occurs as a dark-brown to black organic or peaty soil in some areas or silty clay in other areas.

The Duhaney River forms the eastern boundary of the existing disposal site. The river is influenced by the tide in the vicinity of the site and therefore the stage changes with tidal fluctuation. This poses a problem for accurately measuring the flow in the river. The

estimated flow in the Ferry River below the confluence with the Duhaney River is 2.8 m³/sec. The generally flat nature of the topography has resulted in poor drainage in the area.

Groundwater flow in this area, is influenced by the Ferry and Rio Cobre Rivers, the wetlands, recharge over the existing disposal site and tidal activity. The regional groundwater flow direction is however south towards the coast at Hunts Bay. Groundwater level fluctuation in this area is typically less than 0.2m.

Twelve parameters of water quality were determined at four surface water stations. At all stations total organic carbon (TOC), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total coliforms and faecal coliforms exceeded the national standards, indicating a high level of contamination. Historical data for groundwater quality indicates that there is a high level of microbiological contamination. Other tests also indicate organic matter in the water and anaerobic conditions in the aquifer.

Subsurface measurements (1 m below ground level) of methane (the main component of landfill gas) were made along the perimeter of the expansion to the landfill to determine the extent to which there is subsurface migration of landfill gases away from the site. Measurements of carbon dioxide were also made. Methane and carbon dioxide were not detected along the west, south and northern perimeters of the site. Low concentrations of methane (1.7% and 3.7%) were detected at two locations, along the eastern boundary of the extension and at much higher concentrations (23%) at one of the two locations along the northern extension boundary. The low concentrations of methane and CO₂ at the eastern extension boundary can be attributed to the fact that there were very recent fires at the landfill and consequently previously deposited waste along the eastern boundary had been consumed by the fires and there would not have been sufficient time to re-establish anaerobic conditions needed for methane production.

The amount of landfill gases generated by the existing Riverton City dumpsite were estimated. Although the Riverton City dump has been in operation for several years the extensive amounts of fires at the landfill are likely to have consumed significant amounts of the waste deposited over the years. Dust emissions were modelled for the entire site since trucks delivering waste and cover material will traverse the site from opposite directions. The predicted total suspended particulates (TSP) concentration exceeds the Jamaican National Ambient Air Quality Standard (JNAAQS) for the 24 h average for TSP ($150 \mu\text{g m}^{-3}$).

Biological Environment

The existing vegetation of the proposed landfill site can be described as rinate vegetation or scrubland and is adjacent to the wasteland of the existing active area. The area is predominantly open with isolated trees and a closed canopy fringe. Colonization has occurred by opportunistic, pioneering, coastal, salt tolerant species such as *Sesuvium portulacastrum* (Seaside Purslane), *Acacia spp.*, and *Conocarpus erectus* (Button mangrove). No rare, threatened or endangered species were observed, nor have been reported from the site.

Social Environment

The Riverton City community and its environs are taken to include the adjacent areas of Riverton City, New Haven, Callaloo Bed /Mews and Seaview Gardens. The areas outside include Spanish Town Road, Washington Boulevard and the Six Miles area. Approximately 12,000 persons reside in the area. There are approximately 1,600 housing units with an average of seven persons per dwelling unit. Over 70% of the housing units can be categorized as poor to extremely poor standard, and sanitation and water supply are equally substandard. Mean annual household income within the community is J\$152,000, which represents significant percentage points below that required to meet basic needs. Informal sorters earn approximately \$128,000 per annum and 77% of them rely solely on sorting for income. 68% of the sorters are male.

Livestock rearing, particularly pigs, is an important use in the area. An estimated 12,000 pigs live on the site. Piggens are located immediately adjacent to the Duhaney River. Lack of adequate water and toilet facilities predisposes the communities to diseases and there have been reports of skin diseases, as well as worm related and other parasitic diseases. Scavenging through the dump has been improved through controlled sorting, but risk of contamination and contagion remains.

Eleven organizations were identified as operating in the area working to effect change. These included Youth Clubs, Churches, Development Organizations, Foundations, Basic Schools, Social Development Commission, and political party organizations. The work of the organizations relates mainly to education, welfare, security, and promotion of economic and social development. The organizations represent diverse and significant vehicles for improving the effectiveness of the proposed landfill, and improved solid waste management.

Fire is the major hazard associated with Riverton, and several events have created major problems with health, visibility, and overall safety of communities. Fires may be a result of spontaneous combustion which is typical of landfill areas, but may also be the result of civil unrest as experienced on July 9 and 10, 2001. Flooding from high water levels due to extreme rainfall events is another threat, as well as potential seismic activity.

It is proposed that the entire site, including the support facilities, be completely fenced to prevent access to animals and unauthorized persons. Adequate security personnel will also be deployed to allow the public to freely use the services of the facility. The current access road will be upgraded for use for the proposed landfill.

Potential Impacts and Mitigation Measures

Impacts have been described as to duration (long-term or short-term), direction (positive or negative), location (direct or indirect), magnitude (large or small) and extent (wide or local). Impacts have also been separated into site preparation, construction and operation

phases. Potential negative impacts are related mostly to the site preparation and construction phases. These include soil compaction through use of heavy equipment, water contamination from construction activities and terrestrial run-off with increased sediments due to exposed soil, increase in levels of fugitive dust from construction activities, soil/water contamination from improper disposal of construction camp sanitary waste, traffic congestion and social dissatisfaction due to enforcement of security measures.

Mitigation measures have been proposed including construction of berms to contain stored earth materials, provision of chemical toilets for construction camps, wetting of exposed soil, installation of adequate signage, provision of flagmen and public notices.

Leachate poses a major threat to water resources at landfill sites. If the leachate enters surface or groundwater before sufficient dilution has occurred, the water resources will become contaminated. Mitigation will be by a well-designed storm-water and leachate drainage system. A buffer zone should be created around the proposed landfill particularly on the margin adjacent to the wetland area.

Operation phase impacts are mostly positive and include long-term improvement of air quality, water quality and improvement of public health. The construction of the landfill is expected to have a positive impact through the creation of several jobs for casual labourers, contractors and suppliers. Mitigation measures to prevent negative impacts associated with public health include increasing site security, provision of protective clothing and eliminating access of sorters to domestic waste.

Conclusions

The Riverton City Landfill is being developed adjacent to an existing and currently used open dumpsite. The proposed development will see the implementation of a sanitary landfill, which will be an improvement over the current dump and operations there. The potential negative impacts have adequate mitigation measures proposed, and these must be implemented. Several positive impacts are anticipated.