

Riverton City Landfill

Environmental Impact Assessment

Presented by

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The Project

- Conversion of Dump – Sanitary Landfill
- Waste-shed: 4 parishes – KMA, St. Catherine, Clarendon, St. Thomas
- 15 year projected lifespan
- Projected volume ~ 1030 tonnes/day
- Serving population of ~1.5 mill.

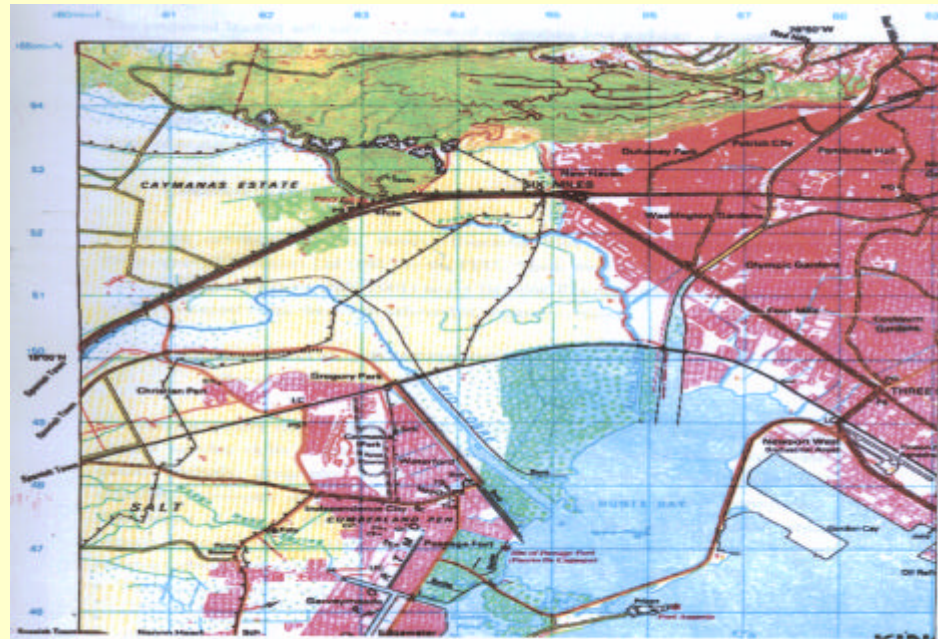


Figure 1.1: Site Location of Riverton City Dump

The Project

- Closure and Sealing Existing Waste dump
- Construction of new controlled landfill
- Proposed landfill site – west of existing disposal site
- Construction of leachate ponds
- Establishment of transfer stations

Development Engineering Works

- Proposed Landfill will be rectangular sited on ~ 42 hectares
- New landfill and existing dumpsite to be confined by an earthen berm 10m above ground level

Engineering Works cont'd

- The works will include:
 - Grading, filling and compaction of the base of the new landfill areas to facilitate storm run-off and leachate flow management
 - Installation of leachate and storm drainage systems including holding and evaporation ponds for potentially contaminate storm run-off and leachate

Engineering Works cont'd

- Construction of an earth fill berm around the perimeter of the landfill area to confine and manage hazards of contaminated storm run-off and leachate flow
- Construction of a perimeter access road and access roads for support facilities
- Construction and installation of support facilities and utilities

Team & Methodology

- Multi-disciplinary Team
- Standard Research Techniques
 - Site Reconnaissance
 - Field Investigations
 - Analysis of Maps, Plans and Aerial Photographs
 - Literature Review
 - Desk Top Research
 - Interviews

Methodology -Areas of Focus

- **Physical Environment** (Climate, Meteorology, Topography, Geology, Soils, Hydrology, Water Quality, Air Quality)
- **Biological Environment** (Vegetation, Fauna, Nuisance Species, Pests and Vectors, Endangered Species)
- **Social Environment** (Land Use, Zoning, Public Health, Hazard Vulnerability, Traffic, Transportation, Access, Public Consultations)

Legislation

- Natural Resources Conservation Authority Act (1991), established the NRCA (now NEPA) with primary responsibility for protection and management of Jamaica's natural resources and control of pollution.
- The Environmental Permit and License System introduced in 1997 to ensure all development meet required standards and to minimise negative environmental impacts
- Draft Air Quality Regulations Jamaica National Ambient Air Quality Standard which specifies the requirements for ambient AQ monitoring

Legislation

- **National Solid Waste Management Authority Act (2001)** – to provide for the regulation and management of solid waste, and to establish the NSWM Authority.
- The NSWM Authority is to ensure effective management of solid waste - safe guard public health, ensure that waste is collected, sorted, transported, recycled, reused or disposed of - in an environmentally sound manner

Existing Environment - Main Physical Issues

- Temp range from 22.3°C – 31.9 °C
- 30 year mean rainfall – 1108 mm
- Monthly mean 30mm – 263mm
- Annual evaporation higher than annual rainfall
- Wind data (1981 –1990) prevailing E – ESE winds (sea-breeze directions)
- Flat Terrain - 1.5 m a.s.l.; slopes toward Hunts Bay
- Depressions on site due to illegal sand mining
- Thin soil cover <0.2 m - Peaty in some areas & silty clay in others.

Physical Environment

- North & South of the site are wetlands
- Inflows to the wetlands are primarily overflow from Ferry River & storm water
- Poor drainage due to flat topography
- Little ponding in depressions due to sandy soil
- High water table - Groundwater gradient flat

Ground Water- Main Issues

- Regional groundwater flow is south towards the coast at Hunts Bay.
- Flow influenced by tide & Ferry/Rio Cobre Rivers. Flow direction varies depending on factor exerting greatest influence at time of measurement.
- Sentar Study 1993, showed high bacterial levels.
- Leachate poses the main impact to groundwater.
- Clay/peat sequence underlying area – aquiclude
- No significant Ground water resource below site that is at risk of contamination

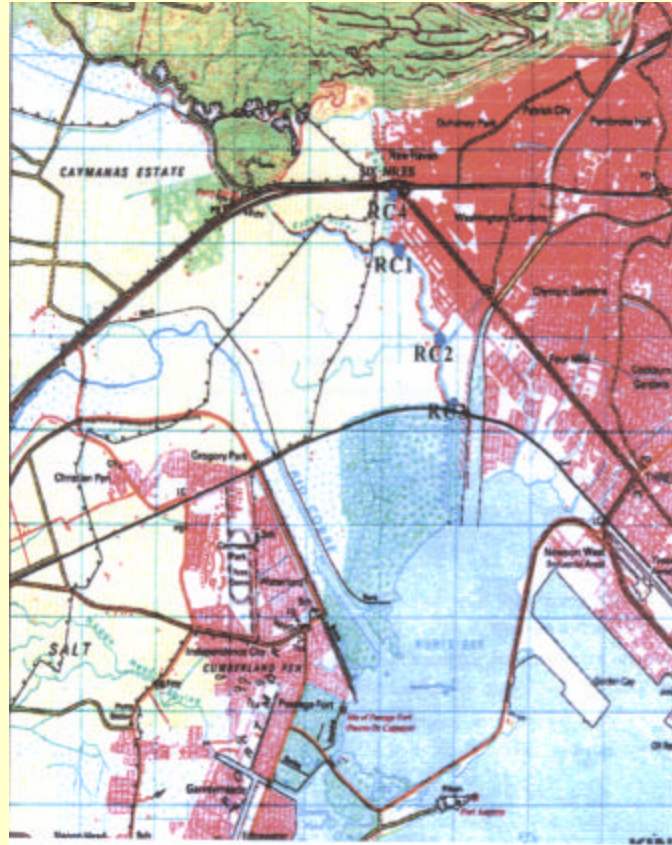


Figure: 2.1: Surface Water Quality Stations

Surface Water Quality -Main Findings

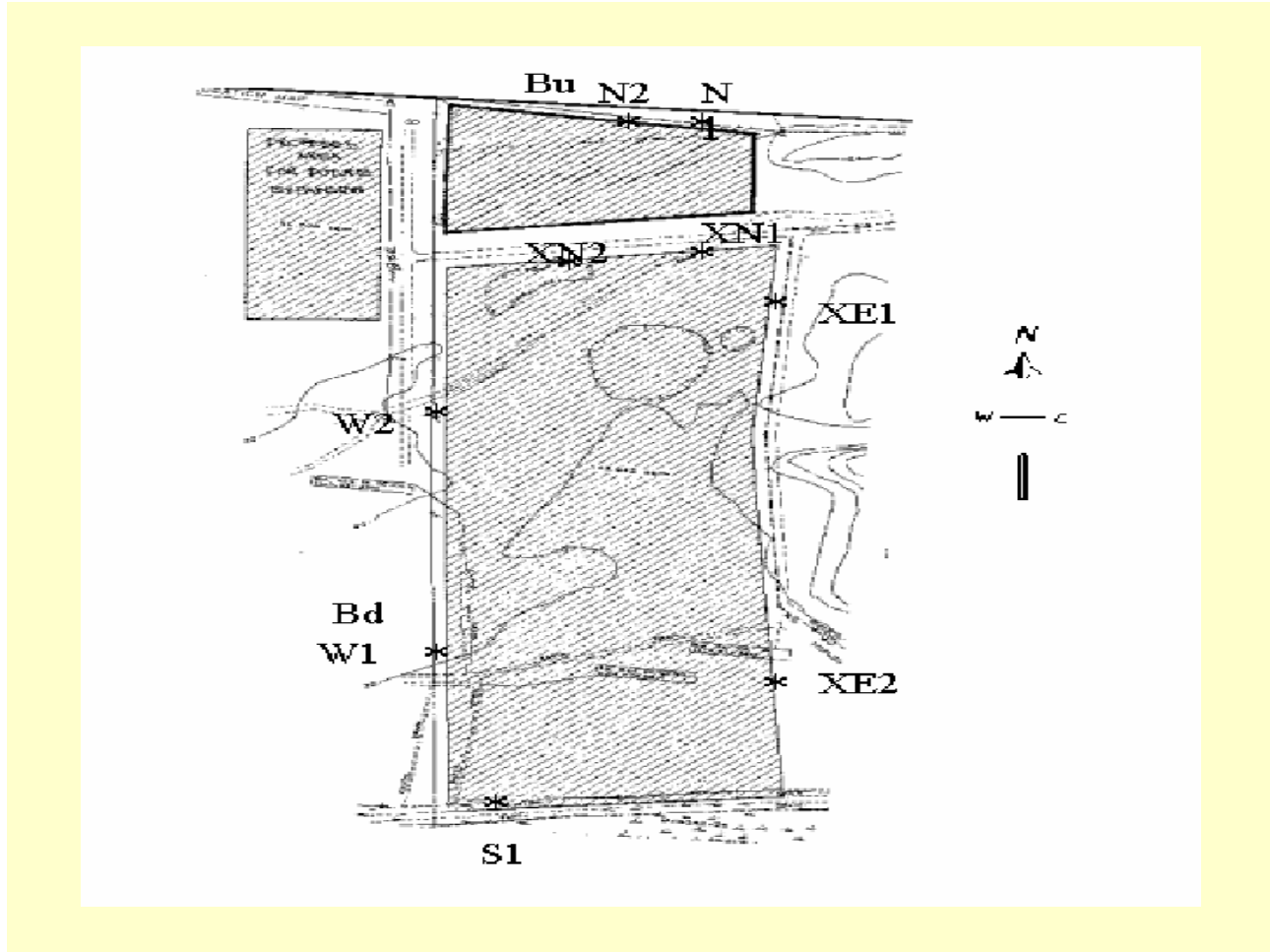
- Significant contamination of water bodies
- High bacterial levels
- High organic loading
- Anoxic waters
- High Suspended solids

Data for Riverton City Surface Water Quality

PARA-METERS	SAMPLES				NEPA Standard *
	RC 1	RC 2	RC 3	RC 4	
DO (mg/L)	7.77	0.36	2.25	8.35	4.5-7.0
TOC (mg/L)	923	1067	1077	4377	100
COD (mg/L)	79	59	56	113	10
Fecal Coliform	2,400	2,400	2,400	2,400	<2-13

Air Quality

- Characterisation of the existing air quality included a review of historical data supplemented by measurements.
- Potential air quality impacts can arise from
 - Landfill gas emissions
 - Fugitive dust and other emissions



Air Quality

- Historical data for SO_x, NO_x & benzene reviewed were limited and did not allow a reliable estimate of mean ambient levels.
- The study showed however that highest SO₂ levels occurred in the Spanish Town Road area down wind of the refineries and JPSCo.

Air Quality Findings

Particulates

- Particulates are produced from the operations at the landfill. These activities are listed below in order of emission rate:
 - Delivery of waste
 - Covering operations (bulldozing, compacting)
 - Wind erosions (wind speed high & soil cover dry)
 - Vehicle exhaust emissions

Landfill Gas

- Generated by biodegradation of waste
- Landfill gas is ~ 50:50 CH₄ & CO₂
- Additional low concentrations of non-methane compounds
- Extensive fires at Riverton consumed most of gases generated over time.

Air Quality Findings - Landfill Gas

- CH₄ & CO₂ were not detected along the western and southern perimeters.
- Low concn of CH₄ (1.7% & 3.7%) were detected at XE1 and XE2 - eastern boundary
- Higher CH₄ concn along northern boundary;
- XN1 (23%) & none at XN2.
- Low levels due to recent fires ~2 weeks before measurements were taken.
- CH₄ & CO₂ < dl upwind & downwind of site



Plate 4.5: Smoke at the active site

Air Quality Modeling

- TSP and landfill gas emissions were estimated using **U.S. EPA Screen 3 Dispersion Model** assuming 1200 tons/day
- Predictive model of worst case, downwind, 1-hour average concentrations.
- Modeled for entire site
- Area source dimensions 720m by 720m
- Height 16.4 m a.b.s.
- Simple terrain – flat, few depressions
- Nearest receptor (residence) 400m from centre of existing active area & 640m from centre of expansion area

Air Quality Modelling

- **NRCA** guideline recommends 1-hour predn applies to 24-hour averaging period
- **Findings:** Maximum downwind 1-hour average concentrations:
 - Methane – **9,280 ug/m³ (14 ppm) cf 250,000ppm**
 - Vinyl chloride – **0.524 ug/m³ cf 1ug/m³/hr**
 - TSP - **1,017 ug/m³ (586 with wetting)**
cf standard – **150ug/m³**



Plate 4.1: Ruinate vegetation at the proposed site of the landfill

Biological Environment Main Issues

- Ruinate Vegetation/Scrubland
- Open – isolated trees – closed canopy fringe
- Opportunistic species
- No rare, threatened or endangered flora or fauna
- Birds - Scavenging species
- American Crocodiles in Duhaney R. – protected by law



Plate 4.2: Adjacent wasteland on the active site



Plate 4.3: The area is predominantly open with isolated trees and a closed canopy fringe

Social Environment -Main Issues

- Residential Use – Riverton City, Callaloo Bed/Mews, Seaview Gardens, New Haven - 12,000 persons. 1,600 units 7 persons/unit. 70% units poor to extremely poor.
- Major industrial belt adjacent - Spanish Town Road , Six Miles, Washington Boulevard
- 11 Community Organisations within area
- Livelihoods - Zoning & Sorters

Main Issues cont'd

- Livestock Rearing - pigs & cows
- Pig Pens adjacent to Duhaney River
- Public Health
- Traffic and transportation arteries -Mandela Hwy, Six Mile, Spanish Town Road, Washington Boulevard
- Traffic into site



Plate 4.4: Squatter settlements adjacent to the active site

Public Health

- Scavenging
- Lack of Sanitary Facilities
- High Faecal Coliform
- Smoke
- Diseases - STDs, Skin

Hazard Vulnerability

- Fires
- Hazardous Materials Disposal
- Flooding
- Aircraft Flight Path – Visibility
- Seismic Activity

Significant Environmental Impacts and Mitigation

- **Soil Compaction and Contamination**
 - Liners, Leachate collection systems, and cut-off drains
 - Cover material and landfill cells
- **Surface and Ground Water Quality Impacts**
 - Increased bacterial contamination
 - Increased suspended solids loading
 - Contaminated runoff from landfill to water bodies

Impacts and Mitigation

- **Surface and Ground Water Quality Mitigation**
 - Well-designed stormwater and leachate drainage system
 - Sediment and detritus traps
 - Check dams and berms along river banks in active areas
 - Relocation of livestock
 - Appropriate site planning re location of stock piles
 - Provision of adequate sanitary facilities
 - Clear operating procedures/trained staff

Impacts and Mitigation

Air Quality Impacts

- Increased levels of fugitive dust during construction
- Landfill gas not expected to pose a health risk
- Migration of landfill gas to enclosed spaces could pose a safety risk if [Ch4] attain the explosion limit >25%

• **Air Quality Mitigation**

- Wetting road surfaces (70% redn) and surface improvement
- Covering trucks
- Control vehicular speed
- Landfill Gas control system - Venting

Impacts and Mitigation

- **Vegetation**
 - Tree buffer - air-shed purification and aesthetic improvement
- **Traffic, Transportation and Access**
 - Sensitisation of haulage contractors
 - Provision of turning areas – acceleration/deceleration lanes, Scheduling

Impacts and Mitigation

- **Public Health**
 - Security - limit access
 - Protective clothing for sorters
 - Removal of livestock
 - Warning signs re Water contamination
- **Hazard vulnerability**
 - Supervision of disposal & Sorting by Waste Cells
 - Construction of cut-off drains
 - Buffer zone around landfill
 - Buildings low-rise, earthquake/hurricane resistant
 - Berms around leachate ponds earthquake sensitive
 - On-going dialogue with AAJ

Next Steps

- Permit
- Project Implementation
- Monitoring and Training

Environmental Monitoring Programme

- Long term programme required to ensure that the project performs as designed
- Monitoring Plan has been prepared & costed
- The following parameters will be measured
 - Local Meteorology
 - Ambient Air Quality
 - Landfill Gas
 - Surface Water
 - Ground Water