

Since our inception, *B & L Cremation Systems, Inc.* has been perfecting the packaged cremation retort. Our commitment to Research and Development is unsurpassed. Designs engineered by B & L have changed not only today's crematories, but have changed the entire industry. B & L was the first to introduce the hot hearth system, fuel saving materials such as ceramics and the separate remains removal system to the human crematory market.



For nearly fifteen years, B & L has grown to become the recognized leader of the cremation industry. B & L will continue to improve every aspect of the human crematory. We set the standards which others follow.

Why accept less... *B & L - Built Better to Last Longer.*



N-205A Cremation Retort



N-20 Cremation Retort



N-201A Cremation Retort

N-20 Cremation Retort Series

Plate 11: Proposed crematorium system

BL-300 Processing Station



FEATURES

- ✓ State of the art design
- ✓ Heat resistant stainless steel work area
- ✓ Self contained
- ✓ Designed to accomodate most processors
- ✓ Lighted work area
- ✓ Removable filters
- ✓ Low noise

SPECIFICATIONS

- ✓ Length: 53"
- ✓ Width: 30½"
- ✓ Height of Back Panel: 66"
- ✓ Height of Table: 36"
- ✓ Weight: 450 lbs.
- ✓ Work Area: 48" x 24"
- ✓ Elec. Req. 230 VAC 60 HZ 10 7.6 FLA
120 VAC 60 HZ 10 15.2 FLA
- ✓ One Year Warranty
- ✓ FOB: Largo, Florida

Loading Funnel

Stainless steel funnel provides easy loading of processor.



Processor Stand

Lightweight aluminum stand places processor at the correct working height.



BL-199 Processor

The Industry Standard



B & L offers a complete line of ancillary products to ensure your cremation facility is State-of-the-art. Contact B & L for more details.

Urn Loader

Stainless steel urn loader prevents spillage while loading.



Systems, Inc.

7205 114th Avenue North • Largo, Florida 33773
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Web: www.blcremationsystems.com • e-mail: blcremsys@aol.com

Plate 12: Related crematorium equipment.

4.3.10 Control Measures

Administrative

Training programmes both by the management team and by the vendors of the crematorium equipment. These training programmes will be address, inter alia, the types of hazards associated with the processes, approaches to controlling them, use and care of personal protective equipment (PPE), limitations of PPE, safe work practices and personal hygiene. In addition, a culture of “universal precaution” i.e. “treat every dead body as being infectious”, will be promoted and implemented.

Worker protection measures

Engineering solutions will be the preferred approach, however, when such measures are impractical and/or inappropriate, adequate and appropriate PPE will be utilized. Local exhaust (fitted with appropriate control systems for ambient air) is indicated as a means of controlling worker exposure to ash at the “urn-filling” work station. Also mechanical lifting aids and UVR shields are other engineering solutions indicated.

Physical

This is deemed limited to ultra violet radiation (UVR) exposure when inspection of the body is done during cremation.

4.3.11 Other Health and Safety Impacts

Water Pollution

Burial has a great potential to pollute waterways especially through the contamination of ground water. Water that percolates through the cemetery could carry with it some elements of the interred remains, where sealed vaults are not used; this may then be dispersed through the environment. The main health impacts as far as groundwater is concerned would be from bio-contaminants and chemicals.

a. Bio-contaminants

Viruses, protozoa and bacteria still living in the corpse have the potential to contaminate groundwater. Some studies have indicated only insignificant bacterial contamination of

groundwater located near to cemeteries. The degree of contamination that may result would be influenced by various factors such as the age of the corpse and their decay rates.

Table 4.3: Variables affecting decay of human bodies

VARIABLES	EFFECTS ON DECAY RATE
Temperature	5
Access by Insects	5
Burial and Depth	5
Carnivore/rodent access	4
Trauma (penetrating/crushing)	4
Humidity /aridity	4
Rainfall	3
Prior embalming	3
Body size & weight	3
Clothing	2
Surface body rests on	1

Source: Assassin, 1994

Note: 5 is the most influential factor and 1 is the least

Research studies have indicated that the decay of interred human remains produces a salinity plume locally, which diminishes with distance from the cemetery. Very saline plumes of chlorides, sulphate, and bicarbonate ions have been measured beneath graves. However the impact of the saline plumes on the environment is yet to be determined.

b. Chemicals

The process of embalming bodies prior to cremation or burial contributes to water pollution. Embalming is a "*process of chemically treating the dead human body to reduce the presence and growth of micro-organisms, to retard organic decomposition and to restore an acceptable physical appearance*". Chemical preservative in the corpse (from embalming) can contaminate groundwater when the bodies decompose (Table 4.4).

The Occupational Safety and Health Administration in the United States classifies formaldehyde, the main chemical injected into the body during embalming as a hazardous chemical linked to cancer and birth defects and as a carcinogen by the National Institute of Occupational Safety and Health (NIOSH).

Other Impacts

The problem now experienced by residents with high influxes of mosquitoes when it rains will be alleviated with the development of the site. **(Direct, long-term, positive impact).**

Table 4.4 Types of chemicals used in embalming

TYPES OF CHEMICALS	FUNCTION
Preservatives e.g. formaldehyde & methyl alcohol	Change the nature of the body's cell proteins so they would not putrefy
Germicides	Kill bacteria
Dyes	Colour tissue
Humectants	Help retain moisture in the tissue
Anticoagulants	Prevent blood clotting
Surfactants	Allow fluid to pass through small blood vessels
Water conditioners	Purify water used to dilute embalming fluid
Perfuming agents	Mask smell of chemicals being used
Chemical vehicles	Allow various chemicals to mix together

Source: Iserson, 1994

4.4 Mitigation Measures Recommended for Health and Safety Impacts Identified

- Controlling leachate from graves - The use of cement concrete in the construction of vaults would limit the escape of leachate from the grave.
- Preventing ground water pollution - While the risk is minimal it is not impossible that leachate flows from the graves if cracks occur in the concrete surface. A system for monitoring the bacteriological and chemical quality of groundwater should be implemented by government authorities.
- Preventing contamination from onsite disposal system – The construction and use of a tile field/septic tank system is environmentally friendly. The resulting wastewater could be incorporated into the water management plans for the cemetery lawn care. This will also reduce the need for fertilizers.
- Guidelines for the contents of coffins to be cremated should be introduced and could include:
 - a. No unnecessary items (such as artefacts and other prized possessions of the deceased) be included in the cremation container.

- b. Only non-chlorinated plastics should be used in order to minimize the amount of hydrogen chloride emission.
- To minimize carbon monoxide emissions from cremation, a minimum temperature of 1400° F (USA FDA guideline) is recommended along with the proper amount of oxygen and sufficient turbulence for adequate mixing. The equipment, however, is designed to incorporate a large after burning area to ensure that gases are fully combusted in the chamber prior to exit from the stack.
 - Electricity and gas would be the fuels of choice in the crematory as coal would be avoided as its high sulphur content, could give rise to sulphur dioxide emissions.
 - The heavier the body, the more time it takes for cremation to be completed. Therefore, the heaviest bodies would be cremated first. Cremation is usually completed within 2 hours.
 - Plastic, fibreglass or polystyrene coffins would not be cremated to avoid emissions of toxic gases.
 - Use of the best available technology, which would meet NEPA standards for stack emissions and ambient air.
 - The installation of appropriate emission control devices for the crematory is strongly recommended. However, the proposed equipment is state-of-the-art; for example, the urn loader prevents spillage when loading as shown in Plate 11.
 - To mitigate dust impact from cemetery site preparation and construction, the wetting of the site would be undertaken and workers provided with personal protective devices.
 - While both burial and cremation contribute to environmental pollution the impacts from burial have the potential to be much more devastating than those caused by cremation. Therefore in order to preserve the environment cremation should be promoted as the preferred option for the disposal of human remains.
 - Appropriate equipment will be made available in the event minimum chemical levels are exceeded.
 - Exhaust stacks will be at least 1.3 meters (4 feet) above any roofline within 6.09 meters (20 feet).

4.5 Socio-economic Impact Assessment

4.5.1 Employment Impacts

The anticipated employees for operation and maintenance of the proposed cemetery would have an insignificant economic impact on the region in relation to the current and projected employment trends of the Dalling Street and the town of Savanna-la-mar. Persons that stand to benefit most are the employees and the owners of grocery shops, restaurants and other linkage funeral service activities, such as, vendors of cut and artificial flowers in the town.

4.5.2 Economic Impacts

The proposed cemetery would have minimal impact on the local economy, but nevertheless, welcomed in light of the high unemployment rate (14.9 %) in the parish and by extension the town. Responses during the swift survey were mixed as to whether or not the cemetery will benefit the area residents cited that the owners stood to benefit the most.

After the initial construction of capital facilities on the Property, employment projections indicate employment creation of approximately thirty (30) persons at the cemetery. Employees would be hired locally where possible. Based on information obtained from the Developer the cemetery would be used by a population drawn from a 25-mile radius. Initial interment is expected to last approximately one hour and subsequent visits would last a maximum of 30 minutes.

It is estimated that average attendance at each interment would be 150 persons. It is projected that approximately 100 burials would occur for each year of operation. This would result in at least 15,000 projected visitors to the cemetery on a yearly basis. It is anticipated that visitors to the proposed cemetery would not stay over night, nevertheless, restaurant business is adjacent proximity are likely to be significantly impacted after funeral services are held.

Other funeral homes in Savanna-la-mar are expected to benefit from the cemetery since typically funeral arrangements are based in the Town and grave sites would be made available to other funeral homes for purchasing.

New businesses that could be attracted to the area because of the cemetery include florists as flowers are allowed at the gravesites and would be available for relatives who may visit.

(Direct, positive, long term impact)

4.5.3 Transportation, Parking Lot and Motor Vehicles

Cemeteries typically generate minimal traffic under normal conditions during a typical day leaving the greatest pedestrian and vehicular traffic to Saturdays and Sundays. Residents surveyed in the area agreed that the cemetery will not significantly impact on pedestrian or vehicular traffic.

- The proposed parking lot would have an impervious cover (grass crete as recommended by NWA), however, certain materials may accumulate on the surface during dry weather conditions, only to form a highly concentrated first flush during rain. The vehicles utilizing the parking may be a source of potential pollutants such as gasoline, exhaust, motor oil and grease, undercoating, brake lining, rubber and engine wear could contribute to the presence of heavy metals such as cadmium, cobalt, iron, manganese, copper, chromium and nickel in the area. These materials may contaminate storm water, some of which may percolate into the soil and may reach groundwater.
- Due to the slow nature of funeral processions to the cemetery and large number of vehicles involved the concentration of carbon monoxide and other dangerous gases could increase in the area.
- In addition, with the expected increase in vehicular traffic on the roadway, resulting in an increased risk of motor vehicle accidents on this relatively narrow roadway.

(Indirect, long-term, negative impacts).

Measures Incorporated by Design and Mitigation Measures

There would be no increase in traffic parked on this road, as ample parking would be provided within the grounds (81 spaces).

4.6 Cumulative Impacts

- a. The following cumulative impacts are anticipated: -

- A gradual increases in the impervious area of the cemetery due to grave construction, which would increase surface run-off of storm water.
- A build-up of leachate from the decomposition of bodies with increased threat to groundwater pollution.

However with the implementation of mitigative actions the cumulative impact on the region would be insignificant.

- Impacts to ecological resources at or near Dalling Street are the result of the complex interactions of several different trends. Existing and newly planted vegetation and grasses would continue to contribute to the water cycle. Another trend that would affect these resources are planned changes in land ownership patterns resulting in change of land use and as critical areas are managed with the design of the storm water drainage plans for the Property. These trends are positive.
- No significant impact on vegetation or habitat is anticipated from this action, as there are no threatened or endangered species.

4.7 Residual Impacts

The proposed development would result in permanent changes to the landscape with respect to physical characteristics, such as, topography and distance above mean sea level. The composition and vegetation distribution will also change.

4.8 Site Specific Mitigative Actions

The following preventive measures would be taken to ensure that the minor adverse impacts from some aspects of this project are minimized. Site specific impacts would be reduced by the use of best management practices to prevent dust, noise, and soil erosion.

4.8.1 Landscaping

The following measures and best management practices are proposed to avoid, minimize, and mitigate for impacts on ground water supply because of the proposed action.

1. Choice of durable grasses for use on gravesites, such as Bermuda grass.
2. Use of native grasses and ornamentals on all other manicured areas

3. Limit watering of Buffer areas.
4. Suspend watering during rainy season. Best Available Technologies (BAT) procedures and technologies would be used extensively to keep water consumption as low as possible. Maintenance staff would be trained in best techniques to ensure lowest water consumption.

4.9 Occupational Health and Safety Considerations

Numerous processes are typically associated with the preparation and disposal of the human dead all of which present occupational health and safety hazards to varying degrees. The processes involved will be:

- transporting the casket and body to the grave/crematory,
- lowering the casket into the grave or placing it into the **combustion chamber** of the crematory,
- digging and filling of graves and inter alia,
- the removal of the cremated remains into urns.

There are four (4) types of occupational hazards that are associated with the handling of deceased humans:

- biological,
- chemical,
- ergonomic and
- psychological.

In addition, physical hazards such as noise exposure and ultra violet radiation (UVR), fugitive exposure and general housekeeping safety considerations are also indicated.

5.0 MONITORING AND MANAGEMENT PLAN

The operation of the cemetery and the crematorium will be monitored to ensure compliance with national environmental standards set by the NEPA. Specific monitoring parameters are outlined in Table 5.0 below:

Table 5.0: Monitoring and Management Plan

Activity	Agency/Individual
Preparation and Constructional Phases	
a. Marking of trees to be maintained for landscaping	Contractor/Developer
b. Engineered measures to prevent inundation of parking lot, vaults and roads	Contractor/Parish Council /Project Engineer
c. Design and traffic control measures to reduce conflict between pedestrians, and vehicles operating on the site	Contractor/Parish Council /Project Engineer
d. Obtaining construction materials from the nearest legitimate sources	Contractor/Parish Council /Project Engineer
e. Construction of a sewage treatment facility, that produces treated wastewater of the quality that could be used for irrigating the park	Contractor/Parish Council /Project Engineer
f. Plants required for landscaping to be obtained from legitimate sources	Parish Council /Landscape Architect
g. Fill material to be obtained from nearest legitimate sources	Contractor/Project Engineer
Strict adherence to the approved building plans	Westmoreland Parish Council/ Developer
Operational Phase	
a. Periodic measurement of salinity plume beneath graves	"
b. Stack emission testing from the crematory will be conducted to ensure compliance with emission standards.	"
c. Stringent monitoring of the use of fertilizers and pesticides to minimize environmental impacts.	"

Activity	Agency/Individual
e. Monthly monitoring of wastewater quality	Consultant
f. Providing appropriate safety equipment for staff both operating the crematorium as well as grave diggers	Operator
g. The watering of lawns only during dry seasons	Operator
i. Both environmental and medical monitoring will be conducted on an on-going basis and appropriate corrective measures taken as indicated. The Threshold limit Value (TLV) of 0.3ppm, 8-hour time- weighted- average exposure limit of the authoritative ACGIH, will be used as benchmark for formaldehyde exposure. Medical surveillance, informed by the environmental hazard analyses, will be undertaken as indicated.	Public Health, Ministry of Labour

5.1 Management

- a) careful selection, training and supervision of staff
- b) provision of personal protective equipment
- c) collaboration and cooperation with local health department and other regulatory agencies in the monitoring of the operation.

6.0 REGULATORY AUTHORITIES AND LEGISLATION

The regulatory frameworks within which the proposed project will be developed are addressed below. The areas of relevance concern environmental quality, health and safety, protection of sensitive areas, protection of endangered species, site selection and land use control at the regional, national and local levels that relate to or should be considered within the framework of the project.

6.1 Regulatory Authorities

6.1.1 The National Environment and Planning Agency

Under the Natural Resources Authority Act and the Permits and Licences Regulations of 1996, the National Environment and Planning Agency (NEPA) is responsible for environmental protection on the island. In discharging its responsibilities, the NEPA is not only responsible for the environmental protection but also manages the nation's natural resources and the enforcement of environmental laws. Its functions include ensuring that developments are undertaken within its physical planning and environmental guidelines by requiring environmental impact assessments, reviewing proposed developments and granting permits and licences.

Besides the NRCA Act, NEPA monitors and enforces laws and regulations such as The Beach Control Act, The Watershed Protection Act and the Wildlife Protection Act.

6.1.2 The Ministry of Health

The Environmental Health Unit (EHU) of the Ministry of Health is the agency responsible for the approval of the proposed sewage treatment and disposal system, setting discharge limits and pollution control.

6.1.3 Ministry of Transportation and Works

The Ministry of Transportation and Works requires that the drainage and road design meet its approval.

6.1.4 National Water Commission

The National Water Commission is responsible for potable water supply and sewerage services.

6.1.5 Water Resources Authority

This government Agency is responsible for the monitoring and ensuring the proper use of the surface and ground water resources of the island.

6.1.6 The Westmoreland Parish Council

The Westmoreland Parish Council has responsibility for the provision of certain public services including public health, fire protection, abattoirs, cemeteries, street cleaning, parks and play fields and markets. The Parish Council is also responsible for solid waste disposal but it is now being managed by the WPM Solid Waste Management.

6.2 Relevant Legislation

Legislation relevant to the establishment for a cemetery development is outlined below.

6.2.1 The Natural Resources Conservation Authority (NRCA) Act, 1991

The NRCA Act (1991) is the overriding legislation governing environmental management in Jamaica. It requires that all new developments (or expansion of existing projects) which involve the sub-division of more than ten (10) lots be subject to EIA.

The regulations require that eight (8) copies of the EIA Report be submitted to the Authority for review. Therefore is a preliminary review period of ten (10) days to determine whether additional information is needed. After the initial review, the process can take up to ninety (90) days for approval. If on review and evaluation of the EIA the required criteria are met, a permit is granted. In the event that the EIA is not approved, there is provision for an appeal to be made to the Minister.

Specifically, the relevant section(s) under the Act that addresses the proposed project are:

- Section 10: Empowers the Authority to request EIAs for the construction of any enterprise of a prescribed category.
- Section 12: Addresses the potential for contamination of ground water by trade effluent and sewage.
- Section 15: Addresses the implementation of stop orders and fines associated with the pollution of water resources.

Section 16: Authorizes the government to intervene in order to prevent the contamination of ground water.

Section 17: Addresses the authority of the government to request in writing, any information pertaining to the:

1. performance of the facility
2. quantity and condition of the effluent discharged
3. the area affected by the discharge of effluent

6.2.2 The Watershed Protection Act (1963)

This Act governs the activities operating within the island's watersheds. The watersheds that are designated under this Act include the Cabarita River Watershed.

6.2.3 The Public Health Act (1974)

This Act falls under the ambit of the Ministry of Health (MOH). Provisions are also made under this Act for the activities of the Environmental Health Unit (EHU), a division of the MOH. The EHU has no direct legislative jurisdiction, but works through the Public Health Act to monitor and control pollution from point sources. The Central Health Committee would administer action against any breaches of this Act. In addition, there are various sections of this legislative instrument that govern and protect the health of the public. Relevant sections under the Public Health Act of 1985 are:

Section 7. - (1) A local Board may from time to time, and shall if directed by the Minister to do so, make regulations relating to nuisances and,

Section 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 air, soil and water pollution.

6.2.4 The Litter Act (1986)

This Act seeks to control the disposal of refuse in undesignated areas, to include public places as described under Section 2 (c) of the act., which includes public gardens, parks or open spaces, or "any place of general resort to which the public have, or are permitted to have,

access with or without payment of any fee”.... . or “any other place in the open air to which the Public has right of access without payment of any fee”. As such, disposal of refuse in the area during any phase of the development would constitute an offence under this Act.

6.2.5 The Town and Country Planning Act (1958)

Section 5 of the Town and Country Planning Act authorizes the Town and Country Planning Authority to prepare, after consultation with any local authority, the provisional development orders required for any land in the urban or rural areas, so as to control the development of land in the prescribed area. In this manner, the Authority will be able to coordinate the development of roads and public services and conserve and develop the resources in the area.

Any person may, under Section 6 of the Act, object to any development order on the grounds that it is:

- impractical and unnecessary;
- against the interests of the economic welfare of the locality.

However, if the Minister is satisfied that the implementation of the provisional development order is likely to be in the public interest, he may, under Section 7 (2) of the Act, confirm it with or without modification by publishing a notice in the Gazette. Section 8 of the Act also gives the Minister the authority to amend a confirmed development order.

Section 10 of the Act states that a development order must include:

- clearly defined details of the area to be developed;
- regulations regarding the development of the land in the area specified;
- formal granting of permission for the development of land in the area.

If the provisions of section 9A of the Natural Resources Conservation Authority (NRCA) Act apply to the development, the application can only be approved by the Planning Authority after the NRCA has granted a permit for the development. (Section 11 (1A)).

The Authority may impose a "tree preservation order" under Section 25 of the Act if it considers it important to make provision for the preservation of trees and woodlands in the area of the development.

6.2.6 The Local Improvements Act

The subdivision of land throughout Jamaica is regulated under this Act. The Act stipulates that all subdivision of land for building or sale throughout Jamaica requires the permission of the local planning authority of the parish in which the land is located. The Act requires that the comments of the Chief Technical Director be obtained prior to the applicant being notified of the Parish Council's decision. By virtue of an amendment in 1959 the expert advice of the Government Town Planner is also required by the local authority prior to notification of applicants.

7.0 BIBLIOGRAPHY

Adams, C.D. (1972). *Flowering plants of Jamaica*. University of the West Indies, Mona, Jamaica.

American Conference of Government Industrial Hygienists: (1953). *Documentation of the Threshold Limit Values and Biological Exposure Indices*, 6th Edition, 1991
Asprey G.F. & R. G. Robins. .

Brown, B. et al (1997), *Environmental Impact Assessment for Retirement Cemetery, St. James*. Kingston

Brown, B. et al (1997), *Environmental Impact Assessment – part of Grotto, Savanna-la-mar, Westmoreland*. Kingston

Brown, F.M. (1972). *Jamaica and its Butterflies*. E.W. Classey Limited, London.

Downer A & R. Sutton. (1990). *Birds of Jamaica*

<http://www.epa.gov/ttn/oarpg/naaqstin/pmhealth.html> , 12-7-01

<http://www.geoscience.org.sa/divisions/ecmg/cemetery.ht> 13-6-01

<http://www.lungasa.org/air/envmajairpro.html>, 12-7-01

[http://www.sydgram.nsw.edu.au/College – Street/extension/kale .../burn or bury.ht](http://www.sydgram.nsw.edu.au/College-Street/extension/kale.../burn%20or%20bury.ht) , 8-6-01

<http://www.ieeco.com/environ2.htm> , 11-6-01

International Labour Organization: (1998) *Encyclopaedia of Occupational Health & Safety*. 4th Edition, Vol. 3 pp. 100.1-100.19

Scientific Research Council – *Technology profile of a Biodigester Septic Tank*.

Town Planning Department (1968) *Savanna-la-mar Development Plan*. Kingston

The vegetation of Jamaica. Ecological Monographs, **23**: 359-412.

8.0 APPENDICES

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APPENDIX I

ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

EPN Consultants Limited wishes to thank a number of individuals and institutions for their assistance and support towards the successful completion of this Environmental Impact Assessment. The Water Resources Authority- specifically, Mrs. Michelle Watts- who provided general hydrogeological information for the site along with water quality data sets for nearby wells. We are also grateful to the Institute of Jamaica, particularly the Natural History Department that provided scientific information on site flora.

Special thanks also to Dr. Ravidya Burrowes and Mr. Michael Whyte who provided valuable information in the assessment of the physical environment as it relates to the geology and the hydrology of the site and the surrounding area.

Finally we say thanks to the project proponent Mr. Melvin Honeyghan who provided background information on the development.

APPENDIX II

TERMS OF REFERENCE

**TERMS OF REFERENCE
AN ENVIRONMENTAL IMPACT ASSESSMENT
OF THE PROPOSED WEST PALM MEMORIAL GARDENS AT 104 DALLING STREET,
SAVANNA-LA-MAR, WESTMORELAND**

1.0 Background

EPN Consultants Limited has been commissioned by the developer Mr. Melvin Honeyghan to prepare an Environmental Impact Assessment (EIA) for this proposed project. The development would be located on a total of 10 acres (4.05 hectares) at 104 Dalling Street, where most of the property would be utilized for the construction of a cemetery, a Crematorium and a Chapel would also be built on the grounds, as well as, ample parking for mourners.

Dalling Street is located to the southwest in Savanna-la-mar, the capital town of the parish of Westmoreland. Dalling Street defines the western boundary of the site. To the south, the site is bounded by the Tate and St. Josephs Cemeteries. Various private landowners own the lands to the north and east of the site.

2.0 Terms of Reference

Task 1: Description of the Project

- a. Scope of the Project
 - general description of the principal project and site including maps, design plans and photographs
 - detailed description of the design and construction of vaults
 - purpose and justification
 - how the project relates to the existing conditions
 - public utility requirement – sewerage, water, electricity in short to long term
- b. Project Development Procedures
 - site preparation
 - construction of Crematorium and Chapel
 - scheduling of development activities, methods, materials
 - waste disposal associated with the project
- c. Project Operational Requirement
 - long-term operation of the facilities and development of the site.
 - garbage collection and disposal
 - sewage disposal – description and diagram
 - traffic flow
 - identify erosion and storm runoff control measures
- d. Project Permit Requirements
 - The relevant regulations, local and national government agencies, and their roles concerning the project permit and approval requirements will be identified.

Task 2: A Description of the Biophysical Characteristics of the Site and alternatives to the site

Description of the existing environmental components, their interrelationships will serve to identify and quantify the current site in its existing condition and prior to any development.

- a. Site location
 - Site location in comparison to public cemetery
- b. Site description will include the following:
 - site size
 - site specific land use history (present and past)
 - climate (general, micro)
 - geology and hydrogeology (surficial, subsurficial, special resources) – including depth to ground water,
 - vegetation (including species composition, shrub and herb layer densities, crown cover, special resources)
 - hydrology and watershed components (drainage areas) –including map showing nearest location of water surface flows and wells, description of primary uses of water and the flooding vulnerability of the area
 - wildlife (species composition, population densities, habitat uses, special resources)
 - aesthetic values
 - air quality parameters - including nitrogen dioxide and sulphur dioxide levels
 - noise and vibration levels
- c. Alternatives to the site
 - description of alternative land use e.g. no action
 - potential impacts of proposed on site and off site activities
 - conclusions related to choice of final land use
 - Alternative site for the cemetery

Task 3: A Description of Socio-cultural characteristics

- a. Aesthetics – short to long-term sensory effects to residents.
- b. Public Facilities and Services – roads, utilities and social services
- c. Public Safety – the identification of risks and the assessment of them as they relate to the project
- d. Cultural Heritage – Potential value and special considerations
- e. Socio-Economic Impacts will include population, employment, community concerns

The influence of the project on adjacent areas will be assessed with the assistance of a survey within and in adjacent communities. A community consultation meeting will be also be held to further sensitise the population to the development and facilitate community feedback.

Task 4: Identification of Environmental Impacts

The EIA would include a description of the impacts to the ecosystem components as a result of the project during the preparational/construction and operational phases. These impacts will be quantified where possible. Off-site impacts, as a result of the project development will also be identified and quantified where possible. Both on-site and off-site impacts will be assessed based on significance and magnitude and whether they are positive or negative, major or minor, direct or indirect. Impact mitigation will also focus on design elements, alternative construction techniques and long-term operational practices.

The identification of impacts will focus on the following areas:

- a. Wildlife – especially avifauna: change in species composition and distribution, habitat change/fragmentation, displacement corridor impairment, endangered and special species.
- b. Vegetation – change in species composition and community structure, introduction of non-native species and potential effects on rare, endangered or special resource species.
- c. Landform – physical changes, erosion potential, features of special interest
- d. Land values – related to planned residential development north and east of the proposed site.
- e. Pollution - potential for short to long-term impacts related to:
 - soil and under groundwater resources e.g. effects of leachate and chemicals like formaldehyde
 - ambient air quality e.g. fugitive dust from the ground preparation and cremation services etc.

Cumulative Impacts

Changes within the area over time because of the project along with those being experienced from existing land uses will also be identified.

Residual Impacts

Given the mitigation measures recommended, environmental changes that result from project implementation will be described.

Task 5: Risks Associated with the Project and their Contingency Measures will be identified.

Potential risks to health and safety associated with the proposed project will be identified.

Task 6: Monitoring and Management Plan

Areas for monitoring during and after the Construction Phase will be identified. Follow-up activities will be recommended where necessary. The responsible persons/agencies will be identified.

APPENDIX III

LETTER FROM NEPA REQUESTING EIA

Ref. no. 2005-10017-EP00192

September 19, 2005

Mr. Melvin Honeyghan
Water Works District
P.O. Box 113
Peterfield
Westmoreland.

Dear Mr. Honeyghan:

Re: Application for Permit for a proposed Cemetery consisting of a chapel and a crematorium at Dalling Street, Savanna-la-mar, Westmoreland

The National Environment and Planning Agency (NEPA) has reviewed the permit and licence applications and conducted an Environmental Screening (ES) of the captioned project. A site assessment visit was conducted on September 13, 2005.

Based on the results of the ES, NEPA hereby requests that an Environmental Impact Assessment (EIA) of the proposed project be conducted and an EIA Report be submitted to the Agency pursuant to Section 10 of the NRECA Act

The ES revealed potential for adverse environmental impact in the following areas:

1. Water Resources
2. Air quality (including noise)
3. Drainage/flooding

The EIA Report should be prepared in accordance with the Guidelines for conducting EIAs, a document which can be obtained from NEPA upon request. Please submit a **Terms of Reference (TORs) for the EIA** to NEPA for review and approval prior to initiating the study. A set of Generic TORs are enclosed for your guidance. A Public Presentation of the findings of the EIA study will be required.

...../2

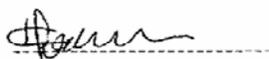
Page 2

September 19, 2005

Mr. Melvin Honeyghan
Water Works District
P.O. Box 113 Petersfield
Westmoreland.

Questions regarding the TORs or EIA should be directed to Ms. Francis Blair, Manager, Applications Secretariat Branch of NEPA.

Yours sincerely



Leonard Francis
for Chief Executive Officer

cc. Ms. Frances Blair - Manager, Applications Secretariat Branch, NEPA

APPENDIX IV

LETTER FROM NWA



140 Maxfield Avenue, Kingston 10, Jamaica Tel: (876) 926-3210-9 - Fax: (876) 926-2577

ANY REPLY OR SOURCE OF INFORMATION SHOULD BE ADDRESSED TO THE CHIEF EXECUTIVE OFFICER AND THE FOLLOWING REFERENCE NUMBER QUOTED:

Ref No

8th September 2005

The Government Town Planner
National Environment and Planning Agency
10 Caledonia Ave
KINGSTON 5

North Regional Office
15 Hopley Park Road
Kingston 10
Tel: 976 6426
Fax: 929 3668 1504
Fax: 929 7327

Central Regional Office
23 Caledonia Road
Springvale, Manchester
Tel: 962-2254
Fax: 963 8122

Western Regional Office
Figueras Main Road
Falmouth, St James
Tel: 598 2532
Fax: 462-879 3188
Fax: 416 2673

South Eastern Regional Office
West Street
Port Antonio
Port Antonio
Tel: 933 2633
Fax: 933 9556

Dear Sir:

Re: Planning Application for Burial Park Comprising of Chapel Crematorium & Morgue (Cemetery) @ Lot #2 Part of #104 Dalling Street, Westmoreland by Melvin Honeyghan – Reference No. 2003-10010-BA00116

With reference to your letter dated 22nd August 2005, received 22nd August 2005, regarding the above, I am to advise that this Agency offers no objection to approval being granted subject to the following conditions:

1. No building or permanent structure should be erected less than 9.14m from the property boundary along Dalling Street.
2. The gate house and gate barrier should be setback a minimum of 45.72m as illustrated on section of site plan returned herewith.
3. The turning radius at the vehicular ingress/egress should be a minimum of 6m
4. A minimum of 82 parking spaces 5.48m x 2.43m in size with a 6.1m wide driveway for maneuvering should be provided within the curtilage of the site.
5. Parking bays should be grasscrete constructed the driveway paved and underdeveloped areas landscaped to the satisfaction of the relevant authority.
6. Surface drainage/storm water runoff should be effectively intercepted and disposed of by means of a cross drain at the entry/exit point before reaching Dalling Street and channelled to detention areas within the burial grounds to the satisfaction of the Chief Executive Officer, National Works Agency.
7. The Parish Manager should be consulted to inspect and monitor the construction of the drainage infrastructure works from start to completion and confirm approval in writing to the Chief Executive Officer, National Works Agency.

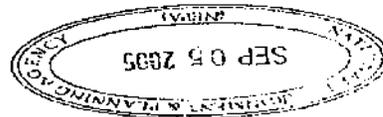
Reason for condition

- #2 To provide adequate space within the site for off street standing of vehicles.
- #6 & 7 To ensure the detention of the surface drainage / storm water within the site.

Note: The only set of plans submitted is retained for our files.

Yours truly,

WINSTON HARTLEY
Physical Planner
for Chief Executive Officer



Copied to: The Secretary/Manager – Westmoreland Parish Council
The Parish Manager – Westmoreland Parish Office, NWA

“Developing Safe, Reliable and Quality Roads”

APPENDIX V

SOCIO-ECONOMIC QUESTIONNAIRE

**QUESTIONNAIRE
PROPOSED CEMETERY AT DALLING STREET,
WESTMORELAND**

Housing

1. How long have you lived here? _____
2. Where did you live previously? _____

Employment

3. What is your occupation? _____

Community Concerns

4. What, if any, do you consider to be the most urgent community needs? _____
5. What uses would you recommend for the proposed site? _____

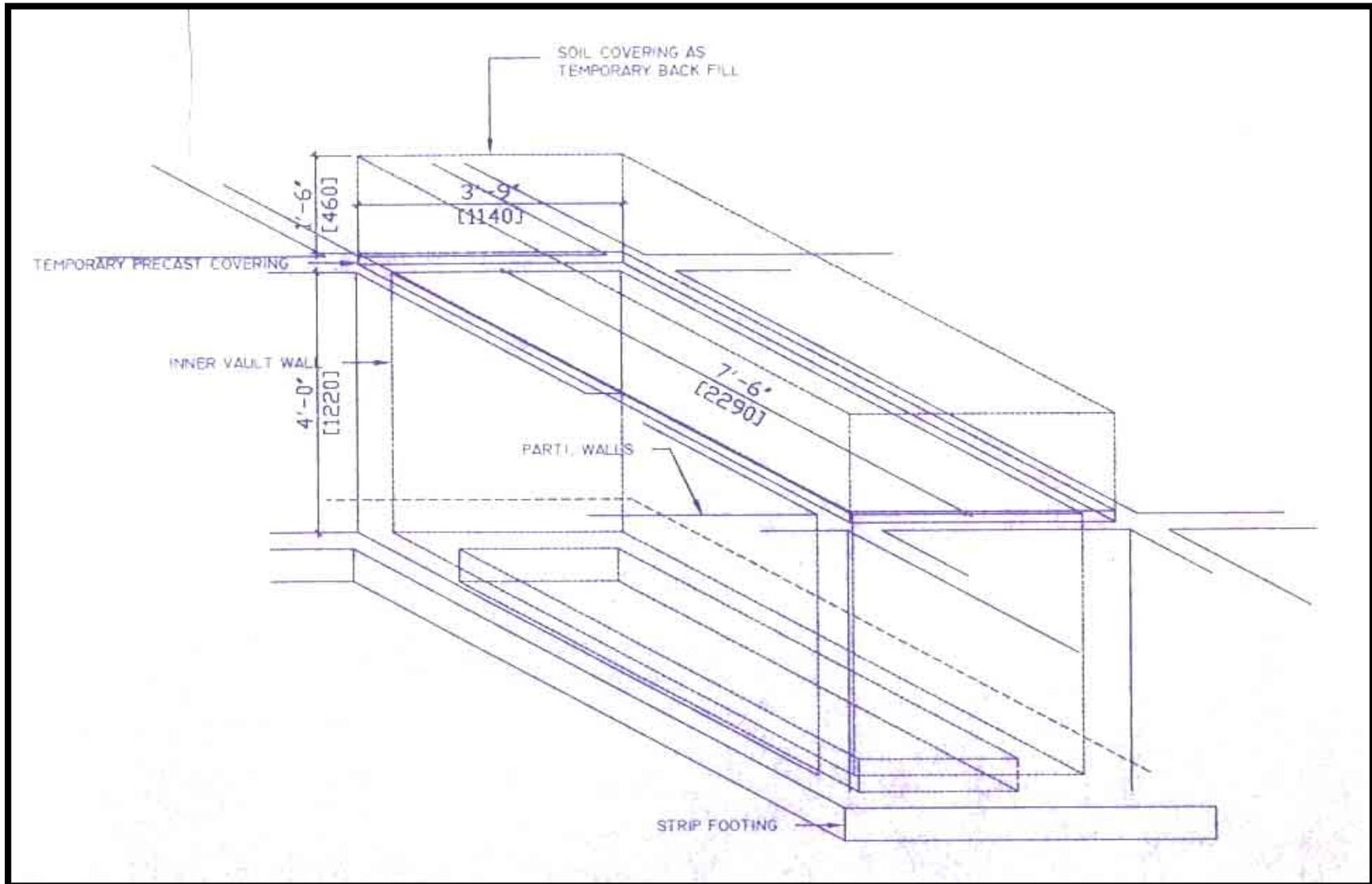
6. How would you rate the following as community concerns (high, medium, low)?
a. risk of fire _____ b. risk of flooding _____ c. air pollution d. air pollution - dust & smoke(e.g.)
7. How will the proposed development affect your life? _____

8. Are you aware that a new cemetery will be located in the area/ the community?
Yes__ No__
9. What are your views on having a cemetery located within your community? (e.g. effect on health) _____
10. Do you think cemeteries produce environmental hazards? Yes__ No__ If yes, what type?

11. Do you think it will contribute significantly to the economy of the area? Yes__ No__
12. What effect do you think it will have on the value of lands in the area?
Positive_____ Negative_____ No effect_____
13. Cemeteries tend to generate some degree of traffic congestion based on their location; do you think the cemetery will affect traffic flow in the area? Yes__ No__

APPENDIX VI

DIMENSION OF VAULTS



APPENDIX VII

POTENTIAL IMPACT MATRIX

APPENDIX VIII

HYDROGEOLOGY INFORMATION FROM WRA



TELEPHONE: 977/ 927-0293/ 927-0189/ 927-0302
 FAX: 977-0179/ 702-3937

REF: 8/26

November 9, 2005

Mrs. Beverline Brown Smith
 EPN Consultants Limited
 83^{1/2} Red Hills Road
 Kingston 20

RE: Permit Request for Groundwater Depth Information at Site for Proposed Cemetery at Savanna-la-mar, Westmoreland

SUBDIVISION	Type Of Development	Hydrogeology	Flooding Vulnerability	Recommended Sewage Disposal/Treatment System	Other Remarks
Location: Savanna-la-mar Applicant: Beverline Brown Smith/ EPN Consultants Limited Parish: Westmoreland Review Requested by: EPN Consultants Limited Date Request Received: October 25, 2005	Proposed Cemetery at 104 Dalling Street Savanna-la-mar. Site elevation is of the order of 4.73 m AMSL	An alluvial formation, transported and deposited over time by river action, forms the secondary aquifer. The underlying white limestone rocks comprise the primary aquifer into which wells in this area have been drilled. Groundwater levels are less than 3 m below ground while groundwater flow direction is to the south. There are no wells down-gradient of the site. The marine environment is within 1.9 km to the south of the proposed development. Soil is not classified, however it is expected to be alluvial: sand and clay particles.	The area is generally flat with elevations of less than 5 m above mean sea level.	Where sewage disposal is required in relation to the cemetery, the Water Resources Authority recommends Secondary Level Sewage Treatment. (See sewage treatment option below)	The high groundwater table renders the aquifer vulnerable to surface sources of contamination. However due to the proximity to the marine environment the groundwater is likely to be brackish. In addition the presence of the marine environment within 1.9 km of the site requires that appropriate sewage treatment be effected to reduce the risk of contamination of the marine environment.

SEWAGE TREATMENT METHODS (List not exhaustive)

PRIMARY Treatment Methods	SECONDARY Treatment Methods	TERTIARY Treatment Methods
- Absorption pit - Septic tank-absorption pit - Dry pit latrine (double vaulted / composting toilet)	- Septic tank-tile field - Septic tank-mound system - Septic tank-sand filter-tile field - Septic tank-sand filter-abs. pit - Biogester septic tank-tile field	- Aerated septic tank-tile field - Stabilization ponds - Mechanical systems with aeration steps (e.g. oxidation ditch, aerated sludge process)
Any mechanical or non-mechanical treatment process which includes removal of nutrients by natural (eg. evapotranspiration bed/reed bed, biological denitrification) or chemical means (eg. phosphorus precipitation)		

Michelle Watts (Mrs.)
 Senior Environmental Officer
 For Managing Director