APPENDIX 1

TERMS OF REFERENCE

FOR PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED SEVENTH HARBOUR DEVELOPMENT

1 INTRODUCTION

1.1 The Development Proposal

Treasures Ltd. Is seeking permission to undertake the proposed Seventh Harbour development on 109 acres of land leased from the Tourism Product Development Company (TPDCo) at Gunboat Beach, Palisadoes. The Seventh Harbour Development as proposed, consists of the following design elements:

Phase 1:

1. Small entertainment centre (5000 persons) – open air seating with 2 VIP bars, concession amenities, box office, male and female restrooms, and proper backstage facilities.
2. Boat Tour Facility (inclusive of a 150-person capacity catamaran)
3. Mini-Marina: the 1st section of the marina (40 slips) and associated marina facilities (inclusive of a 30,000 gallons refuelling facility, pump out facility; laundry, launch and haul-out, boat storage and workshop). Neither dredging nor foreshore defence structures are planned.
4. Harbour Mart (a convenience store catering to the marina users stocking food items, toiletries, tackle and other basic supplies).
5. Restaurant; bar and grill. Grease traps will be installed on all sinks. The restaurant will have a capacity for 200 guests. A small gaming lounge will be located in the restaurant building.
6. Associated infrastructure (parking and main road access, sewage treatment plant, storm water drainage, water, power, cable). Tertiary effluent from the sewage treatment plant will be used for irrigation.

Phase 2:

1. Water-park.
2. Large entertainment centre (20,000 persons).
3. Retail/Entertainment Complex
4. Fine Dining Restaurant
5. 350-Room Waterfront Hotel with Conference and Gaming Centres (no recreational beaches).
6. Expansion of the marina to 200 slips.

7. A cruise ship pier
8. Remediation and rehabilitation of the mangrove lagoon area, and possible replanting of mangroves at other more viable locations within the Palisadoes Ramsar site).
9. Associated infrastructure (parking and main road access, sewage treatment plant, storm water drainage, water, power).

It is unlikely that Phase 2 shall be implemented within the next three years, thus making any environmental permit, licenses or data collected obsolete when the developers are ready to proceed with that phase. It is assumed that a second EIA (inclusive of the relevant baseline environmental surveys deemed necessary at that time) shall have to be prepared in respect of Phase 2. Therefore, this EIA while outlining plans for both phases, shall focus on presenting information necessary for a decision in respect of environmental permits and beach licenses being applied for in Phase 1. The footprint of Phase 1 is expected to occur on less than 15 acres of the total available lease area (109 acres).

Figure 1 7th Harbour Master Plan

1.2 Permitting Requirements

Pursuant to the Natural Resources Conservation Authority (NRCA) Act, Phase 1 of the proposed development falls under the following Prescribed Categories, and will therefore require the respective Environmental Permits: Marina, theme parks (entertainment centre and boat tour facility), shopping centre (Harbour Mart) and the sewage treatment plant. In addition, beach licenses are required for any works to be done in the foreshore, inclusive of any dredging or construction of pilings for boardwalks or jetties. An Environmental Impact Assessment (EIA) must be submitted in support of the application for these Environmental Permits.

NEPA has determined that the applications made in connection with the proposed Seventh Harbour Development must be supported by an Environmental Impact Assessment (EIA). These Terms of Reference (TOR) outline aspects of the EIA, which when thoroughly addressed, will provide a comprehensive and integrated evaluation of the proposed development, in terms of predicted environmental impacts, needed mitigation strategies, potentially viable alternatives to the project and all related legislation.

1.3 The EIA Permitting Process in Jamaica

Environmental permitting systems seek to achieve the following objectives:

(1) Compliance with the environmental laws and regulations of Jamaica, specifically Sections 9 and 10 of the NRCA Act of 1991.

(2) Assurance of all concerned stakeholders that environmental considerations have been taken into account in project planning, particularly in respect of minimization of environmental disturbance, optimization of resource consumption and effective management of waste streams. The success of this may be measured against environmental standards, policies and plans.

(3) Evaluation of the potential for environmental impacts that could arise during the project life-cycle (site preparation, construction, operations and decommissioning phases). This should include evaluation of the ecological footprint of the project both on-site and off-site (such as downstream, along supply corridors and upon material sources etc.). The document will give a clear statement as to whether there are any significant negative environmental impacts that cannot be cost-effectively managed by implementation of mitigation measures or design modification.

(4) Determination of whether wider societal benefits of the project and the cost-effectiveness of proposed mitigation measures are sufficient to justify environmental costs or trade-offs. This is normally done in the Analysis of Alternatives Section of the EIA.

(5) Preparation of an EIA document to support the granting of the Environmental Permit and Beach Licenses, which:

- Is fully compliant with the approved terms of reference (TOR) for the study.
- Is technically accurate and meets international standards in terms of methodologies and approaches.
- Has followed prescribed procedures and is transparent enough to withstand public scrutiny.
- Highlights opportunities for enhancing operational performance/efficiency or modifying design so that the project will be better aligned with environmental objectives.
- Is professionally produced in a style and format that is consistent with international standards for EIA reporting.

1.4 The Purpose and Scope of the Terms of Reference

This document represents the Terms of Reference (ToR) for the conduct of an Environmental Impact Assessment process in respect of the above-mentioned 7th Harbour development proposal. The purpose of the TOR is to set the ground rules for the conduct of the EIA process, which includes the EIA report.

At a **minimum**, these Terms of Reference (ToR) must outline the aspects of an Environmental Impact Assessment (EIA) which when thoroughly addressed will provide a comprehensive evaluation of the site, in terms of predicted environmental impacts, needed mitigation strategies, potentially viable alternatives to the development proposed and all related legislation. At the time of preparation, the requirements stipulated in the ToR shall include the environmental sensitivities scoped at that time. However, as the investigation of the site and project progresses other significant environmental issues may be determined. It is expected that these issues be incorporated accordingly.

The legal defensibility of the environmental permit and the EIA rests upon:

1. The validity of the project and environmental information provided, in so far as they are representative of the actual plans to build and host environment respectively.
2. The verifiability of the main scientific conclusions of the report.
3. Adherence of the process to accepted norms that promote transparency.

Therefore the TOR should:

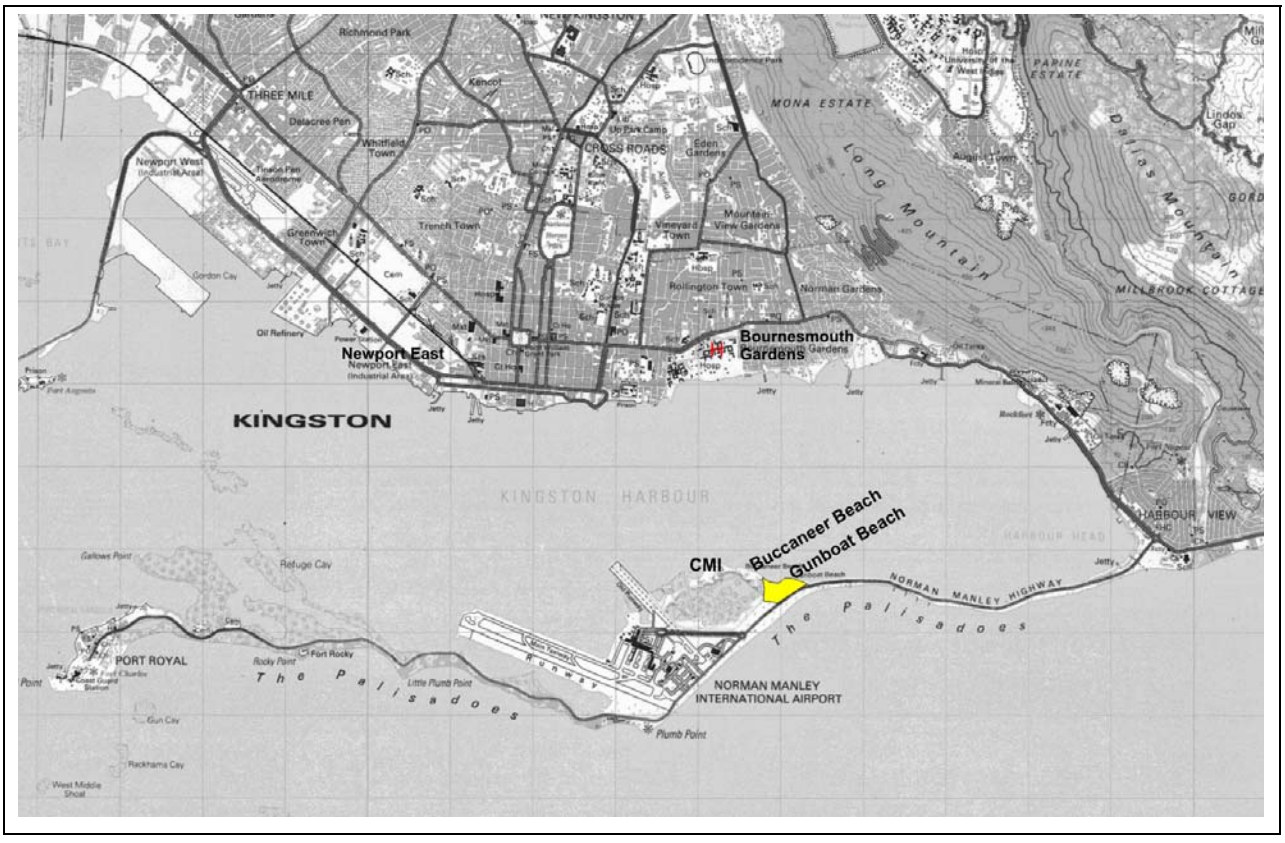
- Be reviewed and accepted by all relevant parties as the representative of the minimum requirements for an acceptable study and should indicate the process for such consultation.
- Provide sufficient information about the development proposal and the environment to allow for a preliminary scoping of environmental sensitivities.
- Outline the minimum requirements in respect of the scope of the environmental baseline, specifically in terms of the parameters (Valued Environmental Components or VECs) to be investigated, the scale area of investigation for each parameter and the acceptable sources of information. Where primary survey is to be undertaken, the sampling regime is described. The level of environmental investigation is commensurate with the level of concern (that a receptor may be affected by the project). As is the international standard practice in EIA, the geographic areas included in the study are not limited to the project site, but extend to the *sphere of influence* of the project, for the various environmental parameters.
- Outline the basic structure of the EIA Report, outlining the purpose of each of the sections as well as the minimum required scope/content.
- Indicate any other information that is specifically required to facilitate the decision making process.

2 PRELIMINARY ENVIRONMENTAL SCOPING

2.1 Environmental Setting

The proposed site of Phase 1 of the project is given in Figure 1. It is located approximately 2 km across the harbour from the Kingston Public Hospital and the community of Bournesmouth Gardens. The site is bound in the north by the shoreline of the Kingston Harbour and on the south by the Norman Manley highway. To the east, it is bound by open lands and to the west it shares property boundaries with the Caribbean Maritime Institute (CMI), the Royal Jamaica Yacht Club and the Norman Manley International Airport. The total lease area is 109 acres, of which Phase 1 comprises ~10 acres.

Figure 2 Site Location



Phase 1 of the site has approximately 200 m of harbour waterfront. Site elevations vary between sea level on the western side to ~6 m above sea level. Hilly landforms on the site are interpreted as sand dunes. Storm run-off from the site and adjacent areas flow towards the wetlands located on the western side of the property. Soils are generally sandy and likely to be prone to liquefaction during a severe earthquake. The site is also vulnerable to hurricanes and storm surges.

The shoreline is a major receptor for floating debris coming from other harbour front areas. The backshore area is vegetated with disturbed patchy xerophytic community and typical wetland vegetation (dominated by black mangroves). No protected, rare or endemic species were found in the 1999 survey.

Gunboat beach itself was a small beach that has all but completely eroded, reverting to mangroves in some sections. The site lies outside the major seagrass areas of Kingston Harbour (based on the 1999 Environmental Impact Assessment of the site). No corals are documented in this area. Bird habitats are generally associated with the mangrove eco-system occurring to the west of the site. No protected, rare or endangered species were found in the 1999 survey.

The site was previously used as a municipal recreational facility. Derelict buildings and structures associated with this past land use can be observed on the site and offshore of the site. Although recreational swimming at this location is now restricted, there remains a cultural practice to use the beach. The western side of the site (slated for Phase 2) appears to be used by transients.

Figure 3 Recent Satellite Image of Site (Google)

2.2 Environmental Sensitivities

The following major environmental concerns have been identified at this time for further evaluation.

1. Changes arising from the physical footprint of the proposed construction and operations:
    (a) Possible changes to the stability and integrity of Gun-Boat Beach and the Palisadoes Spit as a result of foreshore works or earthworks on the land. Specific attention should be paid for the potential of land clearance for parking and other proposed land uses to impact on the stability of the shoreline on the eastern side of the highway.
    (b) Flood potential in adjacent lands arising from proposed drainage modifications.
    (c) Changes to visual aesthetic arising from excavation (if any), demolition and construction works.

2. Changes arising from storage of project subsidiary inputs and disposal of waste streams
    (d) Increased total suspended solid loads and turbidity during dredging and construction works (including material stockpiling) in the foreshore as well as during site preparation and construction.
    (e) Effects on receiving water bodies during the operational phase of the project (arising from boats and marina operations, upset conditions, sewage effluent disposal and restaurant operations). This shall include, but not necessarily be limited to, demand created on the importation, storage and disposal of fuels and other chemicals.
    (f) Any potential effects on air quality.
    (g) There should be a thorough examination of the effects of any proposed drainage modification and associated outfalls to the marine and wetland environments.

3. Impacts on biological receptors and habitats
    (a) Implications for the Palisadoes/Port Royal Ramsar Site arising from Phase 1.
    (b) Biodiversity, biomass and populations, with specific attention to endemic, protected, endangered species, migratory species and commercially important species
    (c) Eco-system functions and integrity (e.g. habitat reduction/modification or fragmentation; introduction of invasive alien species, and predators, breeding grounds).
    (d) The effect on the crocodile population in the area, and impacts on their habitat. The EIA must present mitigation measures to protect both the animals and users of the facility.

4. Impacts on the socio-economic environment, specifically,
    (a) The effects of having large numbers of visitors and employees at this site.
    (b) The effects of increased boating traffic to this section of the harbour.
    (c) The impact of increased traffic flows to the site at specific periods, including during the construction period.
    (d) The effects of the proposed development on transients and other informal users of the site
    (e) The perceived loss of amenity to beach users of Gun Boat Beach (n.b. swimming at this location has been restricted by NEPA).
    (f) The effect of demand and consumption of the following municipal services and utilities to this location: police services, emergency services, solid waste collection and disposal potable services, water, electricity and telephone and cable.
    (g) Off-site impacts of construction material sourcing and transportation.
    (h) The availability of water for this development must also be indicated.

The study shall not be limited to consideration of the fore-going environmental issues, but shall be expanded accordingly if the need arises.

2.2.1 Stakeholders

The following stakeholders shall be apprised of the proposed development, and should be included in the EIA consultative process:

1. Relevant government agencies:
    - National Environment and Planning Agency (NEPA)
    - Water Resources Authority (WRA)
    - Kingston & St. Andrew Corporation (KSAC)
    - National Works Agency (NWA)
    - Office of Disaster Preparedness and Emergency Management (ODPEM)
    - Ministry of Tourism
    - Tourism Product Development Corporation (TPD.Co.),
    - Environmental Health Unit (EHU)
    - National Solid Waste Management Authority (NSWMA)
    - Fire Services Division
    - Jamaica National Heritage Trust (JNHT)
    - Harbour Master and Port Authority.
    - The National Water Commission (NWC)

2. Non-Governmental Organizations and community based organizations with an interest in the area.

3. Occupiers/Owners of adjacent lands:
    - Caribbean Maritime Institute,
    - Norman Manley Airport Authority,
    - Royal Jamaica Yacht Club,
    - TPDCo
    - NWA/KSAC

4. Communities of Port Royal and Harbour View.

3 MINIMUM REQUIREMENTS

3.1 Conduct of the EIA Process

The EIA process shall be conducted as follows:

1. Submission of the Draft TOR for the EIA to NEPA.
2. Posting of the 1st Public Notice of the availability of the Draft TOR for public review.
3. Finalization of the TOR based on comments received.
4. Conduct of the EIA as prescribed in the TOR by qualified environmental consultants within 3 months of receiving an approved TOR.
5. Submission of 11 copies of the EIA Report to NEPA for review.
6. Posting of the 2nd Public Notice advising on (1) the availability of the EIA for public review and (2) the venue and time for the public meeting.
7. Distribution of review copies of the EIA within one week of receipt of the EIA to the review panel.
8. Conduct of the Public Meeting within 3 weeks of the 2nd Public Notice.
9. Submission to NEPA of the Town Meeting Report within 7 days of the meeting.
10. Review of the project application in light of the EIA by NEPA's Internal Review Committee (IRC) and the inter-agency review panel, the Technical Review Committee (TRC).
11. Collation of review comments and submission of these to the Consultant by NEPA.
12. Submission of an Addendum Report addressing review comments by the Consultant
13. Review and acceptance of the review comments by specific reviewers.
14. Further response by the Consultant if necessary.
15. Recommendation of a decision by NEPA to the Board of the NRCA.
16. Notice to the Applicant of the Board's decision.

All EIA documentation may be placed online (NEPA's website and the consultant's website to facilitate the review process).

After the submission of the EIA for review, neither the applicant nor consultant should contact NEPA before the review report has been submitted to the consultant.

3.2 Stakeholder Consultation

The EIA process will only be considered valid if there are meaningful and valid opportunities for public scrutiny of the environmental effects of the project as proposed, including:

1. During the course of preparation of the EIA Report, direct written communication from the EIA preparer to relevant public agencies, NGOs and adjacent land owners/occupiers advising them of the project, and seeking their concerns about it as they relate to potential environmental impacts.
2. Survey of the communities within proximity to the site in respect of:
    a. General acceptability of the proposed project, with consideration of the community-based stakeholders' willingness to make trade-offs, given the potential benefits of the project to the local and national economies.
    b. Fears and expectations about the specific project, including any anticipated social conflict and crime.
    c. Perceptions and attitudes of present community-based resource users, e.g., fishermen, squatters, recreational beach users.
    d. General health, safety and environmental concerns related to the project
3. Public Meeting held in Port Royal three weeks after the EIA is made available for review. This meeting should include presentations outlining the project, its may environmental impacts, and proposed mitigations.
4. Availability of all EIA documents for public review, inclusive of: (1) these Terms of Reference (2) the EIA inclusive of all supporting technical appendices (3) the Public Meeting Report (containing presentations, summary, verbatim report of question and answer session and the register of attendance) and (4) Addendum Report (i.e. written response to EIA review comments).

3.3 Content of the EIA Report

The following describes the typical scope and content of the EIA report, and is subdivided according to the standard sections of the EIA, as are usually stipulated in the NEPA TOR for such projects.

3.3.1 Project Description

The aim of this task is to provide a comprehensive description of the project, noting areas to be reserved for construction, areas to be preserved in their existing state as well as activities and features which will introduce risks or generate impact (negative and positive) on the environment. This should involve the use of maps, site plans, aerial photographs and other graphic aids and images, as appropriate.

This section will include at a minimum:

1. Location and setting (relative to other developments, environmental sensitivities and communities).
2. Project overview (main design elements and objectives) and general description of the site plan (lay-out, boundaries and scale) including ancillary buildings, pre-construction activities, construction methods, works and duration, and post construction plans. Note areas to be reserved for construction and areas to be preserved in their existing state as well as activities and features which will introduce risks or generate impact (negative and positive) on the environment. Design life, overall design capacities and availability (open periods).
3. The proposed schedule for development of the various design components of the project. Phasing and timelines for each aspect of the proposed development should be disclosed.
4. Design and planning specifications: scale and capacity of proposed operations; design concepts and proposed technologies. This shall also include details of spatial allotments for various proposed land uses (buildings, parking, roadway, green space, marina etc.). This shall specifically include a critical evaluation of any coastal works proposed, inclusive of potential impacts (encroachments, seagrass removal and coastal modifications) and their respective mitigative measures.
5. Impact-causing aspects of activities conducted during both expected and upset conditions should be evaluated in terms of estimated resource consumption and waste streams, for all phases of the project (preparation, construction and operational).
    a. All proposed land use changes.
    b. Proposed foreshore encroachments including but not limited to any seagrass or coral removal and replanting.
    c. Sewage treatment system including treated effluent disposal: technology, capacity and location of the sewage treatment and disposal facility along with clarification regarding the proximity of this treatment system to the marine environment, other buildings and basic infrastructure.
    d. Solid waste disposal option.
    e. Plans for storm water collection and disposal.
    f. Plans for providing utilities and other services.

    This should involve the use of maps at appropriate scales, site plans, aerial photographs and other graphic aids and images, as appropriate.

For projects to be done on a phased basis it is expected that all phases be clearly defined, the relevant time schedules provided and phased maps, diagrams and appropriate visual aids be included. If a permit is issued, it will be tied to what is disclosed here so the information about the project should be as close to final-stage as possible. Where design or technology options are still being considered, the discussion of these shall be done under the "*Analysis of Alternatives*" Section.

3.3.2 Analysis of Alternatives

The purpose of this section of the EIA is to examine feasible alternatives to the project. The following options will be rigorously evaluated:

1. Alternative sites in the Kingston area for a similar proposal. This shall include a discussion of the selection criteria used in determining the feasibility of this site.
2. Alternative land use options. This shall include an examination of the environmental, social and economic costs of (a) leaving the land as is (*status quo*), versus (b) the proposed option. Renovating the site as a public (municipal) recreational site is not a feasible option at this time as recreational bathing is restricted. Feasible land use options are compared below in terms of potential benefits and costs, using a range of factors or normative criteria.

This section should highlight the benefits of and general rationale for the project that need to be considered against any potential environmental cost. It should outline in balanced way, the wider societal benefits of the development proposal that could arise if the environmental permit is granted.

3.3.3 Legal and Institutional Framework

The objective of this task is to provide an outline the relevant environmental regulations, policies and standards governing. This shall include a regulatory controls and institutional frameworks with jurisdiction over the following main areas as they relate specifically to this site and project:

1. Development Control:
    - Permitting: environmental permits, beach and discharge licenses, drainage and sewerage permits, planning permission and other operational permits.
    - Construction (including building codes and site management controls) and subsidiary inputs (concrete, lumber, etc.)
    - Resort/recreational operations (marina, water sports, restaurants, etc.)
    - Public safety and vulnerability to natural disasters
    - Physical planning controls (National Tourism Master Plan, Water Resources Master Plan, National Physical Plan, plans for road and infrastructural development and other planned development projects for the area).

2. Environmental Conservation:
    - Forestry, wildlife and biodiversity (including marine resources). This shall include review of the national policies in respect of wetlands management and designated RAMSAR sites.
    - Water resources (freshwater and coastal waters).
    - Heritage and cultural resources.

For sites located within, adjacent to or in the vicinity of areas listed as protected (e.g. under the Wild Life Protection, Forest, Natural Resources Conservation Authority, Fishing Industry or Jamaica National Heritage Trust Acts or designated Ramsar Sites) or having protected species, the main issue(s) of concern are determined by the statutes of the legislation or convention in question to which the convention speaks.

3. Waste Management:
    - Air quality
    - Noise levels
    - Public health and sewage
    - Solid waste
    - Storm water.

In all cases the roles of agencies with responsibility for implementing legal mechanisms will be described. Where Jamaican standards or policies are insufficient, international standards and policies will be outlined.

This section should summarize (thematically) the key regulatory controls on the project (including environmental quality criteria, physical planning restrictions, building codes etc.). The degree of compliance with these controls (general acceptability) is a key criterion used in determining of the relative significance of environmental impacts.

3.3.4 Description of the Environment (Baseline)

The EIA must include an overall evaluation of the existing environmental conditions, values and functions of the proposed development area. The purpose of this section is to describe sensitive environmental receptors in terms of pre-project status and trends (if the project is not implemented). This therefore provides a baseline against which future monitoring data can be compared to determine whether and how a project is actually impacting specific receptors.

It also allows for evaluation of contributions to environmental degradation from other sources (or cumulative impacts), and the carrying capacity of the environment in respect of specific stresses. The most basic use of the data is terms objectively determining the effect level of impacts, using a classification system.

The scope of the environmental baseline is outlined in Table 1.

3.3.5 Summary of the Stakeholder Consultation Process

This section should summarize the key environmental concerns arising during the stakeholder consultations done prior to submission of the EIA. At a minimum, this section should

- Document the public participation programme for the project.
- Describe the public participation methods, timing, type of information to be provided to the public, and stakeholder target groups.
- Summarize the issues identified during the public participation process
- Discuss public input that has been incorporated into the proposed project design; and environmental management systems

The degree of public concern with specific issues (and general acceptability of the impact given proposed mitigation) is a key criterion used in determining of the relative significance of environmental impacts.

Table 1 Scope of the Baseline Section

VEC	SCALE/AREA	DATA SOURCES/METHODS/OUTPUT
PHYSICAL BASELINE		
Climate	Regional (Norman Manley International Airport)	**Literature Review**: Existing Meteorological Office data. This should described prevailing winds, temperature and humidity, and rainfall (mean annual distributions).
Hydrology	Site specific	**Literature Review and Field Observations:** Interpreted from existing reports, rainfall and geology. This should include descriptions of (a) the water management unit in which the area falls, as well a map showing the location of the development site in relation to the watershed boundaries (b) the hydro-geological classification and characteristics of the site (c) the likely depth to groundwater (wet and dry season) (d) the hydrological controls on the adjacent wetlands (e) the influence of tides on the wetlands and water table (f) natural and manmade surface drainage features (including estimated peak spontaneous flows into the adjacent wetlands from the site in its present condition) and associated civil structures.
Topography	Site specific and regional	**Literature Review and Field Observations:** Description of the site based on published reports on the geomorphology of the Palisadoes tombolo. This should include a determination of the stability and integrity of the Palisadoes tombolo within 200 m of the site boundaries, as well as the stability of Gunboat Beach. A geomorphic map with the classified landforms/processes and elevations at the site should be included
Geology	Site specific and regional	**Literature Review and Field Observations:** Published reports/maps, remote sensing and geotechnical report. Descriptions of the following should be included: (a) the regional geological setting, inclusive of stratigraphy and structure (n.b. this should extend to adjacent marine areas) based on a review of all relevant literature (b) available core hole data and field observations of the site and Palisadoes in general (c) field observations of the sediments comprising the beach along the shoreline of the property, estimates of the quantity and source of the sand, and sediment dynamics.
Soils		**Literature Review:** Review of available soils literature and data (including soil boring and geotechnical report), and reference to the Rural Physical Planning Soils Classification. Soils should be discussed in terms of their genesis, texture, internal drainage, pH and colour as well as capability and erosion hazard
Land Use	Site specific and regional	**Literature Review and Field Observations:** Published reports/maps, remote sensing and site investigation. A map showing the cover by various categories should be included.

Physical Oceanography:	Regional	**Literature Review:** Coastal Engineering Design Report would be the main source of this information, in addition to other literature for the Kingston Harbour. This should include a general description of Kingston Harbour, and its physiographic features with a more detailed description of the area near to the proposed development site, as well as tides, waves, currents affecting the area. A storm surge analysis must be conducted to inform coastal setbacks of buildings and impact mitigation structures/measures.
Chemical Oceanography:	2 stations located above the 2 m iso-bath and 1 wetland station	**Primary Survey:** Multi-parameter meter: basic descriptions of salinity, dissolved oxygen (DO), temperature, pH values compared to ambient harbour conditions.
Natural hazards:	Regional	**Literature Review:** Existing data and engineering design report and other available literature should be reviewed to describe the historic occurrence (magnitude, frequency and likely effects) and remedial actions previously taken in respect of (a) earthquakes (b) hurricane winds (c) coastal flooding as a result of storm surge or tsunamis (d) flooding from intense rainfall (e) shoreline and top-soil erosion (f) breach of the tombolo/main road and (g) submarine landslides or slippage arising. In each case recommendations should be given to minimize loss, including reference to the applicable standard practices and codes.
POLLUTANT BASELINE		
Coastal Water Quality:	2 stations located above the 2 m iso-bath in the inshore area with 3 replicates at each station – wet and dry seasons.	**Primary Survey:** Samples will be collected and tested according to standard methodologies. Descriptions of the average values compared to ambient concentrations and criteria should be included for each of the following: Biological oxygen demand (BOD), total suspended solids (TSS), nitrates and phosphates, faecal coliform, and oil and grease.
Adjacent wetland:	1 station in the small adjacent receiving wetland with 3 replicates. – wet and dry seasons.	**Primary Survey:** Samples will be collected and tested according to standard methodologies. Descriptions of the average values compared to ambient concentrations and criteria should be included for each of the following: Biological oxygen demand (BOD), total suspended solids (TSS), nitrates and phosphates, faecal coliform, and oil and grease.
Foreshore sediments	2 stations located above the 2 m iso-bath in the inshore area – wet and dry seasons.	**Primary Survey:** Heavy metals (cadmium, copper, lead, nickel, zinc) concentration levels should be described from within area slated for the Phase 1 marina. These should be correlated with the benthic biodiversity indicators to determine the existing effect of pollution on the diversity of benthic macro invertebrate fauna.
Air Quality	Site Specific	**Field Observations:** Description of sources of pollution (particulates, NOx, SOx) in the area from mobile and stationary sources in the context of prevailing wind directions and speeds.

Ambient Noise Levels	Regional	**Literature Review and Field Observations:** Description of sources of pollution and a review of any available noise monitoring data for the airport.
Solid waste	Site Specific	**Field Observations:** Description of status, and factors affecting the deposition on shoreline.
BIOLOGICAL BASELINE		
Terrestrial Eco-systems		
Vegetative cover	Site and adjacent small wetland.	**Literature review, satellite image interpretation and site observations**. No clearance of mangrove is planned. Types described in terms (a) aerial coverage, (b) community structure and maturity, (c) relative species abundances and identification of important species (protected/endangered, rare, endemic, commercially or ecologically important) and (d) ecological functions.
Other Fauna	Regional	**Literature review** to describe each group (birds, butterflies and reptiles) in terms of (1) important ecologically species (protected/endangered, rare, endemic, commercially or ecologically important) that have the potential to occur in this geographic area, and ecological dependencies (habitat, food, breeding, environmental sensitivities etc.). Invasive species, pests and disease vectors at the site (public health nuisances) should be discussed. There may be the need to incorporate micro-organisms to obtain an accurate baseline assessment. Generally, species dependence, habitats/niche specificity, community structure and diversity ought to be considered
Marine Eco-systems		
Benthic Cover	Regional and site specific Benthic grab samples from 2 marine stations and 1 wetland – in triplicate.	**Literature Review and Field Survey**: A review of the available literature on sea grasses and algae in Kingston Harbour, as well as a benthic survey of the foreshore (to a depth of 5 m) of the proposed development site. The benthic survey area should be described in terms of (a) aerial coverage (bare sand/rock, muddy bottom, sea grass, coral reef etc.), (b) relative species abundances and identification of important species (protected/endangered, rare, endemic, commercially or ecologically important). A photo inventory shall be prepared to catalogue the benthic dive transects and quadrats used to characterise the benthos. This should include sampling of the macro benthic in-fauna, identification of the species to the lowest possible identification levels (LPIL), and determination of the biodiversity index using standard methods.
Marine Fauna	Kingston Harbour and site if available	**Literature Review and Field Observations:** Available literature for marine mammals, marine reptiles, fish. Each of these groups should be described in terms of (1) important ecologically species (protected/endangered, rare, endemic, commercially or ecologically important) that have the potential to occur in this geographic area, and ecological dependencies (habitat, food, breeding, environmental sensitivities etc.).

SOCIO-ECONOMIC BASELINE		
Socio-economic setting		**Literature Review and Field Observations:** Identification of the project's area of influence in terms of its potential social, economic and cultural impacts. This must include major communities in the Palisadoes/Harbour View area that may be affected by the project. Attention should also be given to identifying specific resource users within the study area, such as owners of adjacent lands (including the highway), fishermen, squatters on the property, persons who traditionally use the lands, access routes to the coastal area and the coastal area itself. In general, all community-based stakeholders should be identified, and a basic description of their location and the reason why they are considered stakeholders in the project should be given. A settlement pattern map showing the proposed survey area must be prepared.
Tourism Trends	Kingston Metropolitan Area	**Literature Review:** This should examine recent trends in tourism (e.g., number of cruise ship visitors, airline passengers, occupancy rates) as they relate to the potential viability of the development. Island-wide (internal/local) tourism potential should also be considered.
Demographic Profile:	Palisadoes and Harbour View	**Literature Review and Field Survey**: Census data available from Statistical Institute (STATIN) for the Enumeration Districts for of the communities identified above. Where possible, this should be accomplished using published information (e.g., Statistical Institute of Jamaica, Census and other relevant data) and primary survey data. Parameters must include: population size and growth trends, age distribution of the population, male to female ratios, workforce (dependency ratio), income, education levels, and employment levels. Additionally, there should be an estimated of the transient population (commuting workforce) to the area.
Municipal resources:	Regional	**Survey**: interviews with agencies and a literature review should inform a description of the present availability and scope for expansion of resources such as utilities (telecommunications power, water supply), solid waste disposal capacity, and facilities (public transportation, housing stock, and emergency response services such as fire, medical, protective, disaster relief). Basic crime statistics for the Palisadoes should also be discussed.
Land use	Regional: Palisadoes	**Literature review, satellite image interpretation and site observations** Available literature, remote sensing and map interpretation should be used to describe historical and present use of surrounding lands, e.g., recreational/open space, airport land use, Ramsar site, Caribbean Maritime Institute, Yacht Club. Additionally, maritime routes through the Kingston Harbour should be presented in map form and described. Economic activities in the area should also be described in relation to the regional land use. The potential for archaeological and other valued resources to occur in the area should be described.

Heritage resources:	Site specific (including marine area)	**Literature Review:** Published data and interviews with Jamaican National Heritage Trust (JNHT) should describe potential for marine archaeological resources to occur near the site and any cultural aspects of the site.
Traffic:	Survey station to be located above roundabout to Harbour View. 24-hour surveys done for two days (week and weekend).	**Literature Review and Field Survey** Traffic survey and a review of available NWA data for the area, as well as the 1999 EIA report should inform the description of the baseline (ambient) levels of traffic along routes to be used during construction and operational phases of the project. The traffic survey should be consistent with the National Works Agency methodology, and should document 24-hour traffic flows into and out of the area, document the percentage of flow associated with Harbour View and the percentage associated with Palisadoes - frequency and types of vehicles.
Socio-cultural aspects	Regional	**Field Survey:** A community stakeholder questionnaire should be developed, which should be administered to at least 10% of the population identified in Task 1 above, or 100 households (whichever is less). The sampling regime for administration of the questionnaire must also be described, and a map showing the area and routes included in the survey must be given. The following information should be determined from the population survey: The values that the local communities place on the area; Their quality of life indicators; Perceived problems, and fears; Nuisances and complaints; Social organization: membership in voluntary organizations, churches, clubs and Linkages outside of the community. The socio-economic baseline report must contain a description of the methods used including analytical, statistical and any other standard approaches, as well as a review of existing literature. A list of all references must be included. Map overlays (depicting the communities within the area of potential impact) should be used to provide a spatial portrayal of socio-economic data. Field studies should be undertaken to update information that may no longer be current. Appropriate sampling methods shall be employed for the conduct of these studies/surveys

3.3.6 Assessment of Impacts and Mitigation Measures

The impact of the development on the specific sensitivities of the protected area should be comprehensively evaluated. The purpose of this is (1) to identify the major environmental and public health issues of concern and (2) to indicate their relative importance to the design of the project and the intended activities, taking full consideration of the effectiveness and acceptability of any proposed mitigation measures in the protected area context.

In terms of impact identification, both positive and negative project impacts are to be determined using the following methods:

1. Stakeholder consultation.
2. Technical inputs from environmental specialists on the EIA team.
3. Review of the possible impact-causing aspects of the project.
4. Review of impact assessments done for similar projects.
5. Regulatory criteria governing aspects of the environment likely to be impacted.
6. The sensitivity of valued environmental components (VECs) likely to be impacted by the project.
7. Review of the risks arising from the project and the range of environmental consequences that could arise under upset conditions.

Each identified impact is classified according to the assessed effect level (no impact, minor, moderate or major). Each identified impact should be assessed using the following criteria:

1. Scale: this refers to the magnitude of the adverse effect in terms of the geographic extent of influence arising from frequency and magnitude of the causative action. This allows higher assessment of impacts with a wider sphere of influence.

2. Affected Numbers: this considers the numbers of individuals (organisms, people etc.) from a valued population that stand to be impacted. This parameter can refer to indicator species or general receptor populations.

3. Secondary Effects: This parameter looks at the impact as a trigger mechanism for other effects, particularly those manifesting downstream of a pathway emanating from a project component, latent effects that could occur in the future, such as bioaccumulation of heavy metals in the food chain, or effects on future generations.

4. Resilience: This criterion examines ecological resilience/sensitivity (ability of a population to cope with effect). Existing stresses and variability of sensitivity (spatial or seasonal) should be considered. Resilience/sensitivity can be determined by eco-toxicological response, dose/response relationships and exposure of the population given effect pathways. Degree of loss (risk) can also be factored in terms of quantifiable amounts.

5. Persistence: This addresses the frequency and duration of effects in the environment. In general, chronic (persistent) or acute (short-term but severe) effects are regarded as more significant.

6. Reversibility. This criterion evaluates the extent to which an effected receptor can be returned to its pre-project state.
7. Baseline change: This relates to any model or prediction of the extent of change that can be expected. This should compare predicted levels of change with normal fluctuations as well as trends in the parameter without the effect of the project.
8. Extent to which the impact can be mitigated: This addresses the feasibility (ease of implementation and cost-effectiveness) of measures to prevent or reduce environmental costs. It should also consider the benefits or moderating circumstances given these environmental costs.
9. Uncertainty: This allows for disclosure of the level of scientific confidence in the predicted outcomes, and the general reliability of the data and models used to predict impacts.
10. Acceptability to stakeholders: This examines the willingness to make trade-offs and the degree of objection, given potential benefits of the project. This also includes planning constraints and scientific criteria (maximum allowable limits).

Using these criteria, **a significant negative environmental impact** is herein defined as one that:

- Is located in proximity to any sensitive or protected areas and has been determined to impact negatively on these.
- Is extensive over space or time (scales must be appropriately defined)
- Is intensive in concentration (i.e. exceeding recommended criteria) or in relation to assimilative capacity (as appropriated to the affected receptor).
- Is not consistent with national plans for the general use of the area.
- Contributes to the endangerment of threatened species.
- Reduces the stocks of commercially important species.
- Permanently damages habitat quality or creates ecological barriers.
- Threatens cultural or heritage resources.
- Alters community lifestyles or requires long-term adjustments of local people in respect of traditional values and resource use.
- Represents a long-term nuisance or significant safety risk to other users.

Cumulative impacts are caused by (a) activities unrelated to the proposal being evaluated but are likely to occur at the same time that the project activities are occurring and (b) several activities associated with the implementation of the project as proposed.

External activities form part of the baseline condition, and are taken into account in the examination of the baseline, as well as divergence from the baseline that might be expected to arise from project implementation. In this way the impact of the project on the sea and the surrounding area especially as it relates to the cumulative impacts of this project with any existing developments will be included.

In respect of internal aggregations of impacts on specific VECs that may individually be assessed as having a “minor” effect, but that may collectively have a significant combined effect, the resultant cumulative effects are evaluated collectively where multiple project activities contribute to the same effect (however, these should be treated separately when the activities are spatially separated).

This section must conclude with the preparer’s statement on whether, based on the various investigations and assessments of the project that were done as part of the EIA process, there is a Finding of No Negative Significant Impacts (FONSI). If the study finds that the project has the potential to result in significant negative environmental impacts that cannot be cost effectively mitigated, and which require project modification (in terms of design, site, technology use or scale/footprint), this must be clearly disclosed.

3.3.7 Environmental Management Plan

Design a plan for the management of the natural, historical and archaeological environments of the project to monitor implementation of mitigatory or compensatory measures and project impacts during construction and occupation/operation of the units/facility. An Environmental Management Plan and Historic Preservation Plan (if necessary) for the long term operations of the site should also be prepared.

The Environmental Management Plan (EMP) outlines the following:

- Environmental performance objectives for the project based on the specific impacts identified during site preparation, construction and operational stages of the proposed development.
- Summary of proposed mitigation measures, identifying the best timing for implementation, responsibilities and any required commitments of resources (including training and human resources).
- General guidelines for activities during construction and operational phases of the project to improve the project’s overall environmental performance (e.g., in respect of waste management, water and energy conservation, marine conservation, community development, etc.).
- Requirements for post-permit plans and approvals.

- Outline monitoring programme should be included in the EIA, and a detailed version submitted to NEPA for approval after the granting of the permit and prior to the commencement of the development. At the minimum the monitoring programme and report should include:
  - Introduction outlining the need for a monitoring programme and the relevant specific provisions of the permit and/or license(s) granted.
  - The activity being monitored and the parameters chosen to effectively carry out the exercise.
  - The methodology to be employed and the frequency of monitoring.
  - The sites being monitored. These may in instances, be pre-determined by the local authority and should incorporate a control site where no impact from the development is expected.
  - Frequency of reporting to NEPA

The Monitoring report should also include, at minimum:

- Raw data collected. Tables and graphs are to be used where appropriate
- Discussion of results with respect to the development in progress, highlighting any parameter(s) which exceeds the expected standard(s).
- Recommendations
- Appendices of data and photographs if necessary.

The environmental permit will outline compliance requirements with respect to monitoring of sensitive environmental receptors and implementation of mitigation measures.

3.4 Additional Information

Additionally, the EIA preparer should observe the following guidelines:

- Professional opinions should not be presented as statement of fact, and should be avoided unless they can be substantiated by published references as is the norm in technical scientific writing.
- All bibliographic references used to substantiate statements in the report should be listed.
- The report should include appendices with items such as the approved TOR; raw data; and Water Quality Lab Certificates, maps, site plans, photographs, and other relevant information.
- A list of EIA preparers (including analytical facilities) and their credentials must be included.

APPENDIX 2

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

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1. Name and address of the compiler of this form:

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2. Date this sheet was completed/updated: Wednesday, January 26, 2005

3. Country: Jamaica

4. Name of the Ramsar Site: Palisadoes- Port Royal

5. Map of site included:

Refer to Annex III of the Explanatory Note and Guidelines, for detailed guidance on provision of suitable maps. See Figure 1

a) hard copy (required for inclusion of site in the Ramsar List): yes

b) digital (electronic) format (optional): yes

In the autumn of 2003, a new datum was introduced to Jamaica. The older datum, JAD69, was no longer suitable with the advent of GPS technology. It was at this time that JAD2001 was introduced the parameters for which are as follows:

Lambert Conformal Conic Projection
Datum: WGS84
False Easting: 750000m
False Northing 650000m
Latitude of 1st Parallel: 18 N
Latitude of 2nd Parallel: 18 N
Longitude of Central Meridian: 77 W
Latitude of origin of projection: 18 N
Spheroid Name: WGS84

6. Geographical coordinates (latitude/longitude): 17°55' North, 76°49' West.

7. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

The site is located on the southeast coast of Jamaica and is actually the southernmost part of the parish (administrative region) of Kingston, which is also the capital of Jamaica. This city has a population of approximately 652,181. The area covers approximately 7523.08 hectares including the cays, shoals, mangrove lagoons, mangrove islands, coral reefs, seagrass beds and surrounding shallow water, excluding the urban centres on the Tombolo (the town of Port Royal and the Airport complex).

8. Elevation: (average and/or max. & min.)
Minimum – Sea level
Maximum - 10 m

9. Area: (in hectares): 7,523.08

10. Overview:
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The historic and cultural value of the area is very high as it includes forts on the dunes and a portion of the city of Port Royal that sank in an earthquake at a time when Port Royal was the largest and wealthiest city in the Western Hemisphere (NRCA 1997). In the earthquake of 1692 more than 90% of the city sunk giving rise to Port Royal's "sunken city", as a consequence the archaeological sites relative to this area are both oceanographic and terrestrial. The site includes three categories of wetlands classified as underrepresented by the seventh Conference of Parties (1999): coral reefs, mangroves and sea-grass beds, all significant in biodiversity and in ecologically sensitive areas which are essential to the maintenance of waterfowl and fish populations. The Tombolo and the associated mangrove areas form the southern boundary of the site and the seaward boundary of the Kingston Harbour, reported to be the seventh largest natural harbour in the world.

11. Ramsar Criteria:
Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

12. Justification for the application of each Criterion listed in 11 above:
Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

JUSTIFICATION FOR RAMSAR CRITERION # 1
The Palisadoes and Port Royal area is within ecoregion 236 - Western Tropical Atlantic Greater Antillean Marine (WWF) and contains several wetland types that are representative and near natural for this region. These include the underrepresented categories being mangrove forests, coral reefs and seagrass beds.

JUSTIFICATION FOR RAMSAR CRITERION # 2.
The area is important as it contains several threatened ecological communities including sand dunes, coral reefs, sea grass beds and mangroves (Steel, 1994). Further it functions as a critical habitat for a number of vulnerable and/or endangered animals according to the

IUCN Red List (2004) (VU: Vulnerable, EN: Endangered, CR: Critically endangered), for example, *Crocodylus acutus* (American Crocodile - VU), *Chelonia mydas* (Green turtle - EN), *Eretmochelys imbricata* (Hawksbill turtle - CR), *Trichechus manatus* (West Indian Manatee - VU) and *Tursiops truncatus* (Bottlenose Dolphin – CITES Appendix II).

JUSTIFICATION FOR RAMSAR CRITERION # 3.
The mangrove communities are essential for the maintenance of the overall biodiversity of the area. In fact a large number of species (Goodbody in prep., 2004) have been identified from the area, of which at least 26 are new species and are found only in this locale. Hechtel (1965), found 57 species of sponges in the Port Royal area with 16 new species and 1 new genus, examples include *Darwinella rosacea*, *Haliclona hogarthi* and *Callyspongia pallida.* Further, Goodbody (2003) found 39 ascidians in the Port Royal mangroves and lagoon area with one new species: *Phallusia caguayensis*. This tremendous diversity is exhibited in the kingdoms of living organisms Animalia, Plantae and Protista (Appendix 1).

JUSTIFICATION FOR RAMSAR CRITERION # 4.
The site serves as a refuge for many animals at many stages in their lifecycle and during adverse weather conditions. In addition, it also provides habitat for juvenile birds and marine organisms, especially commercially important species including fish (e.g. Atlantic thread herring *Opisthonema oglinum* and Redear herring *Harengula humeralis),* oysters (Mangrove Oyster *Crassostrea rhizophorae* and Flat Tree-oyster *Isognomon alatus),* shrimp and lobster (Harvey, 1986)

JUSTIFICATION FOR RAMSAR CRITERION # 8.
The site is an important source of food for fishes, spawning ground and nursery for several species (eg. Atlantic thread herring *Opisthonema oglinum* and Redear herring *Harengula humeralis* upon which stocks both within this specific area and other areas of Jamaican waters including the wider area of Kingston Harbour depend. The area also serves as a significant source of marine derived protein as food for the Jamaican population.

13. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic rationalization system that has been applied.

a) biogeographic region: Jamaica falls in the Neotropical Biogeographical Region as defined by the global biogeographic regionalisation system, specifically, ecoregion 236 - Western Tropical Atlantic Greater Antillean Marine (WWF)

b) biogeographic regionalisation scheme (include reference citation): Scheme used for the Island is from Hedges (1999).

Olson, D. et al. ***The Global 200*: A Representation Approach to Conserving the Earth's Distinctive Ecoregions. 2000.** Conservation Science Program, World Wildlife Fund-US. http://www.panda.org/about_wwf/where_we_work/ecoregions/global200/pages/home.htm

14. Physical features of the site:
Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

This site includes the wetland areas associated with a 13.3 km long Tombolo, the offshore coralline cays, coral reefs, seagrass beds and the shallow near shore waters. This Tombolo also forms the southern boundary of an extensive natural harbour.

- **Origins**: The geological origin of the Palisadoes Tombolo and the cays is believed to have been as a consequence of several changes in sea level rise and the deposition of sediment as a result of long shore drift from a large river in the area. The cays vary in composition from sand to coralline rubble and are stabilized by the existence of several well-developed reef structures in the area (Robinson, 1974).
- **Water depth**: The depth of water ranges from less than 1 m in the mangrove areas to as much as 35 m deep in areas adjacent to the Port Royal Cays.
- **Tidal variations**: There are mixed semidiurnal tides that vary between 20 – 30 cm.
- **Water quality**: Water quality ranges from eutrophic at sites influenced by Kingston Harbour to mesotrophic/oligotrophic, pristine at the extreme southern edge of the proposed site (South Cays).
- **General climate**: The climate is typically dry (mean annual rainfall <700 mm) and hot (30º – 32º C).

15. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The area has no rivers and no hydrological catchment relationships to any freshwater drainage. There are however several fresh water upwellings within the marine area of this site associated with nearby riverine systems.

16. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

While the wetlands in this area do not function in the recharge of groundwater, they act as a hydrodynamic barrier for the reduction of wave energy from offshore. Additionally, the mangrove areas associated with the Tombolo serve to contain and reduce sediment and fresh water incident from the outfalls in the Harbour, thereby protecting the marine areas especially the coral reefs and sea grass beds. This function is particularly evident during flood events when sediment-laden plumes from the Hunts Bay area have been observed to flow directly to the Port Royal mangroves where settlement is facilitated. The Port Royal mangroves and the sand dune vegetation further contribute to the stabilization of the shoreline and hence costal protection of the city of Kingston.

17. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal:

A	B	C	D	E	F	G	H	I	J	K	Zk(a)

Inland:

L	M	N	O	P	Q	R	Sp	Ss	Tp	Ts	U	Va	Vt	W	Xf	Xp	Y	Zg	Zk(b)

Human-made:

1	2	3	4	5	6	7	8	9	Zk(c)

b) dominance:
List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

B – C – I– A – F – E– G – D – J

18. General ecological features:
Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The major habitats in the area are associated with the Port Royal Mangroves, the Port Royal Cays and the sand dunes of the Palisadoes Tombolo.

1. The mangrove habitats of importance are as follows:
    a. **The forest** (trees and forest floor)**.** Dominant organisms are crabs, amphipods, insects, birds and mammals.
    b. ***Rhizophora mangle* roots**. These red mangrove prop roots hang into the adjacent water column and provide an important habitat for a wide range of sessile animals such as sponges, ascidians, bryozoans, barnacles and bivalve molluscs; these in turn provide habitat and substrate for errant forms such as annelid worms, flatworms, gastropods and crabs, as well as crevice dwellers such as copepods and amphipods. These root communities are undoubtedly one of the richest and most diverse communities occurring anywhere in the protected area.
    c. **Lagoons.** This is the water column in large open bodies of water within mangrove swamps and is dominated by a variety of zooplankton, phytoplankton, fish and crocodiles. Alleng (1998) lists eleven species of commercially important fish species taken from these lagoons.

2. **Seagrass beds.** There are several beds of mixed seagrass throughout the area; *Thalassia* is however known to be the dominant type in the area (Green *et al.*, 2003). The roots of the sea grasses, especially *Thalassia testudinum* (Turtle grass) provide stability for bottom sediments while at the same time providing habitat and substrate for a number of other organisms. Abundant growths of sea grass can be found down to depths of 2 metres and are usually associated with sandy bottoms. They provide habitat for a variety of echinoids, the solitary coral *Manacina* sp. and a variety of sessile organisms, which use blade space for settlement and growth. Where long-bladed plants occur juveniles of reef fishes find shelter from predators.

3. **Salinas.** These are small open areas within the mangrove forest/swamp, which are flooded at high tide. The shallow water suffers extremes of salinity and temperature when exposed to daytime heating. As a consequence, it is habitat only for stress

resistant species including branchiopods and fiddler crabs. Migrant wading birds as well as resident ibis and herons regularly visit these areas suggesting that there is a viable invertebrate fauna population serving as food supply for these birds.

4. **Coral Reefs.** There is extensive coral growth marked by a ridges or crests of coral rock mostly dead as a result of low tide exposure and storm damage, but with occasional small living colonies. The next zone of the reef is a slope with, *Acopora cervicorni*s at depths between 2 and 12 metres followed by a zone of massive corals (e.g. *Montastrea annularis, Porites spp.*) mixed with sponges and gorgonians down to a depth of 15 metres, below which is a rubble zone of broken coral. The reef slope flattens out at about 20-30 metres where it meets a smooth soft bottom with occasional rocky outcrops. All coral formations provide shelter and livin*g* space for fishes and a variety of invertebrate animals especially sessile forms (Bryozoa, Porifera, Ascidiacea) which settle on the under surface of plate corals or beneath old slabs of dead coral broken down by storms or bioerosion. Broken coral rock also provides habitat for a variety of boring and excavating species of animal; notable among these are species of barnacle, sponge and bivalve molluscs.

5. **Sand Beaches** On the leeward side of most cays there is a sand beach composed of the skeletal remains of carbonate skeletons of marine organisms notably the alga *Halimeda sp.*, echinoids, molluscs etc. These beaches provide shelter and habitat for a number of burrowing organisms such as the Mole Crab (*Hippa cubensis)* and the Ghost Crab *Ocypode quadrata*. Where sediments at the upper level of the beach are sufficiently deep there are available nesting sites for turtles.

6. **Sand flats** Sand flats at depths of 2 to 4 metres may contain colonies of the corals *Acropora cervicornis* and *A. palmata* as well as heads of *Diploria strigosa* and *Montastrea annularis.* Larger sand flats are often occupied by dense forests *o*f gorgonians, the basal stems of which provide habitat for sessile organisms.

7. **Water Column.** The water column between and around the various coral cays provides habitat for many species of planktonic organisms especially Copepoda and Siphonophora as well as larger organisms such as fish and dolphins.

8. **Sand dunes**. These are found on the exposed side of the Palisadoes Tombolo as well on the larger of the Port Royal Cays. They support xerophytic vegetation arranged in three zones progressing from sea to land: strand, beach-strand dune and strand thorn scrub and provides habitats for various species.

19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. ***Do not include here taxonomic lists of species present - these may be supplied as supplementary information to the RIS.***

Noteworthy flora associated with this area includes an endemic and rare terrestrial species *Opuntia jamacensis* (Prickly pear cactus) that is found in the sand dune communities of the Palisadoes. There are also marine species of interest, for example, a few red algal species in the genera *Gracilaria* is harvested and used as a source of natural supplements and is believed to have restorative and aphrodisiac properties.

20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. ***Do not include here taxonomic lists of species present - these may be supplied as supplementary information to the RIS.***

The faunal types in the area are very diverse and as such there are many that are noteworthy by virtue of their rarity, threatened status or their potential medicinal applications. ***Ecteinascidia turbinata***, an orange-coloured colonial ascidian common in the mangroves, was discovered to contain a compound, now known as *Ecteinascidin*, which may alleviate certain childhood cancers and leukemia and may also be used in treatment of inflammatory conditions.

Port Royal is recognized as the *type locality* for ~ 26 animals. This designation means that the species was first discovered at Port Royal and the original description of the species was compiled from a specimen collected at Port Royal. There are also several endangered species found in the area including the Brown Pelican, American Crocodile, Green Turtle, Hawksbill Turtle, West Indian Manatee and Bottlenose Dolphin. In recent years, studies have identified as an invasive species of bivalve native to the Pacific the Green Mussel (*Perna viridis)* thriving in the mangroves of the area (Buddo, *et al.* 2004). While it is clear that this species has significant potential as a mariculture prospect, the overall effects of this species are still being studied.

21. Social and cultural values:

e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

The major social and cultural values associated with this area surrounds the historical value of the city of Port Royal which is said to have been the most important place in the Island in the 17th Century. It was a rich merchant city and home to the infamous Buccaneers, for example, Sir Henry Morgan and as such also came to be known as “the wickedest city on earth.” During an earthquake in 1692 a significant portion of the city sank beneath the waters of the Harbour, creating what is today the “sunken city” the only archaeological site of this type in the Western hemisphere.

22. Land tenure/ownership:

(a) within the Ramsar site:

The area earmarked as the Ramsar site is the property of the State (the Government of Jamaica); one of the cays (Lime Cay) has been leased to a private company but is still required to conform to the existing regulations and guidelines relevant to the area as a protected area.

(b) in the surrounding area:

The urbanized areas of the Tombolo not designated as a part of the Ramsar site are predominantly State controlled but there are few areas that are in the control of private companies or citizens.

23. Current land (including water) use:

(a) within the Ramsar site:

The cays and dunes are important recreational areas for the population of Kingston including SCUBA diving, boating, sunbathing, swimming, fishing and other water sports. The marine areas and in particular the areas close to reefs are extensively fished by local communities. There is also a shipping channel that passes through the site and connects the port of Kingston to the Caribbean Sea.

(b) in the surroundings/catchment:

The Norman Manley International Airport is located along the Tombolo and the town of Port Royal is also used as the Jamaica Defence Force Coast Guard base, residential area, private and public open spaces.

24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:
(a) within the Ramsar site:

The major adverse factor affecting the ecology of the area is the increased recreational activity that could exceed the carrying capacity specifically anchoring on the cays by boats. The fishing pressure incident in the area also poses some concern as it is generally accepted that the fisheries of Jamaica are degraded**.** Commercial activity and shipping has led to recent modifications involving the widening of the Southeast ship channel by the removal of a section of Rackham's Cay and the relocation of the associated coral reefs. In addition, mangrove areas have previously come under threat from road improvement projects and housing developments. This area of Jamaica is the most persistent approach for hurricanes that have made landfall in Jamaica; as a consequence, the reefs of the area have been adversely affected in the past. The effects of the most recent system affecting Jamaica (Hurricane Ivan, September 2004) are still being studied and as such are currently unknown.

(b) in the surrounding area:

Solid waste, organic and oil pollution from Kingston Harbour through the discharge of rivers and gullies which empty into the harbour and have deleterious effects on the coastal and marine ecosystems of the area especially the mangrove communities.

25. Conservation measures taken:
List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

The main conservation measures taken thus far include the declaration in 1998 of the Palisadoes-Port Royal Protected Area (PPRPA) under the Natural Resources Conservation Authority Act (1991). Activities towards declaration included educating and sensitizing the people within the area about the vulnerability and value of the areas being used.

26. Conservation measures proposed but not yet implemented:
e.g. management plan in preparation; official proposal as a legally protected area, etc.

A management plan was drafted when the area was declared a protected area to ensure wise use of the resources (NRCA, 1999). The Palisadoes-Port Royal Protected Area Management Plan is currently being updated with a view towards implementation.

27. Current scientific research and facilities:
e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The University of the West Indies enjoys a 99-year lease on an area that has functioned as the Port Royal Marine Laboratory since 1955. It provides wet and dry laboratory space for local and foreign research scientists and accommodates courses from the University of the West Indies (Mona Campus). There is also a modern aquaculture facility that is engaged in research on various fish species.

28. Current conservation education:
e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The Government, through the National Environment and Planning Agency (NEPA) facilitates presentations, exhibitions and tours within the area aimed at enhancing public awareness and education. Non-governmental organisations through their activities for example beach clean up also educate persons living within the PPRPA and the wider public about wetland conservation.

The Caribbean Maritime Institute (formerly the Jamaica Maritime Institute) provides tertiary maritime education, training, research and consultancy to students from the region. The Fort Charles Maritime museum and visitors centre in Port Royal provides information dedicated to the seamen and ships that visited Port Royal. The Port Royal Marine Laboratory accommodates groups of naturalists wishing to take tours into the surrounding mangrove and coral areas.

There is also presently a project funded by the Environmental Foundation of Jamaica (EFJ) aimed at developing field guides and information booklets about the biodiversity associated with the mangrove areas, along with aquarium exhibits showing the mangrove organisms associated with the *Rhizophora* roots.

29. Current recreation and tourism:
State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Recreational use in the area is centered primarily around the use of the beaches on the Cays, the town of Port Royal, along the Palisadoes Tombolo, the Yacht Club and the go-kart racing track adjacent to the Norman Manley International Airport. The beaches of Port Royal and the Cays are used everyday with maximum numbers being recorded on the weekends. The exact numbers utilizing these areas is currently the subject of studies to determine carrying capacities.

30. Jurisdiction:
Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Ministry of Land and Environment, Ministry of Education, Youth and Culture and the Ministry of Local Government

31. Management authority:
Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

The primary management authority of the area is the National Environment and Planning Agency (NEPA) and in matters related to development and the use of heritage resources the local government/parish council (the Kingston and St. Andrew Corporation) in conjunction with the Jamaica National Heritage Trust must also be consulted for approval.

32. Bibliographical references:
scientific/technical references only. If biogeographic rationalization scheme applied (see 13 above), list full reference citation for the scheme.

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APPENDICES:

APPENDIX I. Lists with numbers of species as per justification for Ramsar criterion # 3

KINGDOM:

(A) PLANTAE
(1) Macrophytic Algae
(2) Sea grasses
(3) Mangroves
(4) Sand dune vegetation

`

(B) ANIMALIA
(5) Porifera
Cnidaria:
(6) Corals,
(7) Anemones,
(8) Jellyfish (Hydrozoa and schyphozoa)
(9) Ctenophora
(10) Platyhelminthes
(11) Annelida
Crustacea:
(12) Zooplankton
(13) Cirripedia
(14) Malacostraca
(15) Mollusca
(16) Echinodermata
(17) Chaetognatha
(18) Bryozoa
Chordata:
(19) Hemichordates & Cephalochordates
(20) Urochordate - Larvacea
(21) Urochordate - Ascidiacea
Vertebrata:
(22) Fish
(23) Reptiles
(24) Birds
(25) Mammals

(C) PROTISTA
(25) Phytoplankton algae
(26) Planktonic ciliates

Note: The major groups of organisms are arranged under their respective kingdoms. The numbers in brackets correspond to the number on the list of species of each group.

APPENDIX 3

Table 1 Water Quality at the 3 Stations

	BOD	TSS	FC	Nitrates	Phosphates	O & G
STATION 1: INSIDE						
1a - Wet Season	44.25	<1	43	< 0.5	<0.1	1.71
1b - Wet Season	60.75	1	240	< 0.5	<0.1	2.25
1c - Wet Season	48.75	<1	150	< 0.5	<0.1	11.87
Mean	**51.25**					**5.28**
Standard Deviation	**8.53**					**5.72**
1a - Dry Season	1.35	11	1100	1.32	0.07	0.93
1b - Dry Season	1.3	3	150	1.32	0.09	1.2
1c - Dry Season	1.1	6	1100	1.32	0.07	3
Mean	**1.25**	**7**		**1.32**	**0.08**	**1.71**
Standard Deviation	**0.13**	**4**		**0.00**	**0.01**	**1.13**
STATION 2: OUTSIDE						
2a - Wet Season	0.65	<1	150	< 0.5	0.13	7.6
2b - Wet Season	0.65	<1	>2400	< 0.5	0.23	16.77
2c - Wet Season	0.60	1	1100	< 0.5	0.37	10.88
Mean	**0.63**				**0.24**	**11.75**
Standard Deviation	**0.03**				**0.12**	**4.65**
2a - Dry Season	1.15	3	>2400	0.88	0.11	0.53
2b - Dry Season	1.45	11	240	1.32	0.07	1.63
2c - Dry Season	1.45	6	460	1.32	0.07	1.25
Mean	**1.35**	**7**		**1.17**	**0.08**	**1.14**
Standard Deviation	**0.17**	**4**		**0.25**	**0.02**	**0.56**
STATION 3: POND						
3a - Wet Season	1.30	901	43	< 0.5	2.6	6.29
3b - Wet Season	0.65	2968	9	< 0.5	3.53	3.47
3c - Wet Season	0.80	672	7	< 0.5	2.3	9.57
Mean	**0.92**	**1514**			**2.81**	**6.44**
Standard Deviation	**0.34**	**1265**			**0.64**	**3.05**
3a - Dry Season	5.15	221	93	3.08	0.04	3.6
3b - Dry Season	5.5	84	9	3.08	0.02	4.27
3c - Dry Season	6.10	65	9	3.52	0.08	4.57
Mean	**5.58**	**123**		**3.23**	**0.05**	**4.15**
Standard Deviation	**0.48**	**85**		**0.25**	**0.03**	**0.50**
NRCA Freshwater std	0.8 - 1.7	-	-	0.1 - 7.5	.01 -0.8	-

APPENDIX 4

Appendix

Table 1a Approximate benthic percentages for Transect 1

		Benthos / Subtrate					
Distance (m)	**Depth (ft)**	**Sand**	**Rock**	**Rubble**	**Seagrass**	**Algae**	**Coral**
10					100		
20					100		
30	3	85			15		
40		100					
50	5	100					
60		100					
70	8	100					
80		100					
90	9	96				4	
100	10	100					
AVERAGE		**78.1**	**0.0**	**0.0**	**21.5**	**0.4**	**0.0**

Table 1b Approximate benthic percentages for Transect 2

		Benthos / Subtrate					
Distance (m)	**Depth (ft)**	**Sand**	**Rock**	**Rubble**	**Seagrass**	**Algae**	**Coral**
10		81	2	14		3	
20		100					
30		100					
40		100					
50	3	13			87		
60		100					
70	5	100					
80	9	100					
90		100					
100	10	100					
AVERAGE		**89.4**	**0.2**	**1.1**	**8.7**	**0.3**	**0.0**

APPENDIX 5

Angler's Club	Aunt May's Enterprise
Authority (NSWMA)	Brave Star Sound System
Buccaneer's Roast Bar and Restaurant	Cable and Wireless Jamaica
Caribbean Maritime Institute	Circle Circle Pastry Shop
Environmental Health Unit	Fisherman's Cabin
Gloria's Restaurant	Gloria's Restaurant
Golden Horse Betting Shop	Jamaica Environment Trust
Jamaica Fire Brigade	Jamaica Hotel and Tourism Association
Jamaica National Heritage Trust	Jamaica Public Service Company Ltd.
JDF Coast Guard	Kingston and St. Andrew Corporation (KSAC)
Kingston Public Hospital	Lighthouse Tabernacle Pentecostal
Lou's Enterprise	Maritime Authority of Jamaica
Ministry of Health (Port Royal Health Department)	Ministry of Tourism
Ministry of Water and Housing (ODPEM)	Morgan's Harbour Hotel
National Environment and Planning Agency	National Housing Development
National Housing Trust (NHT)	National Solid Waste Management
National Water Commission	National Works Agency
Norman Manley International Airport	Old Goal Bar
Port Royal Action Committee	Port Royal All-Age Infant
Port Royal All-Age School P.T. A.	Port Royal Band Club
Port Royal Basic School	Port Royal Basic School P.T. A.
Port Royal Basketball Club	Port Royal Branch Library
Port Royal Brotherhood Association	Port Royal C.O.D.A.C.
Port Royal Citizen's Association	Port Royal DA
Port Royal Environment Management Trust	Port Royal Fire Station
Port Royal Fisherman Cooperation	Port Royal Football Club
Port Royal Golden Age Club	Port Royal Heritage Foundation
Port Royal Honeywell Club	Port Royal Netball Club
Port Royal Police Station	Port Royal Sea Scouts
Port Royal Seven Day Adventist Church	Royal Yacht Club of Jamaica
St. Paul's Methodist Church	St. Peter's Anglican Church
The Port Authority of Jamaica	Tourism Product Development Company Ltd.
University of the West Indies Marine Lab	Urban Development Company
Water Resources Authority	Y Knot on the Deck

APPENDIX 6

Jamaica Public Service Company Limited
CHANGING LIVES WITH OUR ENERGY

6 Knutsford Boulevard, Kingston Jamaica, W.I.
Telephone: (876) 926-3190-9 Fax: (876) 511-2167
Website: www.jpsco.com

January 11, 2007

Ravidya Burrowes, Ph.D.
Managing Director
Environmental Management Consultants (Caribbean) Ltd.
61 Mansfield Meadows
Ocho Rios, St. Ann

Re: Proposed Marina and Entertainment Complex (7th Harbour Development) at Gunboat Beach, Palisadoes, Kingston

Dear Dr. Burrows,

In response to the project brief for the above captioned, sent December 8, 2006, we have the following environmental concerns:

1. Oil Storage Facility
   - Type & size of storage – above/under ground
   - Delivery method to avoid spills
   - Methods for spill control/containment

2. Sewage Treatment Plant
   - Type of facility
   - Type of monitoring

3. Energy Conservation
   - Consideration for lighting requirements – use of fluorescent lamps/bulbs
   - Solar water heater to provide hot water for sanitation

4. Garbage disposal
   - Storage facility
   - Disposal mechanism
   - Frequency of disposal

We wish you success in the development of this project.

Sincerely,

Michelle Dunn (Mrs.)
Manager – Environmental Affairs
Tel: 876-935-3351
Email: mdunn@jpsco.com

APPENDIX 7

SOCIO-ECONOMIC SURVEY
GUNBOAT DEVELOPMENT

Community _____

Age: _____
Gender: Male [ ] Female [ ]

Housing and Population

1. How long have you lived in area? 1-5 years [ ] 6-10 years [ ] >10 years [ ]

2. Where did you live previously? KSA [ ] Other Parish [ ] state _____

3. Are you a member of any voluntary organizations [ ] church [ ] clubs [ ] community group within the community [ ] ?

   If yes, please state organization and position held._____

   _____

   _____

4. Do you have relationships (linkages) outside the community related to?

   a. Work [ ]
   b. School [ ]
   c. Family [ ]
   d. Social organizations [ ]
   e. Entertainment [ ]
   f. Other [ ]

5. Is the house you occupy-?

   a) Owned? [ ]
   b) Rented? [ ]
   c) Leased? [ ]
   d) Other [ ] _____

Employment & Economy

6. Indicate your level of education

   a) Primary
   [ ]

b) Primary/All Age [ ]
c) Secondary/High [ ]
d) Tertiary [ ]

7. In which occupational group do you fall?

Craft & Related Trade Workers [ ] Professionals [ ] Shop and Market Sales Workers [ ]

Clerks [ ] Elementary Workers [ ] Agriculture Workers [ ] Plant & Machine Operators

& Assemblers [ ]

8. Are you employed Yes [ ] No [ ]

9. If yes, are you employed in the area [ ] outside in KSA [ ] out of KSA [ ]?

If you work within the area please state where_____

10. What is your average weekly income?

a.	Below $2000	[ ]	d)	$6001-$8000	[ ]
b.	$2001-$4000	[ ]	e)	$8001 and above	[ ]
c.	$4001-$6000	[ ]			

Social Services /Physical Infrastructure

11. Do the following public services and physical infrastructure need improvement (Yes/No)?

a. transportation_____
b. fire _____
c. electricity_____
d. telephone_____
e. water supply_____
f. recreational facilities_____
g. garbage collection_____
h. police_____
i. health (community centre)_____

Awareness of Proposed Development & Community Concerns

12. Did you have prior knowledge of the proposed development of the Gunboat Beach?

Yes [ ] No [ ]

If yes state information known and source. _____

_____

_____

13. Do you think there is a demand for the entertainment/recreational facilities?

Yes [ ] No [ ] State reason for answer _____

_____

_____

14. Do you think the proposed development will have the following effects on the area?

Positive	Yes/No	Negative	Yes/No
□ Job creation		□ Conflict/competition between locals and newcomers for jobs	
□ Improved utility services (e.g. waste disposal, water, electricity etc.)		□ Increase in crime rate	
□ Improved security (policing), thus decreased crime rate		□ Exclusion of person who currently use the property/beach	
□ Improved living standard		□ Loss of job/income	
□ Improved community resources		□ Loss of biodiversity (e.g. plants, marine life)	
		□ Increase effects of hurricanes, flooding etc.	
		□ Increased traffic congestion	

15. Do you like the area? Yes [ ] No [ ] If yes, state reason_____

_____

16. How important is the Gunboat Beach to you and the community?
    a. important [ ]
    b. very important [ ]
    c. unimportant [ ]