Environmental Impact Assessment

For

Proposed Ecotourism Park, White River Valley, St. Ann

RIVVA RIDDIM

February 2012

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1.0 Introduction

The *Rivva Riddim* Company Limited has applied to the Natural Resources Conservation Authority (NRCA) for permits and licenses associated with the development of an Ecotourism Park on a property measuring 16 hectares in White River Valley, St. Ann.

This Environmental Impact Assessment (EIA) has been prepared in accordance with Terms of Reference (TOR) approved by the National Environment and Planning Agency (NEPA). The approved TOR is provided in Appendix 1.

2.0 Project Background and Description

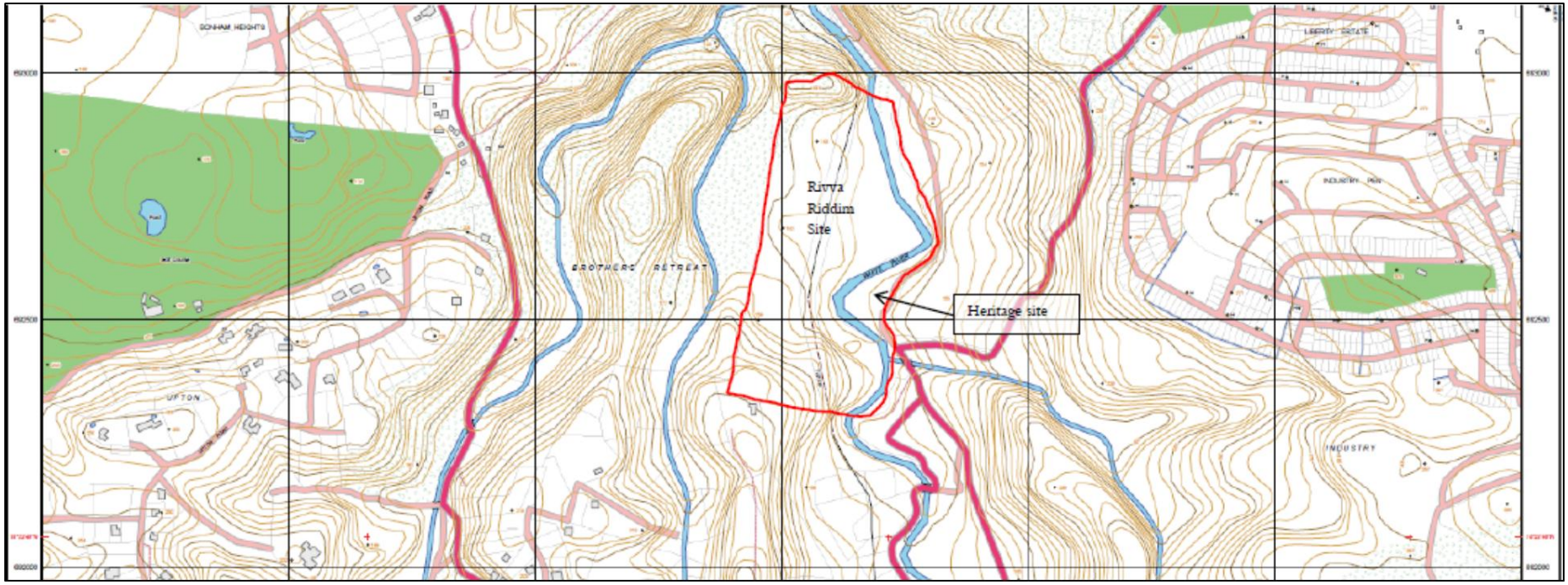
2.1 Project Location

The proposed site for the Ecotourism Park "*Rivva Riddim*" is located in the White River Valley, 11 km (7 miles) outside the town of Ocho Rios. The White River Valley Watershed area is a 102 km^2 area which spans the parishes of St. Mary and St. Ann and comprises more than twenty-five (25) residential communities. The proposed eco-tourism site is a 16 hectare (40 acre) property, located just north of the Bonham and Exchange communities, and southwest of Tower Isle. The property has an uneven landscape with slopes >25% in the forested areas of the site and a more uniform topography (slopes <10%) in the open field or pasture lands of the property. The property is bordered to the south by several hills and to the north and east by forested or open space areas. Its western boundary is marked by the Prospect community located on the hillside.

The White River, which flows through the eastern end of the property, is a major tourism attraction, which for its entire length, forms the boundary between the parishes of St. Ann and St. Mary. The river possesses more than seven (7) beautiful cascades; well-known beauty spots along the river. The White River is approximately 28 km in length and is used mainly for rafting, river tubing, fishing and recreational swimming. The White River is also the source of hydroelectric power for the Jamaica Public Service Upper and Lower White River Power Plants located north (Exchange District) and south (Lodge District) of the site respectively.

Figure 1shows the location of the Ecotourism site and Appendix 2 shows the 1:12,500 location map of the project site and surrounding area.

Figure 1: Site Location Map (1:4,000)



2.2 Project Overview

The proposed '*Rivva Riddim'* Ecotourism Park is an environmentally friendly showcase of attractions that aptly represents the term 'design with nature.' The project, a J$300 million investment, will see the development and operation of over ten (10) visitor attractions on a 16 hectare (40 acre) property, with forested and grassland areas and slopes ranging between <5% - 25%; a landscape ideally suited for the development of a wide diversity of ecotourism features.

The Ecotourism Park does not have a finite lifetime; instead the activities will be reviewed periodically for relevance and continued feasibility.

The Park is being developed to accommodate 500 visitors on a daily basis with 200-300 at any one time. Cruise ship tourists that will likely stay for an hour at a time and school groups will be some of the main users of the Park.

The construction of the park is anticipated to be undertaken in 3 phases over 24 months. The first phase is over a 6 month duration after which the park will be operational and the subsequent phases will be undertaken as expansions over a 2 year period. The Park is expected to operate 3-5 days weekly, including opening on specific public holidays.

2.2.1 Project Rationale

The Rivva Riddim Ecotourism Park is aimed at achieving three main objectives:

1. Environmental conservation and protection
2. Supporting the diversification of the Jamaican tourism product
3. Creation of employment opportunities

The proposed project is beneficial both in its overall objective and timing. With the global financial crisis at the end of 2007, many economies, like Jamaica's experienced a sharp decline, with many key sectors being severely impacted. Today Jamaica is still trying to recover from the impacts of the global economic crisis, but has had to deal with:

- The fall in export demand (goods and services such as bauxite and tourism)
- A decline in remittances from migrant workers
- Reduced foreign direct investment (capital inflows)
- Reduced access to financial credit - changes in credit rating
- Some depreciation in the exchange rate
- Increased unemployment
- Deterioration of the fiscal balance and the balance of payments

The decline in real output, such as gross domestic product, tourist arrivals and private construction activity has increased calls for new policy approaches to be developed and implemented to guide the recovery process and stabilize the Jamaican economy.

Tourism, by all accounts is one of the most critical sectors within the Jamaican economy. The sector accounts for 27.7% of GDP and employs approximately 284,000 persons, i.e., 1 in every 4 jobs. It is for this reason the recovery of the sector and its continued growth is paramount to Jamaica's overall strategy in strengthening the local economy. Growth in the sector provides two broad positives:

1. Employment
2. Foreign exchange earnings

Diversification of the tourism product offered has been touted as being critical and relevant to the sustainability of the sector. According to the Master Plan for Sustainable Tourism Development in Jamaica there are five (5) critical objectives that will help in spearheading the movement of the tourism industry on a path of sustainability. These include:

- Growth based on a sustainable market position; marketing Jamaica's heritage
- Increasing the types and quality of attractions or enhancing the visitor experience
- Engagement of local communities or community based development
- An inclusive industry; increasing parity across all areas of the sector e.g. gender equality
- Promotion of the environment as a product and reduction of degradation threats

The plan identifies ecotourism or nature based tourism as a minor niche segment within the tourism market, but one with the potential to help diversify the local products offered. Ecotourism is defined in the plan as *"… that sub-set of nature tourism in which a part of the proceeds is reinvested in the preservation/conservation of the natural asset,"* and is recognised as being critical to the conservation and management of the environment, while promoting and advancing tourism interests via collaboration with Jamaica's major market segment: sun, sand and sea.

The *Rivva Riddim* project is a pivotal venture, given its anticipated contributions to the overall Jamaican economy, through one of its most vital sectors. The project's objectives are in sync with those outlined in the Tourism Master Plan, but also have an underlying social construct, which would be beneficial for the country. Aside from increasing the active tourist attractions offered on the island, the Park will generate foreign exchange revenues and create specialised job opportunities for nationals. Most importantly the project seeks to strike a balance between economic development and environmental protection; a sustainable development objective that is not always easily attainable.

2.3 Design Elements and Planning Specifications

The development of the *Rivva Riddim* Ecotourism Park will involve the construction and installation of twelve (12) attractions and several infrastructural supporting features, including car parks, sewage treatment system and water storage facilities. The attractions will be constructed under two project phases as previously mentioned. Phase one (1) will see the construction of all water based attractions, administrative buildings, floating restaurant and gazebos. Phase two (2) of the project will see the construction and operation of hiking and biking trails, along with zip line and rope bridge attractions.

2.3.1 Attractions

1. Zip Line, Rope Bridges and Tree houses

a. ***Zip Line and Rope Bridges***: A maximum of fifteen (15) zip lines will be constructed on the property. The zip lines (Figure 2) will be double cable zip rides measuring 46-137 m and will be installed on the highest tree canopies, with the zip lining route reaching near the river. Across the river a maximum of five (5) rope bridges will be constructed over the width of the White River. The bridges will be fitted with zip harnesses, allowing patrons to '*zip*' across.

b. ***Tree House***: Fifteen (15) tree house units (Figure 3) will be constructed measuring 9-41 m^2. The tree houses will have platforms built around them to facilitate linkage with the zip lining attraction. Ladders and knotted ropes will also provide access to the tree houses via floor doors.

These attractions are to provide the 'thrill effect' sought by adventure visitors in a safe and clean environment, where patrons can enjoy the natural features of the environment.

Figure 2: Picture of a Zip Line

Figure 3: Picture of a Tree House

2. Hiking and Cycling Trails

a. ***Golf Cart Visitor Transportation Trail***: A 4.8 km dirt track, extending from the welcome court to the hills located on the western side of the property, will serve as a golf carting trail for the movement of visitors from the welcome area to the attraction/rides area. The trail will be a winding path, approximately 4.2 m wide, which takes visitors past historical features on the property, the river, a forested landscape, while providing a clear and scenic view of the Caribbean Sea. The trail is designed to accommodate a maximum of five (5) golf carts. The carts used at the Park will be solar powered modified golf carts. The carts will also be used by security personnel to patrol the site.

b. ***Bicycle Trail***: A 3.2 km bicycle dirt trail, approximately 1km wide, will be cut across the property, extending from the welcome court (pick up area) to the hills on the western end of the property. The trail is being designed to accommodate a maximum of twenty (20) bicycles during each session. Sessions are expected to last for an hour duration.

3. Splash Pool, Water Slides and Lake

There will be three (3) water attractions provided at the theme park. The attractions cater to toddlers, pre-schoolers, preteens, teens and adults.

a. ***Splash Pool***: one-tenth (0.10) hectare (¼ acre) of land area will be paved using concrete and fitted with underground piping leading to several spouts. High pressure water stored on the hill will flow through the sprouts via the base of the splash area and slop into a shallow pool area approximately one (1) metre in depth.

b. ***Water Slides***: Three (3) water slide attractions (Figure 4) will be installed on the eastern end of the property. The slides will be constructed along the natural contours of the land area (beginning 4.5 to 6 metres above the lowest level of the slope) around the eastern rim of the upper flat on the property. Water slides will be constructed from one (1) metre wide grooves

entrenched in the earth and covered with lightly reinforced concrete. A water trough, 1m x 2.5m, sloping upwards will connect all slides. The slides will have a variety of shapes and slopes, with several covered with ferro-concrete to make tunnels. Water for the slides will be via pipes connected to a small reservoir.

Figure 4: Picture of Water Slides

c. ***Dry Slide*:** A dry slide or alpine slide (Figure 5), measuring 0.4 km will be constructed on the eastern end of the property. The slide will serve as the longest slide attraction on the property and is designed to accommodate 3 persons at any one time. The slide will have three (3) sections, each section having its own snow mobile cart (runners on the cart have been converted into wheels). Each cart can hold a maximum of one (1) person and a maximum of six (6) carts will be used.

Figure 5: Picture of an Alpine Slide

d. ***Pool***: A 3 m x 12 m pool will be constructed on approximately 23 m^2 of land. The pool, which will be constructed to resemble a water hole, will be designed to facilitate entrance via hanging zip lines and small water slides.

e. ***Lake***: Approximately three (3) hectares of land space will be used to facilitate the construction of a lake with a maximum depth of 1.2 m. The lake will be built by cutting and filling to a depth of 15.2 cm to accommodate berms to a depth of 1.5 m (5 ft.) at the sides of the lake. Berms will be installed at 25-30 degree slope with a 1.5 m wide base. The lake will be fed by water from the reservoir. All large trees on the three (3) hectare plot will form part of the attraction in the lake. Earth will be built around the root of the trees at a height of 1.2 m to cover the exposed ground surface, creating the effect of a small island. The islands will measure approximately 56 m^2. Each tree will house a large 10 m x 10 m tree house connected to a zip line and a small jetty. Three (3) islands will be built in Phase 1 of the project.

   I. **Lake Hut**: at specific locations, footings will be erected to accommodate a 6 m container. The container will be dressed, creating a lake hut feature that will serve as a fast food and drink shop. A 1m railing will be constructed around the lake hut to facilitate patrons walking around the entire structure. Three such huts will be constructed in Phase 1 of the project on 56 m^2 of land area.

   II. **Gazebos**: Fifteen (15) 6.3 m^2 -10.8 m^2 gazebos will be constructed with mosquito mesh in the lake and will be available for rental. The gazebos will facilitate family gatherings and will be fitted to allow for small catering activities to take place within the structures e.g. bonfires etc. Gazebos will vary in size, measuring 8 m x 8 m or 12 m x 10 m.

   III. Ten (10) battery operated lake boats with solar charging will be used as part of the river attraction. Each fibre glass boat will have a maximum carrying capacity (1 person per boat).

2.3.2 Infrastructure

1. Administrative and Guest Facilities

A *welcome court* will serve as the main administrative and entrance area to the Park. The court, to be constructed on 360 m^2 of land, will comprise the main office, ticket counter, locker room, bathrooms and food court. The entrance to the Park will be via two (2) 6 m containers that will be dressed similar to rainforest cabins and a wooden bridge will take visitors directly to the parking area and welcome court.

The administrative facilities (office, ticket counter etc.) will be located in four (4) 6 m containers. The food court, also located in the welcome court, will be a 100 seat canopy facility, comprising a 6 m thatch roof and supporting wooden beams.

2. Parking and Delivery Area

Approximately 1.2 hectares of land space will be reserved for the construction of a parking area comprising 90 degrees-angled parking bays for motor cars. Fifty (50) parking spaces will be constructed facilitating two way traffic. Of the 50 parking spaces, four (4) will be for tour buses.

3. Sewage Treatment Plant

The sewage treatment system for the *Rivva Riddim* Park has four (4) main components:

1. Septic Tank
2. Vegetative Submersible Bed (VSB) Reed Bed
3. Ultraviolent (Light) Chamber
4. Concrete Storage Tank

The system is designed to support an average flow of 3 m^3/day for an estimated five hundred (500) visitors daily and to meet the NRCA Sewage Effluent standards.

4. Water Facilities

No water will be abstracted from the White River for use at the Park.

Water attractions will be supplied by an existing 20 cm (8 inch) diameter pipeline from the Jamaica Public Service (JPS) woodstave pipeline which passes through the property. Historically water is made available to all property owners through which the woodstave pipeline passes. The provision of this water to property owners has no impact on the operations of the hydropower plant. In fact there are numerous leaks along the pipeline (due to its age) which causes water to flow into properties along the route of the pipeline. Water will be stored in an 800 m^3 plastic water storage tank that will be located at the southern end of the Park near the welcome area.

Potable water will be supplied via a National Water Commission (NWC) connection and there will be a 2,273 Litre (500 gallon) storage tank for potable water.

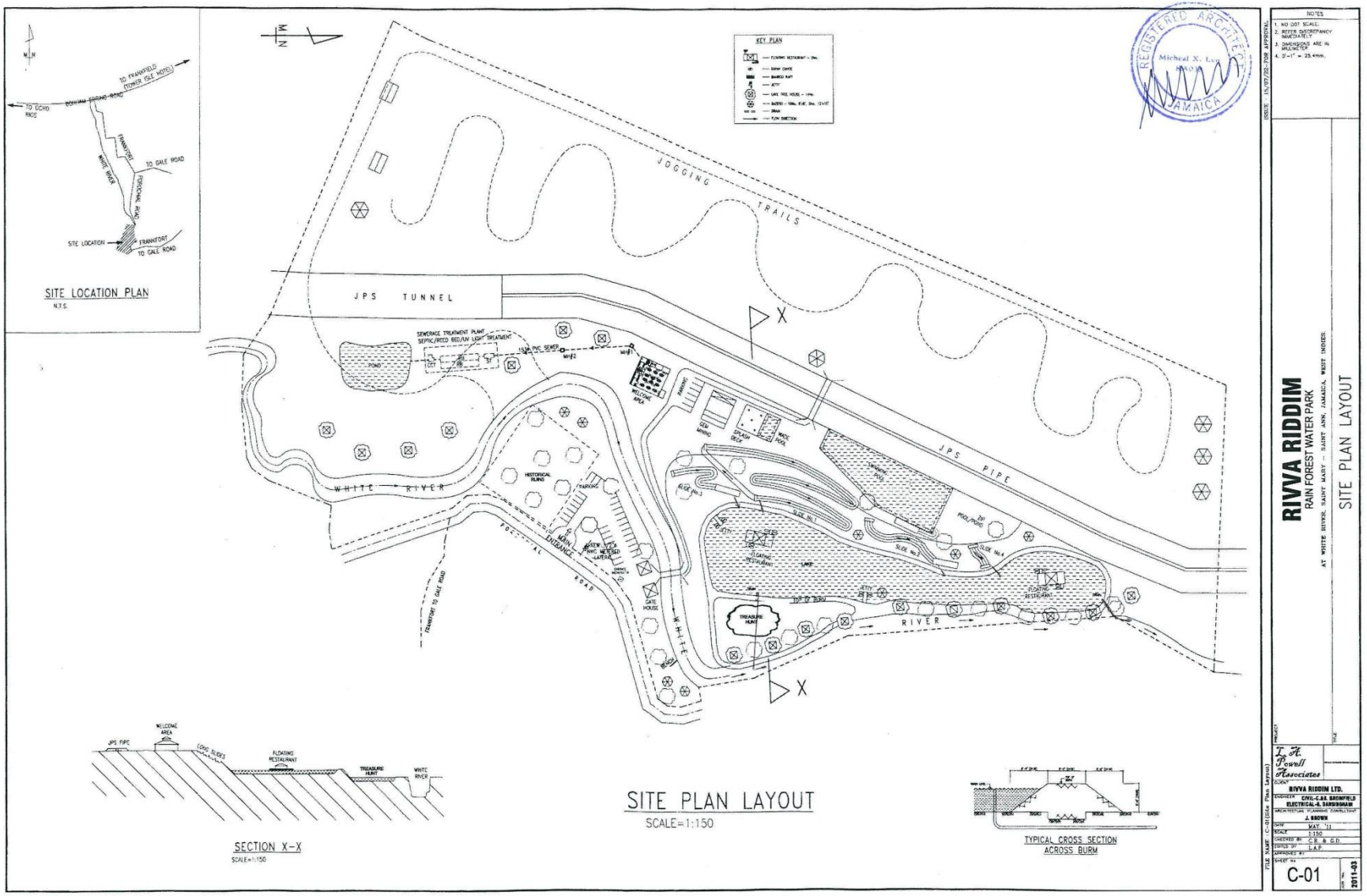
A berm will be constructed between the JPS woodstave pipe and the *River Riddim* property to serve as a flood mitigation measure in case of a failure of the woodstave pipe.

5. Electricity Facilities

200 Evergreen and Sunforce Solar panels will be installed at various sections of the property. The panels will be used for electricity generation and will have a generating capacity of 200 watts each.

Three (3) 6 kW hydropower (HP) plants will be installed on the southern end of the property. The plants will be used for generating electricity. The HP plants will be constructed approximately 6 m above the river as a precautionary measure in the event of rising waters. Water from the JPS woodstave pipeline will be used by the HP plants to generate electricity. The water used by the HP plants will be released into the White River.

Figure 6: Rivva Riddim Ecotourism Park Layout



3.0 Legal and Institutional Framework

This section outlines the environmental and other specific regulatory approvals, policies and legislation relevant to the project at the national, international and local levels.

3.1 Policies

National Policy applicable to this project is the National Watershed Management Policy managed by the National Environment & Planning Agency

3.1.1 National Watershed Management Policy

Part I of the document provides an overview of watershed problems, past interventions, current international trends in watershed management. Part II highlights the major challenges facing the country with respect to watershed management and Part III the key principles and strategies being employed by the policy to address these challenges. Options for obtaining funding for policy implementation are also suggested in this section. The requirements of the policy in terms of the development of watershed legislation are also noted. Finally, Part IV of the policy document sets out the essential elements of the institutional framework required for the attainment of policy objectives. The full policy document is available at NEPA's website www.nepa.gov.jm.

3.2 Guidance Manuals

3.2.1 Development and Investment Manual (2006)

The Development and Investment Manual is intended to offer guidance to stakeholders interested in undertaking various types of development in Jamaica. The Manual sets out the development standards, guidelines and procedures for various development activities. The manual outlines the criteria for the design and implementation of different infrastructure and amenities. The Manual consists of seven (7) volumes:

- Volume 1: Planning and Development Matters
- Volume 2: Environment
- Volume 3: Infrastructure, Utilities and Communications
- Volume 4: Hospitality Industry and Security
- Volume 5: Social Infrastructure and Waste Disposal
- Volume 6: Business Facilitation
- Volume 7: Finance

Information on Volumes 1-7 are available at the website of Jamaica Trade and Invest www.jamaicatradeandinvest.org

3.3 Plans

The plans applicable to this project include:

1. The National Physical Development Plan
2. The Tourism Master Plan
3. National Forest Management and Conservation Plan

3.3.1 National Physical Development Plan

The National Physical Development Plan (NPDP) is the major planning policy used to guide land use planning and development in Jamaica. It focuses on physical planning, settlement, conservation, income generators (i.e. forestry and fisheries, agriculture, mineral industries, tourism and manufacturing) and public utilities. To support modern planning objectives the NPDP has been used to inform the preparation of Development Orders, which are development control mechanisms used in the development control process.

The proposed development is located in St. Ann for which there exists a Development Order, and as such any proposed development must be in accordance with the zoned land uses promulgated by the order.

The St. Ann Development Order confirmed in 2002 is used to guide the development of land in the parish of St. Ann. The proposed project area is not zoned for any land use in the St Ann Development Order. The use of the proposed land is therefore guided by the Certificate of Title under the Registration of Titles Act, which states that "the said land shall be retained and maintained in agricultural use until permission is given to remove it by the Ministry of Agriculture and Local Planning Authority." The *Riwa Riddim* Company Limited has therefore applied to the Parish Council for a change of use.

3.3.2 Tourism Master Plan (2002)

The Master Plan for Sustainable Tourism Development in Jamaica is the most comprehensive and relevant plan for evaluating tourism related development proposals. The plan, which was developed as a policy response to guide the development of the industry over a ten year period (2000-2010), outlines its main aims as:

1. To provide a comprehensive planning framework for the development of one of Jamaica's leading industries;

2. To elaborate a vision of the future direction, shape and composition of the industry that can serve to guide the actions of the huge number of stakeholders in the industry to a common goal and purpose;

3. To detail the timing and sequencing of the major programmes, roles and responsibilities of key players, institutional arrangements and resource requirements for bringing the vision to fruition.

According to the plan, its critical aim is to guide the industry on a path of sustainable development. Industry practices have been deemed largely unsustainable due to:

- Gradual decline in rate of growth and rapid movement towards industry saturation
- Increased competition from other islands
- Limited tourism products (natural, cultural, historic and built heritage attractions) and widespread dependence on 'all-inclusive' tourism
- Degradation of the natural environment
- Limited ownership of tourism by locals

Ecotourism is identified in the plan as a small, but relevant niche market, which has not been explored or taken advantage of in Jamaica. The Master Plan notes that the development of ecotourism (nature-based) attractions has been poor and stresses the need for an adoption of the principle of ecotourism across all sectors of the tourism market. The principle of ecotourism maintains that revenues earned from tourism activities should be used for the protection and conservation of the natural environmental assets relied upon by the industry for its growth and success.

The tourism plan maintains that the growth of niche markets such as ecotourism is an indication of the increasing fragmentation of the tourism market. Projects that seek to capitalise on such changes are good for the local industry, and can have the most success when compared with other established local products.

The plan states that though "*these niche segments are not likely to generate large numbers of visitors to Jamaica in themselves. Jamaica does not have outstanding assets that would draw large numbers of visitors with these special travel motives, though undoubtedly, it could attract visitors in their tens of thousands, particularly if nature tourism is combined with sun and sand.*"

3.3.3 National Forest Management and Conservation Plan

National Forest Management and Conservation Plan (Forestry Plan) as required under the Forest Act of 1996 has been developed to promote and improve the conservation and sustainable use of forest resources. The plan outlines the management and restoration of forest resources to continuously meet the local and national needs of the country.

3.4 Legislation

The legislation applicable to this project includes:

1. The Tourist Board Act, 1955
2. The Natural Resources Conservation Act, 1991
3. The Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order, 1996
4. The Natural Resources Conservation (Permits and Licences) Regulations, 1996 and The Natural Resources Conservation (Permits and Licences) (Amendment) Regulations, 2004
5. The Natural Resources Conservation, (Ambient Air Quality Standards) Regulations, 1996
6. Town and Country Planning Act, 1957
7. The Parish Council Act, 1901
8. The Parish Council Building Act, 1908; Parish Council's Building (St. Ann) Bylaws, 1952 & Parish Council's Building (St. Mary) Bylaws, 1952

9. The Local Improvement Act, 1914
10. Water Resources Act, 1995
11. The Watershed Protection Act, 1963
12. Forestry Act, 1996
13. The Wildlife Protection Act, 1945
14. National Solid Waste Management Act, 2001
15. Jamaica National Heritage Trust Act, 1985
16. Public Health Act, 1985 and Public Health (Nuisance) Regulations
17. Flood Water Control Act, 1958

3.4.1 Tourist Board Act (1955)

Under Section 23 (A) (1) of the Tourist Board Act, powers are granted to the Board to require licensing of any tourism enterprise. The act states: *"no person shall operate or maintain any tourism enterprise unless such person is the holder of a licence granted under section 23B."* By virtue of its proposal to offer services to be utilised by tourists, the *Rivva Riddim* Ecotourism Park will need require a licence.

3.4.2 The Natural Resources Conservation Act, 1991

The Natural Resources Conservation Authority Act (1991) section 4(1) gives the Natural Resources Conservation Authority [NRCA] (now embodied within the National Environment and Planning Agency [NEPA]) the power to take the necessary steps for the effective management of the physical environment of Jamaica so as to ensure the conservation, protection and proper use of its natural resources among other things. In performing its functions, the NRCA, as outlined in section 4 (2) (d), may among other things, formulate standards and codes of practice to be observed for the improvement and maintenance of the quality of the environment generally, including the release of substances into the environment in connection with any works, activity or undertaking. Under section 9, enterprises, developments and construction proposals must first secure an environmental permit from the Authority, prior to commencement, for projects that fall within the categories listed in the Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order, 1996.

3.4.3 The Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order, 1996

This regulation requires that effective January 1, 1997, a permit be obtained for the construction and operation of certain types of projects. Ecotourism projects and sewage treatment plants require environmental permits in accordance with this Order.

3.4.4 The Natural Resources Conservation (Permits and Licences) Regulations, 1996 and The Natural Resources Conservation (Permits and Licences) (Amendment) Regulations, 2004

Completed Permit Application and Project Information Forms are to be submitted to NEPA in accordance with this regulation for the construction and operation of prescribed activities. An

Environmental Impact Assessment may also be requested by NEPA as well for the proposed activities. Permits and licences will be required for the following project components:

- Sewage and industrial wastewater treatment facilities – permit for construction and operation and licence for effluent discharge
- Eco-tourism and nature tourism projects – permit for construction and operation

3.4.5 The Natural Resources Conservation, (Ambient Air Quality Standards) Regulations, 1996

These regulations set the acceptable limits for common air pollutants in ambient air. Since this project proposes various construction related activities e.g. site excavation, controls will need to be in place to ensure that fugitive dust and heavy duty vehicular emissions during the construction phase do not contribute negatively to ambient air quality.

3.4.6 The Town and Country Planning Act, 1957

This legislation stipulates that in areas for which a Development Order has been prepared, planning permission is required from the Local Planning Authority before "development" as defined by the Act can be undertaken. In those areas for which no development orders have been prepared, no planning permission is required to undertake development. The Development Order is therefore the legal document guiding development in Jamaica. These orders are prepared by the Town and Country Planning Authority in consultation with the Local Planning Authority (Parish Councils & KSAC). The Town and Country Planning Authority, which is a body, established under the Act can "call in" an area for which a development order has been prepared. In this instance the Town and Country Planning Authority has the jurisdiction to oversee all development applications if it so desires within the area. This Act is currently administered by NEPA and is applicable to the proposed project.

3.4.7 The Parish Council Act, 1901

This Act provides for the establishment of the Local Authority (Parish Council). The Act gives powers to the Council to make Bylaws and to make certain regulations in respect of the areas or towns which may be delimited by the Parish Councils.

3.4.8 Local Improvement Act, 1914

The Local Improvement Act regulates and controls the subdivision of land throughout Jamaica. The Act stipulates that all subdivision of land for building, lease sale or other purposes throughout Jamaica requires the permission of the Local Planning Authority of the parish in which the land is located. A plan is required by the Act for submission to the Parish Councils for approval. 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.

3.4.9 The Parish Councils Building Act, 1908, Parish Council Building (St. Ann) Bylaws, 1952 and Parish Council Buildings (St. Mary) Bylaws, 1952

The Parish Council Buildings Act of 1908 stipulates that permission for the construction, removal, alteration or extension of any buildings must be granted by the local planning authority. The Act provides for parish councils to make bylaws addressing the requirements as it relates to granting of approval for the erection, alteration or repair of buildings.

The Bylaws provide the Parish Councils with the authority to control the construction, removal, alteration or extension of any buildings in towns and any area which may be delimited by the Parish Council. The Parish Councils/KSAC are allowed to impose suitable conditions with regards to size, elevation, and structural integrity of buildings.

3.4.10 Water Resources Act, 1995

The principal water law in Jamaica is the Water Resources Act (1995), enacted in April 1996, making the Water Resources Authority (WRA) responsible for regulation, control, allocation, and management of the water resources of the nation. This Act allows the WRA to declare a water quality zone to protect water quality in the public interest. No water will be abstracted from the White River for use at the proposed site.

3.4.11 The Watersheds Protection Act (1963)

The purpose of this Act is to provide for the protection of watersheds and areas adjoining watersheds and promote the conservation of water resources. The Act makes provision for conservation of watersheds through the implementation of provisional improvement schemes whereby soil conservation practices are carried out on land.

3.4.12 The Forest Act, 1996

This Act addresses the sustainable management of forests on lands in the possession of the crown and vests management responsibility in the Conservator of Forests. The Act provides for the establishment of forests reserves, the establishment of protected areas, the promotion of forestry research areas, reforestation initiatives and the preparation of a forestry management plan. It also specifies mandatory requirements for:

- Inventory and classification of forest lands;
- Appointment and function of forest management committees;
- Determination of allowable cut;
- Establishment of nurseries and provision of seedlings;
- Enforcement of forest protection measures.

Though the Act looks at the management of forests on lands owned by the crown, section 4 (d) grants permission to the Department responsible for forestry to promote the development of forests on private lands.

3.4.13 The Wildlife Protection Act, 1945

The Wildlife Protection Act (1945) makes provision with respect to the management of wildlife, including fish, in Jamaica.

The Act makes provision for the protection of animals and birds and the protection of fish. Other provisions deal with the appointment of officers, regulations, power to enter lands, power of search, arrest without warrant, persons found offending, penalty for assaulting game warden, fishery inspector or constable, penalty for offences generally, jurisdiction over offences committed at sea, power to exempt from provisions of the Act, and forfeiture of things seized.

The Act specifies Game Sanctuaries and deals with hunting, etc. in a Game Sanctuary, prohibits the hunting of protected animals and protected birds, prohibits the hunting of animals and birds in and taking of eggs from the exclusive economic zone without a licence. Taking or killing of immature fish is declared an offence, and the use of explosives or other noxious materials in fishing is prohibited. It seeks to protect waters containing fish from trade effluents and industrial waste. Every person who knowingly buys sells or has in his possession fish taken, killed or injured in contravention of the provisions of this Act or of any associated regulations shall be guilty of an offence against this Act.

The Wildlife Protection Act and Regulations are administered by the National Environment and Planning Agency.

3.4.14 National Solid Waste Management Act, 2001

This Act gives the National Solid Waste Management Authority (NSWMA) the power to take all steps as are necessary for the effective management of solid waste in Jamaica in order to safeguard public health, ensure that waste is collected, stored, transported, recycled, reused or disposed of in an environmentally sound manner and promote safety standards in relation to such waste. Solid waste generated as a result of construction activities would need to be collected and stored and appropriately disposed of at an approved municipal site in accordance with the Act.

3.4.15 Jamaica National Heritage Trust Act, 1985

The Jamaica National Heritage Trust (JNHT) is a branch of the Ministry of Tourism, which enforces its mandate under the Jamaica National Heritage Trust Act. The Act serves to protect and control the development of national monuments and national heritage.

The JNHT mission statement states: "*to inspire a sense of pride through the promotion, preservation and development of our material cultural heritage*…" The primary functions of the JNHT are:

- To promote the preservation of national monuments and anything designated as protected national heritage for the benefit of the island;
- To conduct such research as it thinks necessary or desirable for the purposes of the performance of its functions under the Jamaica National Heritage Act;
- To carry out such development as it considers necessary for the preservation of any national monuments or anything designated as protected national heritage;

- To record any precious objects or works of art to be preserved and to identify and record any species of botanical or animal life to be protected;
- To promote the sustainable utilisation and management of our material cultural heritage resources

Any artefacts discovered during land clearing and excavation associated with this project must be reported to the JNHT.

3.4.16 Public Health Act, 1985

The Act grants powers to the Minister of Health and by extension Medical Officers (Health) to take action where any situation existing or potential is likely to endanger the health and wealth of the population.

The Public Health Act also speaks to the prevention of contamination of food and drink and gives the Minister of Health the power to ensure, inter alia, the inspection and prevention from contamination of food and drink intended for human consumption, the analysing and testing of samples of such food and drink by an official analyst, the issuing of certificates in relation thereto, and the condemnation, seizure and disposal of such articles as are unfit for human consumption.

3.4.17 Flood Water Control Act, 1958

The National Works Agency (NWA) administers the Flood Water Control Act, 1958 which regulates the management of watercourses concerning flood regulation, specifically, terms of surveys, civil works or clearance. The NWA reviews and approves the development proposal of any road or drainage works particularly as they connect to municipal roads or drainage systems.

3.5 Recommended Standards

3.5.1 Noise levels

The Jamaica National Noise Standards (as extracted from the Recommendations for National Noise Standards for Jamaica, 1999) recommends the following zonal limits:

Table 1: Time Based Zonal Noise Limits

ZONE	7a.m. to 10:00p.m.	10:00p.m. to 7:00a.m.
Industrial	75dBA	70dBA
Commercial	65dBA	60dBA
Residential	55dBA	50dBA
Silence	45dBA	40dBA

The recommended limits for moving vehicles are as follows:

Table 2: Noise Limits for Moving Vehicles

VEHICLE	NOISE LIMIT
Motorbike	85dBA
Motorcar	85dBA
Small Commercial Vehicle	90dBA
Large Commercial Vehicle	95dBA

3.6 The Application Process

NEPA requires the submission of permit applications for the Ecotourism project and the associated sewage treatment plant. They also require a licence application for the discharge of effluent from the sewage treatment plant. These are to be submitted along with a Project Information Form and a Project Brief. After review by the agency, they advise on whether an Environmental Impact Assessment (EIA) is required or not. Projects of this nature usually require an EIA.

Once an EIA is required, the first step is to agree on the Terms of Reference (TOR) for the EIA. Draft TOR are submitted to NEPA for approval and once approved, the EIA can be done. It may be necessary to advertise the TOR and await comments from the public.

There must be stakeholder consultations throughout the process of conducting the EIA. Once the draft EIA is completed, a Public Meeting is usually required to present the findings to stakeholders and to solicit feedback. The Public Consultations must be done in accordance with NEPA's guidelines which can be viewed at:

http://www.nepa.gov.jm/business/guidelines/general/GuidelinesforPublicPresentations2007.pdf

There are critical timelines that must be adhered to for the Public Meeting. There must be at least three weeks' notice of the Public Meeting, advertised in the printed press in a format approved by NEPA. Special invitations can be sent to stakeholder groups. The public has 30 days from the date of the Public Presentation to submit comments to NEPA. Revisions to the EIA may be required. Once approved, the relevant permits and licence will be granted with conditions.

The applications for building approval will need to be submitted to the St. Mary Parish Council. The Parish Council will only approve the project after NEPA has granted their approval.

Table 3 summarises the approvals that will be required for this project.

Table 3: Regulatory Approvals Required for the Proposed Project

	Activity	**Agency**
1.	Environmental permit and licence applications (Ecotourism park and sewage treatment plant)	NEPA
2.	Terms of Reference (TOR) for Environmental Impact Assessment (EIA)	NEPA
3.	EIA	NEPA
4.	Parish Council Building Approval (Parish Council will only give final approval after NEPA has approved project)	St. Mary Parish Council

4.0 Environmental Setting

4.1 Physical Baseline

4.1.1 General Climate

Temperature

Temperatures in coastal areas are comfortably warm, becoming cooler in the hilly and mountainous regions in the centre of the island, particularly in the Blue Mountain range with a peak of 2,256 metres (7,402 feet). Apart from rapid fluctuations associated with afternoon showers and/or the passage of frontal systems, the island's temperatures remain fairly constant throughout the year under the moderating influence of the warm waters of the Caribbean Sea.

In coastal areas, daily temperatures average 26.2ºC (79.2ºF), with an average maximum of 30.3ºC (86.5ºF) and an average minimum of 22.0ºC (71.6ºF). Inland, temperature values are lower, depending on elevation but, regardless of elevation, the warmest months are June to August and the coolest December to February.

The diurnal range of temperature is much greater than the annual range and exceeds 11.0ºC (20ºF) in mountainous areas of the interior. Night-time values range from 18.9 to 25.6ºC (66 to 78.1ºF) in coastal areas. At elevations above 610 metres (2,000 feet), minimum temperatures of the order of 10ºC (50ºF) have been reported occasionally when active cold fronts reach the island.

Wind

For most of the year, the daily wind pattern is dominated by the Northeast Trades. By day on the north coast, the sea breeze combines with the Trades to give an east-northeasterly wind and along the south coast, an east-southeasterly wind. In the period December to March however, the Trades are lowest and the local wind regime is a combination of trades, sea breeze, and a northerly or northwesterly component associated with cold fronts and high-pressure areas from the United States.

By night, the trades combine with land breezes which blow offshore down the slopes of the hills near the coasts. As a result, on the north coast, night-time winds generally have a southerly component and on the south coast, a northerly component. However, winds are generally lighter inland and towards the west.

Rainfall

Of the weather parameters, rainfall is the most variable. Rainy seasons are May to June and September to November. The rainfall is regionally very different in its intensity but show a likely annual distribution. Rainfall is comparatively higher from April to November with May and October being the rainfall peak months. The driest period is usually December to March. Most of the rainfall during this period is associated with cold fronts migrating from North America. Whether during the dry or rainy season, however, other rain-producing systems are influenced by the sea breeze and orographic effects which tend to produce short-duration showers, mainly during mid-afternoon.

The Tropical storm and hurricane season is from June to November.

4.1.2 Soils

Despite pedological analyses in its purest scientific form constituting agronomical testing for agronomical purposes, in engineering respects (important to this analysis) soil will be generally reviewed within its engineering context. This of course relates to the physical attributes of the inorganic substances found at the surface. Here the area is generally dominated by stony clays and is highly influenced by the Coastal Limestone extent (Figure 7).

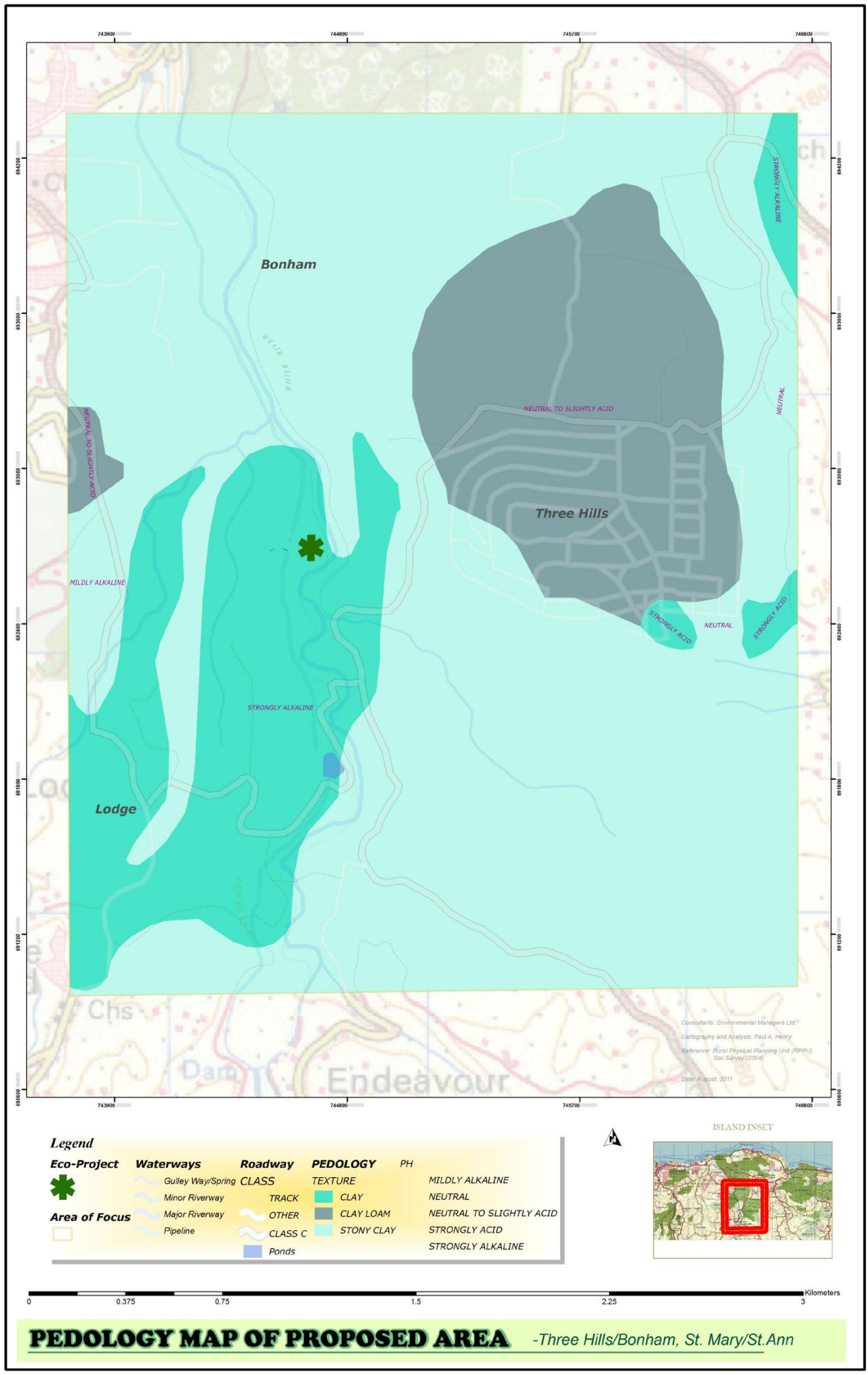
4.1.3 Geology

The area being analysed is generally defined by a sole petrological unit comprised of limestone and as such is not common to the majority of Jamaica's geological extent. The Limestone found in the area by facies analysis are of the Younger Coastal Group and the Montpelier Formation (Figure 8).

The Montpelier Formation comprises the older Formation and was laid in Miocene times and this extent, where exhibited, demonstrates a micritic texture as soft chalky deposits which are not distinctly defined by any bedding. However, in some exposures chert nodules are seen.

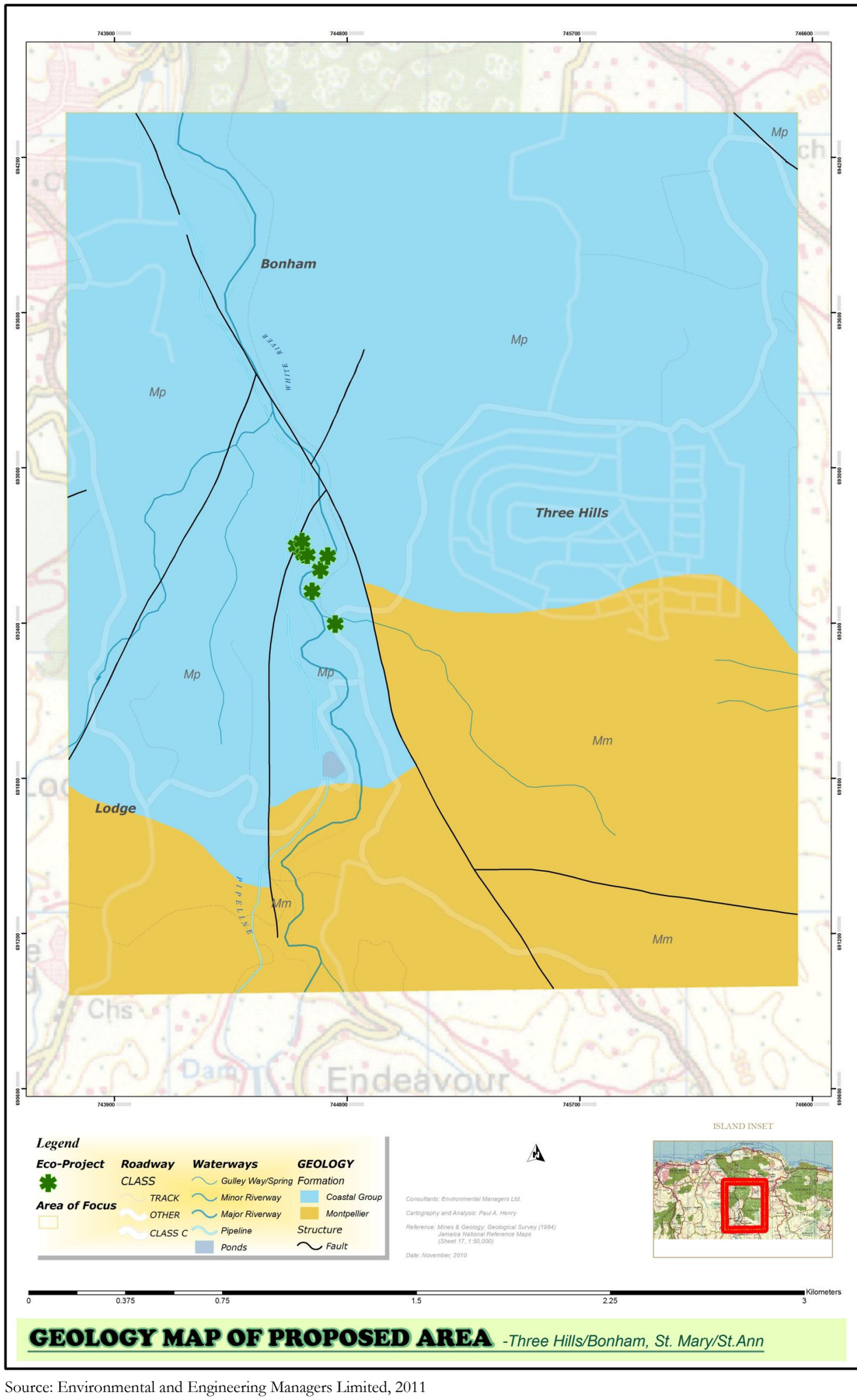
As the name suggests and as the location illustrates, the Coastal Group of Limestones line the coastal rim around much of the eastern portions of Jamaica. These Formations are the youngest (Younger Miocene to Older Pliocene) Limestones found within the island and are defined by their yellowish light brown colour with rubbly lithology containing rounded pebbles and carbonates in the form of shells and corals. Such a Formation is often indicative of recently raised coastlines and in some instances ancient lagoon environments.

Figure 7: Soil Map of Rivva Riddim Project Area



Source: Environmental and Engineering Managers Limited, 2011

Figure 8: Geology Map of Rivva Riddim Project Area

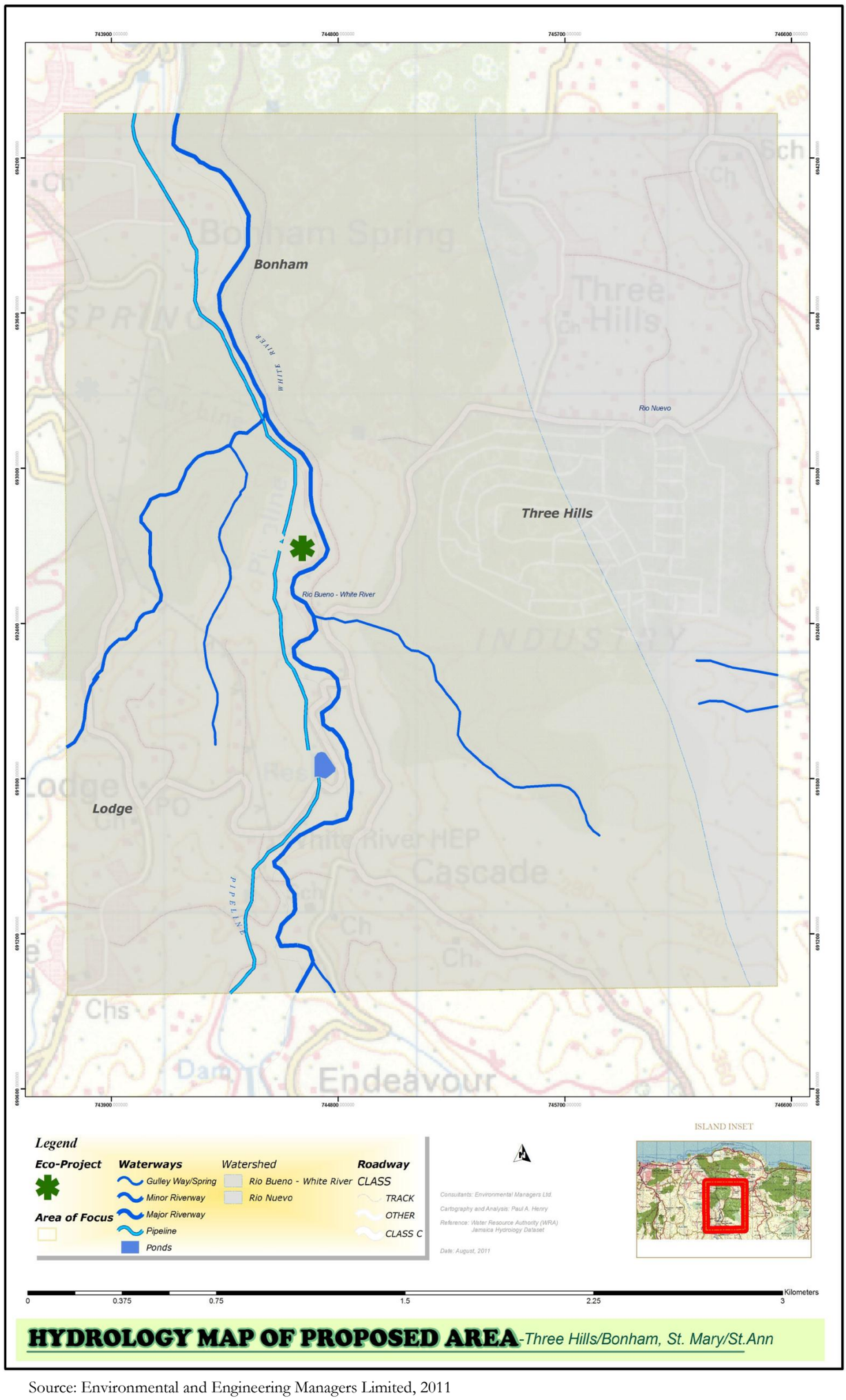


Source: Environmental and Engineering Managers Limited, 2011

4.1.4 Hydrology

The analysis of the hydrology of the area looks at the general relationship of the main drainage course and that of the wider landscape. Here, the specific area is a part of the Rio Bueno Water Management hydrological drainage divide as described by the Water Resources Authority (WRA) and is along the course of the White River channel. The Rio Bueno Drainage basin in comparison to other drainage basins in Jamaica spans the most extensive geographical area. This could be likely owing to plateau-like geomorphology of the northern and central part of the island block. Also of note is the fact that the Rio Bueno despite being an extensive basin lacks surface flow for the majority of its extent. A lack of surface drainage also translates to lower probability of denudation through hydrological erosion. However, towards its eastern reaches, where the White River drains to the sea, there is a contrasting sustained surface drainage. At this point headwaters spanning as far south as the northern reaches of the 'Devil's Race Course' in Guys Hill contributes water which at the point of interest drains the surface as a fourth order river (Figure 9).

Figure 9: Hydrology Map of Rivva Riddim Project Area



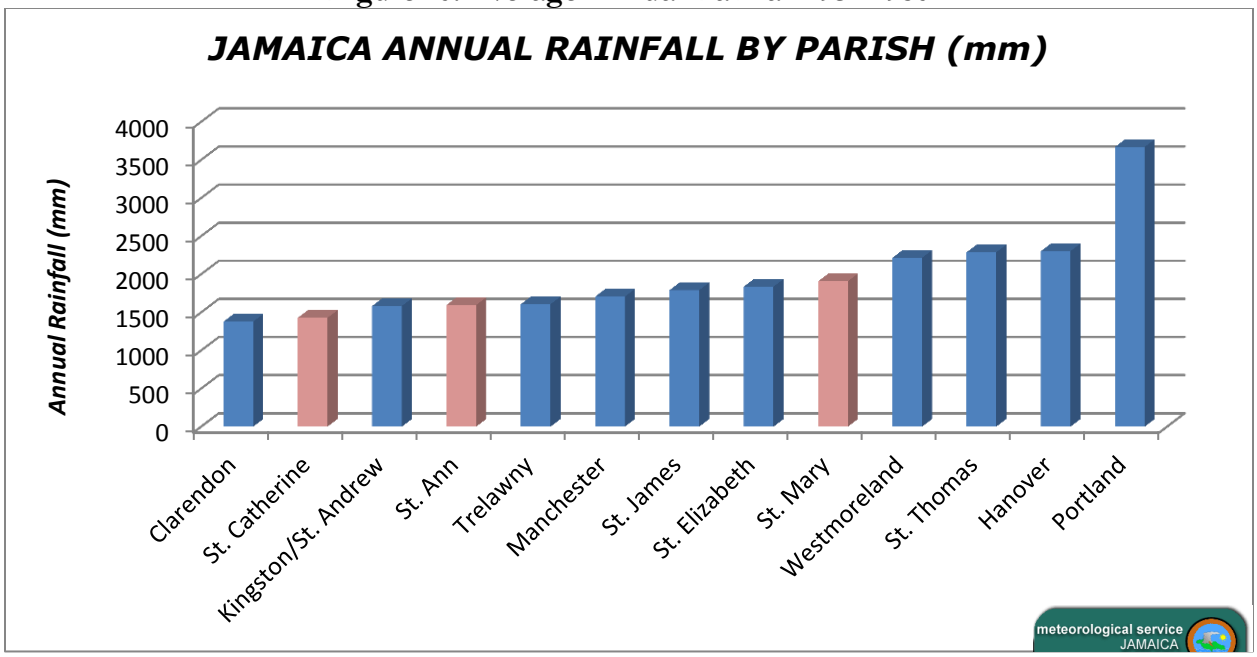
Source: Environmental and Engineering Managers Limited, 2011

Climatological data compiled by the Meteorological Service of Jamaica between 1951-1980 indicates the three (3) parishes over which discharge water found within the White River is derived (Figure 10). These include St. Ann, St. Catherine and St. Mary. These average about 1,644 mm per annum which are above the average of 1,500 mm which is normally accepted as the signature annual average for tropical climates, this of course noting that the average rainfall for Portland is 3,076 mm.

Therefore, this volume of precipitation translates to a recorded average channel discharge rate of 6.92 cubic meters per second (m^3/s) based on data over the past 6 years. This figure for the White River sub-system relates to the 92 km^2 which defines that drainage area.

A hydrological budget applied to an area spanning 92 km^2 or 92,000,000 m^2 when analysed with respect to precipitation amounting to 3,076 mm or 3 m (Climate Data) yields a total overland flow of **276,000,000** m^3/annum. As indicated above, the Water Resources Authority (WRA) reports an average of 6.92 m^3/s which yields a figure of **218,229,120** m^3 passing through the channel at its closest recordable point before the channel terminates to the sea. Analysis of this budget therefore indicates that some **54,000,000** m^3 of water was lost through evapotranspiration and anthropogenic means annually. Critical to note is the comprehensive verification of water within the system despite data emanating from two separate recording disciplines.

Figure 10: Average Annual Rainfall 1951-1980



Source: Meteorological Office of Jamaica, 2011

Table 4 to Table 6 provide information on the streamflow in the White River for 2011 and previous years.

Water quality data (Table 7 & Table 8) for sites on the White River upstream and downstream of the proposed Park were obtained from the Water Resources Authority (WRA) for the period June 2003 to July 2004. These data were from water quality monitoring conducted by the NEPA during the period. Figure 11 and Figure 12 show the locations of the monitoring points.

Table 4: Monthly Mean Discharge for White River Recorder Stations January - October 2011

Month	White River @ Exchange (mm)	White River @ Labyrinth (mm)
January	193	205.3
February	231	220.7
March	186	202.7
April	181.8	202.1
May	181	199.1
June	271.3	271.3
July	193	213.1
August	189	212.9
September	183	-
October	196	-

Table 5: Mean Monthly and Annual Flow Data for White River near Exchange (mm)

Station: White River Near Exchange (Station Number:09KA013)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2001	2.76	1.95	1.66	1.60	3.14	1.90	1.98	2.12	1.95	3.45	3.53	3.15	2.43
2002	3.94	3.14	2.96	3.32	4.77	4.62	3.50	3.59	5.29	4.93	4.66	4.72	4.12
2003	4.74	4.57	4.16	4.91	5.09	5.20	5.09	5.08	5.12	5.14	5.35	6.04	5.04
2004	5.32	5.02	5.32	5.11	6.02	5.03	4.83	4.71	5.65	4.30	4.42	4.72	5.04
2005	5.96	5.31	5.31	5.43	5.42	5.20	7.52	5.82	5.72	7.20	7.95	6.93	6.15
2006	7.75	8.16	8.20	7.85	7.78	8.00	7.71	7.48	7.20	7.17	9.48	9.28	8.01
2007	9.33	7.10	8.72	7.38	8.46	7.40	6.41	6.26	6.12	6.78	12.43	7.06	7.79
2008	6.94	6.52	6.77	6.57	6.23	6.03	5.59	6.86	6.90	7.47	8.75	7.06	6.81
2009	7.31	10.64	8.00	7.60	7.77	7.46	7.04	6.84	6.51	6.35	6.10	6.10	7.31
2010	6.02	5.73	5.53	5.09	5.00	5.03	4.90	4.65	6.08	6.19	5.64	5.25	5.42
Mean	6.01	5.81	5.66	5.49	5.97	5.59	5.46	5.34	5.65	5.90	6.83	6.03	5.81
Maximum	9.33	10.64	8.72	7.85	8.46	8.00	7.71	7.48	7.20	7.47	12.43	9.28	12.43
Minimum	2.76	1.95	1.66	1.60	3.14	1.90	1.98	2.12	1.95	3.45	3.53	3.15	1.60

Table 6: Mean Monthly and Annual Flow Data for White River at Labyrinth (mm)

Station: White River at Labyrinth (Station Number:09KA014)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2001	-	-	2.95	3.77	2.89	2.90	2.90	2.92	4.45	4.81	4.34	-	-
2002	4.33	3.81	3.88	4.36	5.72	5.22	4.24	4.56	6.01	5.62	5.13	5.84	4.89
2003	6.38	6.10	5.55	6.57	6.23	6.16	5.42	5.68	6.17	6.31	6.58	7.07	6.18
2004	6.20	5.58	5.88	5.43	6.13	4.93	4.84	5.03	7.77	6.05	6.01	6.33	5.85
2005	6.99	6.14	6.18	6.35	6.42	6.52	8.92	6.85	6.86	8.47	9.22	8.20	7.26
2006	8.21	8.22	8.32	7.96	8.00	8.08	7.89	7.79	7.77	7.73	8.21	7.94	8.01
2007	8.08	7.37	7.93	7.36	7.37	7.22	6.93	6.94	6.84	7.03	8.54	7.19	7.40
2008	7.22	6.80	6.84	6.68	6.54	6.64	6.57	7.87	7.56	7.62	8.80	7.54	7.22
2009	6.99	8.77	7.09	7.22	7.46	7.69	7.55	7.49	7.30	7.14	6.96	6.84	7.37
2010	6.75	6.69	6.36	5.80	5.76	5.69	5.16	5.09	6.46	6.74	6.33	5.92	6.06
Mean	-	-	-	6.07	6.34	6.10	6.04	6.02	6.57	6.72	7.06	6.72	-
Maximum	-	-	-	7.96	8.00	8.08	8.92	7.87	7.77	8.47	9.22	8.20	-
Minimum	-	-	-	2.95	3.77	2.89	2.90	2.90	2.92	4.45	4.81	4.34	-

Table 7: Water Quality Data White River Point #1- Upstream of Park Site

Date	pH	TDS mg/L	TSS mg/L	BOD_5 mg/L	Phosphate-Phosphorus mg/L PO_4-P	Sulphate mg/L	Nitrate-Nitrogen mg/L NO_3-N	FC MPN/100mL	Remarks
18-Jun-03	8.16	216	10	0.86	0.029	8	0.900	1600	NEPA
17-Sep-03	8.18	192	10	0.98	0.226	5	0.800	1600	NEPA-Water level dropped drastically since last sample, small fishes, dead leaves and debris
Nov 7-03	8.22	96	46	0.69	0.005	6	0.670	1600	NEPA
Dec 3-03	8.07	282	10	2.15	0.005	5	1.140	1600	NEPA-River banks and edge of water have a lot of rotting leaves and branches, water level low, area of stones usually under water now exposed, water cloudy, muddy
04-Feb-04	7.86	226	10	0.84	0.009		0.930	50	NEPA-Area usually above water level covered with water
23-Apr-04	8.15	4584	10	0.29	0.007		0.840	500	NEPA
03-Jun-04	7.59	324	10	0.46	0.005		0.982	900	NEPA
22-Jul-04	7.98	196	16	0.92	0.005		1.098	500	NEPA

White River @ Mile Post, Dry Harbour Mountains, St. Ann
Taken near to the main road, at Ginger Bottom. A Mile Post used as marker
Metric East 744796 Metric North 692186

Table 8: Water Quality Data White River Point #2- Downstream of Park Site

Date	pH	TDS mg/L	TSS mg/L	BOD_5 mg/L	Phosphate-Phosphorus mg/L PO_4-P	Sulphate mg/L	Nitrate-Nitrogen mg/L NO_3-N	FC MPN/100mL	Remarks
18-Jun-03	8.46	630	10	0.43	0.033	8	0.970	1600	NEPA
17-Sep-03	7.29	206	12	0.88	0.033	6	0.860	140	NEPA-small mullet spotted in river, evidence of bathing soap at sample site
Nov 7-03	7.99	516	24	0.77	0.029	6	0.580	1600	NEPA
Dec 3-03	7.17	424	10	2.29	0.005	7	1.110	1600	NEPA-Turbid, sample taken 20 meters above regular site due to inaccessibility
04-Feb-04	7.97	192	10	1.01	0.005	-	0.870	170	NEPA-Cloudy water, high turbidity, persons waiting with soap to bath
23-Apr-04	8.12	208	10	0.08	0.016	-	0.840	170	NEPA
03-Jun-04	8.01	332	10	0.34	0.005	-	0.861	900	NEPA
22-Jul-04	8.09	144	10	0.15	0.005	-	1.401	170	NEPA

White River @ Calypso Rafting, Dry Harbour Mountains, St. Ann
Launch site for Calypso Rafting at the bottom of the steps
Metric East 744078 Metric North 694781

Figure 11: Water Quality Monitoring Point on White River Upstream of Proposed Park

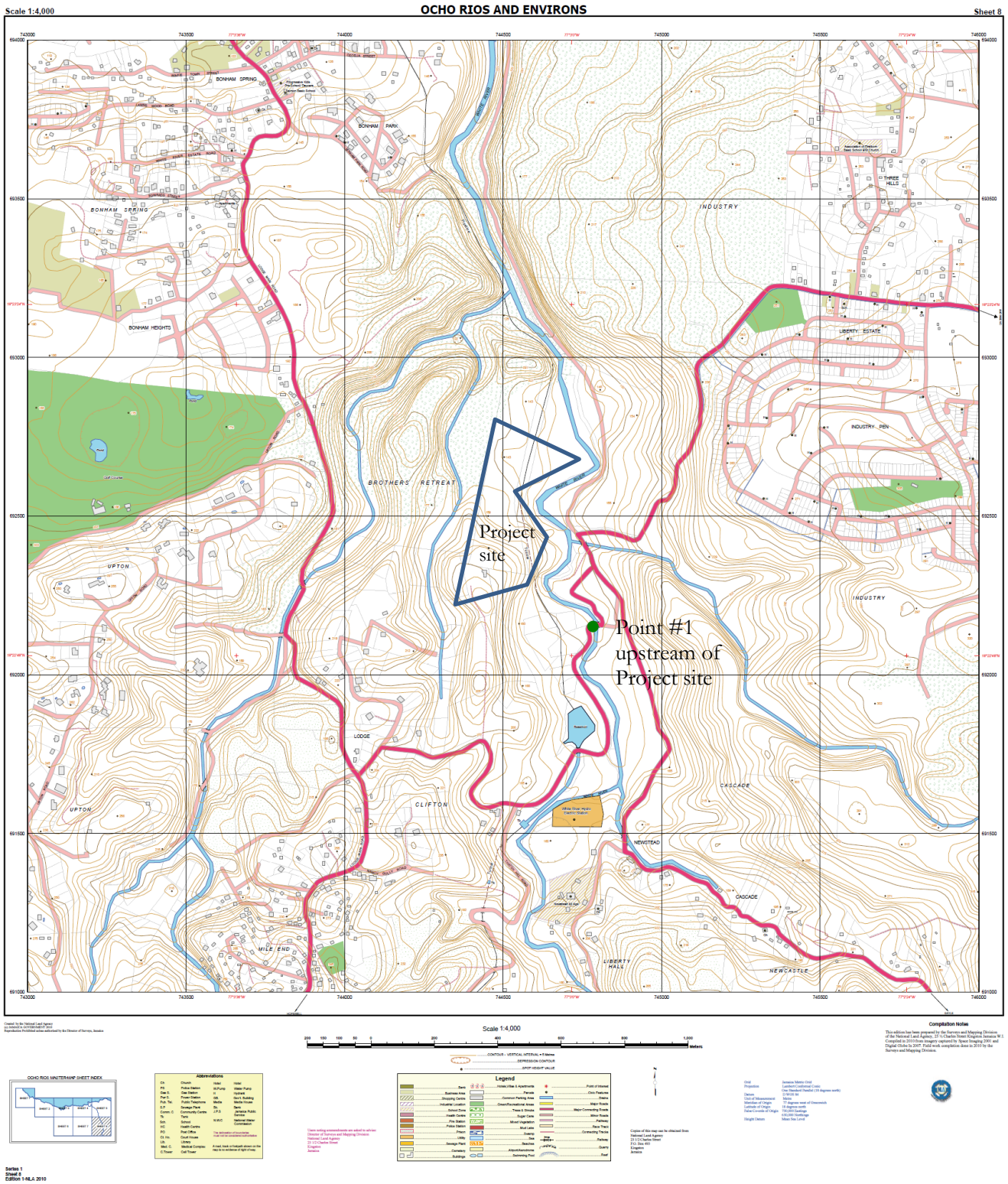


Figure 12: Water Quality Monitoring Point on White River Downstream of Proposed Park

4.2 Biology

4.2.1 Methodology

1. Avifaunal Census

Fixed Radius Point Count Census Method: This Point Count method is based on the principle of counting birds at a defined point or spot and determining the distance of each bird censured. A point is selected and then all bird contacts (seen and heard) are recorded, with a determination of distance given (< 25 m or >25 m) for each contact. This is done for a predetermined time, usually 10 minutes, before moving to another point at a specified distance away (Bibby et al. 1998). Points for this survey were 60 m – 100 m apart.

Advantages of this method include:

- Greater concentration on the birds and habitats without having to watch where you walk (Bibby et. al. 1998).
- More time available to identify contacts (Bibby et. al. 1998)
- Greater opportunity to identify cryptic and skulking species (Bibby et. al. 1998)
- Easier to relate bird occurrence to habitat features (Bibby et. al.1998).

As with all survey techniques, there are weaknesses, which influence overall results. Census techniques used in the study are affected by the following:

- Time of Day – the best time for conducting a census is in the morning from sunrise until about 10 a.m. in the lowlands. It is recognised that as the day continues it gets hotter and the ability to detect birds decreases due to lack of movement. (Wunderle 1994).

- Time of Year – the change in behaviour of birds during the breeding and non-breeding seasons affect detection. However for this report, the assessment was done at the end of breeding season, when birds are more vocal. (Wunderle 1994).

- Weather – things such as wind, rain, fog or if the day is too hot, affect conducting a census (Wunderle 1994).

- Summer Counts versus Winter Counts – the counts conducted within the area were done within the summer period, therefore incorporating both residents and summer migrant birds, however such habitats are known to be utilised by winter migrants, and these summer counts tend not to incorporate these birds.

2. Other Faunal Surveys

Other faunal surveys were done, through basic direct observation of species within the surrounding area. The use of burrows, nests and tracks were also included to ensure a complete assessment of all the fauna.

4.2.2 Vegetation (Flora) Assessment

Vegetation descriptions were done while surveying the entire property. The resultants were species lists of trees and other plant species inclusive of all plant life forms, endemics and native plants.

Forty-one (41) tree species were observed at the proposed development site. Thirty-two (32) of the species were native, while six (6) were introduced species and the remaining three (3) identified as endemic. The DAFOR rating conducted identified seventeen (17) species as being occasional, fifteen (15) were said to be rare, seven (7) frequent, one (1) abundant and one (1) dominant. Table 9 provides a listing of the trees observed.

Table 9: Observed Tree Species at the Rivva Riddim Project Site

	Scientific Name	**Common Name**
1.	*Allophyllus cominia*	
2.	*Spathodea campanulata*	African Tulip
3.	*Terminalia catappa*	West Indian Almond
4.	*Bambusa vulgaris*	Bamboo
5.	*Guazuma ulmifolia*	Bastard Cedar
6.	*Cupania glabra*	Wild Ackee
7.	*Ficus Americana*	Jamaican Cherry Fig
8.	*Ficus membranacea*	Fig
9.	*Haematoxylum campechianum*	Logwood
10.	*Samanea saman*	Guango
11.	*Psidium guajava*	Guava
12.	*Magnifera indica*	Mango
13.	*Comocladia pinnatifolia*	Maiden Plum
14.	*Miconia rigida*	Melastome
15.	*Miconia serrulata*	Melastome
16.	*Pimenta diocia*	Pimento/Allspice Tree
17.	*Citrus aurantifolia*	Lime
18.	*Zanthoxylum martinicense*	Prickly Yellow
19.	*Bursera simarouba*	Red Birch
20.	*Coccoloba* sp.	Wild Grape
21.	*Cecropia peltata*	Trumpet Tree
22.	*Cedrela odorata*	West Indian Cedar

	Scientific Name	**Common Name**
23.	*Bauhinia divaricata*	Bull Hoof
24.	*Pithecellobium arboretum*	Wild Tamarind
25.	*Nectandra hihua*	Long-leaved Sweetwood
26.	*Nectandra coriacea*	Small-leaved Sweetwood
27.	*Cananga odorata*	Ylang Ylang
28.	*Brysonima coricea*	Locust-berry Tree
29.	*Clusia havetoides*	Mountain Mangrove
30.	*Calytronoma occidentalis*	Long Thatch
31.	*Inga vera*	Panchok
32.	*Tabebuia rosea*	Pink Poui
33.	*Syzygium jambos*	Rose Apple
34.	*Zanthoxylum martinicense*	Prickly Yellow
35.	*Calophyllum calaba*	Santa Maria
36.	*Matayba apetala*	Cobywood
37.	*Portlandia grandiflora*	Bell Flower
38.	*Eugenia monticola var. monticola*	
39.	*Tournefortia* sp.	
40.	*Petitia domingensis*	
41.	*Persea Americana*	Avocado/Pear

Table 10 shows the thirty-two (32) herbs and/or shrubs observed from surveys of which there were no endemic species. Based on the DAFOR rating sixteen (16) of the species were observed often, nine (9) frequent, five (5) were rare and two (2) abundant. Within the lower plants group, only one (1) flora species was observed, the spike moss (*selaginella sp.*).

Table 10: Shrub and Herb Species Observed at Project Site

	Scientific Name	**Common Name**
1.	Black-eyed Susan	*Thunbergia alata*
2.	Blue Pea Vine	*Clitoria ternatum*
3.	Bougainvillea	*Bougainvillea* spp.
4.	Button Weed	*Borreria laevis*
5.	Chainy Root	*Smilax balbisiana*
6.	*Crotalaria lotifolia*	
7.	Dogberry	*Rivina humilis*
8.	Duppy Gun	*Ruellia tuberosa*
9.	Elephant Grass	*Pennisetum purpureum*
10.	God Okra	*Hylocerus triangularis*
11.	Jamaican Marigold	*Wedelia trilobata*
12.	John Crow Bead	*Abrus precatorius*
13.	Leaf of Life	*Bryophyllum pinnatum*
14.	Old Mans Beard	*Tillandsia recurvata*
15.	Maiden Hair Fern	*Adiatum pedatum*
16.	Moses in the bulrushes	*Rheo spathacea*
17.	Ram Goat dash-a-long	*Turnea ulmifolia*
18.	Red Head	*Asclepias curassavica*
19.	Shame-o-lady	*Mimosa pudica*
20.	*Sida* sp.	
21.	Spanish Needle	*Bidens pilosa*
22.	Sweet Potato	*Ipomoea batatas*
23.	Susumber/Gully Bean	*Solanum torvum*
24.	Tank Bromeliad	*Tillandsia* sp.
25.	Wandering Dew/Water Grass	*Zebrina pendula*
26.	Wild Hops	*Flemingia (Moghania) strobilifera*
27.	Wild sage	*Lantana camara*
28.	White top Sedge	*Rhynchospora colorata*
29.	*Peltomorphe* sp.	
30.	*Peperomia acuminate*	
31.	*Piper* sp.	
32.	Pepper Elder	*Peperomia pellucid*

4.2.3 Faunal Assessment

Table 11 and Table 12 show the forty-two (42) bird species observed at the proposed site using counts and transects. Fifteen (15) of the species were endemic, seven (7) endemic subspecies, thirteen (13) residents, four (4) winter migrants, two (2) summer migrants and one (1) was an introduced specie.

Table 11: Avifauna Observed at the Project Site

	Common Name	Scientific Name
1.	Jamaican Tody	*Todus todus*
2.	Jamaican Vireo	*Vireo modestus*
3.	White-Chinned Thrush	*Turdus aurantius*
4.	Jamaican Stripe Headed Tanager	*Spindalis negricephalis*
5.	Red-Billed Streamertail	*Trochilus polytmus*
6.	Jamaican Becard	*Pachyramphus niger*
7.	Jamaican Woodpecker	*Melanerpes radiolatus*
8.	Sad Flycatcher	*Myiarchis barbirostris*
9.	Stolid Flycatcher	*Myiarchus stolidus*
10.	Jamaican Euphonia	*Euphonia jamaica*
11.	Arrow-Headed Warbler	*Dendroica pharetra*
12.	Yellow Shouldered Grassquit	*Loxipasser anoxanthus*
13.	Jamaican Crow	*Corvus jamaicensis*
14.	Rufous Tailed Flycatcher	*Myiarchus validus*
15.	Orangequit	*Eunoernis campestris*
16.	Cattle Egret	*Bubulcus ibis*
17.	Little Blue Heron	*Egretta caerulea*
18.	Greater Antillean Grackle	*Quiscalus niger*
19.	Vervain Hummingbird	*Mellisuga minima*
20.	Northern Mockingbird	*Mimus polyglottos*
21.	Jamaican Oriole	*Icterus leucopteryx*
22.	Common Ground-Dove	*Columbina passerina*
23.	Bananaquit	*Coereba flaveola*
24.	White Crowned Pigeon	*Patagioenas leucocephala*
25.	Loggerhead Kingbird	*Tyrannus caudifasciatus*
26.	White Winged Dove	*Zenaida asiatica*
27.	Yellow-faced Grassquit	*Tiaris olivacea*
28.	Black-faced Grassquit	*Tiaris bicolor*
29.	Zenaida Dove	*Zenaida aurita*
30.	Smooth billed Ani	*Crotophaga ani*
31.	Caribbean Dove	*Leptotila jamaicensis*
32.	Olive Throated Parakeet	*Aratinga nana*
33.	Nutmeg Mannakin	*Lunchura punctulata*
34.	Antillean Palm Swift	*Tachornis phoenicobia*
35.	Greater Antillean Bullfinch	*Loxigilla violacea*
36.	Ruddy Quail Dove	*Geotrygon montana*

Table 12: Observed Migrant Bird Species

	Common Name	Scientific Name	Summer/Winter
1.	Louisiana Waterthrush	*Seiurus motacilla*	Winter
2.	Black and White Warbler	*Dendroica pharetra*	Winter
3.	Prairie Warbler	*Dendroica discolour*	Winter
4.	Barn Swallow	*Hirundo rustica*	Winter
5.	Black Whiskered Vireo	*Vireo altiloquus*	Summer
6.	Grey Kingbird	*Tyrannus dominensis*	Summer

A total of eight (8) butterfly species were observed. Six (6) resident species were observed, one (1) endemic specie and one (1) endemic subspecie. (Table 13)

Table 13: Observed Butterfly Species

	Common Name	Scientific Name
1.	Zebra	*Heliconius charitonius simulator*
2.	Cloudless Sulphur	*Phoebis sennae*
3.	Julia	*Dryas iulia delila*
4.	Jamaican Admiral	*Adelpha abyla*
5.	Buckeye	*Junonia genoveva*
6.	White Peacock	*Anartia jatrophae*
7.	Jamaican Albatross	*Appias drusilla castalia*
8.	Tropical Siverspot	*Agraulis (Dione) vanilla insularis*

Other observed fauna included:

Anoles: *Anolis garmani* and *Anolis opalinus*

Other Animals: Indian Mongoose (*Herpestes sp.*), Cicada, Ladybug Beetles (Coccinellidae family), Snails, Dragonfly (*anisoptera* and *erythrodiplax berenia*), Wasp (*sceliphron assimile*) and Spider (*Argriope argentata*)

4.3 Socio-Economic

4.3.1 Demography

In 2007, the population of St. Ann was estimated to be 172,455, approximately 6.4% of the total population of Jamaica. The growth rate of St. Ann's population between 1991 (149,425) and 2007 (172,455) was 16%, which represents a 1% annual growth rate. At the end of 2010, the population for the parish stood at 174,281. The 2007 population figure shows that males account for 50.5% or 87,186 of the total population of the parish, while females accounted for 49.5% or 85,269 of the population. Over the period 1991 to 2007 the male population grew at a rate of 1.07% per annum,

while the female population grew at a rate of 0.94% per annum. At the end of 2009, the population of St. Ann was 173,830, a 0.8% growth from the 2007 year end population.

The parish of St. Mary in 2008, was estimated to have a total population of 114,300; an increase of 2.5% over 2002 figures. At the end of 2010, the population for the parish stood at 114,889.

The White River Valley community is recognised as part of the Ocho Rios Development Area (ORDA). The ORDA covers approximately 150-200km^2 of land area and is estimated to have an overall population of approximately 16,000 persons. The ORDA consists of twelve (12) communities and seventy (70) districts.

The White River Valley is estimated to have an overall population of 3,500, located in twenty-five (25) communities. These communities include: Exchange, Union, Mile End, Lodge, Thatch Hill, Bonham Park, Bonham Heights, Upton, Ching Street, Eltham, Corn Piece Street, River Oaks, White River, Launce Wood, Gordon Town, Refuge Hill, Top Exchange, Farm Hill, Middle Street, Hand to Mouth, Compound Street, White River Estate, Cascade, Three Hills and Cecilla's.

4.3.2 Housing

According to the 2001 census, the parish of St. Ann had an estimated 39,844 housing units and 43,963 dwelling units. The average size of dwelling units was 3.79. The parish of St. Mary had approximately 29,002 housing units and 31,403 dwelling units. The average size of dwelling units was 3.55.

4.3.3 Utilities

1. Water

The White River Valley receives its' water supply from the National Water Commission (NWC) via the White River Treatment Plant. The White River Treatment Plant is situated in the western section of St. Mary near the border of St. Ann and St. Mary. It is a full-scale treatment plant with 24-hour operation. It has two settling tanks, three filter beds, a clear well and three (3) re-lift pumps. The rapid gravity filter plant produces 4,400m^3 of water per day.

Recently the NWC constructed a comprehensive treatment plant and sewerage system for the ORDA to meet the increasing demand for sewerage services in the area.

2. Electricity

The Jamaica Public Service Company (JPSCo) hydropower plants located in the Upper White River in Lodge and the Lower White River in Exchange are the main sources of electricity for the ORDA, which includes the community of White River Valley. The hydropower plant on the Upper White River is a 3.6 MW plant and is smaller than the 4.8 MW plant located on Lower White River.

3. Telecommunications

LIME (Cable and Wireless), Digicel and Claro provide telecommunication services in the project area. Residents living in the vicinity of the project area have access to cellular and internet services

provided by all three (3) companies. LIME is however the sole provider of landline service in the area.

4.3.4 Municipal Services

1. Police Services

The White River Valley communities are served by the Prospect and Ocho Rios Police Stations. The Prospect Police Station is located 1.5 km from the proposed project site, and is deemed the first responder for the area. The Ocho Rios police station, located on Main Street in the town, is found approximately 5 km from the project site.

2. Fire Services

There are three (3) fire stations in the parish of St. Ann. They are located in Ocho Rios, St. Ann's Bay and Brown's Town. The White River Valley communities are served by the Ocho Rios Fire Station, located approximately 5 km from the area.

3. Health Services

There are twenty-seven (27) health service facilities in the parish of St. Ann. These include twenty-five (25) health centres, a community hospital and a hospital. The White River Valley communities are served by two health centres, the Exchange Health Centre, a type 2 ranked centre and the Ocho Rios Health Centre, a type 3 ranked centre. The Gayle and Labyrinth Health Centres, type 3 and 1 ranked centres respectively, also serve the communities in the White River Valley area.

4. Solid Waste Management

North Eastern Parks and Markets Limited (NEPM) is responsible for the collection and disposal of solid waste in the parish of St. Ann. The Northeastern Wasteshed, the division managed by NEPM, also comprises the parishes of St. Mary and Portland. It is estimated that 120,825 tonnes of waste annually is collected and disposed of in this region.

Waste collected in St. Ann is taken to Haddon and Tobolski, the two approved disposal sites in the parish. Waste collected in St. Mary is taken to Doctors Wood in Buff Bay Portland or Haddon in Moneague, St. Ann. The Haddon landfill in Moneague, St. Ann will be used as the disposal site for the Rivva Riddim property.

4.3.5 Economy

Tourism and agriculture are the two major economic activities in the parish of St. Ann. Tourism is however considered the most sustainable economic activity in the parish, given the earnings generated from the sector, the number of persons employed within the sector and the expansive multiplier effect tourism has on the parish. Ocho Rios, one of the major towns in St. Ann, is one of the major tourist destinations in Jamaica. In 2009, it was estimated that Ocho Rios had 8,202 rooms and was the main port of call for cruise ships, receiving 679,247 cruise passengers in 2008 or 62.2% of total cruise passenger arrivals for that year. Ocho Rios is estimated to have 245 active tourism

entities (attractions, car rentals, guest houses, hotels, etc.), which in 2007, employed approximately 9,979 persons.

Agriculture, though on the decline, has remained an important economic activity for the parish of St. Ann. Crop and pastoral farming is practiced in the parish with the main agricultural products being bananas, allspice/pimento, sugar, coconuts, coffee, limes, corn, ginger, sweet potatoes, yam, and annatto. The soil is also said to be suitable for citrus and sisal, which are cultivated in the drier areas. The parish is also noted for cattle rearing, horses and hogs (swine). In 2009 the Ministry of Agriculture allocated $12.7 million towards a project aimed at revitalizing the sector. The decline of agriculture has been attributed to the widespread use of farmlands for housing and other built developments.

In November 2009, the Financial Access to Responsible Members (FARM) Programme was launched in St. Ann on November 30, 2009. The programme is being carried out in collaboration with Approved Financial Institutions (AFIs), to provide monetary assistance for farming projects in the parish. In January 2010, a total of $8.3 million had already been disbursed to some 32 farmers in St. Ann to carry on crop production, under the FARM programme.

4.4 Land Use

4.4.1 Historical Land use

In 1494 when the Spaniards discovered the White River Valley, it was home to a few Amerindian settlers (Tainos). The area was described as a hidden valley with an exotic rainforest and an abundant wildlife. The Spaniards built a stone bridge across the river in hopes of discovering gold in the area. The search however proved futile, but the area was used by the Spaniards as a place for recreation. Later in the 18th and 19th century agricultural activities were established in the area. This included both crop and pastoral farming. Settlements were soon developed within the area, which led to other land uses e.g. commercial, educational and institutional land uses.

The proposed project site consists of forested, as well as open space areas previously used as agricultural lands. The site was also used for recreational purposes, such as hiking and swimming.

There are ruins on the site that appear to be the remnants of an old sugar factory. However an archaeological assessment will need to be done to provide more details on the ruins. It is intended that the ruins will be a feature of the Park.

4.4.2 Current land use

Based on the examination of aerial imageries (Google earth) approximately 50-60% of the White River Valley is still open space area. The open space areas include expansive forested land areas consisting of dense woodland/tree and shrub vegetation. Residential land use is currently the major land use type in the area, accounting for approximately 25% of active land uses. This is followed by agricultural and commercial land uses. Major residential areas include Bonham, Exchange, and Three Hills.

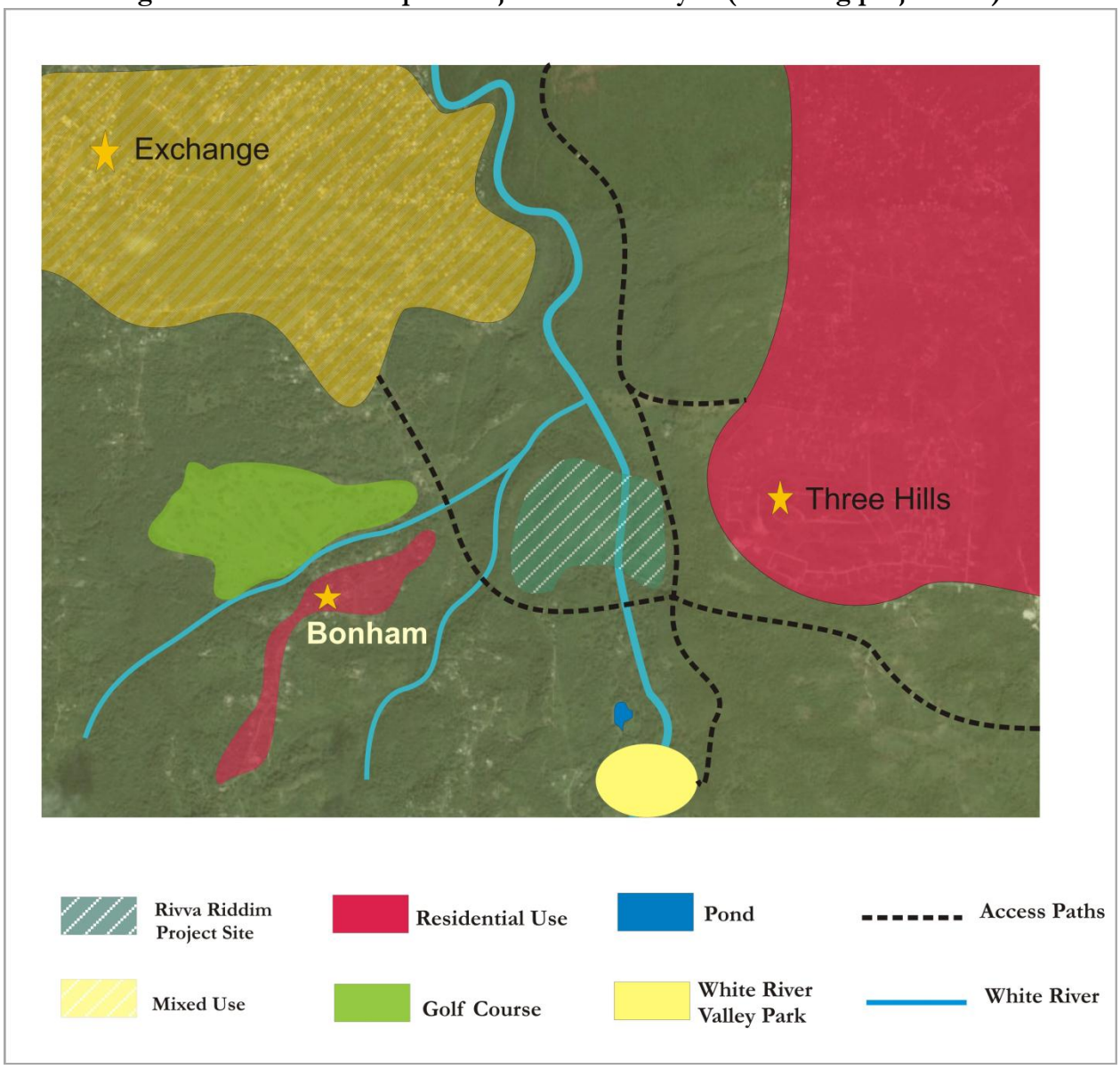
Major commercial and recreational developments include: Chukka Caribbean Adventures White River Valley and Sandals Golf and Country Club.

Clustered and linear settlement patterns are the two distinct land use patterns found in the Valley. In the Three Hills community, land uses are clustered together along access paths. There are no clear and definitive roadway patterns e.g. grid patterns. Instead roadways and paths have emerged as lands are developed. In other areas land uses are in a linear pattern along major roadways or along divergent paths (smaller access routes) off the major roadway. The communities of Exchange, Bonham, Lodge and Salmon all exhibit this spatial pattern.

4.4.3 Land use surrounding the Project Site

Tower Isle, located north east of the site, is a mixed land use area consisting of residential, resort, commercial and recreational land uses. It is one of the major adjoining communities located close to the project site. On the western end of the site is the community of Prospect, which includes Prospect Plantation, a Jamaican agricultural property. The property has a great house that was built in the 18th century and provides a clear view of the White River gorge. To the southwest of the site is Bonham community and the Sandals Golf and Country Club. Exchange is located northwest of the site. The communities described above are shown on Figure 13.

Figure 13: Land Use Map of Project Area Surveyed (including project site)



Source: Environmental and Engineering Managers Limited, 2011

4.5 Watershed and Protected Areas

While the Rivva Riddim project site is not located within a protected area it is located within the White River Watershed.

The White River Watershed is located on the border of the parishes of St. Ann and St. Mary and runs south 23 km to the foot of Guys Hill in St. Catherine. The watershed drains approximately 10,049.2 hectares into the Ocho Rios Marine Park. It is a very sensitive watershed and there are some activities within the watershed that threaten the environmental health of the zone and the

Marine Park in Ocho Rios which is a protected area. The watershed has historically had multiple uses including recreation, agriculture, mining, and tourism.

Siltation is one of the major pollution issues affecting the White River watershed and the Ocho Rios Marine Park area. Water levels within the White River are said to be predominantly low throughout the year but during heavy rainfall events, silt is washed downstream to the sea. The felling of trees within the area is considered one of the primary reasons for the persistent increase of silt in the river. Land use development activities e.g. farming, housing construction etc., have also contributed to siltation of the river.

Activities within the watershed directly impact the reef system in the Ocho Rios Marine Park. In recent history this impact has been almost exclusively negative, to the extent that less than 8% of the reef is left alive and fish populations have plummeted. This has severely impacted the subsistence fishermen in the area and the tourism product that the Ocho Rios region so heavily depends upon.

4.5.1 Watershed Management Zones

The watershed has been sub-divided into five management zones, which cross cut the sub-basins and existing land-cover patterns. These include:

- **Zone 1**: Development Zone
- **Zone 2**: Erosion and Surface Run-off Control along River/Buffer Corridor
- **Zone 3**: Forestry Management zone
- **Zone 4**: Floodplains
- **Zone 5**: Groundwater Protection Zone

As far as possible, zone boundaries have been made to coincide with natural sub-basin divides (ridges with the catchment), roads or river systems, and take into consideration hydrological controls. The proposed Rivva Riddim project falls within Zone 1 of the Watershed Management Zones and is located in the Cascade to Labyrinth area on the eastern watershed boundary.

Zone 1: Development Zone: This zone includes areas that are already heavily developed or show trends of increasing population growth. Management strategies for this zone focus on issues related to urban impacts on hydrology, solid waste and sewage management. The six (6) main areas included in this zone are:

1. Content Garden (south-western side of the watershed),
2. Eltham-Exchange-Bonham Spring-Lodge (lower catchment).
3. The western part of Charles Town-Three Hills on the south-eastern side of the watershed.
4. Cascade to Labyrinth (higher elevations on the eastern watershed boundary).
5. Blackstonedge to Guys Hill.
6. Jeffrey Town-Halifax-Elgin Town-Goshen.

Zone 2: Erosion and Surface Run-off Control along River/Buffer Corridor: These areas represent a buffer zone between the river and the surrounding region. Management strategies in this zone focus mainly on prevention of soil erosion on the steep slopes, and retardation of surface flows to the river system. This focus is due largely to the potential impacts on the river channel associated with environmental changes. The three areas included in this zone are:

1. The course of the Salt River below Hiattsfield (confluence of two tributaries).
2. The lower course of the White River below Lucky Hill, including all of sub-basin 6.
3. The upper course of the White River in the Spring Garden area (part of sub-basin 1E).

Zone 3: Floodplain: These are areas adjacent to the main channel of the White River that are likely to be prone to extensive over bank flooding as well as ponded water (due to clay soils). The two areas included in this zone are:

1. The lower floodplain near the mouth of the river, and
2. The section of the White River where the riverbed is empty (between Goshen and Lucky Hill).

Zone 4: Forestry Management Zone: These are areas presently under forest cover and also include sensitive recharge zones. Seven areas are proposed to be forestry management zones. These include:

1. The Hiattsfield-Breadnut area (upper part of the Salt River sub-basin).
2. Prospect to Cascade area.
3. A strip between Up Park Pen and Cascade.
4. Lucky Hill Pen Area.
5. Goshen and Mount Plenty Area.
6. Crawle Pen to Soho Pen
7. Soho Pen-White Hall Area

Zone 5: Groundwater: these are areas presently under extensive pasture cover and limestone bedrock. The management of these zones focus on issues related to water abstraction and use.

4.5.2 White River Watershed and Ocho Rios Marine Park Association (WHROMP)

The White River Watershed and Ocho Rios Marine Park are managed by the White River Watershed and Ocho Rios Marine Park Association (WHROMP), whose mission is to conserve, protect and improve the natural resources of the White River Watershed and adjacent Ocho Rios Marine Park

WHROMP has completed a number of projects. These include:

1. Reforestation in Union cluster (direct funding from SGP to the Union Basic School 2008-2009).
2. Reforestation – Union cluster (with NEPA).
3. Watershed Management Training – funding through The Forest Conservancy (2006-2007).
4. Annual International Coastal Clean-up Day activity - with support from the Tourism Enhancement Fund (TEF) through Jamaica Environment Trust, private entities and volunteers.

5. Institutional Strengthening WHROMP – support from Environmental Foundation of Jamaica.
6. Proposal writing workshop for members

WHROMP is currently developing a number of projects in other key programme areas, which includes Jamaica's ridge to reef ecosystem.

5.0 Community Perspective on the Proposed Development

5.1 Methodology

As a means of gathering detailed information on the perspective of key stakeholders on the potential impacts associated with the use of natural resources to support the development and promotion of an ecotourism, questionnaires were administered in communities located within a 2 km radius of the project site in White River Valley, St. Ann. Thirty-five (35) questionnaires were administered in the communities; an overall representative sample of five percent (5%). The standardised open-ended questionnaires (Appendix 3) consisted of thirty-seven (37) questions covering key areas to determine the overall perspective of stakeholders on the level and types of impact the proposed ecotourism development project would have on their community and Jamaica. The survey conducted on Saturday, February 5, 2011, had an overall response rate of one hundred percent (100%).

Given the nature of the proposed project, twenty-five (25) additional questionnaires were administered in the resort town of Ocho Rios, St. Ann. The aim of the survey was to increase the level of participation of members who did not reside within the 2 km radius of the project site, but are part of the broader community likely to be impacted by the project. The questionnaire consisted of thirteen (13) open-ended questionnaires, with an overall focus of garnering the views of stakeholders on the impacts of tourism on their community (parish) and the types of impacts the proposed project is likely to have on said community. The survey had an overall response rate of one hundred percent (100%).

The results of both surveys are presented below.

5.2 General Profile of Respondents (White River Valley Community Survey)

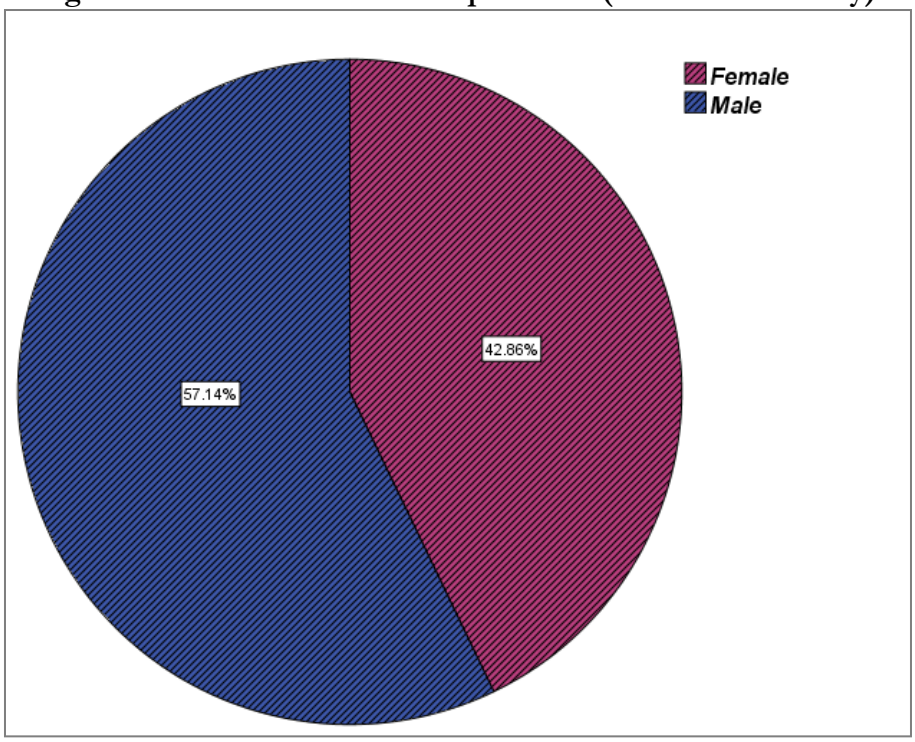
5.2.1 Gender and Age Distribution

Males, based on analysis of the data, accounted for fifty-seven percent (57%) of total respondents, completing twenty (20) of the thirty-five (35) questionnaires administered. The percentage inequity in gender response was linked to the availability of respondents. More males, at the time the survey was being conducted, were readily available. Females accounted for forty-three (43%) percent of respondents.

Fifty seven percent (57%) of all respondents belonged to the age group 40 and over, with the remaining forty-three percent (43%) falling in the <18, 18-29 and 30-39 age groups. The 40-49 age group accounted for the highest percentage of respondents; an estimated thirty-four percent (34.3%) of respondents fell in that age category.

The gender distribution of respondents is presented in Figure 14.

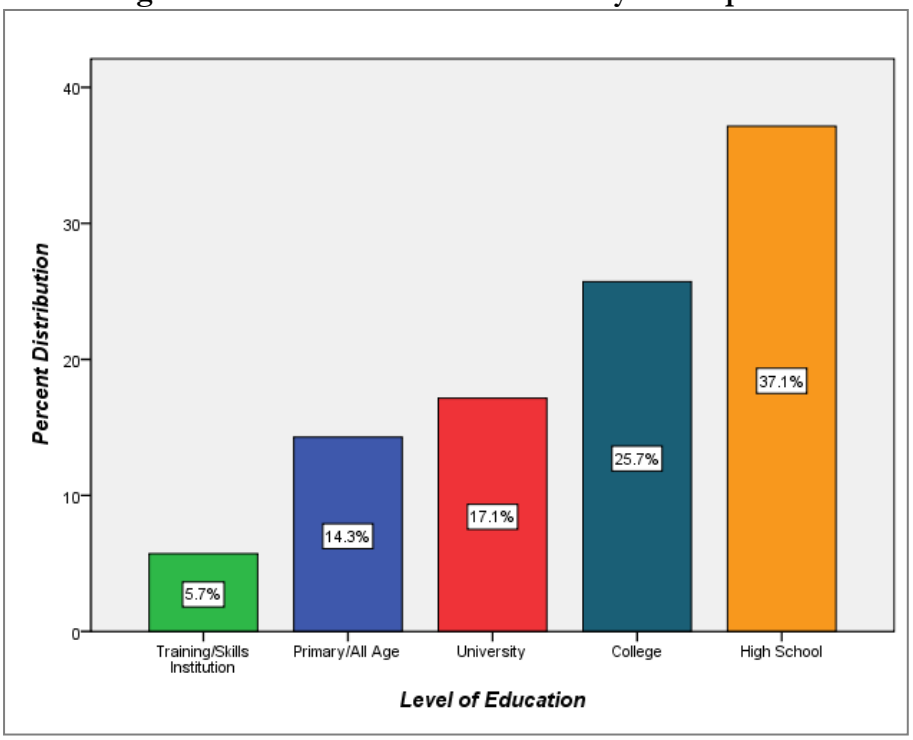
Figure 14: Gender Profile of Respondents (White River Valley)



5.2.2 Education

All respondents had acquired at least primary level education. Thirty-seven percent (37%) of total respondents were educated at the secondary/high school level, approximately twenty-six percent (26%) at the College level, and fourteen percent (14%) at the primary/all-age level. Respondents who had acquired education beyond the secondary level accounted for approximately twenty-three percent (23%) of respondents (Figure 15).

Figure 15: Educational Level of Survey Participants



5.2.3 Employment and Income

Approximately sixty-nine percent (68.6%) of all respondents surveyed were employed. Approximately nine percent (8.6%) of respondents were retired and an estimated twenty-three percent (22.9%) unemployed. Fifty percent (50%) of the total number of respondents employed were full-time employees; approximately thirty eight percent (38%) indicated their employment status as 'Self-Employed' and the remaining twelve percent (12%) as part-time employees.

Only twenty-nine (29%) percent of respondents were willing to divulge their income earnings. Forty percent (40%) of the total number of respondents indicating their income, earned less than JMD$10,000 per month, thirty percent (30%) earned between JMD$10,001-$30,000 per month, twenty percent (20%) JMD$30,001-$60,000 per month and ten percent (10%) indicated earning between JMD$60,001-$90,000 per month.

5.2.4 Housing and Land Tenure

Of the total number of persons surveyed, seventy-seven percent (77%) acknowledged that they owned both the house and land they occupied. Twenty percent (20%) of all responders indicated 'rent' as their tenure status and three percent (3%) indicated 'other' as their housing and land tenure status. Those who indicated 'other' as their status highlighted that the house and land they occupied were family owned.

From the information gathered from the survey, average household size was 3.26, which is below the 2001 parish level of 3.79. The maximum number of persons per household was seven (7), with the minimum number being one (1).

5.2.5 Utilities and Municipal Services

All respondents, based on the data analysed, had access to water, sanitary conveniences and electricity. Ninety four percent (94%) of respondents had water piped into their dwelling from National Water Commission (NWC) water sources, while the remaining six percent (6%) were supplied water to their household via a private tank. Ninety seven (97%) percent of respondents had a water closet/flush toilet and three percent (3%) used pit latrines. All respondents' energy source was provided via electricity. Only one (1) respondent indicated using a wind turbine to generate electricity for his household, instead of utilising the services provided by the Jamaica Public Service Company Limited.

Approximately ninety four percent (94.3%) of respondents had access to telephone services. Eighty percent (80%) of all respondents acknowledged having cellular phone service only and seventeen percent (17%) of respondents had both landlines and cellular phone service.

North-eastern Parks and Markets Limited was the main garbage collection service used by respondents. Approximately eighty-nine percent (88.6%) of respondents utilised the services of NEPM, six percent (6%) burned their garbage and six percent (6%) used a private contractor. Sixty-six percent (66%) had their garbage collected once weekly, fourteen percent (14%) twice weekly and twenty percent (20%) twice per month.

5.3 Resource Usage and Management

Natural resource usage was found to be relatively high among community members surveyed (Table 14 and **Figure 16**). Overall an estimated sixty-nine percent (68.6%) of persons surveyed utilised the natural resources found within their respective communities. All persons surveyed, when asked about the uses of natural resources by other community members, acknowledged knowing community members who used the resources found within the community.

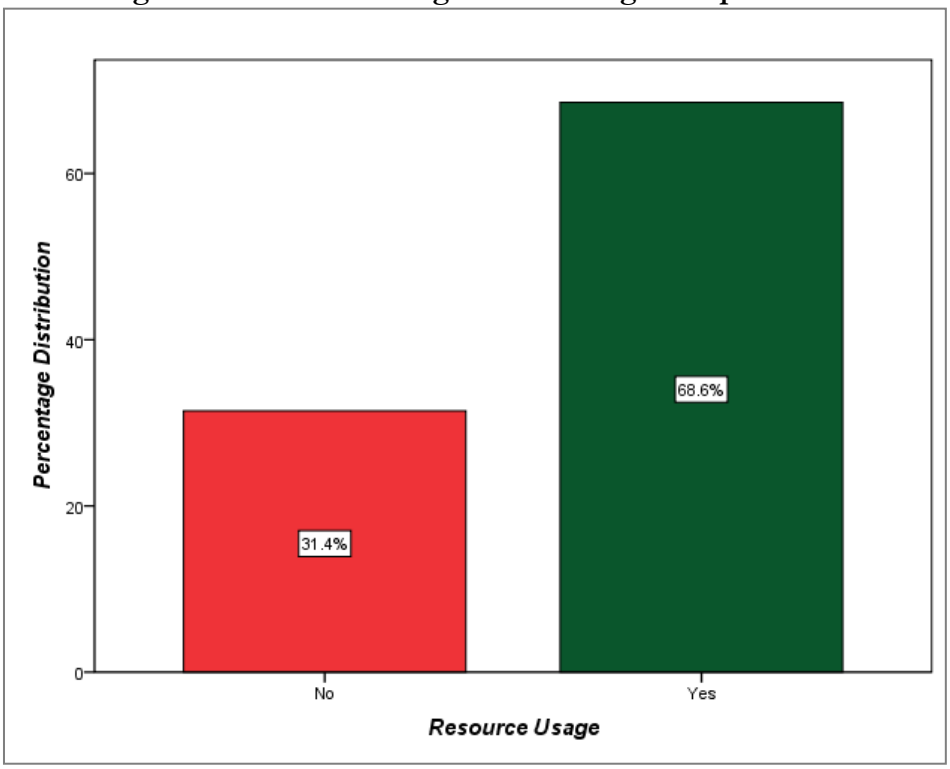
Table 14: Resource Usage

	Resource Usage		Total	% breakdown of persons saying 'YES' per community
Community Name	**Yes**	**No**		
Bonham	2	3	5	40%
Cascade	4	3	7	57%
Exchange	7	2	9	77%
Lodge/Salmon	2	2	4	50%
Three Hills	6	1	7	85.7%
White River	2	0	2	100%
Labyrinth	1	0	1	100%
Total	**24**	**11**	**35**	

For those persons acknowledging the use of natural resources, approximately ninety-two percent (91.6%) or approximately sixty-three (63%) of all persons surveyed, utilised the water resources

within their community. The remaining respondents, approximately six percent (5.7%) of the total number of respondents or eight percent (8%) of the total number of respondents indicating usage of the natural resources, acknowledged using all available resources (Figure 17).

Figure 16: Resource Usage Rate amongst Respondents



Swimming only and recreational uses only (fishing, swimming, tubing etc.) were the main purposes for which water resources were utilised by respondents. Approximately twenty-nine percent (28.6%) of respondents used water resources for swimming only, while twenty percent (20%) used said resources for recreational uses only. Other uses included domestic uses, such as drinking, washing and bathing, farming and tourist attraction. Approximately six percent (5.8%) of respondents indicated that their livelihood was dependent on the resources found within the White River Valley as they were directly employed to the tourism sector. River tubing is the predominant tourist attraction offered in the White River Valley community. The breakdown of use of natural resources is presented at Figure 18.

Figure 17: Types of Resources Utilised by Community Members

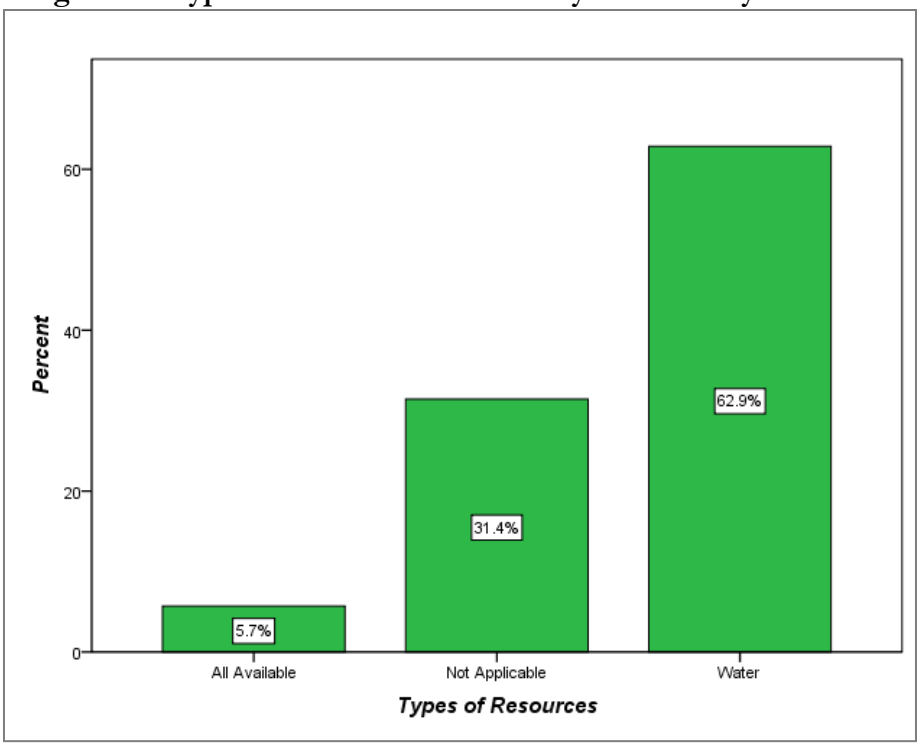
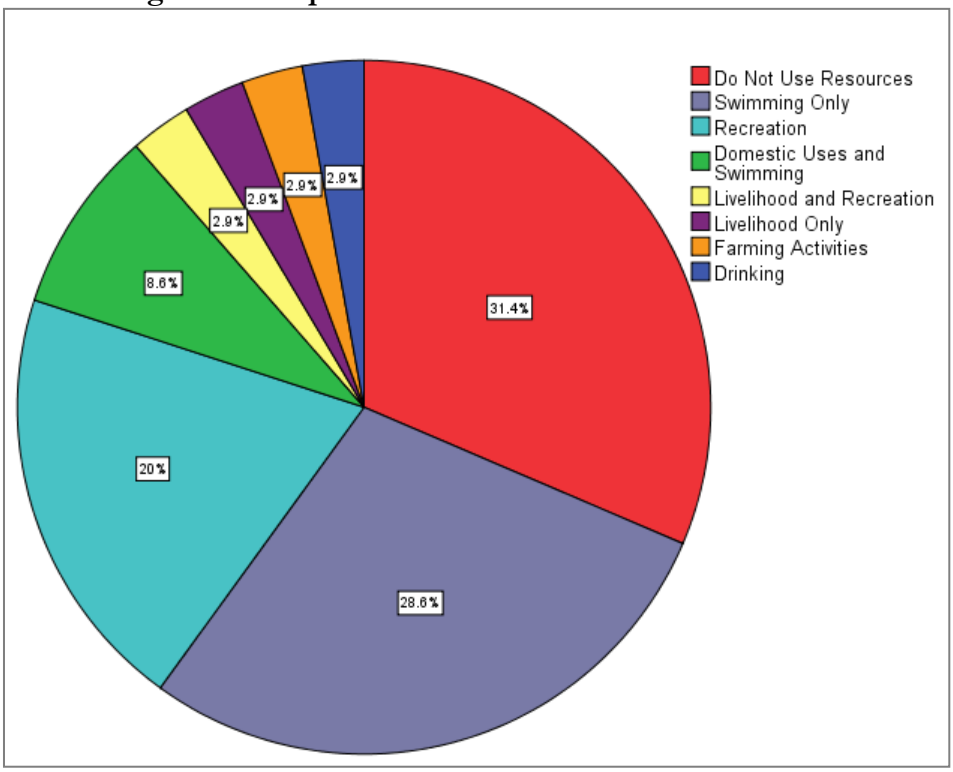


Figure 18: Purposes for which Resources are Utilised



5.3.1 Resource Quantity

Fifty-four percent (54%) of all persons surveyed felt there had been no change in the quantity of resources available to them. Approximately fourteen percent (14%) of respondents however felt that there has been a steady decline in resource quantities, while three percent (3%) felt there had been an increase. Twenty-eight percent (28%) of respondents had no response to the question. Persons indicating there had been a decline in resource quantities cited land based developments as the main reason for the decline. Commercial and recreational (tourism attractions) establishments were identified as the primary types of land based developments resulting in resource quantity declines.

5.3.2 Pollution and Waste Management

Less than fifty percent (50%) of respondents, when asked about pollution threats to the river, responded that there were indeed existing pollution threats. In fact an estimated forty-three percent (43%) of respondents answered "YES" that the White River was being threatened by some form of pollution. Eleven percent (11%) of respondents indicated that they were not aware of any pollution threats, while the majority of respondents, forty six percent (46%) said there were no threats to the river from any pollution sources. There was nothing in the data suggesting that respondents belonging to a particular age group were more knowledgeable of pollution threats. However an estimated sixty-seven (67%) of respondents indicated pollution threats came from the Exchange (40%) and Three Hills (27%) communities. Table 15 shows a breakdown of the responses received to the question on pollution threats to the White River.

Table 15: Responses of Community Members on Pollution Threats to the White River

	River Threatened by Pollution			Total
Community Name	**Yes**	**No**	**Not Aware**	
Bonham	2	2	1	5
Cascade	2	4	1	7
Exchange	6	3	0	9
Lodge/Salmon	1	1	2	4
Three Hills	4	3	0	7
White River	0	2	0	2
Labyrinth	0	1	0	1
Total	**15**	**16**	**4**	**35**

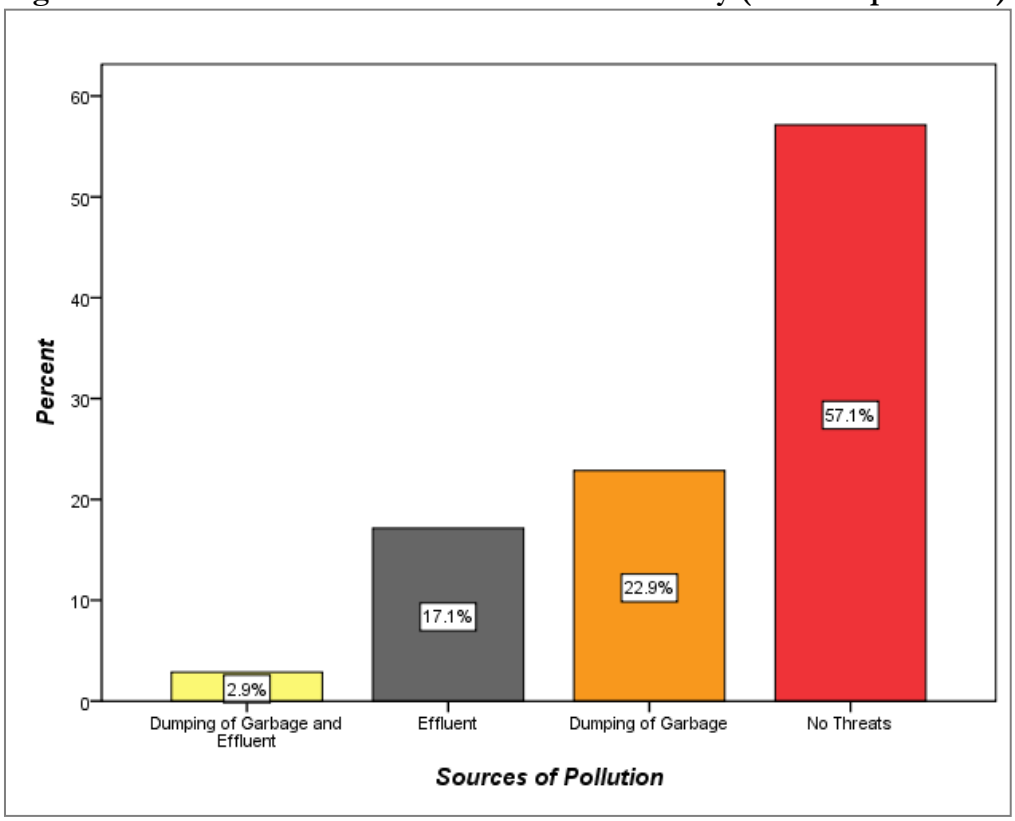
The results of the cross tabulation analysis between community resource usage and pollution threats were not surprising, given that approximately seventy-eight percent (78%) of respondents from the Exchange community acknowledged using the resources in their community, while an estimated eighty-six percent (86%) of respondents from the Three Hills community indicated using natural resources within their community. Only respondents from the White River and Labyrinth communities had higher overall percentages. (Refer to Table 14). The level of resource usage indicated that there is low concern about pollution threats.

There were two main sources of pollution identified by respondents. These included:

1. The improper disposal of solid waste on land and in the river
2. The release of effluent (oil and sewage) into the river

Figure 19 shows that fifty-three percent (53%) of respondents knowledgeable about pollution threats (or an estimated twenty-three percent (23%) of total respondents) indicated that the improper disposal of solid waste was the only threat affecting the river, while forty percent (40%) [or seventeen percent (17%) of total respondents] indicated that the illegal release of untreated effluent was the only threat. Seven percent (7%) of the respondents (or approximately three percent (3%) of total respondents) indicated both sources as major pollution threats.

Figure 19: Sources of Pollution within the Community (Total respondents)



An interview conducted with Alex Lanigan, president of the WHROMP, highlighted the NGO'S strong and differing views on the existence of pollution threats from those of the White River Valley community members. The head of WHROMP revealed that not only is the river threatened by several pollution sources, but these sources were growing. The improper disposal of solid waste, the release of untreated effluent in the waterway, illegal construction and operation of commercial and entertainment land uses were a few of the pollution threats indicated.

The erection, maintenance and operation of piggeries on the banks of the White River and the weekly hosting of social gatherings (fêtes) were two of the more serious threats highlighted in the interview. Patrons attending parties were said to be dumping solid waste into the waterway, which during heavy rainfall events were released directly into the marine environment. The release of untreated sewage and effluent from the piggeries was also identified as a significant source of pollution, affecting the marine organisms found within the Ocho Rios Marine Park. Fisherfolk, whose livelihood depends on the resources found within the marine environment, were facing serious threats from these pollution sources. The smothering of the coastal ecosystems within the

OMP is forcing marine organisms to migrate to other areas to find better suited spawning grounds and living environments. This according to Lanigan is threatening not only the marine environment and its organisms, but the social welfare of persons dependent on these resources.

Several water quality tests conducted within the project area by WHROMP have revealed high levels of faecal coliform in various sections of the White River. The location of piggeries in the communities of Cascade and Exchange and the Newstead School were identified as major pollution threats. Other factors leading to the degradation of resources within the White River Valley watershed area indicated by Lanigan (per comm., 2011) includes the indiscriminate use of chemicals in the agricultural and tourism sectors, poor agricultural farming practices and coal burning.

5.4 General Profile of Respondents (Ocho Rios Survey)

5.4.1 Gender and Age Distribution

Females accounted for fifty-six percent (56%) of the total number of respondents. Both genders were found to be willing participants to the survey. Seventy-six percent (76%) of respondents belonged to the 18-29 age group. The age groups 30-39 and 40-49 each accounted for six percent (6%) of respondents respectively (Figure 20 and Figure 21).

Figure 20: Gender Profile of Respondents (Ocho Rios)

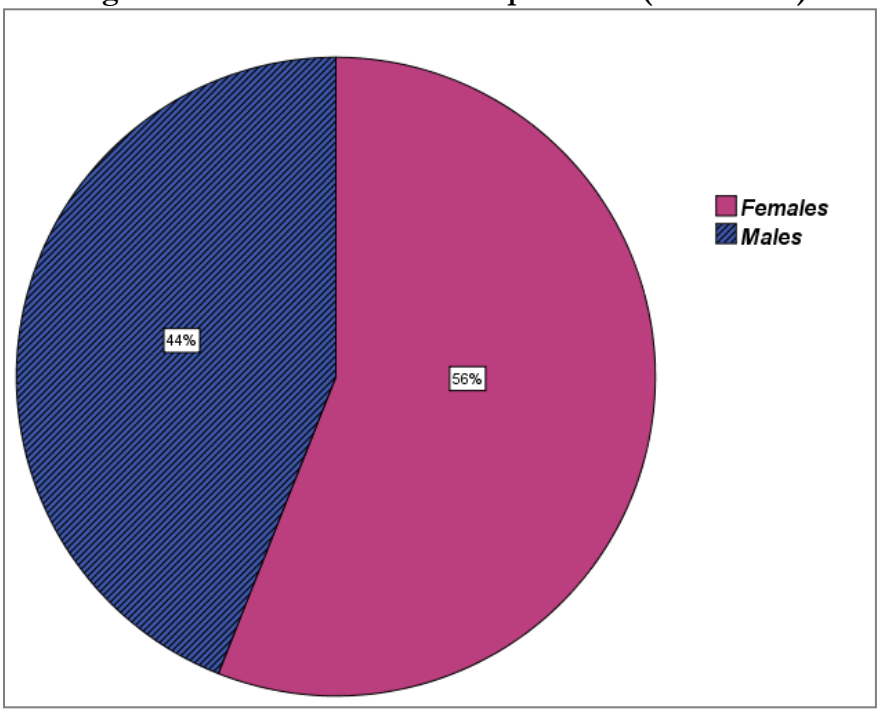
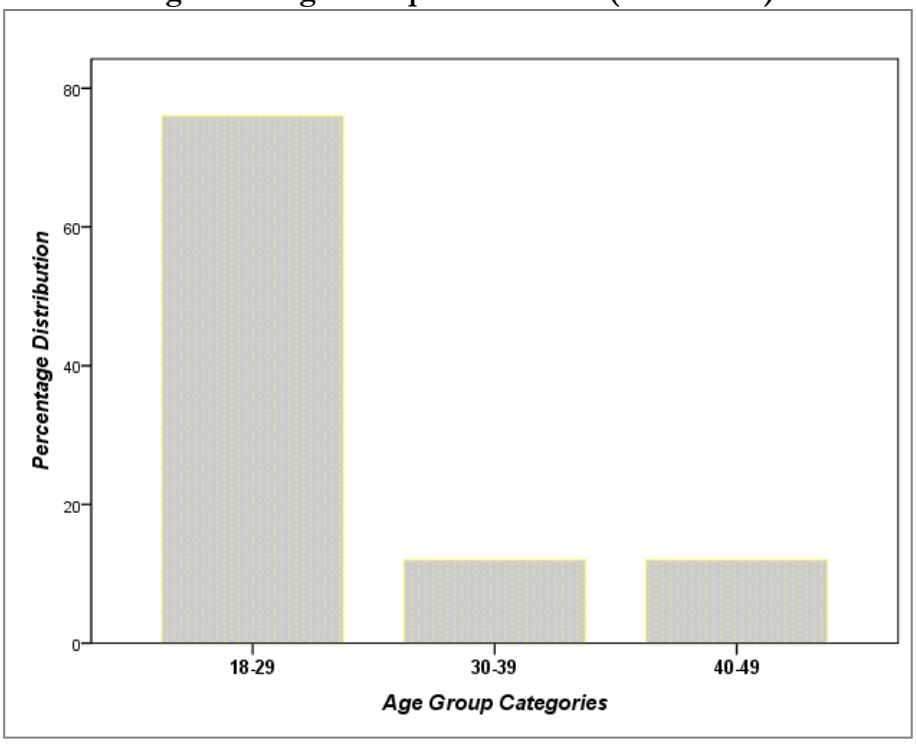


Figure 21: Age Group Distribution (Ocho Rios)



5.4.2 Education

All respondents had received formal education, with the vast majority being educated beyond the secondary level. Forty-four percent (44%) of all respondents had been educated at the college level and twenty percent (20%) had engaged in some form of skills training after high school. Twenty four percent (24%) of respondents were educated at the primary level and eight percent (8%) at the secondary level. Only four percent (4%) of respondents received university education.

5.4.3 Employment

Ninety six percent (96%) of all respondents were employed, with eighty-four percent (84%) indicating they were employed full-time. Eight percent (8%) were employed part-time and four percent (4%) were self-employed. From the total number of respondents surveyed, thirty-two percent (32%) were employed in the tourism sector. The service and retail industry were the main fields of employment for tourism workers (Figure 22 and Figure 23).

Figure 22: Employment Status of Respondents in the Tourism Sector (Ocho Rios)

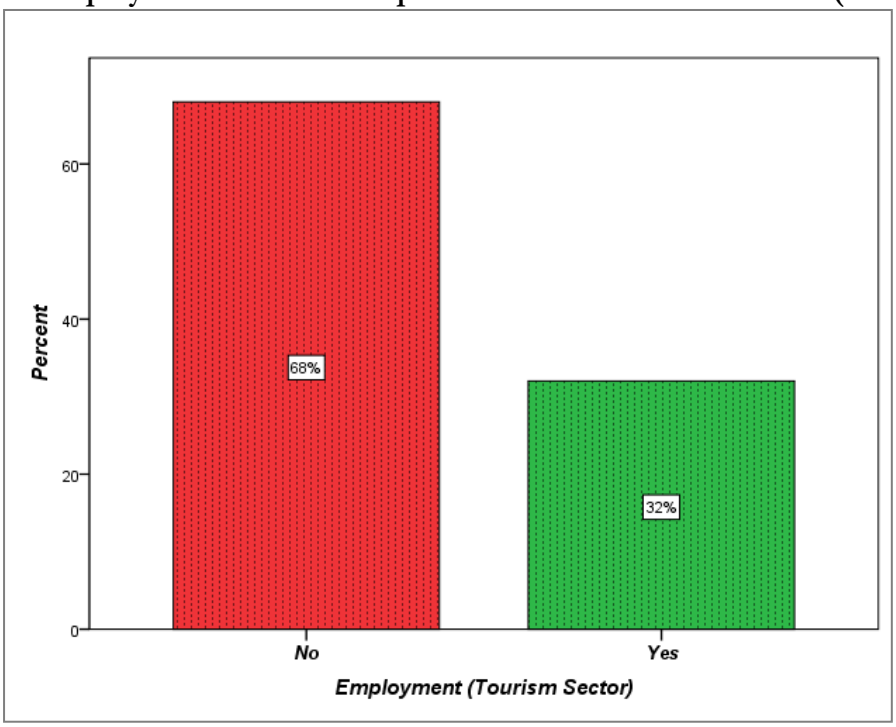
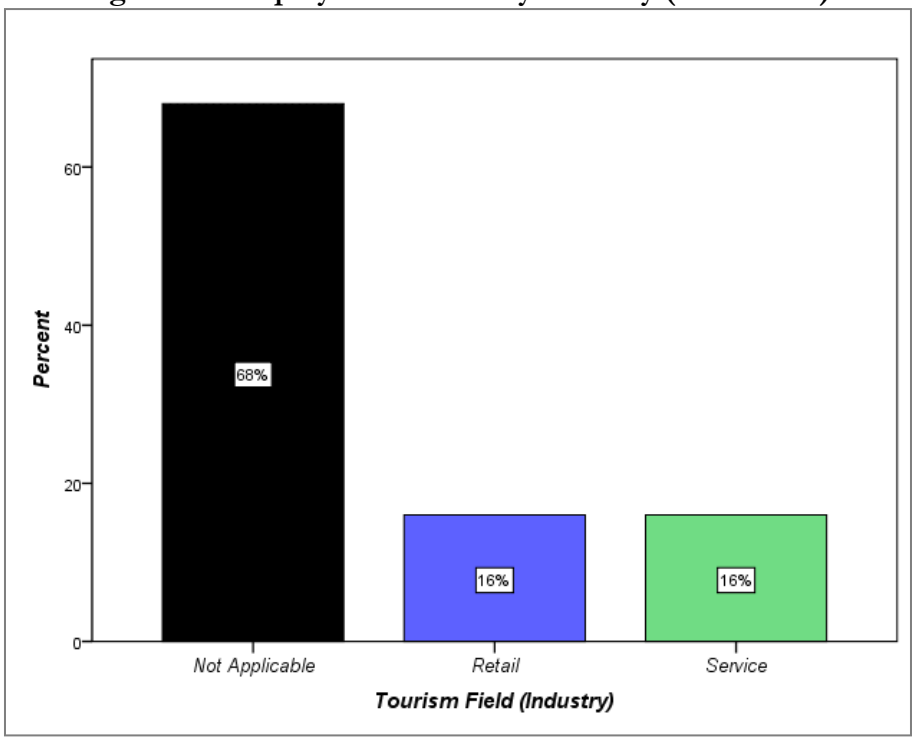


Figure 23: Employment Status by Industry (Ocho Rios)



5.5 Social Assessment of Impacts: Tourism, Natural Resources and Economic Development

The following information has been derived from the survey of persons conducted within a 2 km radius of the proposed ecotourism project site in the White River Valley Community and the town of Ocho Rios in the parish of St. Ann. Discussed below are the major issues that have emerged from the survey. Community stakeholders interviewed outlined what they considered to be the potential negative and positive impacts that may arise with the implementation of the project.

5.5.1 Knowledge of Eco-tourism and Project Awareness

From the sixty (60) respondents interviewed as part of the social impact assessment (SIA), only forty-five percent (45%) had any knowledge of what was meant by the term 'ecotourism' (Table 16). In the community survey, approximately forty-three percent (42.9%) of total respondents indicated having any knowledge as to the meaning of the term, while forty-eight percent (48%) of persons surveyed in the town were able to explain the meaning of the term (Table 16, Figure 24 and Figure 25).

Eighty-eight percent (88%) of the total number of persons surveyed for the SIA were not aware of the proposed project. For the remaining twelve percent (12%) that had some knowledge of the proposed project, all had heard via 'word-of-mouth' (Table 17).

Table 16: Respondents Knowledge of the term 'Ecotourism.'

	Knowledge of the term Ecotourism		
Community	**Yes**	**No**	**Total**
Ocho Rios	12	13	**25**
White River Valley	15	20	**35**
Total	**27**	**33**	**60**

Table 17: Level of Project Awareness Among All Respondents

	Awareness of Proposed Ecotourism Project		
Community	**Yes**	**No**	**Total**
Ocho Rios	3	22	**25**
White River Valley	4	31	**35**
Total	**7**	**53**	**60**

Figure 24: Bar graph Showing Respondents Knowledge of the term 'Ecotourism' (White River Valley)

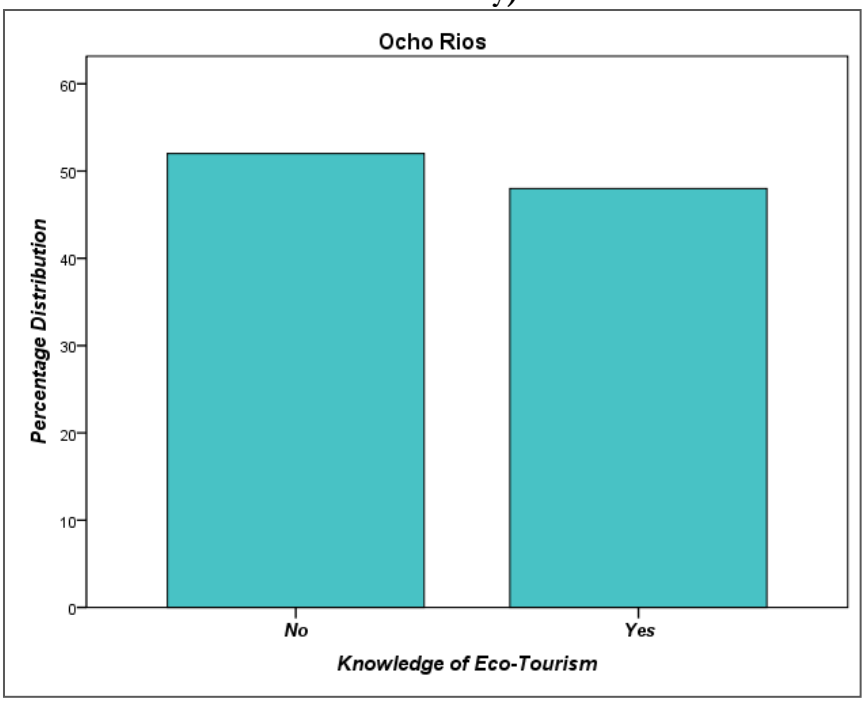
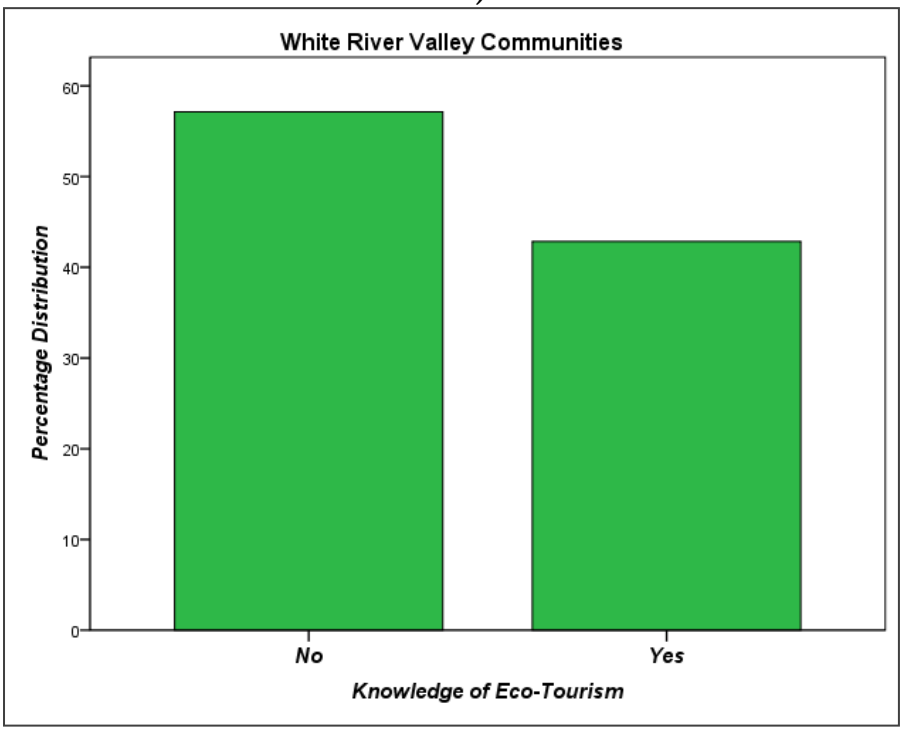


Figure 25: Bar Graph Showing Respondents Knowledge of the term 'Ecotourism' (Ocho Rios)



5.5.2 Potential Positive Impacts

The proposed ecotourism park project though viewed as mostly positive, has not found favour with all stakeholders. Seventy-five percent (75%) of the total respondents interviewed as part of the survey felt the project was a positive and creative approach aimed at enhancing the tourism sector. However, while only twenty-percent (20%) of respondents saw the project as being an outright negative, those admitting the project was mostly positive, had some reservations about the manner in which natural resources would be utilised. There was however a general consensus amongst respondents that if the project is properly implemented, then the community and parish ought to benefit tremendously.

The following were identified by respondents as the potential positive impacts they anticipate from the proposed project:

Employment Opportunities: Approximately seventy-seven percent (76.6%) of all respondents indicated that gainful employment for community members was an anticipated impact of the project. Eighty percent (80%) of respondents from the Ocho Rios survey identified 'jobs' as the most likely positive impact, while seventy four percent (74%) of respondents in the White River Valley community found it the most likely impact.

Forty percent (40%) of all persons surveyed in the White River Valley community felt employment opportunities in their community was lacking, particularly for young adults. The availability of jobs was seen as one crucial way to advance social and economic development goals in their community and by extension their parish.

Enhancement and Diversification of Tourism Products: Respondents were of the general view that the tourism industry was in need of new initiatives to help diversify the existing products being offered. More than sixty-five percent (65%) of respondents indicated that ecotourism projects were useful in helping to diversify the products offered by the sector, given Jamaica's dependence on the 'sun, sand and sea' product marketed. Respondents felt that the diversification of tourism products would lead to the following benefits:

1. Improved types of attractions offered to tourists and locals
2. Attraction of a new type of tourist interest in nature and adventure.
3. Increased employment opportunities and promotion of the acquisition of new job skills for locals.
4. Increased foreign exchange earnings
5. Creation of an avenue for the protection and conservation of natural resources
6. Promotion of education programmes aimed at increasing awareness about natural resources and their functions.

Community and Parish Development: Participants in the SIA survey from the White River Valley though highlighting that they valued much of what their community had to offer, generally felt community improvements were needed. The most urgent of which were the construction of community facilities for youths, undertaking of infrastructural projects e.g. road and utility rehabilitation and drainage improvements, and the creation of employment opportunities. The project was viewed by sixty percent (60%) of community members as being an avenue to facilitate such improvements.

All respondents surveyed acknowledged that the project is likely to be of more benefit to the parish, rather than their community. Tourism, based on the responses of the participants, has helped in providing numerous social, economic and recreational opportunities for the people of St. Ann and by extension Jamaicans. The benefits identified include:

- Widespread infrastructural developments
- Job creation
- Improved community facilities and programmes,
- Generation of foreign exchange earnings
- Diversification and enhancement of cultural experiences
- Increases in the quality of attractions offered to locals
- Beautification of communities

Sustainable Use of Natural Resources: The use of resources to support tourism business initiatives was a favourable and accepted approach amongst survey participants. An estimated seventy-six percent (76%) of all respondents believed ecotourism ventures were a sustainable use of natural resources; which could only serve to benefit a wider cross section of people over a long-term period. Fifty percent (50%) of respondents did however make it clear that their support for the use of natural resources to drive business ventures was only on the basis that steps are taken to protect and preserve natural resources.

5.5.3 Potential Negative Impacts

Participants overall were optimistic about the project, but there were serious concerns raised about the negative impacts of the project on the White River Valley community and the parish. Twenty percent (20%) of all respondents, as mentioned previously, associated only negative impacts with the project. However, more than fifty percent (50%) of all persons surveyed disclosed that there were negative impacts associated with project, despite the obvious positives. The following were the potential negative impacts identified by survey participants.

Destruction and Exploitation of Natural Resources: Thirty-three percent (33%) or a third (1/3) of all respondents surveyed did not support the use of natural resources to support tourism business interests. Respondents noted that tourism developments had resulted in the loss of forests, threatening deforestation, pollution of water resources, encroachment on the habitats of wildlife species and degradation of land resources. Participants also revealed that community resources were often utilised only for the benefit of developers and tourists, with little rewards going back to the community. An example given by one respondent is the exorbitant fees charged by businesses to gain entrance to recreational facilities. The respondent noted that attractions were priced out of the range of what is considered affordable for locals, denying them access to the resources they were once able to enjoy for free.

Additional attention was drawn to the impact upstream activities have on the Ocho Rios Marine Park. According to WHROMP representatives, the excessive dumping of solid waste and the release of untreated effluent was threatening the marine organisms within the Marine Park. Similarly the illegal felling of trees has resulted in increased soil erosion. This has led to the heavy siltation of the

White River, resulting in the smothering of marine organisms, particularly during flood events, when silt is carried swiftly and in large quantities to the mouth of the river.

Displacement of Locals: Perhaps one of the more serious concerns raised by locals is the restrictions placed on accessing resources, once business ventures are undertaken. Several respondents indicated that their primary reason for not being in support of tourism initiatives in their community are the accessibility problems they face once an area has been developed for tourists. Respondents explained that the best resources and recreational sites were often taken by developers and no alternatives were offered to other users. In one example cited by a respondent, reference was made to Fisherman's Beach in St. Ann. The facility served as one of the few remaining spots for locals to enjoy. However recent development activities have prevented locals from accessing certain parts of the area. The respondent noted that access to the beach was through an alternate path. However locals have been told they can no longer relax on the sand, but must stay in the water found outside the boundaries of the property. This according to the respondent is the price residents must pay for tourism growth.

Tourist Harassment: The harassment of tourists is a problem the sector faces on a daily basis. The harassment of tourists was identified by all respondents in the survey conducted in Ocho Rios as one of the negative impacts associated with tourism expansion. They indicated that the occurrence of such events was becoming more frequent and immediate steps were needed to address the problem. According to one respondent 'tourism is all St. Ann has' and things that threaten the industry must be dealt with swiftly.

Community members were less vocal about the harassment of tourists. Though mentioned by a few respondents, it was not one of the factors mentioned when addressing the negative impacts associated with the project. Pollution caused by tourism was of greater concern amongst community respondents.

Migration and Influx of Project Workers: the influx of workers from outside the community to work on the project was a major issue of concern for respondents. With an estimated seventy-seven (77%) of respondents indicating one of the benefits to be had from the project is the provision of employment opportunities, persons were sceptical about the widespread use of locals on the project site. Respondents generally felt that locals, where the skills were available, are to be given first preference for jobs related to the implementation of the project. However many noted that in the past, jobs for locals were promised, but this never materialised, as workers were always brought in, leaving very little opportunity for locals.

6.0 Traffic Impact Assessment

The main access to the Rivva Riddim Ecotourism Park is via the Exchange roadway (Figure 28). The Labyrinth Roadway which intersects with the Frankfort Roadway can also provide access to the site, but is not an access route of choice because of its deplorable state.

The traffic impact study was conducted over a two day period. Day one (1) of the impact surveys was conducted on Thursday, January 5, 2012 and day two (2) on Friday, January 6, 2012. Counting techniques were used to collect baseline traffic data which includes traffic volume counts and turning counts, visual field reconnaissance data and manual traffic volume. Traffic exercises included volumetric counts during two (2) hour periods during the established peak hours. Peak periods used for the study were 7:00 - 9:00 a.m. for morning peak, 11:00 a.m. -1:00 p.m. for afternoon peak and 4:00 - 6:00 p.m. for the evening peak period.

There were four (4) survey points (Figure 26, Figure 27 & Figure 28). These are as follows:

1. The Frankfort intersection with Labyrinth roadway
2. The entrance point to the Rivva Riddim Park site
3. The intersection of Cascade/White River, Labyrinth and Exchange roadways
4. The intersection of the North Coast Highway and Exchange roadway.

6.1 Site Patterns

Manual traffic counts carried out at each survey point yielded vastly different results; the busiest intersection being that of the North Coast Highway and Exchange roadway intersection, survey point #4. A total of twenty-nine thousand, three hundred and thirty-two (29,332) vehicles (27,859 cars/SUV and 1,473 trucks/bus) passed through this intersection during the assessment times over the two day period. The least activity was observed at the Rivva Riddim Entrance, where for the assessment periods over the two (2) day period only six (6) cars/SUV passed by the surveying site.

Figure 26: Traffic Survey Point 1

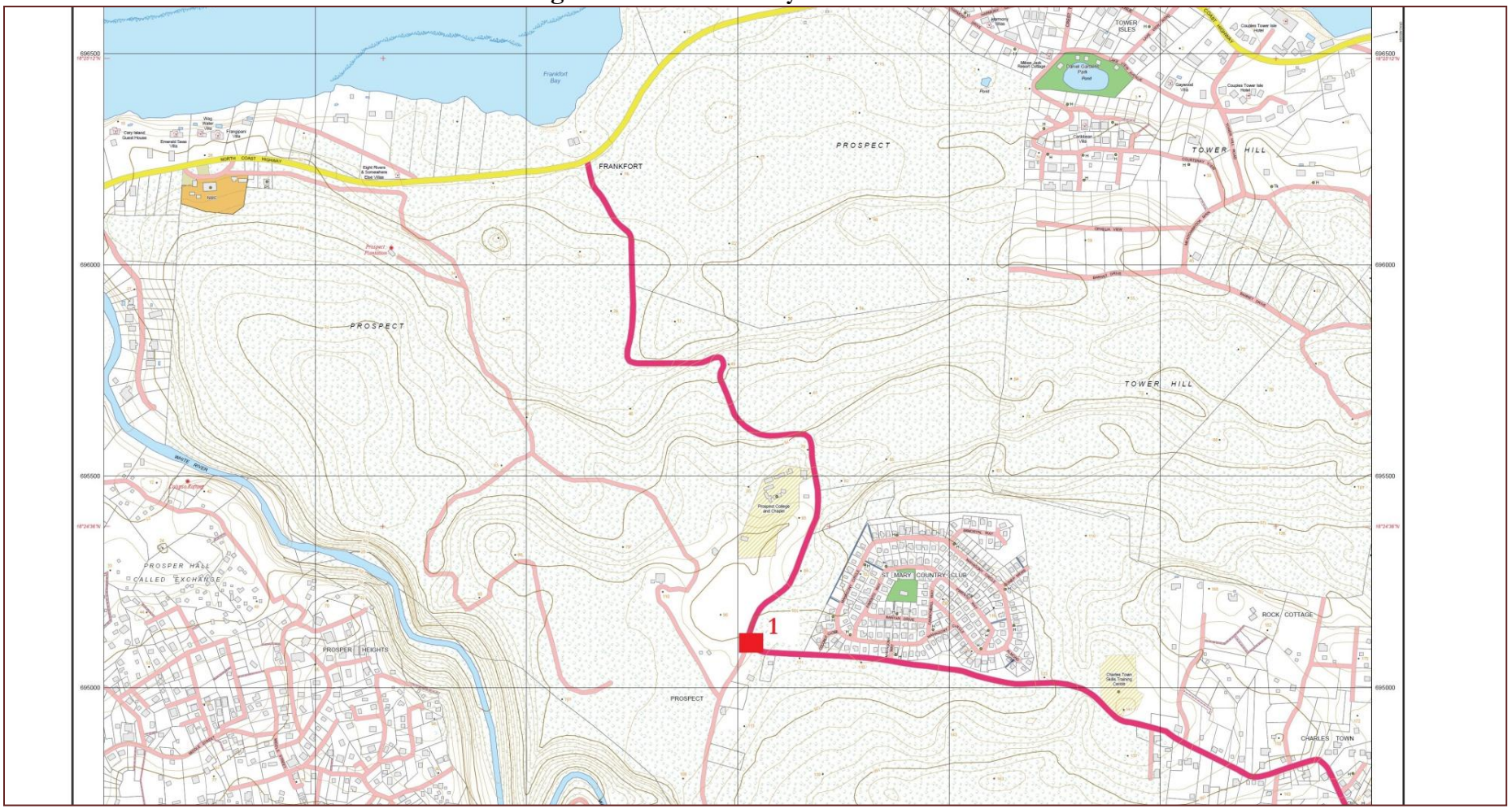


Figure 27: Traffic Survey Points 2 & 3

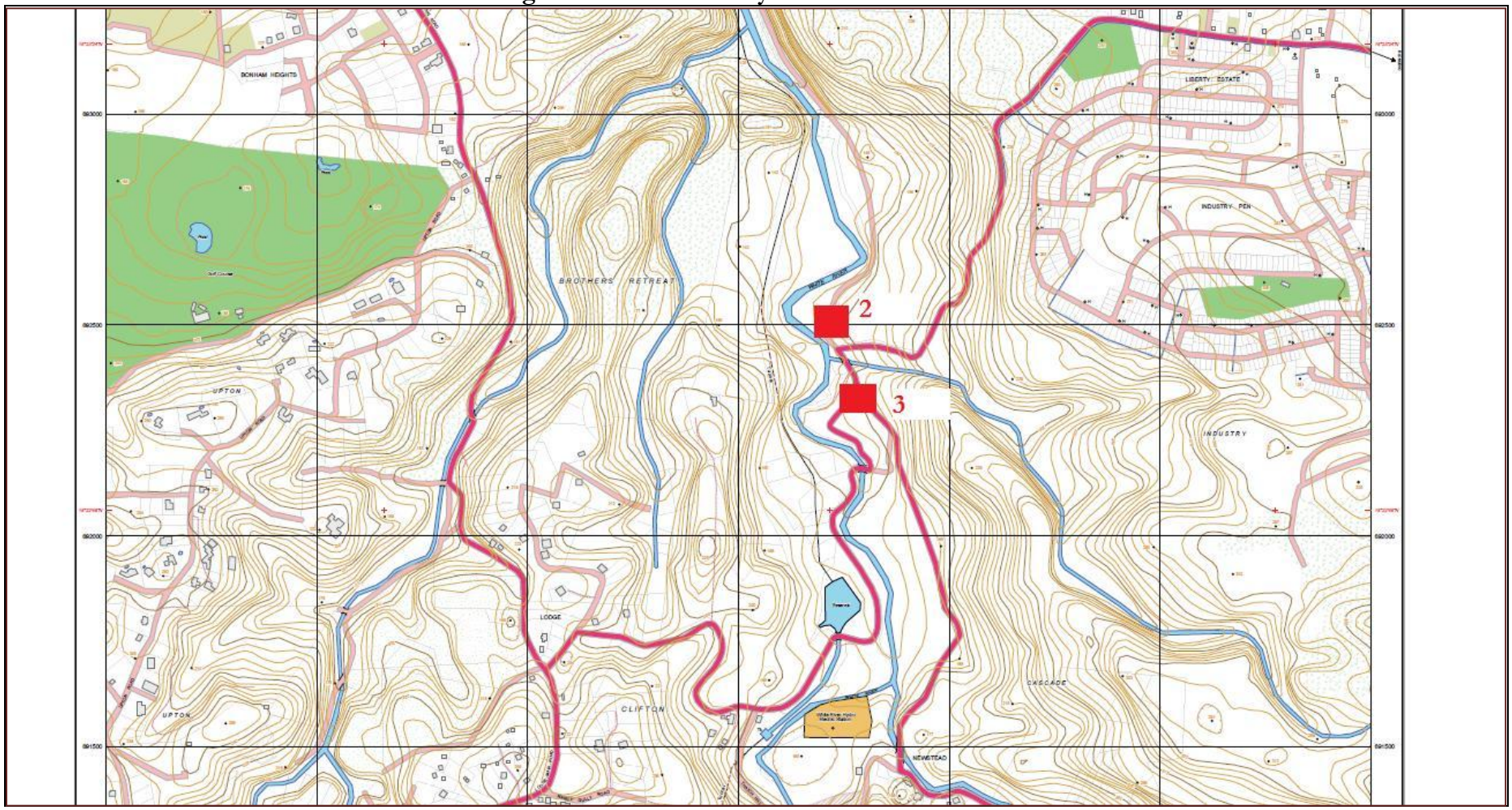


Figure 28: Traffic Survey Point 4

6.1.1 Frankfort-Labyrinth Intersection

Two hundred and eighty-seven (287) Cars/SUVs and forty-three (43) Trucks/Buses passed through the Frankfort/Labyrinth intersection at survey point # 1. On Day 1 one hundred and fifty (150) Cars/SUVs turned right heading towards the North Coast Highway and four (4) turned left on to the Labyrinth Roadway. All twenty-one (21) Trucks/Buses observed on the day turned right in the direction of the Highway.

On Day 2 one hundred and twenty-nine (129) Cars/SUVs turned right in the direction of the Highway and four (4) turned left on to the Labyrinth roadway. All twenty-two (22) Trucks/Buses observed on the day turned right in the direction of the Highway.

Table 18 provides traffic volume and vehicle classification information for the Frankfort/Labyrinth Intersection.

Table 18: Traffic Volumes for the Frankfort/Labyrinth Intersection

Frankfort/Labyrinth Intersection													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	1		42			6	1		39			7	**96**
11:00am-1:00pm	2		66			6	2		56			6	**138**
4:00pm-6:00pm	1		42			9	1		34			9	**96**
Total	**4**	**-**	**150**	**-**	**-**	**21**	**4**	**-**	**129**	**-**	**-**	**22**	**330**

6.1.2 Rivva Riddim

On Day one (1) only six (6) Cars/SUVs passed survey point #2. All vehicles were observed during the afternoon peak period. Three (3) of the vehicles travelled in the direction of Exchange and the Cascade/White River communities and the other three (3) in the direction of Frankfort. There were no vehicles recorded at point #3 on Day two (2) of the survey.

Table 19 provides traffic volume and vehicle classification information for the Rivva Riddim survey point.

Table 19: Traffic Volumes for the Rivva Riddim Survey Point

Entrance point to Rivva Riddim Site													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	-	-	-							-	-	-	**-**
11:00am-1:00pm	3	-	3	-	-	-	-	-	-	-	-	-	**6**
4:00pm-6:00om	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Total	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6**

6.1.3 Exchange/Bonham Spring and Cascade/White River Intersection

A total of nine hundred and two (902) vehicles passed through the intersection of survey point #3. There were seven hundred and seventy-six (776) Cars/SUVs that passed through the intersection and one hundred and twenty six (126) Trucks/Buses. A total of four hundred and seventy-four (474) vehicles emerged from the Cascade/White River roadway (410 Cars/SUVs and 64 Trucks/Buses) and the remainder from the end point of the Exchange/Bonham Spring roadway (366 Cars/SUVs and 62 Trucks/Buses).

6.1.4 Cascade/White River Roadway

On Day 1 of the survey two hundred and thirty (230) Cars/SUVs and thirty-four (34) Trucks/Buses emerged from the Cascade/White River roadway. Two hundred and twenty-five (225) Cars/SUVs turned left on to the Exchange/Bonham Spring roadway and five (5) turned right/straight on to the Labyrinth roadway. All thirty-four (34) Trucks/Buses observed on the day turned left on to the Exchange/Bonham roadway.

On Day 2 one hundred and seventy-nine (179) Cars/SUVs and thirty-one (31) Trucks/Buses emerged from the Cascade/White River. One hundred and seventy-seven Cars/SUVs turned left on to the Exchange roadway and two (2) turned right/straight on to the Labyrinth roadway. Thirty (30) Trucks/Buses turned left on to the Exchange/Bonham Springs roadway and one (1) turned right/straight on to the Labyrinth roadway.

Table 20 provides traffic volume and vehicle classification information for the Cascade/White River Roadway.

Table 20: Traffic Volume for Cascade/White River Roadway

Cascade/White River Roadway													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	69	-	-	9	-	-	60		-	9		-	**147**
11:00am-1:00pm	81	-	3	13	-	-	48		2	12		1	**160**
4:00pm-6:00om	75	-	2	12	-	-	69		-	9		-	**167**
Total	**225**	**-**	**5**	**34**	**-**	**-**	**177**	**-**	**2**	**30**	**-**	**1**	**474**

6.1.5 Exchange/Bonham Spring Roadway (End Point)

On Day 1 of the survey two hundred and thirteen (213) Cars/SUVs and thirty (30) Trucks/Buses emerged from the Exchange/Bonham Springs Roadway. Two hundred and four (204) Cars/SUVs turned right on to the Cascade/White River roadway and nine (9) turned left on to the Labyrinth roadway. All thirty (30) Trucks/Buses observed on the day turned right on to the Cascade/White River roadway.

On Day 2, one hundred and fifty-three (153) Cars/SUVs and Thirty-two (32) Trucks/Buses emerged from the Exchange/Bonham Springs Roadway. One hundred and fifty-one (151) turned right on to the Cascade/White River roadway and two (2) turned left on to the Labyrinth roadway. All thirty-two (32) Trucks/Buses observed on the day turned right unto the Cascade/White River roadway.

Table 21 provides traffic volume and vehicle classification information for the Exchange/ Bonham Spring Roadway

Table 21: Traffic Volumes for Exchange/Bonham Spring Roadway

Ending of Exchange Road Way to Cascade/White River (R) and Labyrinth (L)													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	3		81	-		12	1		81	-		13	**191**
11:00am-1:00pm	3		57	-		6	-		37	-		7	**110**
4:00pm-6:00om	3		66	-		12	1		33	-		12	**127**
Total	**9**	**-**	**204**	**-**	**-**	**30**	**2**	**-**	**151**	**-**	**-**	**32**	**428**

6.1.6 Exchange Roadway

A total of one thousand eight hundred and sixty-nine (1,869) vehicles emerged from the Exchange roadway. Over the two day period 1,752 Cars/SUVs and 117 Trucks/Buses emerged from the roadway. On Day one (1) of the survey eight hundred and eighty-one (881) Cars/SUV and sixty-two (62) Trucks/Buses emerged from the roadway. Five hundred and four (504) Cars/SUVs turned left heading in the direction of Ocho Rios, St. Ann and three hundred and seventy-seven (377) turned right in the direction of Oracabessa, St. Mary. From the total, sixty-two Trucks/Buses emerging from the roadway, thirty-six (36) turned left in the direction of Ocho Rios and twenty-six (26) towards Oracabessa.

On Day 2 eight hundred and seventy-one (871) Cars/SUVs emerged from the roadway, four hundred and eighty-seven (487) turned left in the direction of Ocho Rios and Three hundred and eighty-four (384) travelled in the direction of Oracabessa. A total of fifty-five (55) Trucks/Buses were observed on Day 2, twenty-nine (29) turning left towards Ocho Rios and twenty-six (26) turned right, travelling in the direction towards Oracabessa. **Table 22** shows the traffic volume for the Exchange Roadway.

Table 22: Traffic Volume for Exchange Roadway

Beginning of Exchange Roadway													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	192		166	12		9	178		141	9		9	**716**
11:00am-1:00pm	145		90	9		8	140		102	9		9	**512**
4:00pm-6:00om	167		121	15		9	169		141	11		8	**641**
Total	**504**	**-**	**377**	**36**	**-**	**26**	**487**	**-**	**384**	**29**	**-**	**26**	**1,869**

6.1.7 North Coast Highway

A total of twenty-seven thousand, four hundred and sixty-two (27,462) vehicles (26,106 cars/SUV and 1,356 trucks/bus) passed along this roadway over the two day period. From the traffic count, a total of nine thousand, three hundred and forty-nine (9,349) vehicles originated from the direction of Oracabessa (8,872 Cars/SUV and 117 Trucks/Buses) and eighteen thousand, one hundred and thirteen (18,113) from the direction of Ocho Rios (17,234 Cars/SUVs and 1,753 Trucks/Bus).

On Day One (1) of the survey, Four thousand, three hundred and sixty-three (4,363) Cars emerged from the direction of Oracabessa and two hundred and fifty four (254) Trucks/Buses. From the total number of Cars/SUVs observed four thousand, two hundred and forty seven (4,247) continued straight towards Ocho Rios and one hundred and sixteen (116) turned left on to the Exchange roadway. Two hundred and thirty-six (236) Trucks/Buses continued straight towards Ocho Rios and eighteen turned left on to the Exchange Roadway.

On Day two (2) there was a slight increase in the number of Cars/SUV observed, but a slight decline in Trucks/Buses. A total of four thousand, five hundred and nine (4,509) Cars/SUVs were observed, four thousand three hundred and sixty-five (4,365) continued in the direction of Ocho Rios and one hundred and forty-four (144) turned left on to the Exchange Road. Two hundred and twenty-three (223) Trucks/Buses were observed, with two hundred and two (202) travelling towards Ocho Rios and twenty-one turning left on to the Exchange Roadway.

Table 23 shows the traffic volume for the North Coast Highway from Oracabessa.

Table 23: Traffic Volume for North Coast Highway From Oracabessa

North Coast Highway Heading From Oracabessa													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	47	1372	-	6	70	-	71	1500	-	5	68	-	**3139**
11:00am-1:00pm	36	1776	-	6	67	-	44	1588	-	7	57	-	**3581**
4:00pm-6:00om	33	1099	-	6	99	-	29	1277	-	9	77	-	**2629**
Total	**116**	**4247**	**-**	**18**	**236**	**-**	**144**	**4365**	**-**	**21**	**202**	**-**	**9349**

For vehicles emerging from Ocho Rios, on Day One (1) eight thousand, seven hundred and eighty-two (8,782) Cars/SUVs emerged from the observed route as well as four hundred and seventy (470) Trucks/Buses. An overwhelming amount of the Cars/SUVs travelled towards Oracabessa, with only four hundred and eighty-two (482) from the observed total turning right on to the Exchange roadway. Four hundred and thirty-four (434) Trucks/Buses continued towards Oracabessa and thirty-six (36) Trucks/Buses turned right on to the Exchange road.

On Day two (2) there were eight thousand, four hundred and forty-two (8,442) Cars/SUVs observed; eight thousand travelling in the direction of Oracabessa. A total of four hundred and nine (409) Trucks/Buses were observed, three hundred and seventy-four continued straight towards Oracabessa and thirty-five (35) turned right on to the Exchange roadway.

Table 24 shows the traffic volumes for North Coast Highway from Ocho Rios.

Table 24: Traffic Volume for North Coast Highway from Ocho Rios

North Coast Highway from Ocho Rios													
Time	**Day 1 (January 5, 2012)**						**Day 2 (January 6, 2012)**						**Total**
	Cars/SUV			**Trucks/Bus**			**Cars/SUV**			**Trucks/Bus**			
	L	S	R	L	S	R	L	S	R	L	S	R	
7:00am-9:00am	-	3309	188	-	146	12	-	3111	167	-	121	9	**7,063**
11:00am-1:00pm	-	2126	127	-	112	12	-	2312	132	-	98	14	**4,933**
4:00pm-6:00om	-	2865	167	-	176	12	-	2577	153	-	155	12	**6,117**
Total	**-**	**8300**	**482**	**-**	**434**	**36**	**-**	**8000**	**452**	**-**	**374**	**35**	**18,113**

6.1.8 Observations and Limitations

1. All routes surveyed are heavily used by public route taxis, which make several trips throughout the day. In collecting the data, route taxis would have more than likely been represented several times in the data. The same could be said of tour buses and trucks, particularly at survey points #3 and #4.

2. The Exchange road is a high traffic roadway. The Exchange road provides access to varying land uses that are found within communities such as Exchange and Bonham. These include high density residential land uses, tourism land uses such as the golf course and other commercial establishments. This road will provide primary access to the site.

6.2 Peak Periods

Thirty thousand, five hundred and sixty-nine (30,569) vehicles were observed during the two (2) days of survey. Approximately thirty-seven percent (37%) of the vehicles counted were observed during the morning peak period of 7:00 a.m. -9:00 a.m., thirty-one percent (31%) during the 11:00 a.m. - 1:00 p.m. afternoon peak period and thirty-two percent (32%) in the evening peak period of 4:00 - 6:00 p.m.

6.2.1 Morning Peak Period (7:00 - 9:00 a.m.)

Over the two (2) days a total of eleven thousand four hundred and fifty-two (11,452) vehicles were counted during the morning peak period. Ten thousand, nine hundred and twenty (10,920) Cars/SUVs and five hundred and thirty-two (532) Trucks/Buses were observed during this period. An estimated ninety-five percent (95%) of all vehicles observed were Cars/SUVs. The highest traffic volumes during the peak morning period were observed at survey points #3 and #4.

6.2.2 Afternoon Peak Period (11:00 a.m. - 1:00 p.m.)

During the afternoon peak period, vehicle volumes declined by approximately eighteen percent (18%) from the morning peak period. Nine thousand, four hundred and forty (9,440) vehicles were counted during the peak afternoon period. Cars/SUVs were the dominant vehicle types observed, accounting for ninety-five percent (95%) of vehicles observed. Only four hundred and fifty-nine (459) Trucks/Buses were observed over the two (2) day period within the afternoon peak period.

The highest traffic volumes during this peak period were observed at survey point #1 only.

6.2.3 Evening Peak Period (4:00 - 6:00 p.m.)

There was a three percent (3%) increase in vehicle volumes from the afternoon peak period. Ninety-three percent (93%) of all vehicles observed during the evening period were Cars/SUVs. A total of nine thousand, seven hundred and seventy-seven (9,777) vehicles were observed during the evening peak period. Nine thousand, one hundred and twenty-seven (9,127) were Cars/SUV and six hundred and fifty (650) were Trucks/Buses. Only survey point #2 saw it highest volumes of traffic during this period.

6.2.4 Conclusions from Traffic Impact Assessment

The Exchange roadway based on observations will be the preferred access route for visitors to the Rivva Riddim Eco-tourism Park. The roadway is used heavily by various vehicle types, including cars, buses and trucks. The existence of tourism facilities such as White River Valley within communities served by the Exchange roadway indicates that the presence of additional vehicles using the roadway to gain access to the Rivva Riddim site will not represent or constitute a major change from current baseline conditions. The Parochial road, a minor roadway which gives direct entrance to the site, will collect traffic from the Exchange roadway. This roadway is not heavily used, particularly by trucks and buses and is a very low capacity roadway. The proposed development is therefore expected to be the main cause of any increased vehicle volumes on the parochial roadway. Given that this roadway accounts for approximately 2%-3% of the journey to the site from the beginning of the Exchange roadway, the impact is deemed very negligible given that:

1. The number of vehicles that currently utilise this roadway is very minimal; and
2. The overall traffic volumes are not expected to be high given that tour buses with excursionists are expected to be the vehicles of choice for visitors to the site. Tour buses on average seat up to 36 passengers on one trip. Therefore with the Park expected to attract on average 250 visitors daily over a 5-6 hour period, it means less than 10 tour buses would be required to transport the daily capacity limits.

7.0 Analysis of Alternatives

The aim of this section of the EIA is to determine whether there are practical alternatives for the use of the project site and the project type being proposed. Based on the assessment of feasible alternatives, there are three (3) options: Do Nothing, Agricultural Expansion and Residential and/or Homestead development.

7.1 Do nothing (Status Quo)

The 'do nothing' alternative would see the land being left in its current state. Though the land was previously used for agricultural purposes, currently the land is in an unproductive state, and is overgrown with vegetation. There are several fruit trees on the property that are being over-run with weeds. This alternative is not seen as a feasible option, given the tremendous value that can be reaped with the development of the land.

7.2 Agricultural Re-development/Expansion

Given the wide expanse of open land area and the past land use of the site, the expansion of agricultural activities is a feasible land use alternative. Sections of the sixteen (16) hectare property can facilitate the redevelopment of the site into a large-sclae agricultural estate. The redevelopment efforts under this option could also see the implementation of dairy farming, cattle rearing, organic farming, fisheries, or the introduction of viable agricultural crops. This option has a number of benefits:

- Increased amounts of green space;
- Production of food for the local population;
- Income and employment opportunities for farmers in the area;
- Reduced economic stagnation;
- Attraction of agro-businesses and other new developments in the area;

The negative impacts associated with this option include:

- Increased use of water for irrigation
- Increased use of fertilisers and pesticides which can pollute water resources
- Possible nitrogen loading from animal manure;
- Possible soil erosion threatening productivity of the crops, but also reducing the structural intergrity of the land.

7.3 Residential and/or Homestead Development

The development of gated residential communities or homesteads can be considered feasible alternatives to the proposed project. Residential developments could be mixed type housing, consisted of single dwellings, apartments or town houses. The homesteads would consist of sub-divisions between 0.8-1.2 hectares, where the land is used for both residential and agricultural purposes. One of the main drawbacks of this project alternative is that residential land uses will

render the property an 'unproductive' land use and will result in significant changes to the physical landscape, including possible changes to the terrain, drainage features and soil characteristics.

7.4 Alternative Sources of Water

There are two main uses of water (domestic and recreational) and three possible sources of water for the project site as follows:

1. Direct abstraction from the White River
2. Water supply from the National Water Commission
3. Water from the JPSCo. woodstave penstock running through the property

Direct abstraction is the least favourable option. For both domestic and recreational uses, an abstraction licence would be required from the WRA. Additionally water abstracted directly from the river for domestic use (drinking, washing hands and preparing food) would require treatment and on-going maintenance of the system.

The option of obtaining potable water from the NWC was therefore thought to be the best option for domestic uses at the Park.

There is an established arrangement for property owners to obtain water from the JPSCo. woodstave penstock passing through their properties. The section of the penstock that passes through the Rivva Riddim property supplies the lower White River Hydropower plant. There is an existing 20 cm diameter water connection which can provide more than enough water for the recreational activities. This option was the preferred option of obtaining the recreational water as it was the least intrusive for the following reasons:

- No abstraction infrastructure would need to be constructed and therefore there will be no negative impact on the White River
- There will be no negative impact on the JPSCo. HP plant as the water to be supplied is a negligible fraction of what they use and a minute faction of the amount that leaks from the pipe constantly

7.5 Alternative Sewage Treatment Options

Options examined for sewage treatment included septic tank and absorption pit and septic tank and evapotranspiration beds. The options for disinfection of the treated effluent included chlorination and uv disinfection.

In an effort to minimise negative impacts on the environment, the reed beds and uv disinfection options were selected. The former so that the soil would not be utilised for treatment based on the proximity of the facility to the White River and the latter to eliminate residual chlorine in the treated effluent being discharged to the White River.

8.0 Carrying Capacity

There is no consensus on the definition of carrying capacity as it is a complex concept with many variables. However it is agreed that factors such as physical space, duration of the interaction of the visitor with the environment, the capability of the environment to sustain the activities without irreparable deterioration and the management of the facility on a whole all contribute to ensuring that the recreational capacity of a facility is not exceeded. For ecotourism recreational projects the following criteria are often used to determine the carrying capacity of a facility:

1. The space where the visitor (individual) can move and interact freely without causing uneasiness or stress to other users
2. The disturbance that the visitor can possibly make on the environment e.g. noise, movement;
3. The physical characteristics of the recreational area e.g. forested, rocky, flat etc.
4. The distance/ length of time travelled by the visitors between her/his place of origin to the intended destination.

In determining carrying capacity therefore, four main capacity types will be reviewed based on the proposed design elements of the *Riwa Riddim* Ecotourism Park and its facilities that will be available.

1. Physical/spatial recreational area capacity
2. Facility design or infrastructural capacity
3. Ecological/biological capacity
4. Social capacity

8.1 Physical Carrying Capacity

The Eco-tourism Conceptual Framework (Regis, 2004) outlines that determination of the physical capacity of a facility can be arrived at by simplifying the Carrying Capacity of the environment formula suggested by Boullon, Roberto C., 1985. This proposed approach states that physical carrying capacity of a facility or the total number of allowed daily visits can be calculated as follows:

Total of Daily Visits (TDV) = Carrying Capacity x Rotation Coefficient.

Carrying capacity is calculated as follows:

$$\text{Carrying Capacity (CC)} = \frac{\text{Area used by tourists}}{\text{Average individual standard}}$$

The A*rea Used by Tourists* is the available space in m^2 to be occupied by visitors, while the *Average Individual Standard* is the space requirement by an individual at any given time to freely function, also known as personal or private space. Human private space is estimated to be 1.5-2 m^2. Acceptable social or public distance is estimated to be greater than 2.4 m.[1] In considering other factors such as space for movement and interaction, noise disturbance etc., the average individual standard is

[1]Engleberg, Isa N. Working in Groups: Communication Principles and Strategies. My Communication Kit Series, 2006. Page140-141

generally increased. The level of increase is generally a management or planning decision and encompasses consideration of the changes in the physical environmental setting and the intended use of the facility.

In the case of *Rivva Riddim*, 200 m^2 is being used as the average individual standard for the facility given:

1. The size of the available area for use by visitors
2. The biological environment of the area that visitors will interface with
3. The number of attractions available to visitors
4. The proposed minimum of 5.6 m of social and public distance to be provided to each visitor (if desired); a doubling of the standard social and public distance requirement.

The area of the Rivva Riddim Park is 16 hectares (160,000 m^2). The carrying capacity of the Rivva Riddim Park is therefore:

160,000/200 = 800

The *Rotation Coefficient* determines the number of batches of people which can be allowed to stay in the attraction for a particular duration. It is computed by dividing the number of hours the area is open to tourists over the average time (hour) spent during the visit.

Rotation Coefficient is calculated as follows:

$$\textit{Rotation Coefficient (RC)} = \frac{\textit{No. of Daily hours area is open to Tourists}}{\textit{Average Time of Visit}}$$

The Rivva Riddim Park will be open for eight (8) hours (4 days per week[2]) and each visitor is expected to spend on average four (4) hours.

The Rotation Coefficient of the facility is therefore: 8/4 = 2

Total of Daily Visits is therefore: 800 x 2 =1,600

It is therefore shown, based on above information, that the Rivva Riddim Ecotourism Park can accommodate 1,600 visitors daily; more than three (3) times the intended peak capacity of 500 visitors daily.

8.2 Parking Facilities

The Development and Investment Manual, Vol.1 Planning and Development, Chapter 4, Section 4.14.2 states that the minimum parking design space requirement is 5.5 m by 2.5 m. Where parking is parallel to a curb the length of the car parking space should be 6.7 m

[2] Saturday, Sunday, Tuesday and Thursday

Minimum requirement for angled parking spaces are:

- 3.36 m for 30 degrees parking spaces
- 3.97m for 45 degrees parking spaces
- 5.5 m for 60 degrees parking spaces

The manual does not have a parking requirement for developments of this nature, and as such there may be need for an individual assessment to determine the number of parking spaces that will be considered sufficient for 500 visitors daily taking into account that some of the visitors will be transported to the park by bus.

Capacity for Swimming Pools

The following capacity standards for pools provided in **Table 25** are recommended for use by the Texas Public Health Code Rule §265.184 (n) General Construction and Design for Post-10/01/99 Pools and Spas and the Rules and regulations of the Saint Louis County Health Department for the design and operation of public water recreation facilities.

Table 25: Capacity Standards for Pools

Description	**Standard/Requirement**
Shallow/Instructional or Beginning or Wading Areas	1.35 m^2 (15 sq. ft.) water surface area per user for water depths equal to or less than 11.7 cm
Deep Area (Not Including Diving Area)	2.25 m^2 (25 sq. ft.) water surface area per user for water depths greater than 11.7 cm
Diving Area (per each diving board)	27 m^2 (300 sq. ft.) water surface area per user
NOTE: • A designated plunge area or landing area for a slide shall not be considered in computing a bather load. • One bather shall be allowed for each 4.5 m^2 (50 sq. ft.) of pool deck area.	

The splash pool/deck is sized at 270 m^2 by 45 cm deep. Based on the recommended carrying capacity standards, the splash pool can serve a maximum of 120 children at any point in time. A maximum of forty (40) children will be allowed at any one point in the Splash Pool at the Theme Park.

The pool at Rivva Riddim is sized at approximately 36 m^2 by 1 m deep. Based on the recommended carrying capacity standards the pool will be able to serve sixteen (16) persons at any point time.

Capacity for Lakes

The following guidelines are recommended as the environmental design guideline standards for man-made lakes in the State of Florida[3]:

- A maximum depth of 3 - 6 m (10-20 feet)

[3] http://images.library.wisc.edu/EcoNatRes/EFacs/Wetlands/Wetlands12/reference/econatres.wetlands12.i0019.pdf

- Slide slopes of 6:1 horizontal to vertical (out at least 0.6 m (2 feet) below the control elevation)

The proposed man-made lake will have the following design dimensions:

- 335 m (1,100 ft.) long
- 30 - 60 m (100-200 ft.) wide
- 2.5 m (8 ft.) - maximum

8.3 Capacity for Bicycle Trails

The Florida Department of Environmental Protection Division of Recreation and Parks 'Visitor Carrying Capacity Guidelines'[4] at **Table 26** recommends the following carrying capacity standards for bicycle trails:

Table 26: Carrying Capacity Standards for Bicycle Trails

Land Area	Area Requirements	Person per unit
Minimum of 10 ha per 1.6 km	10-20 bicycles per 1.6 km	1 person per bicycle

The above standard will be used by *Riwa Riddim* in establishing acceptable carrying capacity standards for its bicycle trail attraction at the Park.

The *Riwa Riddim* Park will have a bicycle trail 2.4 km long to serve a maximum of twenty (20) riders/cyclists. In applying the capacity standard in **Table 26** the 16 hectares Park will be able to accommodate a 2.4 km trail supporting a maximum of 32 bicycles. The bicycle trail at the facility will therefore provide additional trail space of six (6) hectares for cyclists.

8.4 Capacity for Boating

The Florida Department of Environmental Protection Division of Recreation and Parks 'Visitor Carrying Capacity Guidelines' recommends the following carrying capacity standards for boating (with no power) in still water (ponds, lakes etc.)

Table 27: Carrying Capacity for Boating

Land & Water Area	Area Requirements	Person per unit
Minimum of 20 hectares of water and 0.1 hectares of land	1 boat per 2-4 hectares of water	2 persons per boat

However boating capacity standards are determined by several factors: usable lake surface area, number of activities to be undertaken in the lake, environmental setting and boat size. The standard applied by the Florida Department of Environmental Protection Division of Recreation and Parks applies largely to single use lakes and in this case is not the best applicable standard for the Park.

The *Riwa Riddim* Park will be using a 3 hectare lake to facilitate boating activities and picnicking activities in gazebos and tree huts. The boats for use are small inflatable boats. Based on an

[4] http://www.dep.state.fl.us/parks/planning/forms/CarryingCapacityGuidelines.pdf

assessment of the proposed activities and boat size, the Warren and Rea (1989) optimum boating density per boat standard for canoes/kayaking and fishing boats of 0.5 ha (1.3 acres) per boat will be used.

In the case of *Rivva Riddim* Park a maximum of ten (10) boats will be made available for use in the lake. Based on the carrying capacity standard being applied it is recommended that six (6) boats at a maximum be used on the lake along with the other lake activities.

8.5 Restrooms

The minimum local requirements for restrooms for outdoor facilities are shown in **Table 28**. This information was obtained from the *Development and Investment Manual, Vol.1 Planning and Development, Chapter 30 Public Sanitary Facilities, Table 30.6 Minimum Requirements for Public Sanitary Facilities*.

Table 28: Minimum Requirements for Male and Female Public Sanitary Facilities[5]

General Use or Occupancy (Male)			
No. of Males	**WCs**[6]	**Urinals**	**Lavatory Basins**
1-30	1	1	1
31-120	2	1	1
121-240	3	2	1
241-360	4	2	2

Notes: Plus 1 urinal for each additional 1-200 persons
1WC for each additional 1-200 persons
1 Lavatory Basin for each additional 1-200 persons

General Use or Occupancy (Female)		
No. of Females	**WCs**	**Lavatory Basins**
1-30	1	1
31-120	2	1
121-240	3	2
241-360	4	2

Notes: Plus 1WC for each additional 1-100 persons
1 Lavatory Basin for each additional 1-200 persons

[5]Development and Investment Manual, Vol.1 Planning and Development, Chapter 30 Public Sanitary Facilities, Table 30.6 Minimum Requirements for Public Sanitary Facilities
[6] WC – Water Closet

Table 29 - Number of Restrooms at Park versus Standard Requirement

Sex	Capacity	Standard Requirement
Male	500 persons at peak capacity assuming equal numbers of male and female patrons (250 male & 250 female)	4 WCs, 2 urinals and 2 lavatory basins for up to 250 persons
Female		4 WCs and 2 lavatory basins for up to 250 persons
Male	500 persons at peak capacity assuming either majority male or majority female patrons (360 male & 140 female or 360 female & 140 male)	4 WCs, 2 urinals and 2 lavatory basins for up to 360 persons
Female		4 WCs and 2 lavatory basins for up to 360 persons

Rivva Riddim will provide the following number of bathrooms:

Male Bathrooms:

- 4 urinals
- 4 water closets
- 4 lavatory basins

Female Bathrooms:

- 4 water closets
- 4 lavatory basins

9.0 Identification of Environmental Impacts

The purpose of this task is to identify the major environmental and socio-economic impacts of the construction and operation associated with the Ecotourism Park. Adverse impacts need to be identified so that alternative approaches and/or mitigation measures can be implemented. Positive impacts are also noted as this provides justification for the project.

The main activities to be undertaken for this project include:

- Construction Phase
  - Land clearing for park administrative and recreational infrastructure
  - Transportation of equipment, pipelines and construction material
  - Operation of heavy duty equipment
  - Fuel storage and dispensing for heavy duty equipment
  - Stockpile of construction material
  - Commissioning
- Operation Phase
  - Operation of the Ecotourism Park
  - Maintenance

9.1 Adverse Impacts associated with the Proposed Project

The aspects associated with each of these activities that can cause adverse environmental and social impacts are presented in Table 30.

Table 30: Project Activities and Associated Aspects

	ACTIVITY	INPUTS	ASPECTS
1.	Land clearing for park administrative and recreational infrastructure	• Heavy duty construction equipment • Fuel • Labour • Land • Water (for construction and welfare) • Construction material (aggregate, cement, wood etc.)	• Noise • Fugitive dust emissions • Vehicular emissions • Use of fuel • Fuel/oil spills • Use of water • Solid waste (top soil, vegetation, construction debris, garbage) • Sewage • Soil erosion • Construction work • Removal of vegetation
2.	Transportation of equipment and construction material	• Labour • Trucks • Fuel • Material	• Noise • Fugitive dust emissions • Vehicular emissions • Use of fuel • Increased traffic movement

	ACTIVITY	INPUTS	ASPECTS
3.	Fuel storage and dispensing for heavy duty equipment	• Storage tanks/drums • Fuel	• Spills
4.	Stockpile of material	• Material (aggregate, wood, cement etc.)	• Fugitive dust • Erosion
5.	Ecotourism park operations	• Water • Energy – Electricity and fuel • Labour • Visitors	• Use of water • Noise • Land use • Sewage • Solid waste
6.	Maintenance	• Equipment • Labour • Fuel/oil	• Solid waste • Fuel/oil spills • Maintenance work • Vehicular emissions • Use of fuel

The environmental and social impacts associated with the activities and aspects are presented in summary in Table 31 and discussed in detail at Section 9.2 for each phase of the project.

Table 31: Some Potential Negative Impacts of the Project

	ASPECT	POTENTIAL NEGATIVE IMPACTS
Construction phase		
1.	Noise	• Nuisance to persons • Habitat disturbance • Hearing impairment (temporary, permanent)
2.	Fugitive dust emissions	• Air pollution • Respiratory problems
3.	Vehicular emissions	• Air pollution • Respiratory problems
4.	Solid waste (top soil, vegetation, construction debris, wood, garbage)	• Land and water pollution
5.	Sewage	• Land and water pollution
6.	Use of fuel	• Depletion of (oil) resources
7.	Land clearing/Removal of vegetation	• Habitat destruction • Disruption of ecosystems
8.	Soil erosion	• Water pollution - Off-site effect is the movement of sediment into watercourses

	ASPECT	POTENTIAL NEGATIVE IMPACTS
		• On-site impact is the reduction in soil quality which results from the loss of the nutrient-rich upper layers of the soil
9.	Construction work	• Accidents causing death or injury
10.	Increased traffic movement	• Traffic congestion • Motor vehicle accidents
11.	Use of water	• Depletion of water resources
12.	Fuel/oil spills	• Land and water pollution
Operation Phase		
1.	Noise	• Nuisance to persons • Habitat disturbance
2.	Use of water	• Depletion of water resources
3.	Recreational Activities	• Accidents causing death or injury
4.	Sewage	• Land and water pollution
5.	Solid waste	• Land and water pollution • Health impacts
6.	Land use	• Land use change in the area
7.	Increased traffic movement	• Traffic congestion • Motor vehicle accidents
Maintenance		
1.	Use of fuel	• Depletion of resources
2.	Oil spills/leaks	• Land and water pollution
3.	Solid waste	• Land and water pollution
4.	Maintenance work	• Accidents

9.2 Potential Adverse Impacts – Construction

1. Carbon Footprint

Carbon footprint is "the total set of GHG (greenhouse gas) emissions caused directly and indirectly by an individual, organization, event or product" (UK Carbon Trust, 2008). The Carbon footprint of any development is determined largely in the operational phase. Carbon footprint is determined by a number of factors, including size of project sites, size of buildings, acreage of landscape to be cleared, types of vegetation cleared, technologies used during operation etc.

Ecotourism developments are expected to have very low carbon footprints, as they generally require limited changes to the natural physical environment. However in some cases, ecotourism projects do require considerable changes to the physical environment, and as such, there is an increase in the overall carbon footprint of these proposed projects.

The main activities contributing to the carbon footprint of this project are:

1. **The removal of biomass**: The clearance of vegetation during the construction phase of the project will minimally reduce the carbon sequestration capacity of the site.

2. **Site clearance**: the removal of vegetation and site excavation will result in the release of fugitive dust and release of emissions from excavating equipment. This is expected to result in a negligible amount of GHGs being released.

3. **Consumption of fuels**: the use of fuels for the operation of equipment and vehicles, will add minimally to the carbon footprint during the construction and operation phase.

Strategies can be devised to reduce the carbon footprint of the project, once carbon contributing sources are identified.

2. Air pollution

The proposed project site is located within a Greenfield area, used predominantly for agricultural and recreational land uses to the north and south. The preparation of the site, which will include limited excavating and vegetation clearance activities. Approximately 3 hectares of land will be prepared for the establishment of water attractions (splash pool, lake, pool and water slides), gazebos, lake huts and other built attractions. The construction of a sewage treatment plant, solar panels and water storage tank will also require clearance of a further 450 m^2 of land. It is anticipated that approximately 4-5 hectares of vegetation will be cleared from the site during the construction phase of the project.

It is anticipated that during the site development and construction phase that air quality could be adversely affected by dust generated from land clearing for the construction of the Ecotourism Park's administrative and recreational infrastructure as well as the sewage treatment facility.

These activities may increase the volume of fugitive dust at the project site. There are no residents within the vicinity of the project site so this impact can be considered negligible and it will be short term and can be mitigated.

The use of heavy duty vehicles and equipment fuelled by diesel is expected to result in an increase in vehicular emissions during the construction phase of the project. Diesel emissions contain over 40 different components identified as being toxic, some of which include carbon dioxide, nitrogen oxide and sulphur dioxide. In addition to causing air pollution, vehicular emissions contain greenhouse gases, a contributor to global warming. While there are no vehicular emission standards, one criterion for motor vehicle fitness is that there are to be no visible emissions. This negative impact will be short term.

3. Loss of flora and fauna

Approximately 3-5 hectares of vegetation will be removed from the project area to facilitate the installation of water attractions, infrastructural facilities and the parking area. The vast majority (an estimated 95% of the total amount to be removed) of the vegetation will be removed under the Phase one (1) component of the proposed development. The vegetation consists of grass and shrubs and guava trees. Much of the vegetation to be removed does not represent a natural ecosystem, but

are remnants of farm lands that are no longer being cultivated and have now been overtaken by secondary type vegetation.

Vegetation removal activities under the Phase two (2) component of the project will involve the trimming of shrubs and trees to create hiking and biking trails. Trails will be designed along the natural terrain of the land with minimal disruption to existing vegetation.

The present floral composition of the target site for the administrative buildings and constructed recreational facilities (water slides, and artificial lakes) is not representative of the remaining vegetation on the property and so there will be no major loss of vegetation from the development activities. The development activities will also have minimal impact to the fauna of the site. Most observed fauna are not located within the target development area and therefore it is not anticipated that intense construction activities will significantly impact the fauna of the site.

4. Loss of soil

Loss of soil from erosion can occur as a result of tree and vegetation removal and from land clearing and excavation. The target site consists primarily of shrubs and minimal excavation will be done. Additionally, measures can be implemented to minimise the potential impacts of soil erosion and loss.

5. Nuisance noise and hearing impairment

Construction and land clearance activities are expected to result in an increase in nuisance noise within the project site and local area. The area which is rural is a very quiet location as there are no other activities nearby. This has made it a suitable habitat for birds and other wildlife. The construction activities will result in a spike in noise levels that may affect wildlife. However, there are no nearby residents and the noise within the area caused by construction activities will be minor, intermittent and short term.

An increase in traffic movement for the construction phase will likely increase noise levels along the main roadways to the site.

The movement and use of heavy vehicles and equipment during the construction phase will also increase noise levels at the project site.

Persons working on the site will likely be impacted by the noise from construction related activities. Mitigation measures can be instituted to reduce/eliminate the impact of noise on workers.

The noise threshold for humans is 140dB. None of the equipment being used generates noise levels greater than 100dB. Heavy equipment and vehicles generate a standard noise level of between 80 and 90 dB.

Jamaica's noise standards do not suggest any guidelines for this land use (Table 1).

6. Traffic Congestion and Motor Vehicle Accidents

There will be increased truck traffic associated with the delivery of equipment and construction materials. The increased vehicular movement will be intermittent and will last for the duration of the construction phase.

The project site can be accessed by two major roadways, one from St. Mary near Prospect (the Frankfort Road) and the other via the Exchange Road/Lodge Road in St. Ann. These roadways are used by private vehicles, taxis, commercial/delivery trucks. After passing through the commercial and residential areas however, there are few if any pedestrians, no sidewalks and the road narrows. While the roadways can accommodate two-way traffic, drivers must be cautious due to the narrow roads and poor road surface in the rural areas near to the project site.

With the increased traffic there is the potential for increased motor vehicle accidents.

7. Land and Water Pollution

The following environmental aspects could cause land and water pollution:

- Fuel spills from fuel storage and dispensing
- Inappropriate disposal of solid waste which will consist of:
    - Soil from land clearing and excavation
    - Garbage associated with welfare activities
    - Packaging waste
    - Construction debris
- Inappropriate disposal of sewage
- Sediments in storm water from land clearing, erosion and aggregate stockpiles

The construction activities will take place close to the White River however mitigation measures can be implemented to guard against water and land pollution.

8. Depletion of oil resources

Fuel is essential to operate construction equipment and to transport material and equipment to the site. The contribution to depletion of oil resources will be negligible.

9. Depletion of water resources

The quantity of water used for construction will be small and will not contribute to depletion of water resources. Water is essential for construction activities and welfare facilities (drinking water and sanitation). Potable water will be trucked to the site by a contracted service.

10. Construction related accidents

Where construction work is being done, the potential exists for accidents. Measures can be instituted to eliminate or minimise these potential impacts.

11. Man-made or Natural Disasters

Work may be affected adversely by fires (man-made or natural), hurricane, earthquake or flood. The level of disruption can be minimised once preventative measures are instituted and response procedures are implemented.

9.3 Potential Adverse Impacts - Operation Phase

1. Nuisance Noise

There will be a negligible increase in the baseline noise from the recreational activities at the Park. Noise associated with the operation of attractions and sporadic outburst from site visitors will contribute to the continued rise and fall in noise levels at the Park.

2. Use of Water

Potable water is required for domestic purposes (food preparation, washing of hands and drinking) and this will be obtained from the NWC supply.

Water for recreational purposes will be obtained from an existing 20 cm diameter water supply line from the JPSCo. woodstave penstock that passes through the property. Water requirements will include topping up of water in artificial lakes due to evaporation and periodic replacement of the water in the artificial lakes.

In both cases measures can be implemented to conserve water while ensuring that health requirements are satisfied.

3. Recreational Activities

During the operation of the Park it is possible for accidents to occur involving visitors and employees. The likelihood of accidents can be minimised if appropriate safety measures are instituted and the intensity/severity of the impact of the incident, should it occur, can be minimised with appropriate emergency response measures.

4. Land and water pollution - Sewage

The sewage treatment system for the *Rivva Riddim* Park has four (4) main components:

1. 4 No. Septic Tanks
2. 3 No. Vegetative Submersible Bed (VSB) Reed Beds
3. Ultraviolent (Light) Chamber
4. 3 No. Concrete Storage Tank

The system is designed to support an average daily flow of 7 m^3/day from an estimated five hundred (500) visitors daily and to meet the NRCA Sewage Effluent standards. Design calculations are detailed at

Table 32.

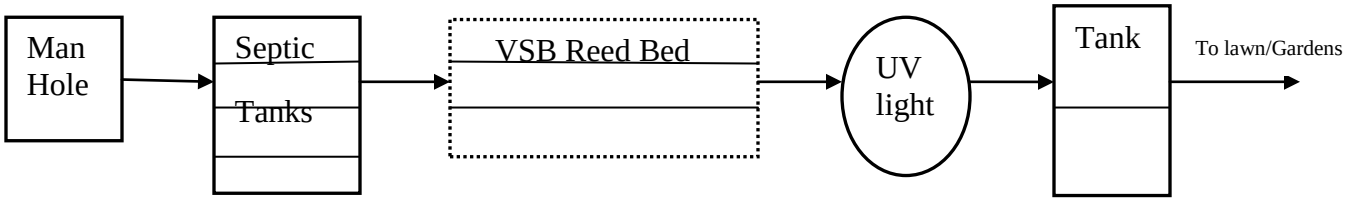
Table 32: Design Calculations for Sewage Treatment System

No of persons	500
No of flushes per day	2
Quantity of wastewater generated per day (2 flushes per day) using water saving toilets 6 L/flush (L)	12
Handwashing per person 2 L per use; 2 uses per day (L)	4
Peak daily generation (L)	14,000
Avg daily generation (L)	7,000
Septic Tank Volume (9,500 L x 4)	38,000
Residence time in the septic tank based on the average daily generation (days)	5.43
Reed bed size 15,884 x 3(L)	47,652
Residence time in the reed bed based on the average daily generation (days)	6.81

Sewage will be treated based on the schematic flow provided below in **Figure 29**.

Sewage will flow via the manhole and grease trap into the Septic Tanks where it will be retained for approximately 5-7 days then flow into the VSB Reed Beds. The sewage will then flow from the Reed beds to the UV system through the UV chamber, where the water will be exposed to the UV-C light rays. Once the water has undergone UV purification it will flow to concrete storage tanks and the overflow will be conveyed via an outlet pipe to water the lawns and gardens on the property.

Figure 29: **UV Sewage Treatment System Schematic Flow**



Treatment plant will be of a modular design and each of the components is described below:

1. **Septic Tank**

The four (4) septic tanks made of concrete with two compartments, designed to treat wastewater effectively for an estimated population of 500 persons daily will be utilised having a combined design volume capacity of 38 m^3.

1. 102 mm diameter PVC inlet, outlet and interior pipes
2. Manhole covers

Estimated retention time in the septic tank is 5 days.

2. VSB Reed Bed

Three (3) 15.2 m x 1.98m x 0.5 - 0.6 m deep VSB Reed Beds will receive sewage from the septic tanks. Sewage treatment in the reed beds involve the settling and filtering of suspended solids, nitrification/denitrification, fixation on the substrate, breakdown of organic matter and nutrient removal via micro-organisms and plant uptake. The reed beds have a retention capacity of 5-7 days.

The beds will be filled with stones and planted macrophytes (reeds) which will be contained using gabion mesh wire. Stones in the inlet and outlet zone will be 60-100 mm in diameter. Perforated PVC pipes will be used for the conveyance of sewage in the reed beds from the septic tanks to the UV Chamber sloped at 0.5%. An adjustable overflow weir will be placed in the outlet box in the outlet zone.

Inlet and outlet pipes within the reed beds are positioned below the gravel surface, so that the water always remains below the gravel surface, thus preventing human exposure to the wastewater, mosquito breeding and unpleasant odours.

3. Ultraviolent Light Water Purification System

The UV Light purification system consists of an ultraviolent chamber and a tank. The UV Chamber has a UV light source (lamp) which is enclosed in a protective transparent sleeve. The lamp will be mounted allowing water passing through a flow chamber to be exposed to UV-C light rays.

The UV light is designed to operate for (1) year under continuous operation or after 9000 hours of use. UV lamps are changed annually to ensure the amount of UV energy available is sufficient to kill micro-organisms.

4. Concrete storage tank

Three (3) 3.3 m x 1.5 m x 1.5 m receiving tanks have a combined design capacity of 22.2 m^3. Treated wastewater will flow from the UV Chamber to the concrete storage tanks. The treated effluent will be used to irrigate the lawns and gardens at the *Riwa Riddim* property.

5. Solid Waste

Solid waste generation and the preparation and storage of food on the property could lead to an increase in the presence of pests and vectors on the site. Rodents, cock roaches, flies and other vermin and pests, including feral/stray animals will thrive in areas where proper measures are not put in place for the safe storage and disposal of garbage, raw and cooked food and other types of

wastes. These pests and vectors are a threat to public health and safety due to the increased potential for the spread of diseases and other associated threats. Mitigation measures can be implemented to eliminate and/or minimise these potential threats.

6. Land Use

The land use will change as a result of the Ecotourism project. An application for change of land use from agriculture to tourism has already been submitted to the St. Mary Parish Council.

The proposed land use change from agriculture and open space to a built tourism development is likely to lead to a small increase in the micro-climate within the immediate boundaries of the site. The change in climate will be due to the increased paved surfaces and buildings. Heat associated with restaurant and kitchen activities, air conditioning units and other heat emitting equipment are likely to contribute to the increased heat effect, though on a very negligible scale.

7. Traffic Congestion and Motor Vehicle Accidents

There will be increased traffic associated with visitors driving private motor vehicles and tour buses. The increased vehicular movement will be permanent once the Park is doing good business.

The project site can be accessed by two major roadways, one from St. Mary near Prospect and the other via the Exchange Road in St. Ann. These roadways are used by private vehicles, taxis, commercial/delivery trucks. After passing through the commercial and residential areas however, there are few if any pedestrians, no sidewalks and the road narrows. While the roadways can accommodate two-way traffic, drivers must be cautious due to the narrow roads and poor road surface in the rural areas nearer to the project site.

With the increased traffic there is the potential for increased motor vehicle accidents.

8. Man-made or Natural Disasters

The operations of the Park may be affected adversely by fires (man-made or natural), hurricane, earthquake or flood. The level of disruption can be minimised once preventative measures are instituted and response procedures are implemented.

9.4 Potential Adverse Impacts – Maintenance

1. Depletion of oil resources

Fuel is essential for maintenance activities and its contribution to resource depletion is negligible.

2. Land and water pollution

The following aspects could cause land and water pollution during maintenance:

- Fuel/oil spills from fuel storage and dispensing
- Inappropriate disposal of solid waste

Oil for lubricating mechanical parts will be used in small quantities and therefore will not pose a significant threat to the environment. Solid waste will likely consist of garbage and worn or damaged infrastructure.

Measures can be implemented to eliminate or minimise the potential negative impacts.

3. Accidents

Employees and maintenance personnel are exposed to the possibility of accidents while conducting maintenance work. Accidents can be minimised if work is done in accordance with an established Health Safety and Environment policy.

9.5 Decommissioning

This project is designed for a long life and will be assessed at regular intervals for relevance. It is expected that the best approach to decommissioning this facility will be determined in the future. As such no specific decommissioning plan will be outlined as a part of this assessment.

10.0 Significant Environmental and Social Impacts

Negative impacts are undesirable, but not all negative impacts are equal. There are some that are considered significant based on a number of criteria. This section determines the significance of each impact according to the specific criteria presented at Table 33. The significant impact determination is presented at Table 34.

Table 33 - Significant Impact Assessment Criteria

CRITERIA	Minor	Moderate	Severe
Scale takes into consideration the spatial/ geographic extent of the impact	On site or within project site boundaries	Beyond site boundary but within community/local area around project site (2 km)	Widespread or at a regional//national/international scale
Duration is the overall length of time an identified impact is likely to persist	Short term (less than 5 years); less than project lifespan; quickly reversible	Medium-term (5-15 years), over the lifespan of the project; reversible over time	Long-term (more than 15 years); permanent; irreversible
Intensity (Baseline Change) examines the severity of the impact on the physical, biological and socio-economic baseline of the project area and examines the change from the pre-project or current baseline conditions	Disturbance of degraded areas, with little conservation value Minor change in species occurrence or variety Limited or no adverse change to the baseline status of social, economic and environmental receptors	Moderate disturbance of areas that have potential conservation value Complete change in species occurrence Disturbance of community's environmental, social and economic fabric Potential conflict with community's development plans	Significant adverse environmental impacts (quality of land, air and water resources) Widespread disturbance of community's social and economic fabric Substantial increase in solid waste generation, increase in potential for erosion, flooding or leaching. Removal and or destruction of large quantities of flora and fauna, including endangered or threatened species; substantial interference with the movement of migratory species

CRITERIA	Minor	Moderate	Severe
Affected Numbers takes into account the number of individuals or receptor population (organisms, people etc.) that stand to be affected by the project	<5% of the population or habitat is directly exposed	5-10% of the population or habitat is directly exposed	>10% of the population or habitat is directly exposed
Secondary Effects considers the indirect effects of the project	Few indirect impacts	Moderate amount of indirect impacts	Substantial amount of indirect impacts (generational impact)
Reversibility evaluates the extent to which the affected receptor can be returned to its pre-project state after experiencing an adverse impact	Completely reversible (0-5 years); not costly	Reversible (5-15 years); may or may not be costly	Irreversible (damage cannot be reverted to original condition within a 50-100 year period)
Acceptability takes into account the willingness of stakeholders to make trade-offs, given the potential benefits of the project, limited environmental changes or the ability to mitigate adverse impacts	No risk to public health. Modification of landscape without down grading special social, economic and aesthetic values Within legal thresholds and allowable limits Some loss of biological populations and habitats	Conflict with policies or land-use plans Loss of populations of commercial biological species Community stakeholders willing to make trade-offs Projected impacts (environmental, social and economic) can be managed through the implementation of alternatives, mitigation measures and with regulatory controls	Large scale loss of productive capacity of renewable resources Increases level of risk to public health Project needs to be redesigned Extinction of biological species, loss of diversity, rare or endangered species and critical habitats Legal thresholds and allowable limits exceeded/ breached Can lead to widespread public outcry

Table 34 - Significant Impact Determination

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
	Construction phase		
1.	**Fugitive dust emissions & Vehicular emissions** • Air pollution • Respiratory problems	SCALE - Local area DURATION - Temporary for the duration of construction INTENSITY (BASELINE CHANGE) -Minor adverse change to baseline status of economic, environmental and social receptors AFFECTED NUMBERS - Potential to affect workers on site; no residents nearby SECONDARY EFFECTS - If excessive could cause respiratory problems for workers; decline in visual aesthetics of the area; health impacts; minimal increase in local climate since dust traps heat; negligible contribution to climate change REVERSIBILITY – Reversible; dust will eventually be rained out of the atmosphere and emissions dispersed; winds within the area will contribute to dispersal of fugitive dust and emissions ACCEPTABILITY – Within legal limits and allowable thresholds; acceptable once mitigation measures are employed	**NO**
2.	**Noise** • Habitat disturbance • Hearing impairment for workers (temporary, permanent)	SCALE - On-site, within project boundaries DURATION - Short term – for duration of construction INTENSITY (BASELINE CHANGE) - No adverse change to baseline status of economic, environmental and social receptors AFFECTED NUMBERS - No one lives near to the project site; workers could potentially be affected The area is disturbed so there is minimal impact on habitat SECONDARY EFFECTS - Not applicable REVERSIBILITY - The effects of the temporary	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		nuisance associated with changes in noise levels are completely reversible with cessation of the construction activities. ACCEPTABILITY - Within legal limits and allowable thresholds; acceptable as noise levels should be low and only for the duration of the construction phase	
3.	**Solid waste (top soil, vegetation, construction debris, garbage)** • Land and water pollution	SCALE - Local area; could extend beyond project boundary if river is polluted DURATION - Temporary for the duration of construction INTENSITY (BASELINE CHANGE) – There is the potential for (a) Moderate disturbance of areas that have potential conservation value (b) Disturbance of community's environmental, social and economic fabric AFFECTED NUMBERS - 5-10% of the population or habitat is directly exposed SECONDARY EFFECTS - Stockpiled solid waste may become an aesthetic and sanitation problem REVERSIBILITY - Reversible ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	**YES**
4.	**Land clearing/removal of vegetation and excavation** • Loss of habitat; disruption of ecology	SCALE - Local area DURATION - Permanent INTENSITY (BASELINE CHANGE) - The target site is a disturbed area covered with shrubs, weeds and grass that was previously used for agriculture/pasture. Negligible change in species occurrence or variety; limited or no adverse change to the baseline status of social, economic and environmental receptors. AFFECTED NUMBERS - Negligible SECONDARY EFFECTS - Improved aesthetics REVERSIBILITY – Reversible; areas will return to	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		previous state if left alone; that is, natural vegetation from the area will cover those areas cleared at no cost ACCEPTABILITY - Within allowable thresholds; acceptable once mitigation measures are employed	
5.	**Use of fuel** • Depletion of (oil) resources	SCALE - National/international scale as an imported non-renewable energy source is being used DURATION - Short term, for the duration of the project INTENSITY(BASELINE CHANGE) - No adverse change to the baseline status of social, economic and environmental receptors; contribution to global depletion of resources is negligible AFFECTED NUMBERS - Contribution to national and global demand is negligible SECONDARY IMPACTS - Contributes to greenhouse gas emissions; air pollution; to high fuel bill and foreign exchange demand REVERSIBILITY - Permanent ACCEPTABILITY – Within allowable thresholds, acceptable given the type of project; no alternatives available	**NO**
6.	**Sewage** • Land and water pollution	SCALE - Onsite within project site boundaries land pollution can occur; potential threat to water resources as the river runs nearby DURATION - Short term, for the duration of the project INTENSITY – Small number of construction workers for a short duration, limited or no adverse change to the baseline status of social, economic and environmental receptors AFFECTED NUMBERS - <1% of the population or habitat will be directly exposed SECONDARY IMPACTS – Possible foul odours; may attract rodents and flies REVERSIBILITY - Quantity of sewage small, land and	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		water pollution reversible naturally over time ACCEPTABILITY – Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	
7.	**Soil erosion** • Off-site effect is the movement of sediment and pollutants into watercourses • On-site impact is the reduction in soil quality which results from the loss of the nutrient-rich upper layers of the soil	SCALE – Local; sediments may be transported by storm water beyond the site boundary but within the community/local area around the project site (2 km) to the White River DURATION - Short term, for duration of project INTENSITY - Minor change in species occurrence or variety; limited or no adverse change to the baseline status of social, economic and environmental receptors AFFECTED NUMBERS - >10%; the aquatic ecosystem could be impacted temporarily by increased sediment runoff; >10% of person in communities could be affected by downstream flooding and loss of livelihood from a depletion in fish resources SECONDARY IMPACTS - • May ultimately adversely impact the Ocho Rios Marine Park and contribute to continued degradation of the reefs and coastal ecosystems generally • Destruction of spawning habitats and nurseries • Increased risk of downstream flooding due to reduced water holding capacity of the river • Destruction to properties within the floodplain during flood events or heavy rainfall events. REVERSIBILITY – Reversible through dredging but costly ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	**YES**
8.	**Construction work** • Accidents causing death or injury	SCALE - Onsite within project boundaries DURATION - Short term for the duration of the project	**YES**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		INTENSITY - Has the possibility to disturb the baseline social receptors AFFECTED NUMBERS - <1%, only construction workers will be exposed SECONDARY IMPACTS – N/A REVERSIBILITY - Death and serious injury not reversible ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	
9.	**Increased traffic movement** • Traffic congestion • Motor vehicle accidents	SCALE - Beyond site boundary but within community/local area around project site (2 km) DURATION - Temporary for the duration of construction INTENSITY (BASELINE CHANGE) - No adverse change to baseline status of economic, environmental and social receptors except in the case of accidents causing injury or death AFFECTED NUMBERS - <1% SECONDARY EFFECTS – N/A REVERSIBILITY – congestion is reversible; loss of life from accidents is permanent ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of alternatives, mitigation measures and with regulatory controls	**YES**
10.	**Use of water** • Depletion of water resources	SCALE - Beyond site boundary but within community/local area around project site (2 km) DURATION - Short term for the duration of the project INTENSITY - No adverse change to the baseline status of social, economic and environmental receptors	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		AFFECTED NUMBERS - Negligible SECONDARY IMPACTS - N/A REVERSIBILITY - Permanent ACCEPTABILITY – Within allowable thresholds; no alternative, water needed for construction and welfare purposes	
11.	**Fuel and oil spills** • Land and water pollution	SCALE - Onsite (within project site boundaries) land pollution can occur; potential threat to water resources as White River is situated nearby DURATION - Short term, for the duration of the project INTENSITY – Quantity of fuel to be used during construction is small; limited or no adverse change to the baseline status of social, economic and environmental receptors AFFECTED NUMBERS - <1% of the population or habitat will be directly exposed SECONDARY IMPACTS - Unsightly appearance of areas where spills occur; quantities are likely to be small but they may be transported to other locations via storm water; land and water pollution associated with waste disposal REVERSIBILITY - Quantities are likely to be small; can be cleaned up; land pollution reversible naturally over time ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	**YES**
		Operation Phase	
1.	**Use of water**	SCALE - Local DURATION - Permanent INTENSITY (BASELINE CHANGE) - No adverse change to the baseline status of social, economic and environmental receptors; no effect on the aquatic	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		ecosystem of the White River. AFFECTED NUMBERS - None SECONDARY EFFECTS – N/A REVERSIBILITY - Permanent ACCEPTABILITY – No noticeable impacts; within legal thresholds and allowable limits.	
2.	**Noise** • Nuisance to persons • Habitat disturbance	SCALE - Onsite within boundary of project site DURATION - Long term, permanent; for as long as the Park is in operation. INTENSITY - Minor change to baseline noise which will fluctuate based on the number of persons at the Park. Expected noise levels should be well within the acceptable limits. AFFECTED NUMBERS – Negligible SECONDARY IMPACTS – N/A REVERSIBILITY – N/A ACCEPTABILITY – Within allowable thresholds	**NO**
3.	**Recreational Activities** • Accidents	SCALE - Onsite within project boundaries DURATION – Episodic INTENSITY - Has the possibility to disturb the baseline social receptors AFFECTED NUMBERS – 5-10%, all visitors are exposed SECONDARY IMPACTS – May affect reputation of facility REVERSIBILITY - Death and serious injury not reversible ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with	**YES**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		regulatory controls	
4.	**Sewage** • Land and water pollution	SCALE - Onsite within project site boundaries land pollution can occur; potential threat to water resources as the White River is located nearby DURATION - Permanent INTENSITY – May cause disturbance of community's environmental, social and economic fabric if sewage generated by the users of the Park (visitors and workers) is not properly treated. AFFECTED NUMBERS - >10% of the population or habitat could be directly exposed SECONDARY IMPACTS – Possible foul odours; may attract rodents and flies; may ultimately adversely impact the Ocho Rios Marine Park and contribute to continued degradation of the reefs REVERSIBILITY – Land and water pollution reversible naturally over time ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of alternatives, mitigation measures and with regulatory controls	**YES**
5.	**Solid Waste** • Land and water pollution	• SCALE - Local area; could extend beyond project boundary if river is polluted • DURATION – Episodic or continuous during the operation of the Park • INTENSITY (BASELINE CHANGE) – There is the potential for (a) Moderate disturbance of areas that have potential conservation value (b) Disturbance of community's environmental, social and economic fabric AFFECTED NUMBERS - 5-10% of the population or habitat is directly exposed SECONDARY EFFECTS - Stockpiled solid waste may become an aesthetic and sanitation problem causing a	**YES**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		public health risk from flies, mosquitoes and rats that contaminate food and increase the threat of diseases REVERSIBILITY - Reversible ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	
6.	**Land use** • Alteration of development and land use in the area	SCALE - Local area around project site DURATION - Long term, permanent. INTENSITY - Significant change in land use AFFECTED NUMBERS - None SECONDARY IMPACTS -Improved aesthetics; negligible increase in local temperature from heat emitting equipment and paved areas REVERSIBILITY – Land use can revert to open space/pasture if infrastructure is removed; this would incur moderate cost ACCEPTABILITY - Acceptable use of land based on the benefits to be derived	**NO**
7.	**Increased traffic movement** • Traffic congestion • Motor vehicle accidents	SCALE - Beyond site boundary but within community/local area around project site (2 km) DURATION – Permanent once the Park is doing good business INTENSITY (BASELINE CHANGE) - No adverse change to baseline status of economic, environmental and social receptors except in the case of accidents causing injury or death AFFECTED NUMBERS - <1% SECONDARY EFFECTS – May affect business at the park if there is too much traffic and if the potential for accidents is high REVERSIBILITY – congestion is reversible; loss of life from accidents is permanent	**YES**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of alternatives, mitigation measures and with regulatory controls	
8.	**Man-made or Natural Disasters**	SCALE - Beyond site boundary but within community/local area around project site (2 km) DURATION – Periodic/Ad-hoc INTENSITY (BASELINE CHANGE) – May cause adverse change to baseline status of economic, environmental and social receptors except depending on intensity AFFECTED NUMBERS - Depends on intensity SECONDARY EFFECTS – May affect business at the park REVERSIBILITY – damage to property is reversible; loss of life is permanent ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of alternatives, mitigation measures and with regulatory controls	**YES**
	Maintenance		
1.	**Oil spills/leaks** • Land and water pollution	SCALE – Local DURATION – Short term, each time maintenance requiring the use of lubricants and oil is conducted INTENSITY - No adverse change to the baseline status of social, economic and environmental receptors; quantities are small AFFECTED NUMBERS – N/A SECONDARY IMPACTS - Unsightly appearance of areas where spills occur; quantities are likely to be small but they may be transported to other locations via storm water; land and water pollution associated with waste disposal REVERSIBILITY - Quantities are likely to be small; can be cleaned up; land pollution reversible naturally over	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	SIGNIFICANT IMPACT ASSESSMENT CRITERIA	SIGNIFI-CANT
		time ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	
2.	**Solid waste** • Land pollution	SCALE – Local DURATION - Permanent INTENSITY - No adverse change to the baseline status of social, economic and environmental receptors; facilities already exist for the management of solid waste; quantities will be small AFFECTED NUMBERS – N/A SECONDARY IMPACTS - Garbage may attract rodents; uncontained garbage can affect aesthetics REVERSIBILITY - Completely reversible at minimal cost ACCEPTABILITY – Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with regulatory controls	**NO**
3.	**Maintenance work** • Accidents causing death or injury	SCALE - Onsite within project boundaries DURATION - Short term INTENSITY - Has the possibility to disturb the baseline social receptors AFFECTED NUMBERS - <1%, only maintenance workers will be exposed; type of maintenance is unlikely to be high risk SECONDARY IMPACTS – N/A REVERSIBILITY - Death and serious injury not reversible ACCEPTABILITY - Projected impacts (environmental, social and economic) can be managed through the implementation of mitigation measures and with	**NO**

	ASPECT /POTENTIAL NEGATIVE IMPACTS	**SIGNIFICANT IMPACT ASSESSMENT CRITERIA**	**SIGNIFI-CANT**
		regulatory controls	

11.0 Mitigation Measures

Negative environmental impacts can be mitigated by implementing measures during the construction, operating and maintenance phases to eliminate or significantly reduce them.

Mitigation measures to address the potential negative impacts, significant or not, associated with this project are presented in Table 35.

Table 35: Mitigation Plan

	SIGNIFICANT ASPECT /IMPACTS	MITIGATION MEASURES	SIGNIFI-CANT
	Construction phase		
1.	**Fugitive dust emissions & Vehicular emissions** • Air pollution • Respiratory problems	• Cover haulage vehicles transporting aggregate, soil and cement • Cover and/or wet onsite stockpiles of aggregate, soil etc. • Ensure proper stock piling/storage and disposal of solid waste • Wet cleared land areas regularly • Provide workers with the necessary Personal Protective Equipment (PPE) e.g. dust masks and ensure that they are worn • Operate well maintained vehicles and equipment	**NO**
2.	**Noise** • Habitat disturbance • Hearing impairment for workers (temporary, permanent)	Provide workers with the necessary Personal Protective Equipment (PPE) e.g. hearing protection and ensure that they are worn	**NO**
3.	**Solid waste (top soil, vegetation, construction debris, garbage)** • Land and water pollution	• Contain garbage and construction debris and dispose of at the approved municipal disposal site at Tobolski or Haddon • Landscape project sites with top soil excavated	**YES**
4.	**Land clearing/removal of vegetation and excavation** • Loss of habitat; disruption of ecology	• Bring to the attention of the Jamaica National Heritage Trust and the NEPA immediately and safeguard • Only clear those areas that are absolutely necessary	**NO**
5.	**Sewage** • Land and water pollution	Use a reputable company to provide portable toilets for workers	**NO**

	SIGNIFICANT ASPECT /IMPACTS	MITIGATION MEASURES	SIGNIFI-CANT
6.	**Soil erosion** • Off-site effect is the movement of sediment and pollutants into watercourses • On-site impact is the reduction in soil quality which results from the loss of the nutrient-rich upper layers of the soil	• Only clear top soil from areas to be used • Place berms around stockpiles of top soil • Avoid steep cuts and where there are steep cuts they must be shored up • Utilise sediment traps to minimise sediment runoff to the river • Re-vegetate areas that have been cleared, but not paved	**YES**
7.	**Construction work** • Accidents causing death or injury	• Erect signs during construction activities • Provide workers with the necessary Personal Protective Equipment (PPE) • Train construction personnel in good safety practices and emergency preparedness and response measures	**YES**
8.	**Increased traffic movement** • Traffic congestion • Motor vehicle accidents	• Erect signs along main transportation route and in sensitive areas such as schools • Transport heavy equipment during off-peak traffic hours • Trucks transporting construction material should be advised to comply with the speed limits	**YES**
9.	**Fuel and oil spills** • Land and water pollution	• Store fuel with secondary (spill) containment infrastructure • Utilise proper dispensing equipment • Have spill containment and cleanup equipment on site and dispose of waste in accordance with best practices	**YES**
	Operation Phase		
1.	**Use of water** • Depletion of water	• Utilise water conserving infrastructure • Develop and implement a water conservation programme for employees and visitors	**NO**
2.	**Sewage** • Land and water pollution	• Design the Sewage treatment plant to meet the NRCA sewage effluent standards • Develop a maintenance plan and implement same • Maintain spare parts and contingency measures • Develop an Emergency preparedness and response plan for man-made and natural disasters	**YES**
3.	**Recreational Activities**	• Develop an Occupational Health and Safety Plan for	**YES**

	SIGNIFICANT ASPECT /IMPACTS	MITIGATION MEASURES	SIGNIFI-CANT
	• Accidents	employees • Develop an Emergency preparedness and response plan for man-made and natural disasters • Maintain a First Aid station at the Park • Use signs to advise visitors of safety requirements	
4.	**Solid Waste** • Land and water pollution	• Contain garbage to prevent infestation by flies and rodents, remove biodegradable garbage for disposal frequently and dispose of at the approved municipal disposal site at Tobolski or Haddon • All food handlers at the facility should have the required permit as required by law • Food should be safely stored to prevent contamination	**YES**
5.	**Land Use**	• Plant vegetation where possible in areas that are not paved • Use environmentally friendly construction materials as the main building materials e.g. wood for the administrative building and welcome area facilities	**NO**
6.	**Increased traffic movement** • Traffic congestion • Motor vehicle accidents	• Consult with the Parish Council to have them effect road improvements to areas where this could help to minimise accidents and congestion	**YES**
9.	**Man-made or Natural Disasters**	• Develop an Emergency Preparedness and Response Plan and train employees in the requirements of the plan • Use signs to advise visitors of safety requirements	**YES**
		Maintenance	
1.	**Oil spills/leaks** • Land and water pollution	• Store fuel with secondary (spill) containment infrastructure • Utilise proper dispensing equipment • Have spill containment and cleanup equipment on site and dispose of waste in accordance with best practices	**NO**
2.	**Solid waste** • Land pollution	Contain garbage and waste from maintenance activities and dispose of at the approved municipal disposal site at	**NO**
3.	**Maintenance work** • Accidents causing death or injury	• Erect signs during construction activities • Provide workers with the necessary Personal Protective Equipment (PPE) • Train construction personnel in good safety practices	**NO**

	SIGNIFICANT ASPECT /IMPACTS	MITIGATION MEASURES	SIGNIFI-CANT
		and emergency preparedness and response measures	

11.1 Positive Impacts

The positive impacts from the proposed project include job opportunities, diversification and enhancement of the tourism product, induced development and increases in property value and conservation and preservation of natural resources. More details are provided below on the positive impacts of the project.

1. Job Opportunities

The *Riwa Riddim* Ecotourism Park will employ persons from the community as well as skilled workers during the construction phase of the project. During the operational phase a maximum of 80 persons will be employed. The following workers will be required:

a. Supervisors
b. Engineers
c. Building Contractors
d. Security Guards
e. Surveyors
f. Sanitation Workers/Clean Up Workers
g. Administrative staff
h. Food vendors
i. Ride/attraction operators
j. Lifeguards
k. First Aid responders

Local contractors and workers will be the target working group for the company. If the required number and level of expertise for the project cannot be sourced within the communities located within the surrounding area of the project site, then regional, national and international contractors will be sourced.

The provision of jobs in the parish has become particularly important, given the results of recent social assessments and surveys on poverty in Jamaica. In 2005, the Planning Institute of Jamaica (PIOJ) ranked St. Ann as the poorest parish in Jamaica. The PIOJ found that the per capita mean average consumption in St Ann was $48,508, or 42.2 % below the national mean. The estimates also revealed that St. Ann was the parish with the highest incidence of poverty at 37%. At the time of the survey, the poverty line was set at $47,128.70 per year for an individual, against the national mean average per capita consumption of $84,253 per annum.[7]

[7] http://www.jamaicaobserver.com/St-Mary-St-Ann-rekindle-poorest-parish-debate_8021660#ixzz1CjYtTS7R

CRITERIA	ASSESSMENT
Scale	Local and Regional
Duration	Job opportunities provided during the construction phase will be short-term arrangements. O&M activities will require long-term contractual arrangements.
Intensity/Baseline	The project will represent a fairly minor change from existing baseline conditions, given that an estimated 68% of persons surveyed were already employed. However with the **creation of employment opportunities** being identified as one of the most needed community improvements, the project could provide additional employment benefits for community members.
Affected Numbers	The entire population stands to benefit from such an initiative
Secondary Effects	• Potential improvement in the standard of living • Increase wages and salaries • Reduction in unemployment rate in communities • Social development through increased employment opportunities and earnings
Acceptability	Positive social and economic development is generally an acceptable outcome in development trade-offs. In this current economic climate, where job losses have been high and investments low, development activities that help to drive the growth of the local economy is an all-round positive impact
This is classified as a moderate positive given the current poverty status of the parish.	

2. Enhancement and Diversification of Tourism Product and Industry

The development of an ecotourism park is deemed a positive impact given the direct and indirect benefits to be accrued from the promotion and growth of a new niche market within the sector. These include increased government revenues (taxes etc.), increases in local sales tax revenues and other tourist oriented revenues (foreign exchange earnings), creation of new jobs to meet tourist attraction business requirements (tour operators, taxi services, etc.), and over time improved municipal services and road infrastructure. The creation of additional linkage opportunities such as food and beverage production, local craftwork, real estate sales and tourist engagement in education and cultural activities, will also contribute to the sustenance of the tourism industry and economy.

CRITERIA	ASSESSMENT
Scale	Widespread effects into the various communities on the island
Duration	Over the lifetime of the project
Intensity/Baseline	Significant effect. With the introduction of an eco-tourism park, a new tourism attraction will be added to the country to help stimulate economic and social growth.
Affected Numbers	The entire Jamaican population is expected to benefit directly or indirectly

CRITERIA	ASSESSMENT
Secondary Effects	• Sustainable economic growth • Increased government revenue • Improved in the general standard of living • Improved community resources • Development of tourism industry • Development and sustenance of micro-businesses • Cultural re-birth
Acceptability	Positive social and economic development is generally an acceptable outcome in development trade-offs. In this current economic climate, where job losses have been high and investments low, development activities that help to drive the growth of the local economy is an all-round positive impact
Based on the long-term duration, very significant change to existing conditions, the large numbers of receptors, this impact is assessed as a significant positive impact.	

3. Induced Development and Increases in Property Value

The proposed development may eventually lead to increased land use within the general surrounding areas. The anticipated growth in land use activities within the watershed area is expected to change the general character of the surrounding area by influencing the type of developments that take place, their scale, and regional extent.

CRITERIA	ASSESSMENT
Scale	Local and Regional
Duration	Long-term
Intensity/Baseline	With the introduction of eco-tourism or nature based tourism, a new tourism product will help to diversify the sector, by providing additional attractions. This in turn will help in attracting new types of tourists, increasing earnings and providing a platform for further economic and social growth with the expansion of the sector.
Affected Numbers	The entire Jamaican population is expected to benefit directly or indirectly
Secondary Effects	The development of an eco-tourism facility will support the growth of commercial activities in the area. This type of induced spatial development has the potential to stimulate economic growth, increase adjacent property values, and support the growth of the land market. • Improvement to local infrastructure (including utilities and municipal services) • Productive use of land within surrounding areas • Promotion of sustainable economic activities
Acceptability	Given the tremendous benefits to be accrued from such a project, receptors will be generally accepting of such a project.

CRITERIA	ASSESSMENT
Based on the long-term duration, very significant change to existing conditions, the large numbers of receptors, this impact is assessed as a significant positive impact.	

4. Protection and Conservation of Natural Resources

Jamaica, like so many other Small Island Developing States, is known for its "all-inclusive" sun, sand and sea tourism package. Ecotourism is still an evolving niche market segment in Jamaica, which has had, though limited, some measurable success. Dunn's River Falls, Mystic Mountain, Apple Valley Park and White River Valley are a few ecotourism establishments that have embraced the principles of ecotourism and have sought to protect and conserve the natural resources on which their businesses' success depends.

If greater focus is spent establishing nature based tourism attractions, then more resources could be made available to protect the limited natural resources that have helped to drive the ever rapidly expanding tourism sector.

CRITERIA	ASSESSMENT
Scale	National Scale
Duration	Long-term
Intensity/Baseline	There exists several ecotourism attractions in the White River Valley area, however the proposed project is larger in scope. If properly implemented and the principles of ecotourism are embraced, then the anticipated changes will represent a major change from present baseline conditions. The opportunity exists to raise awareness on the flora and fauna species within the White River watershed, but also to promote community-based tourism initiatives.
Affected Numbers	The entire Jamaican population is expected to benefit directly or indirectly
Secondary Effects	The development of an ecotourism attraction will support the development and implementation of conservation methods on the use and protection of natural resources. There is also vast potential to raise awareness about scarce resources via educational programmes aimed at increasing local (indigenous) technical knowledge on the various resources available.
Acceptability	Given the tremendous benefits to be accrued from such a project receptors will be generally accepting of such a project.
Based on the long-term duration, very significant change to existing conditions and the large numbers of receptors that can benefit as a result of its implementation, this impact is assessed as a significant positive impact.	

12.0 Environmental Management Plan

In accordance with the approved terms of reference (TOR), this Environmental Management Plan (EMP) has been prepared to ensure that all activities undertaken during the construction and operations of the proposed development are done in a manner that will reduce and/or eliminate the identified adverse impacts associated with the proposed project. The EMP serves to outline the prevention and preservation methods and procedures that should be adopted by the developers and operators of this development to ensure that the physical, biological and social environment is protected. This plan will therefore cover the following:

i. Management Objectives during Construction and Operational Phases
ii. Management and Monitoring Actions to be implemented
iii. Persons responsible for the implementation and management of monitoring actions
iv. Performance targets and specifications
v. Implementation Schedule

12.1 Environmental Management Objectives

1. Construction Phase

a. Establish controls on contractors to ensure that the proposed mitigation measures are implemented in a timely and effective manner. This includes provisions for worker safety, road safety, waste and materials management.
b. Effectively minimise risks and negative environmental effects of natural disasters and hazards (hurricanes, fires, earthquakes, oil spills and accidental leaks).
c. Reduce and manage predicted waste-streams.
d. Minimise specific negative impacts on surface water quality from all aspects of construction
e. Minimise construction nuisances to other land users throughout the development phase of the project.

2. Operational Phase

1. Develop and implement comprehensive environmental management plans, which clearly identify targets for environmental performance.
2. Develop and implement saftey procedures and training schedules that must be undertaken by all staff members and visitors to the site.
3. Ensure that staff is trained in environmental management and monioring procedures.
4. Conduct maintenance operations in a way that is compliant with environmental regulations best practices for pollution prevention, waste reduction, recovery and recycling.
5. Properly maintain the project area to ensure that the adjacent ecosystems and their aesthetic appearance are not negatively impacted.

12.2 Safety Requirements

1. Construction phase

The contractor shall comply with safety rules and regulations that are enforced at the site in accordance with local and international safety standards such as Occupational Health and Safety

Administration (OHSA) and the provisions of the draft Jamaica Occupational Safety and Health Act (JOSHA).

a. The contractor shall be solely responsible for the safety of his subcontractor's employees. It is mandatory that all personnel required to perform work at the site be fitted with approved PPE such as safety helmet, glasses and boots at minimum while on site. Additional PPE must be worn based on the hazards identified. Failure to comply with these requirements will result in the expulsion of the offending individual(s) from the site. A pre-start site conference meeting on safety will be held by the Project Manager to advise the contractor of the safety standards and requirements expected.
b. The contractor shall promptly correct any unsafe conditions brought to his attention.
c. In the event of an accident, the contractor shall provide the Project Manager with a written report of all pertinent details of the accident within twenty-four (24) hours of its occurrence. This report shall include recommended actions to prevent future occurrence.
d. The contractor shall provide protection and storage for his equipment, general property, vehicles and personnel during all phases of the work.
e. The contractor shall be responsible for his sub-contractors' compliance with safety regulations.
f. The contractor shall provide a first-aid station and people who can administer first aid on site.
g. The contractor shall ensure that his on-site work force is fully equipped with the required safety gears, e.g. hats, boots, gloves, overalls, goggles, equipment for working at high elevations etc.

2. Operational Phase

a. Signs, notices and directions must be erected in clear view of visitors, outlining all safety rules and regulations governing the use of the park and its facilities.
b. Fire extinguishers, fire alarms, smoke detectors and other safety equipment should be placed in strategic locations across the property. Staff should be trained in the use of all safety equipment and visitors given a brief overview on the use of safety equipment upon entry to the welcome area.
c. Emergency assembly sites should be clearly labeled and communicated to visitors to the *Riva Riddim* site.

12.3 Post Permit Documentation Requirements

1. Emergency Preparedness Response Plan

An Emergency Preparedness and Response Plan (EMP) will be prepared once all approvals from the relevant authorities have been granted.

The goal of this plan is to prevent where possible and minimise the effects of emergencies, disasters and accidents on the operations of the attraction. Emergency preparedness should help to reduce human suffering and economic losses that could arise. The specific objectives of the plan are to:

a. Implement measures to minimise the likelihood of emergencies that can adversely impact humans and the environment.
b. Provide an immediate and effective response to incidents that represent a risk to human safety, public health or the environment.
c. To ensure that the Park can be operational as quickly as possible after the occurrence of an emergency and/or disaster situation.

The approach taken to emergency response planning is four-fold:

a. Prevention: actions to reduce exposure to or eliminate the hazard. Reducing the degree, extent and magnitude of hazards can be achieved through the proper scaling, designing and redesigning of elements of the project.
b. Preparedness: actions to plan, equip and train for the event, which includes the education of both visitors and staff utilizing the premises.
c. Response: action to save lives and property during the event. This includes safety procedures, methods and equipment required.
d. Recovery: actions taken to resume pre-event conditions.

2. Operational Plan

An attractions operational plan for the proposed Rivva Riddim Ecotourism Park will be prepared following the completion of the development. The plan will be finalised following consultation with the Jamaica Tourist Board (JTB), Tourism Product Development Company (TPDCo.) and the National Environment and Planning Agency (NEPA)

3. Waste Management Plan

The development and implementation of a waste management plan will be necessary to ensure that waste is properly managed at the Ecotourism Park. The plan will outline the methods of waste collection and monitoring and the persons having responsibility for ensuring that waste parameters are in compliance with the standards established by the regulating authorities.

12.4 Mitigation and Monitoring Programme

Table 36 presents the Environmental Management and Monitoring Plan for the construction and operation of the Ecotourism Park and the associated sewage treatment facility to be operated by Rivva Riddim.

Table 36: Management and Monitoring Plan

	Management Plan	Monitoring Programme
Construction phase		
1.	Fugitive dust emissions & vehicular emissions (Carbon footprint) • Cover haulage vehicles transporting aggregate, soil and cement • Cover onsite stockpiles of aggregate, cement, soil etc.	• The Project Manager will conduct periodic audits of the site operations and in his monthly report provide details of the mitigation measures implemented

	Management Plan	Monitoring Programme
	• Ensure proper stock piling and disposal of solid waste • Wet cleared land areas regularly to control fugitive dust • Provide workers with the necessary Personal Protective Equipment (PPE) e.g. dust masks and ensure that they are worn • Operate well maintained vehicles and equipment	
2.	Noise • Advise residents in the surrounding communities of construction dates and times • Ensure that construction activities are undertaken within the stipulated times • Provide workers with the necessary Personal Protective Equipment (PPE) e.g. hearing protection and ensure that they are worn	• The Project Manager is to respond promptly to correct confirmed complaints related to the project • The Project Manager's monthly report is to provide details of the mitigation measures implemented
3.	Solid waste (top soil, vegetation, construction debris, garbage) • Contain garbage and construction debris and dispose of at the approved municipal disposal site at Haddon • Landscape project sites with top soil excavated	• The Project Manager is to obtain verification that the contractor has disposed of solid waste at an approved municipal disposal site
4.	Sewage • Contract a reputable company to provide portable toilets for workers	• The Project Manager is to verify that sewage is being taken to an approved wastewater treatment facility
5.	Soil erosion • Only clear top soil from areas to be used • Place berms around stockpiles of top soil and aggregate	• The Project Manager will conduct periodic audits of the site operations and in his monthly report provide details of the mitigation measures implemented
6.	Construction work • Erect signs during construction activities • Provide workers with the necessary Personal Protective Equipment (PPE) • Train construction personnel in good safety practices and emergency preparedness and response measures	• The Project Manager will conduct periodic audits of the site operations and in his monthly report provide details of the mitigation measures implemented
7.	Increased traffic movement • Erect signs along main transportation route • Advise contractor of the need for their drivers to obey speed limits	• The Project Manager will conduct periodic audits of the site operations and in his monthly report provide details of the mitigation measures implemented
8.	Fuel and oil spills • Store fuel with secondary spill containment infrastructure • Utilise proper dispensing equipment • Have spill containment and cleanup equipment on site	• *Riwa Riddim* Limited will conduct periodic audits of the contractor operations • The Contractor/*Riwa Riddim* Limited is to respond and clean up spills in accordance with emergency preparedness and response plans • The Contractor is to report to Directors of

	Management Plan	Monitoring Programme
		Rivva Riddim Limited on emergencies • *Rivva Riddim* Limited is to report to NEPA in accordance with permit requirements • The Contractor's monthly report to provide details of the mitigation measures implemented
Operation Phase		
1.	• Maintain infrastructure, rides, pool facilities etc., in accordance with manufacturer's requirements	• *Rivva Riddim* Limited is to ensure that all equipment and fixtures are in proper working order by conducting periodic maintenance in accordance with documented maintenance programs.
1.	Sewage • Treat sewage effluent to comply with licence requirements outlined by the National Environment and Planning Agency.	• *Rivva Riddim* Limited is to maintain sewage treatment facility and ensure monitoring of effluent quality.
Maintenance Phase		
2.	Solid waste • Contain garbage and construction debris and dispose of at the approved municipal disposal site at Haddon	• *Rivva Riddim* Limited is to obtain verification that solid waste is disposed of at an approved municipal disposal site
3.	Maintenance work • Erect signs during construction activities • Provide workers with the necessary Personal Protective Equipment (PPE) • Train maintenance personnel in good safety practices and emergency preparedness and response measures	• *Rivva Riddim* Limited is to develop a preventative maintenance programme for all equipment and infrastructure at the Park including the sewage treatment system and maintain records of scheduled and unscheduled maintenance activities
4.	Carbon Footprint • Utilise appliances and lighting with those that use less power and have good energy ratings. • Where possible use renewable energy	
5.	Water Conservation • Utilise water conserving equipment • Develop and implement a water conservation programme for employees and visitors	

Appendix 1: Terms of Reference for EIA

Terms of Reference
Environmental Impact Assessment for the *Rivva Riddim* Eco-Tourism Project at White River Valley, St. Ann and St. Mary

Environmental Impact Assessment Structure and Contents

The Environmental Impact Assessment will include but not necessarily be limited to:

1. Outlining and identifying the objectives of the EIA
2. Complete description of the existing site, including location proposed for development.
3. Identification of significant environmental issues of concern through the presentation of baseline data, which should include social, cultural and heritage considerations. Assessment of public perception of the proposed development.
4. Review and description of Policies and Legislation relevant to the project.
5. Assessment of likely impacts of the development on the described environment, including direct, indirect and cumulative impacts, and their relative importance to the design of the development's facilities.
6. Identification of Mitigation actions to be taken to minimise predicted adverse impacts if necessary and quantify associated costs.
7. Preparation of Monitoring Plan that should ensure that the mitigation measures are adhered to.
8. Consideration and identification of alternatives to the project that could be considered at that site or at any other location.
9. Conclusions

To ensure that a thorough environmental impact assessment is carried out, it is expected that the following tasks be undertaken:

Task # 1 - Description of the Project

Provide a comprehensive description of the ***Eco-tourism Park and Sewage treatment facility Projects*** and the surrounding environment specifying any information necessary to identify and assess the environmental effects of the projects. This should include project objectives and information on the nature, location/existing setting, timing, duration, frequency, general layout, pre-construction activities, construction methods, works and duration, ***and operations including operating hours***. A description of the design elements of the project, raw material inputs, technology and processes to be used as well as products and by-products generated, will be provided. 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. ***For the sewage treatment facility, the relevant setbacks from property boundaries and waterways will be included.***

The design details for infrastructure such as bridges and berms will be provided.

Task # 2 - Description of the Environment

Baseline data will be generated in order to give an overall evaluation of the existing environmental conditions, values and functions of the area, as follows:

i.) physical environment
ii.) biological environment
iii.) socio-economic and cultural constraints

It is expected that methodologies employed to obtain baseline and other data be clearly detailed. Baseline data will include:

Physical

i.) A description of the existing soil and geology, landscape, aesthetic values and hydrology. Special emphasis should be placed on storm water run-off, drainage patterns, and aquifer characteristics. Any slope stability issues that could arise should be thoroughly explored.

ii.) Water quality of any existing wells, rivers, ponds, streams or coastal waters in the vicinity of the development.

iii.) Coastal and marine ecosystem, including but not limited to any wetlands including mangroves, seagrass and coral community with indication of its function and value in the project area.

iv.) Noise levels of undeveloped site and the ambient noise in the area of influence

v.) Obvious sources of existing pollution and extent of contamination

vi.) Availability of solid waste management facilities

vii.) Land uses of adjacent sites

viii.) Local climate and air quality

Biological

Present a detailed description of the flora and fauna (terrestrial and aquatic) of the area, with special emphasis on rare, threatened, endemic, protected and endangered species. Migratory species, wild food crop plants and presence of invasive alien species should also be considered. 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. ***Conduct an assessment of the ecological health and functions of the ecosystem (flora and fauna) in the vicinity of the proposed development and a water quality assessment of the river in the wet and dry season. The extent of the water quality assessment will be dependent on available data.***

Socio-economic & cultural

Present a detailed description of present and future land use; transportation of heavy equipment, road widening and associated traffic considerations particularly in the construction phase of the project and planned development activities; issues relating to squatting and relocation; public health and safety. The historical importance (heritage, archaeological sites and feature) and other material assets of the area should also be examined. While this analysis is being conducted, it is expected that an assessment of public perception of the proposed development be conducted. This assessment may vary with community structure and may take multiple forms such as public meetings and/or questionnaires/surveys.

Task #3 - Policy, Legislative and Regulatory Considerations

Outline the pertinent regulations and standards governing environmental quality, safety and health, protection of sensitive areas, protection of endangered species, siting and land use control at the national and local levels. The examination of the legislation should include at minimum, legislation such as the NRCA Act, the Public Health Act, the Town and Country Planning Act and the appropriate international convention/protocol/treaty where applicable.

Task #4A - Identification and Assessment/Analysis of Potential Impacts

Examine and identify the major potential environmental and public health issues of concern and indicate their relative importance to the development of ***the Eco-tourism Park and the sewage treatment plant***. These should include the occupational exposure, health and safety measures and population exposure in the appropriate study area(s) and changes and or enhancement in emergency response plan.

Identify potential impacts as they relate to, (but are not restricted by) the following:

- change in drainage patterns
- flooding potential if necessary
- landscape impacts of excavation and construction
- loss of and damage to geological and palaeontological features
- loss of species and natural features
- habitat loss and/or fragmentation
- biodiversity/ecosystem functions
- pollution of potable, surface or ground water
- air pollution
- ***the source of water for the artificial lakes and impacts on downstream users*** ***[Water will not be diverted from the White River for the artificial lakes instead water will be sourced from the JPSCo. Penstock]***
- socio-economic and cultural impacts including:
    - ***benefits to the wider White River Community***
    - ***displacement of traditional use of the property by community settlers/dwellers as a result of the development***

  - ***the impact of the project on the local economy and labour force***
  - ***any potential or likely stakeholder conflicts which could arise from other water based attractions on the river***
- impact of flooding, loss of natural features, excavation and construction on the historic landscape, architecture and archaeology of the site
- risk assessment
- noise and vibration
- solid waste disposal
- soil
- change in land use
- visual impacts – aesthetics
- ***potential for erosion in the artificial lakes***

Information should be included on the energy and water conservation features of the proposed project.

Distinguish between significant positive and negative impacts, direct and indirect, long term and immediate impacts. Identify avoidable as well as irreversible impacts. Cumulative impacts of this and other proposed and/or existing developments will be explored.

Characterize the extent and quality of the available data, explaining significant information deficiencies and any uncertainties associated with the predictions of impacts. A major environmental issue is determined after examining the impact (positive and negative) on the environment and having the negative impact significantly outweigh the positive. It is also determined by the number and magnitude of mitigation strategies, which need to be employed to reduce the risk(s) introduced to the environment. Project activities and impacts will be represented in matrix form.

Task #4B – Carrying Capacity Assessment

Determine the suitable number of visitors per unit area ratio to ensure that the environment and the experience, that is the ecological and social carrying capacity, are not compromised. An assessment of the trails including the existing flora and fauna will be incorporated.

Task #4C – Traffic Assessment

An assessment of the traffic to be generated and the extent to which the current road network can accommodate it will be presented. Measures to improve the situation will be incorporated.

Task #5 - Drainage Assessment

An assessment of Storm Water Drainage should be conducted. The EIA Report will cover but not be limited to where necessary:

i.) Drainage for the site during construction to include mitigation for sedimentation to the aquatic environment

ii.) Drainage for the site during operation, to include mitigation for sedimentation to the aquatic environment

iii.) Drainage control for crossings of rivers and/or gullies, to include impacts that drainage control features could have on aesthetics, water quality and sedimentation of rivers and/or gullies.

Task #6 – Mitigation & Emergency Preparedness and Response

Prepare guidelines for avoiding or reducing (e.g. restoration and rehabilitation), as far as possible, any adverse impacts due to proposed usage of the site and utilising of existing environmental attributes for optimum development. Quantify and assign financial and economic values to mitigating methods.

Indicate the emergency preparedness and response plans for dealing with risks and hazards identified at Task 4.

Task #7 – Environmental, Health and Safety (EHS) Management and Monitoring 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 EHS Management Plan and Historic Preservation Plan (if necessary) for the long-term operations of the site should also be prepared.

An outline of a monitoring programme (if necessary) 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:

- An introduction outlining the need for a monitoring programme and the relevant specific provisions of the permit and/or licence(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

Task #8 - Project Alternatives

Examine alternatives to the project including the no-action alternative. This examination of project alternatives should incorporate the use history of the overall area in which the site is located and previous uses of the site itself.

An examination of alternative sources of water for the artificial lakes will be included. [Water will not be diverted from the White River for the artificial lakes]

Task #9 - Public Participation/Consultation Programme

Conduct public presentation(s) on the findings of the EIA to inform, solicit and discuss comments from the public on the proposed development if necessary.

- 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.
- Summarise the issues identified during the public participation process
- Discuss public input that has been incorporated into the proposed project design; and environmental management systems
- Prepare a verbatim report of the Public Consultation for the project

The EIA Report

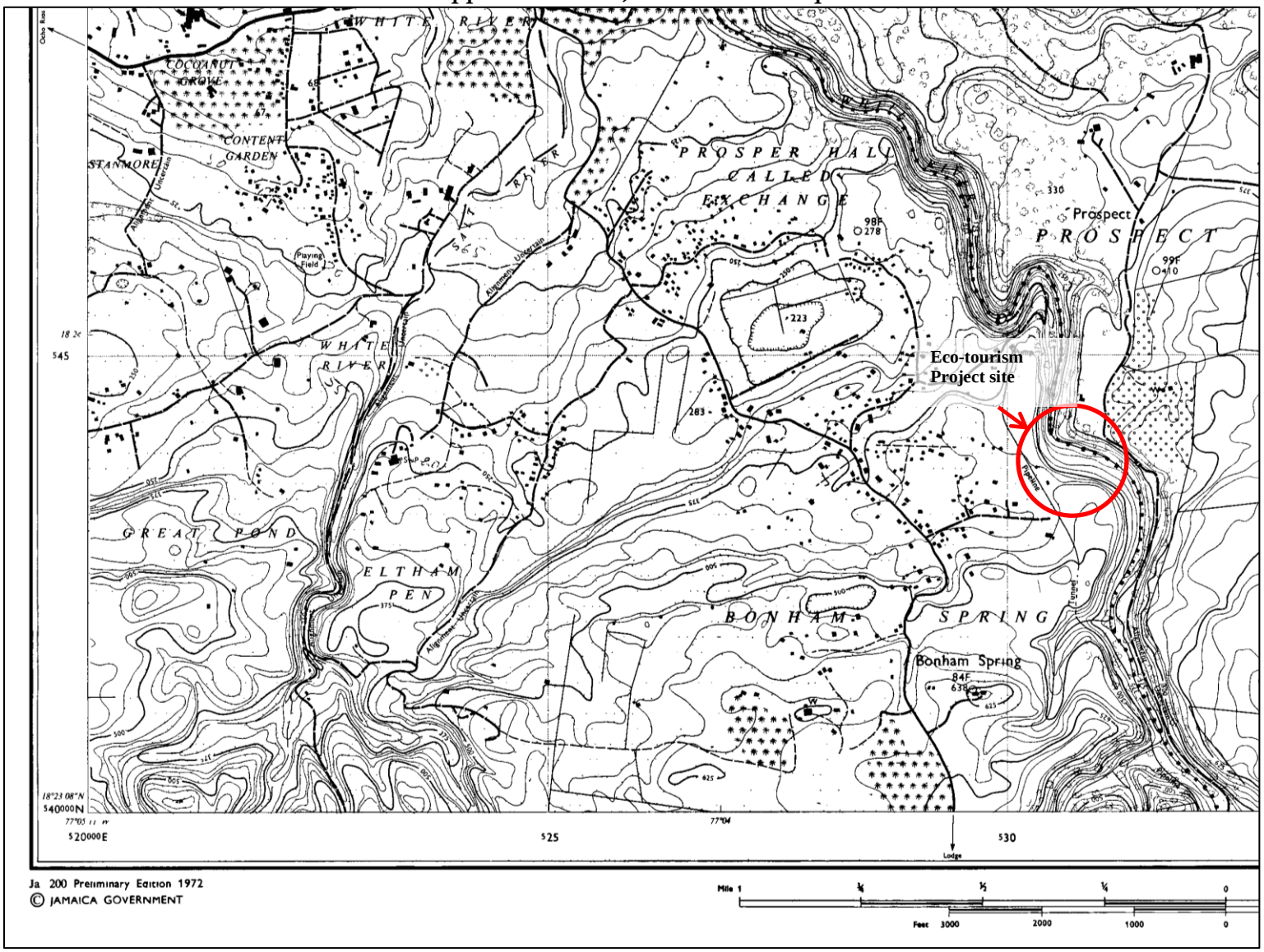
All findings will be presented in the EIA report. The report will contain an introduction explaining the need for, and context of the project. The report should, at a minimum, cover the following basic aspects:

- Executive Summary
- Policy, Legal and Administrative Framework
- The EIA Methodology
- Description of the Existing Environment
- Description of the Proposed Project in detail
- Identification and Assessment of Potential Direct, Indirect, Cumulative, Positive and Negative Environmental Impacts
    - Physical
    - Natural Hazard Risk
    - Biological
    - Heritage
    - Human/Social
- Public Involvement
- Recommended Mitigation Measures
- Identification and Analysis of Alternatives
- Management of the Environmental and Heritage aspects of the Project
- Environmental Management of the Project
- Environmental Quality Objectives
- Training
- Draft Outline Monitoring Programme
- List of References
- Appendices including:
    - Reference documents
    - Photographs/ maps/ site plans
    - Data Tables
    - The study team
    - TOR

- Glossary of Technical Terms used

Ten hard copies and an electronic copy of the report will be required for submission to the National Environment and Planning Agency.

Appendix 2: 1: 12,500 Location Map



Appendix 3: Social Impact Assessment Questionnaires

SOCIO-ECONOMIC SURVEY (February 2011)
Rivva Riddim: Proposed Eco-tourism Project, White River, St. Ann, Jamaica

PERSONAL/CONFIDENTIAL

Personal Interview Schedule (Target: Household Head)

Interviewer: _____ **Respondent ID:** _____
Date: _____ **Location:** _____

In order to determine the social and economic characteristics of the area, and garner your views, perspectives and acceptance of the proposed development I would like to ask you some questions.

Please indicate response by placing a tick in the appropriate box ☑

Demographic Profile

1. Sex: Male ☐ Female ☐

2. To what age group do you belong?
   <18 ☐ 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60 and over ☐

3. How long have you lived there (here)? _____

4. Where are you originally from (Town and Parish)? _____

Quality of Life Indicators

Education

5. What is the highest level of education you have attained? (last school you attended)
   None ☐ Primary/All Age ☐ Training/Skills Institution ☐
   High School ☐ College ☐ University ☐
   Other, specify _____

6. Are you presently attending school? Yes ☐ No ☐

Employment and Income

7. Are you employed? Yes ☐ No ☐

Please tick the box which best describes your type of employment

Full-time ☐ Part-time ☐ Self-employed ☐ Other, specify _____

8. What is your present means of livelihood (occupation)? _____

9. What is your main means of travel? (work, shopping etc.)?
Private vehicle ☐ Bus ☐ Taxi ☐ Other, specify _____

10. What is your weekly/monthly income in Jamaican Dollars (JMD)? (optional)

Less than $10,000 ☐ $10,001-$30,000 ☐ $30,001-$60,000 ☐

$60,001-$90,000 ☐ $90,001-$120,000 ☐ $120,001 – $150,000 ☐

Above $150,000 ☐

Housing (including Tenure), Health and Social Services

11. Do you _____ your house?
Own ☐ Lease ☐ Rent ☐ Other, specify _____

12. Do you _____ the land on which your house is located?
Own ☐ Lease ☐ Rent ☐ Other, specify _____

13. Including yourself, how many people live in your household? _____
(a) Number of adults _____
(b) Number of children less than 18 years _____
(c) Which School(s) do they attend_____(include community location)

14 What type of sanitary conveniences (toilet facility) does your household use?
Water Closet/Flush toilet ☐ None ☐ Pit Latrine ☐ Other, specify_____

15. What is the main source of lighting for your home?
Electricity ☐ Kerosene ☐ Candles ☐ Other, specify _____

16. What type of fuel is used mostly by the household for cooking?
Gas ☐ Electricity ☐ Wood ☐ Kerosene ☐ Other, specify _____

17. What is the main source of domestic water supply for the household?

Public piped water into dwelling☐ Private Tank☐ Public piped water into yard☐ Community Tank ☐ Government Water Trucks (free) ☐ Public Standpipe☐ Private Water Trucks (paid)☐ Spring or River☐ Other, specify _____

18a. What is the main method of garbage disposal for your household?

Public Garbage Truck☐ Private Collection☐ Burn☐ Other, specify _____

18b. If public garbage truck, how often do trucks pick up garbage? _____

19. Do you have access to a residential telephone? Do you have access to a cellular phone?
Yes☐ No☐

20. Do you have access to the following services?

Type of Service	**Location**	**Distance Travelled (km)/miles**
Health Care		
Police Station		
Fire Station		
Post Office/Agency		

Natural Resource Usage and Management

21. Do you or your family members utilise the resources of the White River Valley?

21b. If yes, what resource(s) and for what purpose(s)

22. How long have you been using these natural resources?

23. Is your livelihood supported by any of the resources of the White River Valley?

24. Has there been changes (increase or decrease) in the amount/quantities of resources that are available for use?_____

25. What has caused this increase and/or decrease?
_____
_____
_____

26a. Are the resources used by other persons within and outside of the community?

26b. If yes, for what purpose(s)

27a. Is the White River threatened by any form of pollution? _____

27b. What are the sources of the pollution affecting the river? _____

Community Development

28. (a) What does the average person do for fun within the community?

Parties ☐ Youth Clubs ☐
Sports Clubs ☐ Charity ☐
Church groups/activities ☐ Other, specify ☐

(b) Do you belong to any social groups? _____

29. What do you value most about your community?
_____
_____
_____

30. What types of improvement are needed in the community?
_____
_____
_____

31a. Is the community usually affected by Hurricanes/natural disasters (flooding, fire, earthquake etc.,)
How did you fare in the last Hurricane/tropical storm/natural disaster?
_____
_____
_____

31b. Has the White River ever resulted in the flooding of your community?

32. How long after a major disaster were water, power and telephone restored in your community?
_____

Perception of the Proposed Development

33. Do you know what is meant by eco-tourism? Yes☐ No ☐ (If yes, please explain)

_____
_____
_____

34. Are you aware of the proposed eco-tourism theme park development in the White River Valley?

Yes☐ No ☐ If yes, through what medium? _____

35. What kinds of impact do you think a development of this nature will have on the community?

_____
_____
_____
_____
_____

36. What are your views on the utilization of natural resources to support tourism business development initiatives/interests?

_____
_____
_____
_____
_____
_____

37. In what ways do you think an eco-tourism theme park will help to enhance/diversify Jamaica's tourism product?

_____
_____
_____
_____
_____

Thank you for your cooperation and participation in this survey☺

Interviewer Comments and Observations

_____
_____

COMMUNITY SURVEY (February 2011)
Rivva Riddim: Proposed Eco-tourism Project, White River, St. Ann, Jamaica

PERSONAL/CONFIDENTIAL

Personal Interview Schedule (Target: Anyone)

Interviewer: _____ **Respondent ID:** _____
Date: _____ **Location:** _____

In order to determine the social and economic characteristics of the area, and garner your views, perspectives and acceptance of the proposed development I would like to ask you some questions.

Please indicate response by placing a tick in the appropriate box ☑

Demographic Profile

1. Sex: Male ☐ Female ☐

2. To what age group do you belong?
<18 ☐ 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60 and over ☐

3a. Do you live in the parish of St. Ann? _____

3b. If yes, where?_____
If no, which parish and community do you reside?_____

4. What is the highest level of education you have attained? (last school you attended)
None ☐ Primary/All Age ☐ Training/Skills Institution ☐
High School ☐ College ☐ University ☐
Other, specify _____

5. Are you employed? Yes ☐ No ☐

Please tick the box which best describes your type of employment

Full-time ☐ Part-time ☐ Self-employed ☐ Other, specify _____

5a. Are you employed in the tourism sector?_____

6. What is your occupation? _____

Perception of the Proposed Development

7. Do you know what is meant by eco-tourism? Yes☐ No ☐ (If yes, please explain)
_____
_____
_____

8. Are you aware of the proposed eco-tourism theme park (River Rhythm) development in the White River Valley? Yes ☐ No ☐ If yes, through what medium? _____

9. What kinds of impact do you think a development of this nature will have on the community and the parish?
_____
_____
_____
_____
_____

11. What are your views on the utilization of natural resources to support tourism business development initiatives/interests in St. Ann?
_____
_____
_____
_____
_____
_____

12. In what ways do you think an eco-tourism theme park will help to enhance/diversify Jamaica's tourism product?
_____
_____
_____
_____
_____

13. Do you think tourism has helped in the development of the parish of St. Ann? (Give reasons for your answer?
_____
_____
_____
_____
_____

Thank you for your cooperation and participation in this survey☺

Interviewer Comments and Observations

_____

_____

_____