

## ***Chapter 2: PHYSICAL ENVIRONMENT***

### **2.1 Coral Survey (See Overleaf)**

### **2.2 Topography and Nearshore bathymetry**

The land elevations within the project site were measured along the survey lines that demarcate the boundary of the island. The island was a mangrove overwash of about 0.36m (1.2 ft) below msl. With the highest elevations located on the western lagoon side and the lowest elevations in the center and eastern sections of the project site.

The nearshore bathymetry adjacent to the project site ranges from 1ft to 30 ft. in an as short distance as 60 feet. Generally the areas near shore are gently sloped getting deeper away from shore. Likewise, the main lagoon has depths ranging from 4 ft. to 20 ft. See overleaf coral survey and bathymetry data.

### **2.3 Stratigraphy**

The organic material that constitutes the first 3 feet of the property are as a result of organic material which over the years have increased and resulting in the cayes over several hundreds of years to have increase in size. The sandy coralline mud to the bottom is as a result of the one area that was entirely covered with water that gradually formed a sand bar from accretion and subsequently gave rise to a vegetation cover.

### **2.4 Current Land Use**

The project site has recently been filled, but requires additional filling before it can become suitable for the proposed project development. Currently there is no designated use of the land mass, but it is proposed to be used for a tourism development, similar to other Cayes such as in the Tobacco Caye Range, Turneffee Atoll and other proposed within the Salt Water Caye Marine Reserve. However, this development will be significantly different base on the level of importance being emphasized in protecting the natural environment, as its main objective is to promote nature tourism along with recreational activities that will not exceed the bio-physical carrying capacity of the project area.

## **2.5 Surrounding Receiving Water Bodies**

The project area has a total of eight (8) lagoons of which four are land lock and are brackish. The other lagoons are actually more natural sheltered bay areas. It is the largest of these naturally sheltered areas that is to be used as the fishing marina. As can be noted from the above survey conducted, the surrounding water body, mainly the Caribbean Sea has marked differences comparing the leeward and windward sides.

The surrounding water bodies are anticipated to have any significant change as a result of this proposed development as all wastewater will be treated by aerated treatment plant that will meet or exceed national standards and will be used for irrigation purposes.

## **2.6 Siltation Rates**

Turbidity in the area averages around 630 NTUs and the construction of the fishing marina access channel, which will only have a length of some 150 feet and consist mainly of coralline sand, shall posed no significant impacts of the rate of siltation to the surrounding areas. The fishing marina bottom is also mainly coralling sand and shall pose little to impacts to the surrounding environment as a result of siltation.

## **2.7 Wind and Wave Energy**

The most predominant winds experienced along the coast of Belize are the southeasterly trade winds. However, during the cooler months, winds are from the northeasterly direction. It is these winds that are responsible for the creation of waves and wave actions. Average wind speed in the project area is estimates at 10-15 knots.

In addition, wind and the washing in and breaking of waves bring deep sea oxygenated waters to the coastal areas of the cayes within the South Water Caye Marine Reserve.

## **2.8 Depth Profiles**

As can be noted from the channel survey above, the channel being proposed to access the fishing marina is currently sixteen feet wide and the north wall is thirty feet and the south wall is thirty seven feet wide. Hence, the access channel will not require any further widening.

The channel area has a depth of two feet and then increasing to the leeward side to four feet some eight feet from the channel wall. At fifteen feet the depth increases eight feet; at thirty feet from the leeward wall, the depth is an average of twenty feet; at forty five and sixty feet the depth is an average of thirty feet. As for the lagoon area, at fifteen feet from the wall, the depth is four feet; at thirty feet it is an average of six feet. At a distance of forty five feet from the wall the depth averages fourteen feet and at sixty feet some seventeen feet.

Based on the leeward depths, there will be no need for any dredging extending in excess of fifteen feet from the channel depth. However, a small distance of approximately thirty feet will have to be

## **2.9 Navigation Routes**

The project area and the entire South Water Caye Marine Reserve is mainly navigated by traditional fishers and small craft associated with tourism recreational activities such are scuba diving, snorkeling, fly fishing and catamaran tours. The area is not known to be navigated by any cargo ships. This could be mainly due to the relatively abundant shallow areas around the cayes in the Pelican Cayes Range.

Most of the vessels that come through the range area are catamarans and as such this proposed development will have a transient marina inside the larger of the southwestern lagoon that will be equipped with a floating dock for anchoring. Considering the amount of recreational activities undertaken within the Pelican Caye Range, it is anticipated that the marina area of the proposed developed with serve as a strategic area for anchoring of

vessels instead on anchoring elsewhere where it can pose significant impacts to coral formations as a result of anchoring.

## **2.10 Environmental Legislations**

The legal and administrative framework relevant to the proposed development delineates the obligations and responsibilities of the developer as well as those of the Government of Belize with respect to the conservation and protection of the environment.

Agencies involved in environmental protection include the Department of Environment, The Coastal Zone Management Authority & Institute, the Lands and Survey Department, the Geology and Petroleum Department, the Forest Department, the Fisheries Department, the Public Health Department and the recently established Central Building Authority.

### **International Conventions and Treaties**

The Government of Belize has also, through respective Departments, signed various International Conventions and/or Treaties concerned with conservation practices. The key conventions relevant to this proposed development are:

1. The International Convention on Biological Diversity and the Central American Biodiversity Convention.

These conventions specifically address conservation of biodiversity, sustainable use and sharing the benefits of biodiversity. The proposed development serves to reinforce these conventions through allocations of lands exclusive for conservation use and preservation of native species and wildlife corridors.

2. Convention on the International Trade of Endangered Species (CITES)

CITES is a convention that provides guidelines for the conservation of rare, threatened and endangered species. The proposed public and private development will adhere to this convention as no CITES ranked species will be captured, traded or eliminated by the proposed development. On the contrary, this project will seek to protect all species as the basis of the success of this development in that it maintains a healthy eco-system with an abundance of marine species.

### **National Development Guidelines**

The Coastal Zone Management Authority and Institute, even though it is not regulatory in nature, has, in the past, contributed significantly in coordinating the development of coastal development guidelines. These guidelines made recommendations as to what type of activities could be undertaken on some of the cayes within reserves, including percentage vegetation clearance, type of infrastructure and activities to be undertaken, whilst still maintaining the integrity of the natural environment.

Most regulatory agencies, including the Department of the Environment, at some time have taken these guidelines into consideration when making decisions on proposed projects. In addition, developers and EIA preparers have used these guidelines.

### **National Laws**

The following Acts and Regulations are the principal pieces of legislation, which would guide the development of this project.

#### **The Environmental Protection Act**

The Belize Environmental Protection Act, Chapter 328 Revised Edition 2000-2003 establishes and confers authority to the Department of the Environment for the regulation of pollution, effluent discharge limitation and environmental impact assessments.

### *Environmental Impact Assessment (EIA) Regulations*

This regulation was enacted in 1995 and Amended in March 2007. The EIA regulations govern the type and size of development that requires an EIA or a Limited Environmental Study. This project is subject to this regulation thus the purpose of this document.

The EIA Amendment Regulations also requires the payment of a processing fee ranging from \$2,500 to \$5,000. Furthermore, EIA Regulations and its Amendments also require the signing of an Environmental Compliance Plan, which also includes a fee for monitoring. The fee while not clearly outlined as the EIA Processing can range from a minimum of about \$3,000 on an annual basis to a maximum of tens of thousands. This can be noted as a trend as most developments on Placencia Peninsula and San Pedro Ambergris Caye have been charged a fee near this figure. However, the fee has no determined price.

### *Effluent Limitation Regulations*

The Effluent Limitation Regulations was enacted in 1995 via Statutory Instrument N0. 94 of 1995. This Instrument defines select parameters for effluent discharge from sewage treatment, which falls under the Classification of “Other Industries,” as being  $\leq 50$  mg/L BOD<sub>5</sub> (at 20°C),  $\leq 100$  ppm COD,  $\leq 100$  ppm total suspended solids (TSS),  $\leq 2,000$  ppm total dissolved solids,  $\leq 3$  ppm for nitrates (NO<sub>3</sub><sup>-</sup>),  $\leq 1$  ppm total ammonium (NH<sub>4</sub><sup>+</sup>),  $\leq 5$  ppm phosphates (PO<sub>4</sub><sup>3-</sup>), and 0-10 MPN/100 ml for total Coliform and total fecal Coliform bacteria.

### *Pollution Regulations*

Statutory Instrument No. 56 of 1996 enacts the Pollution Regulations which governs several types of pollution issues including air emissions, noise abatements, dumping at sea, nutrients, and any other possible sources of pollution. This regulation would play a very important rule with respect to the management of solid waste.

### **The Land Utilization Act**

The Land Utilization Act, Chapter 188, Revised Edition 2000-2003 empowers the Land Utilization Authority and delineates the application procedures for the subdivision of land, a process which this development is subject to.

### **Private Works Construction Act**

Private Works Construction Act, Chapter 337, Revised Edition 2000-2003 requires the developer to obtain a license from the Minister responsible in order to construct any pier or fill any land on the shore of the sea or bank of any river in any part of Belize other than Belize City. This proposed development only intends to construct pontoons (floating docks). These pontoons will replace the need for beach nourishment activities.

### **The Mines and Minerals Act**

The Mines and Minerals Act, Chapter 226, Revised Edition 2000-2003 requires that either a license or permit be obtained from the Geology and Petroleum Department prior to conducting any earth movement activities regardless of its sourcing. The extraction of all non-renewable resources except petroleum is regulated by the Mines and Minerals Act. The government owns all minerals under public and private lands and, minerals are reserved from all future grants of state lands. The act provides for licenses and royalties for the taking of minerals, and prohibits the pollution of any river, stream or watercourse. This Act may impact this development as the project will necessitate an additional 24,000 cubic yards of material for filling.

### **The Forest Act**

The Forest Act, Chapter 213, Revised Edition 2000-2003 provides for the collection of fees for the removal of mangrove forest based on a rate of \$0.40 per tree removed. The harvest of several other tree species also requires payment of such royalties to the Forest Department. This proposed development will require no further removal of mangrove vegetation. Vegetation clearance has already been undertaken under a Mangrove Clearance Permit. This permit was issued subsequent to the signing of any

Environmental Compliance Plan that was agreed to for the subdivision of 15 plus acres into 23 lots.

No additional mangrove will be cleared. However, there may be the need for the trimming of mangroves for the construction of raised causeways leading to the proposed Fishing Lodge. In this respect, once the surveying of the causeway is completed, an exact figure as to the number of trees to be altered could be provided to the Forest Department so as to obtain a Mangrove Alteration Permit.

### **Fisheries Act**

The Fisheries Act is sited as Chapter 210, Revised Edition 2000-2003 and makes the provision for the governing of the marine wild life as well as the establishment of Marine Reserves. As this development does not intend to remove any marine life for gain, the only application of this Act is its Subsidiary Chapter 210S. Under Subsidiary Act, the Fisheries (South Water Caye Marine Reserve) Order was established.

This reserve was established by the Minister of Agriculture and Fisheries on the 28th day of August, 1996 and is more fully described as below as per the Subsidiary Laws of Belize Revised Edition 2003:

**ALL THAT** portion of the Caribbean Sea being part thereof and being described as follows:

On the South bounded by an East-West line approximately 1,000 m. South of Wappari Caye, on the East by the Caribbean Sea, on the North by an East-West line approximately 1,250 m. North of Tobacco Range and on the West by the Inner Channel therein enclosed, more particularly described as follows: Commencing at a Point A Southeast of Carrie Bow Caye having scaled UTM coordinates 386 299 East 1852 080 North; thence in a general northerly direction to a Point B Northeast of Tobacco Caye Entrance having scaled UTM coordinates 3 89 290 East 1870 681 North; thence in a general westerly direction to a Point C Northwest of Coco Plum Caye having scaled UTM coordinates 379 668 East 1870 775 North; thence in a general south-westerly direction to a Point D Northwest of Quamina Caye having scaled UTM coordinates 368 036 East 1842 612 North; thence in a general southerly direction back to a Point E Northwest of Wippari Caye having scaled UTM

coordinates 367 942 East 1829 542; thence in a general easterly direction to a Point F Southwest of Tarpum Caye having scaled UTM coordinates 379 168 East 1829 535 North; thence in a general northerly direction to a Point G Southwest of Wee Wee Caye having scaled UTM coordinates 380 973 East 1852 121 North; thence in a general easterly direction back to the point of commencement.

Cat's Caye lies along the western border of this reserve.