ENVIRONMENTAL IMPACT ASSESSMENT

FOR

PELICAN POINT MARINA & YACHT CLUB

A PROPOSED MARINA AND TOURISM PROJECT

Caye Caulker, Belize, C.A.

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A PROPOSED MARINA AND TOURISM PROJECT

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GENERIC GLOSSARY OF TERMS

Algae: one celled or many celled plants that have no root, stem, or leaf system.

Avifaunal: Birds

Bathymetry: depth profile of the ocean bottom or seafloor.

Beach: sediment seaward of the coastline through the surf zone that is in transport along the shore and within the surf zone.

Bedrock: the solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Benthic: pertaining to the ocean bottom or seafloor.

Benthos: the forms of marine life that live on the ocean bottom or seafloor.

Biogenic Sediments: sediments containing materials produced by plants or animals such as corals, shell fragments and tests housing diatoms and radiolarians.

Biomass: total weight of the organisms in a particular habitat, species, or group of species.

Break Water: are structures constructed on coasts as part of coastal defense or to protect an anchorage from the effects of weather and long shore drift. A breakwater is constructed some distance away from the coast or built with one end linked to the coast. Breakwaters may be either fixed or floating.. A breakwater structure is designed to absorb the energy of the waves that hit it.

Bulkhead: bulkheads are most often referred to as seawalls, bulk heading, or riprap revetments. These manmade structures are constructed along shorelines with the purpose of controlling beach erosion. Construction materials commonly used include wood pilings, commercially developed vinyl products, large boulders stacked to form a wall, or a seawall built of concrete or another hard substance.

Canal: a strip of watercourse that is used by the residents to access their lots via a marine vessel

Coast: a strip of land that extends inland from the coastline as far as marine influence is evidenced in the landforms.

Coastline: landward limit of the highest storm waves' effect on the shore.

Coliform: type of bacterial found in feces.

Construction: excavation, movement of earth, erection of forms or structures, or similar activities at a development or project site.

Developer: see Proponent

Disposal: the discharge, deposit, injection, dumping, spilling, leaking, or placing of any waste into or on any land, water so that it may enter the wider environment, including ground water sources.

Effluent: water discharged from a development into receiving water body or the environment otherwise.

Estuary: the mouth of a river valley, or a bay or lagoon receiving freshwater, where marine influence is manifested as tidal effects and increased salinity of the freshwater.

Euryhaline: pertaining to the ability of a marine organism to tolerate a wide range of salinity.

Eutrophication: elevation of nutrient content of water through input of fertilizers, fecal materials and domestic effluents

Fauna: animals.

Fecal: of or related to faeces.

Fetch: area of the open ocean over which the wind blows with constant speed and direction thereby creating a wave system.

Flora: plants.

Geogenic Sediments: sediments derived from non-living or inorganic sources such as silicate sand.

Geology: The scientific study of the origin, history, and structure of the earth.

Geotechnical: The study of soil boring samples in relation to the sitting and placement of piles for construction.

Groundwater: water below the land surface in a zone of saturation.

Habitat: a place where a particular plant or animal lives: Generally refers to a smaller area than environment.

Inlet Canal: a series of canals linked to a primary canal. These are often used for residential and recreation purposes.

Intertidal Zone: lies between the high and low tide extremes and can be divided into a ***high tide zone*** which is mostly dry and covered by the highest high tide but not the lowest high tide, the ***middle tide zone*** exposed and covered equally by all high tides and exposed during all low tides, and the ***low tide zone*** which is mostly wet and covered during the highest low tides and exposed during the lowest low tides.

Lagoon: a body of water separated from the sea by a bank or coral reef: Also the region between a shore and a barrier reef or inside a ring of islands composing an atoll.

Littoral Forest: low-lying coastal forest impacted by tidal influence.

Littoral Zone: also known as the foreshore or intertidal zone, lies between the high and low tide extremes.

Mangal: a swamp dominated by mangroves.

Mangroves: collective term used for range of salt-tolerated inter-tidal plants found throughout the tropics and within latitude of 20° north and south of the equator.

Marina: A boat basin that has docks, moorings, supplies, and other facilities for small boats, yachts and cabin cruisers.

Marina Slips: A docking place for a ship between two piers.

Near shore Zone: the seaward zone from the shoreline to the line of breakers.

Pelagic Environment: the open ocean environment which is divided into a neretic province with water depths 0 to 200 m and the oceanic province with depths greater than 200 m.

Pelagic Organism: free-swimming or floating biota that live exclusively in the water column, not on the sea floor or ocean bottom.

Permitting Agency: a Government Agency responsible for issuing permits to allow various aspects of a development to proceed within the context of the Laws of Belize.

Permit: authorization, license, or equivalent control document issued by an Agency of the Government of Belize to implement various aspects of a development.

Point Source of Pollution: any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft from which pollutants are or may be discharged.

Pollutant: any dredged spoil, solid waste, incinerator residue, sewage, garbage, chemical waste, heat, industrial, domestic, municipal or agriculture waste discharged into the environment.

Primary Productivity: the amount of organic matter organisms synthesize from inorganic substances within a given volume of water or habitat in a unit of time.

Proponent: developer proposing a particular project.

Red List: Catalogue of Threatened Species compiled by IUCN.

Residents: Locals or community members of a development, housing project etc.

Salinity: a measure of the quantity of dissolved solids in ocean water: it is expressed in part per thousand by weight after all carbonates have been converted to oxide, the bromide and iodide to chloride, and all the organic matter oxidized.

Sessile: attached to the bottom or to rocks, pilings, etc. and unable to move.

Sewage: any human body waste and the waste from toilets and other receptacles intended to receive or retain body wastes that are discharged into the environment.

Sand: particle size ranging from 1/16 to 2 mm: It pertains to particles that lie between silt and granules on the Wentworth Scale of grain size.

Sanitary Landfill Site: a facility at which municipal, industrial wastes and hazardous wastes are applied onto or incorporated into the soil surface.

Shore: the section of land seaward of the coast: This extends from the highest level of wave action during storms to the low water line.

Shoreline: the line marking the intersection of the water surface with the shore: It migrates up and down as the tide rises and falls.

Silt: a particle size ranging from 1/128 to 1/16 mm: It is intermediate between sand and clay.

Sublittoral: seabed below the low tide mark.

Supralittoral Zone: this is the backshore environment above the spring high tide line and is only covered by water during storms and heavy sea states.

Tide: periodic rise and fall of the ocean surface and connected bodies of water resulting from the unequal gravitational attraction of the moon and sun on different parts of the earth.

Tidal Range: the difference in height between consecutive high and low water: The comparison may also be a day, month or year.

Tidal Period: elapsed time between successive high or low water.

Topography: the physical shape of the land surface.

Transect: a line or narrow belt used to survey the distribution of organisms or substrate across a given area.

Wave: a disturbance that moves over or through a medium with a speed determined by the properties of the medium.

Wave Height: vertical distance between a crest and the preceding trough.

Wave Length: horizontal distance between two corresponding points on successive waves such as from crest to crest.

Watershed: The region draining into a river, river system, or other body of water.

GLOSSARY OF ACRONYMS

AST: Above ground Storage Tank.

BAS: Belize Audubon Society.

BWSL: Belize Water Services Limited.

BEL: Belize Electricity Limited.

BESST: Biological Engineered Single Sludge Treatment.

BSWMP: Belize Solid Waste Management Program.

BOD_5: 5 days Biological Oxygen Demand test.

CCFR: Caye Caulker Forest Reserve.

CCMR: Caye Caulker Marine Reserve.

CEQ: Council of Environmental Quality.

CITES: Convention on the International Trade in Endangered Species of wild flora and fauna.

CSO: Central Statistical Office.

CZMAI: Coastal Zone Management Authority and Institute.

DoE: Department of the Environment.

EIA: Environmental Impact Assessment.

FAMRACC: Forest and Marine Reserves Association of Caye Caulker.

GoB: Government of Belize.

GPS: Global Positioning System.

IMO: International Marine Organization.

IUCN: International Union for the Conservation of Nature.

MPA: Marine Protectened Areas.

MSL: Mean Sea Level.

NEAC: National Environmental Appraisal Committee.

NEMO: National Emergency Management Organization.

NGO: Non-Government Organization.

REA: Rapid Environmental Assessment.

RTE: Rare Threatened or Endangered.

SPT: Standard Penitration Test.

SWMA: Solid Waste Management Assessment.

TOR: Terms of Reference.

TSS: Total Suspended Solids.

PLACEMENT NOTES

The proposed Pelican Point Marina &Yacht Club is a marina and tourism based development that will be located on the south western portion of Caye Caulker just north of the respective airstrip. The proposed development therefore required an Environmental Impact Assessment to be conducted.

Based on this requirement, the following submission is comprised of two major expansive narrative components aimed at identifying, predicting, evaluating and mitigating the biophysical, social and other relevant impacts. The document is also supported by a number of annexes that in principle provide further details to the issues covered. The purpose of this submission is to inform the decision-makers on the potential environmental impacts related to the project.

The main narrative is dissected into a number of interrelated chapters that were developed following the project's TOR. The principal narrative begins with a description of the overall project including existing and proposed structures and related amenities as well as the physical setting in which the project is planned to be developed (Chapters 1 and 2). Furthermore, these two sections serve as an introduction to other linked documents such as Chapters 5, 6, 7, 8, 10 and 11.

Chapter 3 summarizes the administrative and legal framework of the proposed project citing the relevant laws that will govern the project. Included in this section is also the environmental protection laws that must be abide by when considering this type of activity. Chapter 4 gives a detailed description of the flora and fauna of the area in addition to its proposed impact on the surrounding environment including the reserves and reef system.

The geology and extraction of materials is discussed in detail in Chapter 9. This section focuses primarily of the dredging and excavation activities that are programmed to take place in order to accommodate the proposed marinas. This section is probably one of the most important sections of the document whereby the dredging volumes and mitigation measures are discussed in detail in conjunction with the project development. The marina design and related amenities are discussed in Chapters 10 and 11. Both chapters describe the transportation requirements that will be required for the marina and access site as well as the sitting of the various proposed services.

The orientation of the document changes in Chapter 12, which is focused on the disaster and contingency plans that can and could be incorporated in the event of an accident, incident of natural disaster. Chapter 13 in essence is also considered an important chapter since it describes the potential social impacts the project would have on the environment and related socio-economic impacts or spinoffs that the project would have with the surrounding community.

The most substantive part of the document deals with the magnitude and scope of the impacts arising from the proposed schedule of activities for the development. This is described in Chapters 14, 15 and 16 of the document and entails a detail description of the potential impacts and the proposed mitigation measures designed to reduce or ameliorate the impact.

On the whole, the document was prepared with the fundamental view of understanding the project and its anticipated impacts on the receiving environment. Care was taken in obtaining the necessary information to satisfy the project's TOR.

EXECUTIVE SUMMARY

Project Location

The proposed project is to be located on the southwestern portion of Caye Caulker which is about 20 miles northeast of Belize City. Specifically, the project site is about two miles southwest of the village and just north of the western end of the Caye Caulker Airstrip. The company, Pelican Point Marina & Yacht Club, is a joint venture along with Sunset Enterprise Limited owned by Bob and Elizabeth Ross in conjunction with other interested parties. The proposed development lies on some 5 acres (20 %) of land which is a part of a larger 23.9 acre subdivision development.

The project site is bordered by a pristine environment which consists of a marine component and land based facilities. The marine component presently encompasses a stretch of canal water works or frontage that was constructed for the proposed Sunset Limited subdivision. The terrestrial component is practically non-existent since the project is presently denuded of vegetation except for a few ornamental palm trees that have been planted.

Pelican Point Marina & Yacht Club can be accessed either by land or water. The site itself can be accessed from the village of Caye Caulker through a proposed road which forms part of the subdivision component of the property. The site is also accessible by sea at its western point along the coast. This is accessibility is primarily due to the location of the project in relation to the setting of the village and the traditional transportation means presently in place.

Project Background

Pelican Point Marina & Yacht Club is a proposed marina and tourism related venture that will be carried out in two phases with subsequent sub-phases. The marina component will consist of two marinas (large and small totalling 140 boat slips) to accommodate both local and international water vessels up to 100 feet in length. This will be a full service Ocean Front Marina and will entail international waste collection and disposal as well as the collection and treatment of marine vessel wastewater and bilge water. A small marina is also proposed for the project, in which the proponent plans to utilize this marina as a service pier for smaller boats and to offload and load goods, construction supplies, fuel and potable water among others.

The proposed project also plans to have in operation 48 Ocean Front Condos units ranging from both single and double beds as well as 73 Cabañas of both singe and double beds designed to attract foreingers, locals, boating enthusasts and transient visitors. In addition, various ammenities will be added to the project which include a restaurant and bar, recreational poolscapes, marina and dive shop, landscape jogging path, full service spa and administrative center amoung others.

The Pelican Point Marina & Yacht Club will be designed to accommodate 894 persons of whom 30 are workers and 100 are considered transient visitors. It is anticipated that all of the workers that will be employed will be Belizeans.

The proposed project will also carryout dredging and excavation activities in order to accommodate the marine vessels the projects intends to attract. There will be three dredging/excavation events associated with proposed development. These are the dredging of the residential boat canal, dredging of the large marina, and the dredging of the small marina access canal along with the excavation of the small domestic marina itself to the depth consistent with the 40 foot boats draft.

The combined volume of spoils to be extracted from the small marina and canal excavation is less than 26,776 yd^3 (20,472 m^3). This is nominal in comparison to the spoils to be extracted from the large marinas which have been calculated to yield 40,000 yd^3 (30,203 m^3). The project proponents plan to use two types of dredging equipment to carry out the excavation works

The proposed project will have a Utility Zone where the potable water system, wastewater treatment plant and diesel generators will be located. This zone will also be the site of the Temporary Transfer Site for the solid waste. In all, this utility will be an important component for the proposed development and will ensure that the development remains in operation.

It is anticipated that the project will require about 40,600 gallons of fresh potable water a day at full occupancy. Potable water for the project will be gotten primarily from rain water harvesting and water desalinization in conjunction with the recycling of the post-chlorinated treated wastewater. In terms of the energy consumption, the proposed marina venture will require a demand of about 2,205,000 kWh a year that will be supplied primarily from the use diesel engine generators. The generators will be sized to meet at least 50 % of the demand as the proposed project plans to obtain energy from BEL as well.

In regards to the wastewater management, the proposed development will install treatment plants capable of treating the projected 28,420 gallons a day from the tourism venture and the anticipated 23,380 gallons a day from the marina component. It is important to note that these values will be utilized to adequately size the treatment plants as there may be fluctuations in occupancy rates and marina usage.

In terms of the solid waste, the projected 4.1 cubic yards a day will be further reduced to about 1.6 cubic yards a day via the different waste minimization strategies that will be employed by the proposed project. Waste will be then taken to the Caye Caulker dumpsite for disposal and later to the transfer site on the island where it is anticipated that the waste will be transported to the Mile 21 landfill on the western highway.

Project Rationale

The rationale behind the proposed project is to offer the international and local boating community a marina in which to dock and enjoy the amenities and wanders of both the caye and adjacent reef. Fuel, potable water, bilge pump out and wastewater services are but a few of the services that accompany a modern day marina.

In addition, the justification behind the project is to also offer a safe haven for boaters (local and international) in the event of natural phenomenons such as storms and hurricanes. Secure moored

lines along with the break waters will hold and protect the boats from being damaged during the events.

The proposed project will also offer good housing accommodations in the form of Ocean Front Condo units and Cabañas. In addition, the visitors and guests will be able to enjoy the natural recreational atmosphere without hindrance by offering various amenities and services such as shops, pools, reclaimed beach front access, restaurant and bar along with local shipping services.

Potential Project Impacts

The environmental impacts arising from the project were both ecological and social in orientation. The aim of the project is to develop the Pelican Point Marina & Yacht Club into an environmentally friendly development by planning around and utilizing the existing resources.

The project activities that are likely to give rise to some environmental impacts of note are the dredging/excavation and reclamation operations, the generation of domestic effluents and solid waste as well as energy generation and marina related activities.

Dredging Requirements and Volume

It is anticipated that an estimated 66,776 cubic yards of material will be dredged from the different areas slated to undergo this activity. Of this volume, it is estimated that the small marina and canal excavation will be less than 26,776 yd^3 (20,472 m^3) while the large marinas will yield an additional 40,000 yd^3 (30,203 m^3) of spoils.

Potential impacts related to this activity are varied and a number of measures will be implemented to mitigate the issue. The primary turbidity and sedimentation impacts arising as a consequence of the dredging activities scheduled to be undertaken in conjunction with the currently proposed project are moderate in scope. The secondary impacts have been assessed as ‘minor’ at their most severe. This is related to the limited dredging volumes, the modest sensitivity of the area, and the dredging methods and associated protocols to be applied.

In relation to the latter, a suction dredge and excavators will be applied. This is to be accompanied by sediment curtains. Additional mitigative measures will also be applied such as dredging in calm sea-states only, and suctioning of the mobile sediments on a daily basis to curtail re-suspension and the re-broadcasting of sediments

Water and Wastewater

It is anticipated that 40,600 gallons of water will be required daily at full operation and occupancy of the project. It is also anticipated that 70 % of the demand will be converted to wastewater or 28,420 gallons a day. Water for the project, will be obtained from rain water harvesting where it be stored in ground tanks.

Wastewater and sewage derived from human activities are to be treated through the use of a secondary treatment technology in the form of a ‘BESST’ Treatment Plant. The technology

implemented will reduce the major pollutants such as the macro-nutrients (nitrates and phosphates), ammonia, as well as Total Suspended Solids (TSS) and Biochemically Oxygen Demand (BOD) to levels where they do not pose a threat to the integrity of the environment.

The collection and treatment system will have various pumping stations. This will enable the project to grow without having to purchase a big treatment plant from the beginning. The post-treated effluents from the package treatment plant, is to be stored and used for irrigation and fire-fighting processes.

Solid Waste

Solid waste management will entail the regular collection and disposal of garbage generated on site. Garbage will be separated into organic (biodegradable), inorganic (non-biodegradable) and international food tainted waste. The latter two will be disposed by incineration. The classified waste will be sent to either the Caye Caulker dumpsite or transferred to the Mile 3 dumpsite for disposal.

One of the major impacts of the wastes generated by the development would be the attraction of feral animals and pests such as rats, and birds to the area to scavenge. The mitigative response to be implemented by the proposed development is the judicious collection and segregation of the wastes into biodegradable and non-biodegradable components. The implementation of an education and sensitization campaign focused on the tourists and visitors in general will also be a part of the mitigative response.

Energy

The energy requirements for the proposed project are expected to mainly for residential (domestic) and marina operation purposes. As mentioned previously, energy will be produced by generators that will work continuously. Energy will be required to power domestic appliances, project infrastructure as well as marina based infrastructure including maintenance equipment.

The primary impacts associated with the energy generation are the onsite potential for hydrocarbon spills, as well as the noise produced by the operation itself. The concern related to the potential spills stems from the operation of the generators along with the storage of bulk fuel. The mitigation response to these impacts will be handled by the implementation of contingency practices aimed at preventing, reducing and containing the spills. In addition, preventative maintenance will be carried out on the generators to address these potential problems.

Marina Related Activities

It is anticipated that the marina activities will be limited in scope and includes the fuelling of vessels, providing water and wastewater services, solid waste collection and disposal and vessel maintenance. Potential impacts related to the activity include the construction of the marina in sensitive habitats as well as the dredging of the sea floor where the marina will be placed. These primary impacts will be mitigated by the use of adequate dredging technology in conjunction with the other dredging related mitigation measures such as dredging during calm seas,

suctioning mobile sediments etc. In regards to the construction, the primary impacts include the placement of the piles on sensitive benthic habitat, placement of the breakwater and construction materials among others.

Social Related Impacts

The proposed Pelican Point Marina & Yacht Club is expected to be completed in two phases and throughout the life of the project will create long-term economic employment and investment opportunities for the area, the region, and the country on a whole. The proposed undertaking will result in increased population growth, increased visitation to the site, and an increase in the temporary and full time labor force.

Conclusion

In summarizing the project, the proposed Pelican Point Marina & Yacht Club intends to construct and operate a marina capable of meeting the needs of the boating community. The project plans to meet the needs by offering a wide range of service and amenities along with the hospitality of the guest and residential accommodations.

In essence, the proposed project plans to be the first in offering this type of services, especially considering that the tourism sector is booming in Belize and there is a need for such an investment