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GLOSSARY OF TERMS

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

Avifaunal: Pertaining or relating to 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.

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 bacteria found in faeces

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: Pertaining or relating 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.

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.

Incineration: 1. Burning of certain types of solid, liquid, or gaseous materials. 2. A treatment technology involving destruction of waste by controlled burning at high temperatures, e.g., burning sludge to remove the water and reduce the remaining residues to a safe, nonburnable ash that can be disposed of safely on land, in some waters, or in underground locations.

Incinerator: A furnace for burning wastes under controlled conditions.

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.

Irrigation: Technique for applying water or wastewater to land areas to supply the water and nutrient needs of plants.

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.

Land reclamation: dredging to mine sand, clay or rock from the seabed and using it to construct new land elsewhere. This is typically performed by a cutter-suction dredge or trailing suction hopper dredge. The material may also be used for flood or erosion control

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.

Macroalgae: algae that project more than 1 cm above the substrate, such as *Dictyota spp.*, and *Halimeda spp.*

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.

Neap Tide: tide of minimal range occurring when the moon in quadrate, or its 1st Quarter and 3rd Quarter Phases.

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 is responsible for issuing permits that 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, and 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.

Riprap (also known as **rip rap**, **rubble**, **revetment**, **shot rock** or **rock armour**) is pieces of rock or other material used to armor shorelines or stream banks against water erosion. Riprap reduces water erosion by resisting the hydraulic attack and dissipating the energy of flowing water or waves.

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.

Spring Tide: tide of maximum range occurring every fortnight and coincides with when the moon is new and full respectively.

Sublittoral: seabed below the low tide mark.

Suction Dredges: These operate by sucking through a long tube, like some vacuum cleaners. A plain suction dredger has no tool at the end of the suction pipe to disturb the material.

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.

Wastewater Treatment: Removal of organic solids and materials through aerobic or anaerobic conditions via the three known treatment methods of Primary, Secondary and Tertiary treatment.

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

Wave Height: is a 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.

BEL: Belize Electricity Limited

BESST: Biological Engineered Single Sludge Treatment

BCCDG: Belize City Cayes Development Guidelines

BOD_5: 5 days Biological Oxygen Demand test

BSWMP: Belize Solid Waste Management Program

BWSL: Belize Water Services Limited

CEQ: Council of Environmental Quality

CITES: Convention on the International Trade in Endangered Species of Wild Flora and Fauna

CSO: Central Statistical Office, See SIB

CZMAI: Coastal Zone Management Authority and Institute.

ECP: Environmental Compliance Plan

EIA: Environmental Impact Assessment.

DoE: Department of the Environment.

GoB: Government of Belize.

GPS: Global Positioning System

IMO: International Maritime Organization

IUCN: International Union for the Conservation of Nature.

LLES: Limited Level Environmental Study

NEAC: National Environmental Appraisal Committee

NEMO: National Emergency Management Organization

NFS: National Fire Service

NGO: Non-Government Organization.

MoH: Ministry of Health

MSL: Mean Sea Level

SIB: Statistical Institute of Belize

TNCE: Tunich Nah Consultants and Engineering

TSS: Total Suspended Solids

SWCMR: South Water Caye Marine Reserve

SWMA: Solid Waste Management Authority

WTS: Waste Transfer Site

TBFIM: To Be Filled In later by Management

TOR: Terms of Reference

ORIENTATION NOTES

The intended Chrysalis Resort Limited project aims to develop a low density – low volume residential tourism venture on the Channel Cayes which is a part of the South Water Caye Marine Reserve. This EIA document is an expanded and detailed version of the Limited Level Environmental Study that was undertaken for the same project. Due to public outcry and conditions regarding the World Heritage Site, the Department of the Environment along with the local stakeholders saw it fit to commission a full fledge Environmental Impact Assessment.

Thus the project proponents decided to scale down some aspects of the development, especially considering the importance of the World Heritage Site and the newly enacted South Water Caye Marine Reserve Regulations which delineates the zones and their particular use.

Therefore, the anticipated endeavor will be accompanied by eco tourism based amenities that will attract potential high end guests to the site. This document is aimed at holistically describing the proposed project, its setting and its impact and mitigation measures that will be employed. The description of the project, its setting and supporting services and amenities are in the form of an expansive narrative (Sections 1,2 and 3) with its impacts and mitigation measures described in its outcome (Sections 4,5, and 6).

Narrative

The location and background of the project are identified in an expansive narrative which consists of a description of the overall project, its immediate surroundings and the supporting services required for operation. These components are also supported by a number of annexes that in principle provide further details to the narration. The main narrative is further broken down into two subcomponents as summarized in the following:

- The main narrative begins with Section 1 with the description of the overall project and Section 2 which gives a picture of the physical environment of the project. These Sections an important component in any EIA as it allows the reader to get an understanding of the overall project development along with a detailed description of the environmental setting in which the project will be located.

- The other component or Section 3 relates to the infrastructural supporting services that will be derived from the operations component that will make the project viable. Such support services include identifying the water and energy demands as well as the calculating the wastewater and solid waste production. In addition, other components in this narrative give a broad view of the infrastructural components that will be developed in conjunction with the site's carrying capacity.

Outcome

Every action must have an equal and opposite reaction. The resulting outcomes of the project's development are captured in the alternatives for development and the potential environmental impact the chosen option and alternatives would have on the receiving environment. These impacts can be measured in terms of its magnitude, scale, scope and duration. Prior to these impacts, a set of development alternatives are provided to broaden the reader's perspective in employing alternative measures. These components are described in Sections 4 and 5 of the

document and entail a detailed description of the development alternatives and potential impacts that could arise as a result of developing the intended project.

Management

The mitigational measures to the potential environmental and socio-cultural impacts are manifested in the management aspect of the proposed project (Section 6). Section 6 deals with the implementation of an Environmental Management System (EMS) plan to further address the different environmental impacts, its mitigational measures and proposed monitoring plans. The monitoring plans are a form of indicators or gauges that are used to measure the project's environmental performance. In addition, this section further documents the project's response mechanisms towards natural disasters. The term 'disaster' is loosely used in this section and is referred to as any incident, accident, or natural occurrence that could affect the operation of the project in whatever way.

Conclusion

The overall document was prepared not only with a view of responding to the prescriptions of the TOR, but also with the view of understanding that documents of this nature are a resource material for researchers, administrators, natural resource managers, students, faculty and the public at large. In this regard great care was taken in undertaking the necessary field based surveys and assessments, as well as in providing information with the requisite level of academic integrity (references and citations from reliable sources).

EXECUTIVE SUMMARY

Project Location

The proposed Chrysalis project is to be a low density high-end residential resort development that will be located in the Pelican Range of the South Water Caye Marine Reserve. The range is actually on the south-eastern portion of the reserve, which has also been designated as a UNESCO World Heritage Site. The proposed Chrysalis project sits on top of a coralline atoll or faro which is about 14 ¾ miles northeast of Placencia Village and 10 miles southeast of Riversdale Village as the crow flies. The Belize Barrier Reef which is a popular tourist attraction destination and a part of the Mesoamerican Barrier Reef System is just 6 miles away to the east from the project site.

Presently, the project site is only accessible by boat. It is anticipated that as the development progresses, the project will construct a landing facility for helicopters that would enable guests to be shuttled faster to and from the project site.

Project Setting

The proposed project site will be located on Big Channel Caye and Little Channel Caye which has a combined area of about 19.7 acres. The project is located on a broad strip of land that abruptly gets thinner as one heads southwards. The windward and leeward portion of the project site is relatively shallow and enclosed by strips of either coral reef or coralline sand bars.

These sand bars are also referred to by the local fishermen as sand flats. These flats are frequented by many fish species, crustaceans and other invertebrates. The shallow strip of area surrounding the project site progressively gets deeper as one ventures away from the project site in any direction as seen in the bathymetric and depth profile maps.

Rapid biological assessment of the project site revealed that the site is comprised of two similar vegetation assemblages or terrestrial ecosystems. The flora assessment revealed that the dominant emergent semi-aquatic or inter-tidal tree species were the mangroves, specifically the Red Mangrove (*Rhizophora mangle).* Red mangrove varies in height from 5 to 30 feet, and occurs in association with a few white and black mangrove (*Laguncularia racemosa* and *Avicennia germinians*) respectively. In regards to the primary shoreline, the Red Mangroves (*Rhizophora mangle*) dominate the land/water interface. Red Mangroves (*Rhizophora mangle)* also dominates the mixed mangrove stands although there is an appreciable presence of the Black Mangroves (*Avicennia germinans)* and the White Mangroves (*Laguncularia racemosa*).

There is no pre-existing development in the area except for a small abandoned and dilapidated wooden shack and pier on the small private caye just north of Big Channel Caye: It needs to be noted however that there are transient visitors to the area in the form of sports fishing guides and their tourists, as well as traditional commercial fishers who use the private caye as a stop-over from time to time.

Project Profile

The currently proposed Chrysalis Resort is to be a low density, low impact resort and residential development catering to high-end clientelle. It is envisioned that the tranquil and relaxing environment will provide guests with a much needed and desirable respite from their busy work-a-day urban environment.

The proposed development will be carried out in phases over a two to four year time-frame. It is envisioned that while certain aspects of the project is completed such as the villas, other aspects will be proceeding such as the Helipad and Wind Turbine installation (See development schedule in Section 1, Table 1.3).

The development plan entails the construction of the recreational accommodations and support infrastructure such as the staff quarters, piers and board walks that would allow the project to become operational in as short a time-frame as possible.

The residential component of the development entails the construction of five (5) villas that will range from one (1) to two (2) bedroom. In addition to this, two overwater cabanas or villas will be constructed to address the needs of specific clientele, while at the same time providing architectural diversity and an enhanced vista of the area.

Among these buildings, the proposed development will construct an Owner's residence to accommodate the owners during their visit to the development. This residence will be a three bedroom building and will be largest building on the site. In all, the proposed project plans to construct seven (8) guest buildings on the Channel Cayes. The majority of these guest buildings will be on Big Channel Caye since it is the largest caye of the project site. The Little Channel Caye will support the additional guest buildings. The units are described as follows:

- Three Type One Villa Units
- Two Type Two Villa Units
- Two Overwater Villa Units
- One Owner's Residence Unit

} Total Units = 8

To house the staff, the intended project plans to construct 12 worker's quarter units that will range from two to four bedrooms when completed, along with all the necessary health and sanitary facilities. It is anticipated that these units will be adequate to house the workers.

In essence, the envisioned project plans to construct the units with readily available materials such as concrete and wood with the occasional palmetto or thatch décor. It is expected that native materials will be used as much as possible to enhance the residential settings.

Collectively these units will be able to support about 70 persons of which 24 will be guests. This engineered capacity is theoretical but important in calculating the supporting services and in

analyzing the carrying capacity of the project site. Similarly, the development will have its fair share of amenities to complement the visitor experience. Some of the amenities that will be constructed on site as part of the project outline and setting will include the following:

- Arrival Pavilion
- Beach
- Personalized Services
- Guided Tours

In addition, the development will also have its supporting services to keep the project in operation. These supporting services will be located in the Utility Zone. These services include potable water and its distribution, a wastewater treatment and recycling facility, solid waste storage facility, energy generation and electrical distribution, and communication services. The following sections briefly summarize the supporting services for the proposed project:

- *Water* - At full development, it is anticipated that the proposed project will require about 5,850 gallons of residential potable water a day. This volume however, is conservative as an additional 10 % of the will be added for other amenities. As is usually the case in remote areas, potable water will be sequestered from the seasonal rains and supplemented by a small water desalinization plant capable of producing roughly about 6.0 gpm to 7.0 gpm. In addition, it is anticipated that the water demand will further be supplemented by tertiary source such as the recycling of the post chlorinated and treated wastewater. It is expected that this demand will suffice the project in all its water needs considering the different water conservation measures. In terms of the construction phase, water for construction purposes will also be gotten from rain water harvesting and from the water desalinization plant. It is difficult to predict the potable water for the construction period due to the different construction phases.

- Wastewater Treatment and Disposal - In considering the wastewater production, it is projected that 70 % of the potable water volume is eventually converted to wastewater. At this percentage, it is estimated that about 4,095 gallons of the residential wastewater a day will be generated by the operation phase of the proposed project. Due to the project location, sewage and wastewater associated with the proposed undertaking will be carried out by a 'Tertiary Level Packaged Plant' capable of treating the wastewater to acceptable standards and beyond. In addition, due to the servicing of guests marine vessels, an additional 3,920 gallons a day will be added to the daily load at 100 % slip occupancy.

  Such package plant can either be the BESST Plant which is an acronym for **B**iologically **E**ngineered **S**ingle **S**ludge **T**reatment or an approved equivalent. It is anticipated that a 8,000 gallon treatment plant or larger will be purchased for this development. It is envisioned that the development will utilize a series of pumps and lift stations to collect and treat the wastewater. The post-treated effluent from the package plant is to be stored and recycled and used for flushing of toilets, irrigation and fire-fighting. The management of wastewater has been comprehensively dealt with in Section 3.3.

- *Solid Waste Management* - As is with any remote area, the management of solid waste will entail a sequence of choreographed activities that will ensure that the proper collection and disposal mechanisms are in line with the development concept. These mechanisms will include the initial separation of the waste into its organic and inorganic components. It is anticipated that the development will generate about 207 lbs or about 0.2 cubic yards of garbage a day at full capacity. This volume of waste is expected to be significantly less considering the imposed waste minimization strategies that will be employed by the project. The organic component of the solid waste will then be composted on the project site and the resulting mulch used as fertilizer in gardening operations to 'fertilize' lawns and hedgerows.

  After the initial separation, the inorganic component is to be further separated into combustible and non-combustible components. The combustible waste will be 'incinerated' and the non-combustible waste carted away. Presently, the notion of an incinerator is in consideration and the sizing will depend on the actual volumes of combustible wastes produced once in operation. For the time being, both these components will be compacted, tagged, bagged and transported to the Placencia Peninsula dump site for disposal.

- *Energy Generation* - In considering the remote location of the project site, the intended development will be required to generate its own energy supply to power the project. It is anticipated that the project, at full development, will require an average of about 18.4 kWh a day of energy. This consumption can be interpreted as using about 400 kWh a month per unit. As the nature and location of the proposed development implies, the primary energy sources for the project will be derived from alternative energy sources supplemented by some sort of mechanical generation.

  Thus, the proposed undertaking will obtain its primary source of energy from a wind turbine unit that will be located on the upper north-eastern portion of Big Channel Caye (See Fig. 3.4). It is expected that this source will be supported by some solar energy and diesel generation system. All these sources will depend entirely on the natural environment of the project site. In any case, it is likely that the diesel generators will generate enough power to sustain about 40% to 50% of the development. Fuel for the generating system will be barged to the site following specific and strict environmental guidelines. All these energy systems will be hybridized in order to be compatible with each other.

  Fuel for the anticipated development will be a premium commodity, especially considering the proposed project is located far away from any viable fuel station. Therefore, with this in mind, fuel services for the project will be provided for operational use only and its use will include diesel fuel for the standby generator and gasoline fuel for the development's water craft. It is important to note that fuel will be not used for commercial purposes except for emergency situatuions. It is envisioned that the proposed project will store a minimum quantity of these fuel not exceeding 3,000 gallons. These

fuels will be stored at the Utility Zone area in tanks contained re-enforce concrete containment walls capable of storing 110 % of the tank's volume.

Potential Environmental Impacts

As mentioned previously, the proposed project will be a low impact and low density venture aimed at merging development with the environment. The environmental impacts arising from the project were both ecological and social in orientation. The aim of the project developer is to develop Chrysalis 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: land clearing, dredging and land reclamation, domestic effluents and the sourcing of potable water, as well as solid waste and energy generation. Apart from these impacts, activities such as the placement of the pier and the berthing activities associated with it erection results in another range of environmental impacts.

Land Clearing Process

Potential impacts relating to the land clearing activities includes the alteration of the natural habitat causing a possible reduction in abundance of species. The project site intends to conserve the buffer zone as much as possible which includes mainly mangrove forests. The project plans to take advantage of some of the bare or denuded areas presently on the sites.

The use of re-vegetation, landscaping and buffer zones and reserves will be done to increase habitat value of the disturbed site. The movement of guests and staff will be facilitated by elevated boardwalks which will curtail the need for land clearing since this is to be largely constructed along the path of mangrove canopies that will only be under-brushed for the initial construction. This bodes well for the ecology of the area given the nursery function and the contribution to the primary productivity of the sub-tidal environment from mangrove leaf litter.

The mangroves in the area are generally prolific and robust, and in a good stead of health. Their contribution is related only to the aquatic ecology of the area, but also to terrestrial and arboreal species. The area is much utilized by a range of bird species for foraging and roosting functions.

The arboreal component of the forest is also utilized by boa constrictors which are a major predator on birds along the offshore cayes. A large Boa Constrictor (*Boa Constrictor*) was captured on Big Channel Caye during the first survey of the area by the Tunich Nah Survey Team.

Dredging Requirements and Volume

It is anticipated that the dredging of the access channel will yield an estimated 16,924.5 cubic meters of material (See Fig. 2.13). It is envisioned that much of the dredging spoils will be composed of sand that will be used for the land reclamation component of the development. The demand for spoils will be to accommodate buildings and other standing infrastructure, as well as to enhance or nourish a pre-existing beach at the northern end of the Big Channel Caye.

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 is to be ameliorated by the deployment of silt curtains in tandem with complimentary measures to curtail or eliminate the broadcasting of labile sediments such as ensuring that the walls of the burrow pits are appropriately sloped and that dredging only takes place during calmer sea-states.

The curtailment in the volume of sediments that is to be extracted given the strategy to reclaim on those areas that would accommodate standing structures and ancillary facilities, also has positive implications for sediments that would otherwise be broadcasted into the environment.

Water and Wastewater

The primary impacts in relation to human and domestic waste are evaluated as moderate given the scope of the project location. These relate to nutrient enrichment, increase in BOD compounds and elevation of microbacterial pathogens mainly fecal coliforms and E. Coli.

Apart from the limited dispersal of effluents into the environment, the wastewater and sewage derived from human activities will be treated via a package plant capable of reducing the major pollutants such as the macro-nutrients (nitrates and phosphates), ammonia, as well as Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD) to levels where they do not pose a threat to the integrity of the environment. This has been discussed previously and further expounded in the document.

The storage and chlorination of effluents that are to be reused for flushing toilets and irrigation of lawns and eco-gardens should denature any pathogens that would remain after treatment by the package plant. The collection and treatment system will be centralized and coupled to a vacuum station. This will be able to facilitate growth without having to purchase a big treatment plant from the beginning.

The excess treated and post chlorinated wastewater will be disposed of in a proper manner. This process will be carried out by utilizing a deep injection well that will be perforated for the disposal of the brine from the water desalinization method. It is anticipated that this methodology will not pose any long term impacts to the receiving environment. It is important to note that the treated wastewater will be of excellent quality that will meet and exceed the present DOE standards.

Solid Waste

The most severe and potential impacts related to the generation of solid waste is the introduction of pathogenic diseases and ground water contamination due to the inappropriate management and containment of the waste. The direct wild life impact is also a note of concern. This is mainly in the form of the attraction of feral predators and opportunistic scavengers to the site.
Feral predators in the cayes generally relates to racoons and snakes as well as a range of raptorial birds such as Common Blackhawk (*Buteogallus anthracinus*) and the Broad-winged Hawks (*Buteo platypterus*).

Much of the opportunistic scavengers on the cayes relates to birds such as the Great-Tailed Grackle, the Laughing Gull (*Larus atricilla*) and the Magnificent Frigatebird (*Fregata magnificens*), as well as rodents, mainly rats.

The impacts have been classified as minor to moderate (See Section 5, Table 5.1) given the project location of the project away from the Preservation and Conservation of the South Water Caye Marine Reserve, as well as the low density eco-friendly orientation of the development.

The attraction of predators and scavengers to the site is to be mitigated and circumvented through the judiciously collect and separation solid waste into organic and inorganic components. The organics will be composted and used on site as compost and the inorganics will be compacted and transported to the Placencia dumpsite for disposal. The management of the proposed project will encourage waste minimization strategies such as recycling and reusing of the inorganics.

The solid waste management strategy to be adopted by the project proponent should also mitigate the issues of pathogenic diseases and groundwater contamination.

Energy

The energy requirements for the proposed project are expected to be mainly for residential (domestic) and pier operation purposes. Energy will be produced by alternative energy, mainly, wind turbine and some solar energy. Supplemental power will be provided by the use of a diesel generator. The project site has two options as to where the wind turbine is to be located. The environmental impacts related to the energy generation will be minimal as modern mitigation technologies can be adapted to suit the equipment. Site selection and equipment placement will, however, be an issue to consider when developing the supplemental power.

Pier Related Activities

It is anticipated that the piers will be limited in scope and will primarily be used for servicing and docking of boats. Marina related maintenance will only be carried out on an emergency basis.

Potential impacts related to the construction and operation of the pier is direct injury and trauma to humans and wildlife such as manatees. Other impacts relate to petroleum pollution mainly in the form of the dissolved components from un-combusted petrol and light faction 2-cycle oils, as well as heavier oil factions from the lubricating systems diesel engines. The issue of pollution from oils is to be mitigated by encouraging clients or residents of the resort to invest in four-strokes outboard engines. Policies on limited idling of engines while at the dock should also mitigate the problem of petroleum pollution.

The issue petroleum pollution was classified as minor whereas the issues of injury form boats and activities in the marina were classified as moderate.

Social Related Impacts

The proposed Chrysalis development is expected to be carried out in two subsequent and continuous phases that is anticipated to create long term economic employment and investment opportunities for the Pelican Range and thus the country on a whole. The proposed undertaking will result in population growth to the area, increased visitation to the site, an increase in the temporary and full time labour force and economic spin-offs.

Environmental Management System

The anticipated project plans to implement an Environmental Management System (EMS) to manage and address the potential environmental impacts associated with the development. This environmental tool is also essential in increasing the operational efficiency and investment returns by developing sound environmental practices towards the tourism aspect of the development.

The EMS system will devise monitoring plans to manage and document the different environmental issues associated with the construction and operation of the project. Furthermore, the monitoring program has been developed not only in relation to satisfying the statutory requirements of the EIA process, but also as a consequence of the proper implementation of the proposed development and its relationship to the integrity of the environment and the stakeholders in the area.

Summary Conclusion

The proposed residential development intends to attract high end guests by offering a low density, exclusive and tranquil environment. It is the intention of the developer to incorporate the natural wonders of the area for an ultimate visitor guest experience. There is no aspect of the development in its design or execution that should in any was compromise the viability of the South Water Caye Marine Reserve, or indeed the integrity of the World Heritage Site designation of the area.