
SECTION SIX

ENVIRONMENTAL MANAGEMENT

6.1 Introduction

The environmental management plan for the proposed Belcan Golf Resort & Marina project will involve the identification of the mitigation measures along with the required performance indicators and monitoring plan. Furthermore, in order to carry out these activities, the developer plans to implement an Environmental Management System to simplify the environmental aspect of the entire operation which will include the construction and post construction phase. Furthermore, this EMS will be utilized as a tracking tool for all the environmental objectives and targets set forth by the Department of the Environment.

6.2 EMS Outline

An **Environmental Management System** is a set of processes and practices that organizations or companies use to reduce their environmental impact. It involves a continual cycle of planning, implementing, reviewing, and improving processes and actions to meet both its business and environmental goals. The EMS also reflects the Project's emphasis on continuous improvement in operations by measuring and evaluating its environmental performance.

In considering the proposed project, the proponents will implement an Environmental Management System to aid the residential development and its amenities (Golf Course and Marina Operations) in achieving its environmental goals and objectives. This action first includes the identification of the impacts, its mitigation measures and proposed monitoring plans along with the required contingency management plans.

6.2.1 Required Key EMS Elements

The organization's environmental management system must demonstrate the following key elements:

- ▶ Setting an environmental policy,
- ▶ Determining significant environmental impacts,
- ▶ Setting goals for compliance and environmental performance,
- ▶ Assigning responsibility,
- ▶ Implementing and documenting programs,
- ▶ Evaluating and measuring effectiveness, and
- ▶ Demonstrating performance.

These key elements are essential in carrying out a successful management system that will benefit the project in all its environmental endeavors. This section will facilitate the necessary framework for the project to meet its environmental goals and in so doing, promote the existence and conservation of the natural surroundings in which the project site is to be located.

6.2.2 Benefits

There are a range of benefits associated with operating an effective Environmental Management Systems (EMS) and these include:

6.2.2.1 Financial

- ▶ Cost savings through the reduction of waste and more efficient use of natural resources (electricity, water, gas and fuels).
- ▶ Avoiding fines and penalties from not meeting environmental legislation by identifying environmental risks and addressing weaknesses.
- ▶ Reduction in insurance costs by demonstrating better risk management

6.2.2.2 Operational and Internal

- ▶ Improved overall performance and efficiency.
- ▶ More efficient, less hazardous production processes
- ▶ Improved consistency by reducing waste and disruption of production.
- ▶ More clearly defined staff responsibilities
- ▶ Improved internal communications and morale, often leading to sound environmental solutions suggested by staff, proves seriousness of the company

6.2.2.3 External

- ▶ Better public perception of the organization, leading to improved sales
- ▶ Reduction of the impact (e.g. noises, smells, dust) of the activities on the local residents, leading to more community support

6.2.2.4 Benefits of third party verification

- ▶ Ensures that the EMS is consistent according to set protocols.
- ▶ Provides credibility and integrity in reporting and publishing environmental information.
- ▶ Demonstrates commitment to environmental transparency and accountability.

6.3 Impact Mitigation Measures

Impact mitigation is a critical component of the EIA process. It aims to prevent adverse impacts from happening and to keep those that do occur within an acceptable level. Opportunities for impact mitigation will occur throughout the project cycle.

The objectives of mitigation are to:

- ▶ Find better alternatives and ways of doing things;
- ▶ Enhance the environmental and social benefits of a proposal;
- ▶ Avoid, minimize or remedy adverse impacts; and
- ▶ Ensure that residual adverse impacts are kept within acceptable levels.

This section provides a summary of the key potential residual impacts of the preferred option and recommended mitigation measures intended to reduce the potential negative impacts resulting from actions of the construction period and post construction period. This list is by no means limited and other issues may be added as the mitigation measures as development progresses.

6.3.1 Mitigation Measures In Relation To Dredging Activities

There will be several dredging activities associated with the proposed project which include the dredging of the area in front of the property that will create the appropriate depth for the vessels to gain access to both marina entrances, as well as the dredging of the access channels and the marina basin.

The issues of concern related to the dredging operation are the navigation and berthing of the dredge at the burrow site, as well as the dredging or excavation activity itself which poses a threat of physical harm and injury. This is especially relevant to boat traffic in the area. The mitigative responses to this are in large part related to the placement of navigational aids such as buoys and lights to alert and ward off mariners.

The primary aquatic impacts arising from the dredging operations are expected to be an increase in sedimentation and turbidity, as well as an increase in BOD and Hydrogen sulphide. The impact of the dredging has been categorized as 'moderately deleterious' (See Table 5.1).

The issues associated with the actual dredging of the access channel are sedimentation and turbidity impacts to the marine environment. The mitigative response to these impacts is to mechanically contain or enclose the sediment plume produced from the excavation process through the deployment of several sediment curtains along the dredged sites. Other related responses include activities designed to ameliorate the re-suspension of sediments, as well as measures that would reduce the physiological stress on sessile, slow moving benthic organisms as well as the Manatee (*Trichechus manatus manatus*).

Complementary mitigation measures include the rapid undertaking of the overall dredging operation in addition to the vacuuming of the re-suspended sediments ashore to decrease the

potential of the expansive dispersal of sediments, nutrients, possible toxic substances. Another mitigative intervention relates to adjusting the overall mechanics of the dredge to allow for the re-colonization of the area by benthic organisms.

The impacts from the dredging operations are expected to be localized and should be confined to the areas immediately associated with the dredged sites. Table 6.1 summarizes the proposed mitigation measures that will be implemented by the project proponents.

Table 6.1: Mitigation Responses in relation to Dredging Impacts

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1.0 Actual Dredging or Burrowing of 'Cutter Head' and other dredging equipments (excavator, back hoe)	1a. Disturbance of seafloor and suspension of fine sediments and re-deposition of coarse fraction.	1a1. Direct physical destruction of benthic habitat, and attenuation of light impeding photosynthesis of autotrophs	1a1a. Use of 'Silt Curtains' at burrow site, ensuring that lower end of 'skirt' is resting upon or is at least 1ft off the seafloor, and ensuring that top of 'skirt' is always above surface of water.
			1a1b. Monitoring and where necessary repairing and/or replacing leaky pipes and faulty couplings of 'spoil' discharge pipes. In the case where the excavator is being used, the system of creating a walking pad out of the same dredged material will be utilized, and then it will be cleared as it goes back to shore. Sediment curtains will be utilized. See Fig 6.3 for explanation.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1.0 Actual Dredging Contd.			1a1c. Applying velocity reduction measures where spoils are deposited such as baffles to precipitate solids and curtail turbid influences in effluent stream.
			1a1d. Decrease time frame over which dredging operation is to take place to avoid daily re-suspension of sediments.
			1a1e. Ameliorate impacts of daily re-suspension of sediments by suctioning sediments that have resettled or re-deposited in the area.
			1a1f. Ameliorate re-suspension of sediments by confining dredging operations to calmer sea states.
			1a1g. Assist re-colonization of seafloor by benthic plants and invertebrates by ensuring that walls of dredged areas are not at an angle steeper than 35 degrees.
		1a2. "Blanketing" or smothering effects on benthic habitat and sessile and slow-moving invertebrates.	1a2a. Institute monitoring program to ensure that light penetration is at least 25% of surface irradiance 2,000 ft. from silt curtains.
	1b. Decrease in Dissolved Oxygen and increase in BOD.	1b1. Physiological stress and lethal effects on benthic invertebrates and to a lesser extent, fin-fishes.	1b1a. Completion of dredging operation in as short a time-frame as possible, especially in regards to burrow site
		1b2. Stress on Manatees transient areas and feeding habitats in the immediate vicinity	1b2a. Completion of dredging in as short a time as possible. The use of silt curtains at all times. Curtains will also keep manatee out of burrow site

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1.0 Actual Dredging Contd.	1c. Increase in temperatures brought about by the re-suspension of sediments with a 'specific heat capacity' capable of raising water temperatures by as much as 4 – 6°C.	1c1. Lethal and sub-lethal effects on sessile and slow-moving benthic invertebrates.	1c1a. Proper deployment of 'silt curtains' to ensure that suspended sediments at dredged sites are contained and that any re-deposited sediments are 'vacuumed' and rapidly deposited on land
	1d. Deposition of organic sand, silt and especially peat from the Grand Canal network	1d1. Unpleasant smells associated with degassing of Hydrogen sulphide and potential to smother mangrove root systems.	1d1a. Deposition of spoils from canal network and burrow pits in areas already cleared or otherwise denuded – Also deposition in smaller piles that are spread out to facilitate drying by sun and elimination of unpleasant odor.
2.0 Navigation, Berthing of Dredge and Deployment of Spoil Discharge Pipes.	2a. Navigational hazard.	2a1. Threat of injury and possibly death associated with boat traffic.	2a1a. Ensure that marker buoys and navigational lights are deployed and activated on dredge, sediment curtains and spoil discharge pipes – Buoys are to be large and bright and navigational lights are to be operational from 6:00 p.m. to 6:00 a.m. on a daily basis.
			2a1b. Partially submerging of the pipeline to facilitate the transiting of boats in order to prevent any accidental contact with the pipeline.
3.0 Deployment of spoil and discharge pipes (pontoons)	3a. Same as above	3a1. Installation of discharge pipes can be a navigational hazard	3a1a. Placement of spoils in fence and geo-textile containment

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
4.0 Excavation of marina basin and water obstacles for Golf course	4a. Reduction in wildlife and organisms living within the impacted area.	4a1. Distribution and displacement of wildlife and organism to better less disturbed areas. Intolerance for the remaining circumventing vegetation due to salt water exposure.	4a1a. Limit area to be impacted by the excavation of the marina and the water obstacles for the golf course.
			4a1b. Properly bulkhead the periphery of the marina and lining of the water obstacles.

6.3.2 Mitigation Measures in Relation to Land Reclamation Activities

The anticipated project plans to reclaim the low lying portions of the project site. This activity is important in considering the surface runoff and overall drainage of the area. The primary impacts related to the activity include the salinization of the soils from the dredging of the access channel, increased turbidity and deposition of anoxic sediments in the nearshore seas. Table 6.2 summarizes the mitigation measures to be put in place to circumvent and ameliorate the impacts of land reclamation.

Table 6.2: Mitigation Responses in relation to Land Reclamation Activities

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1. Land Reclamation and land filling	1a. Salinization of soils and ground water contamination as a result of spoil movement	1a1. Reduce habitat for existing wildlife and movement of these to other areas.	1a1a. Dredging of sites when salinity ranges are at the lowest for the project site
	1b. Increased turbidity as a result of spoil runoffs	1b1. Disturbance to the circumventing vegetation as a result of spoil deposition	1b1b. Placement of spoils in fence and geo-textile containment

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
		1b2. Restrict ground water use as a result of turbidity and salinization.	1b2a. Contain spoils in geo-textile material and adequate discharge of the de-watering process into the sea.
	1c. Introduction of 'possible' anoxic sediments to undisturbed areas.	1c1. Bioaccumulation of toxics in organisms thereby altering the food chain.	1c1a. Proper de-watering of the contained spoils before being used to fill the low lying areas of the proposed development.
Land Reclamation and land filling contd.	1d. Possible die-offs of mangroves	1d1. Mangrove dying from sediment accumulation around root system	1d1a. Placement of geo-textile as a barrier to avoid the accumulation of spoil on the roots of the vegetation, namely fringing mangroves

6.3.3 Mitigation Measures in Relation to Domestic Effluent Impacts

The primary impacts associated with domestic effluents are: increased nutrients and fecal coliform in the water column as a result of treatment plant malfunctions, inadvertent discharge, mismanagement, lack of environmental ethics etc.

The situation of increased nutrients in the water column is generally referred to as eutrophication. This relates to the macro-nutrients, which are 'phosphates' and 'nitrates'. These are generally derived from gray water effluents (showering, laundry and cleaning) as well as sewage effluents from the flushing of toilets. In general a major source of macro-nutrients in gray water effluents is from detergents. This is also relevant to the proposed development. The greater contribution of nutrients would come from human waste. The main source of macro-nutrients would be from the occupancy of the residential community and the commissioning of the marina.

The sewage technology to be applied is secondary treatment with the reduction of nutrients to levels that are not a threat to the environment and that are well within national standards. The system to be adopted for the proposed project is a prefabricated treatment plant or 'Package

Plant' titled a "Purestream ES Model BESST" (See Section 3.3.3) or its equivalent. The acronym of the systems stands for **B** Biologically **E** Engineered **S** Single **S** Sludge **T** Treatment.

The issue of fecal coliform associated with the development is an important one. As may be seen from Annex IV, no *E. coli* readings were recorded. The generation of *E. coli* becomes a significant consideration with the commissioning of the development. The primary impact from these features of the development has been characterized as 'negligible deleterious' (See Table 5.1). The application of the BESST Sewage Treatment Technology or its equivalent combined with water conservation measures dampens and greatly diminishes the potential human health impacts from fecal coliform. The mitigation measures that are to be put in place in regard to eutrophic impacts and human health concerns are summarized in Table 6.3.

Table 6.3: Summary of Impacts Associated with Human Wastes and Domestic Effluents

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1. Human Waste and Domestic Effluents	1a. Nutrient enrichment from the injection of macro-nutrients into the environment.	1a1. Stimulus to plant growth on land and in the water column, in the case of the latter this includes phytoplankton, sea grass, and macro-algae	1a1a. Installation of BESST Treatment or equivalent technology to treat waste to 'Tertiary' Levels, where Total Nitrogen Loads are reduced to less than 10 mg/l and Phosphorus are reduced to 2-3mg/l.
Human Waste and Domestic Effluents contd.			1a1b. Reduce further nutrients potentially going into the water column by using stored treated effluents from BESST Treatment Plant or its equivalent for irrigation purposes.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
	1b. Human Health and Biosecurity risks	1b1. Infection of humans and mammals with pathogenic viruses and bacteria.	1b1a. Thorough disinfection of effluents potentially going into water column or otherwise making contact with humans by use of BESST Sewer Treatment Plant or its equivalent which incorporates chlorination of effluents.
			1b1b.Reduction of effluents going into the environment by use of BESST Treatment Plant or its equivalent, incorporation of reuse & recycling of effluents for watering of green areas and golf course.
		1c1. Possible contamination of ground water supply.	1c1a. Boring of 4 monitoring wells, 1 in the utility zone and 3 along an E W line thru the property. Constant monitoring to be conducted to ensure the adequacy of the supply and safety of the water
	1d. Suspended Solids from un-dissolved components of human waste and domestic effluents.	1d1. Suspended solids would impede light penetration in the water column and block photosynthesis.	1d1a. Installation of solids trap prior to BESST Treatment or its equivalent to reduce TSS to less than 10 mg/l

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
	1e. Sedimentation associated with settlement of flocculent fraction of human waste and domestic effluents.	1e1. Blanketing of seafloor and suffocation of slow-moving and sedentary invertebrates.	1e1a. Application of BESST technology or its equivalent reduces TSS to less than 10 mg/l, in combination with effluent recycling reduces to insignificant levels suspended solids in the water column.
Human Waste and Domestic Effluents cont.	1f. Increase in BOD substances and consequent reduction in dissolved oxygen.	1f1. Induction of physiological stress and in extreme circumstances death in relation to sessile and slow moving invertebrates.	1f1a. Application of BESST technology or its equivalent reduces BOD to less than 10 mg/l, this in combination with effluent recycling and reuse regime reduces to BOD to insignificant levels in the water column.

6.3.4 Mitigation Measures in Relation to Solid Waste Management

The solid waste accruing from the general commissioning of the residential and marina operation includes organic and inorganic components that cover both the construction and operational phases of the proposed project. The organic component includes in large part discarded and unconsumed food from the restaurants followed by the ‘green’ waste produced as a result of the landscaping and pruning processes (golf course, green areas, buffer zones etc.). The inorganic waste includes wastes that are either classified as combustible or non combustible.

The construction phase activities have the capacity to generate substantial volumes of solid wastes. This varies from concrete moldings and form boards from the erection of buildings, to Styrofoam packaging, wooden planks and metal strips from shipping crates. Other significant solid waste components from the construction phase include PVC piping, masonry slabs and chippings, food wrappings, aluminum cans and beverage cartons, as well as plastic and glass bottles. Discarded food waste is also a relevant solid waste item during the construction phase.

One of the major impacts of the wastes generated by the development would be the attraction of feral animals such as rats, crocodiles and birds to the area to scavenge and the possible contamination of ground water. The mitigative response to be implemented by the anticipated development is the judicious collection and segregation of the wastes into organic and inorganic

components (See Table 6.4 below). The inorganic wastes are to be compacted and removed from the project site on a regular and recurrent basis (See Table 6.4 below). The implementation of a public education campaign focused on the residents, guests and visitors in general is also a part of the mitigative response (See #1a1b in Table 6.4 below).

The only secondary impact of note would be in regards to the land-based ecosystems. These impacts relates to the fact that there is to be little or no discarded food lying around in a way that would be available to feral animals, given the regular collection, bagging, composting and disposal of this category of waste. The mitigation responses in relation to solid waste are summarized in Table 6.4.

Table 6.4: Mitigation Measures in Relation to Solid Wastes

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1. Commissioning of the operational processes of the proposed project including the relevant amenities.	1a. Accumulation of solid waste that could impact the receiving environment. General discarding of cans, bottles and plastics in general from foods, general packing materials and other utilitarian inorganic functions.	1a1. Attraction of feral animals such as rats, crocodiles, and birds to the area to scavenge and in effect shift the ecological balance in a way not induced by nature.	1a1a. Separation of discard and refuse into organic and inorganic waste. Organic waste will be composted on site and used as nutrients for landscaping activities. The inorganic waste will be compacted and taken to the municipal dumpsite for disposal
			1a1b. Definition and implementation of education and sensitization program focused on residents, guests and visitors in general, in the form of interactive posters and brochures posted in strategic locations such as restaurants.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
			1a1c. The waste from construction will be separated accordingly and used as land fill where applicable.
		1b1. Contamination of Ground water supply	1b1a. Boring of 4 monitoring wells, 1 in the utility zone and 3 along an E W line of the property along with constant monitoring for saline intrusion and pollutants.
		1c1. Habitat for mosquitoes and other insect pests, as well as aesthetic pollution from odor and unsightly accumulation of solid waste.	1c1a. Separation of waste as previously described. Additional measures to be carried out by Public Health Officials.
		1c2. Entanglement and ingestion of plastics floating in the water column by sea birds and other fauna in the area.	1c2a. Judicious collection, confinement and disposal of solid wastes as described above.

6.3.5 Mitigation Measures in Relation to Energy Generation

The main impacts associated with the energy generation process are petroleum and noise pollution that will arise as a result of the operational phase of the development. This is especially true considering the backup and standby source of energy generation chosen by the project proponent – diesel generators with some form of alternative energy.

The primary source of electrical energy for the proposed project is to be obtained from BEL. This is to be complemented by standby power in the form of diesel generators. The mitigation measures that are to be put in place are mainly in relation to the running of the power lines as well as in relation to noise and petroleum pollution.

The petroleum pollution issue is of great importance considering the operation of the diesel generators (supplementary source). This method of energy generation is also interlinked with the sourcing and transportation of the required fuel for its operation. In considering the custodial chain of petroleum management, the proponent will be required to implement mitigation measures in every phase of the fuel management program.

The noise pollution issue is of greater relevance than the petroleum pollution issue, in regard to energy generation. The installation of diesel generators as a back-up source of electricity makes noise pollution a relevant issue. The scope of the proposed development and indeed the overall energy requirement of the initiative have resulted in a categorization of the ‘primary impacts’ as ‘moderate adverse’. This noise pollution can be mitigated by the ‘muffling of the generator noise and the use of sound-proof tiles at the generator stations, as well as their placement in areas far removed from the recreational activities of the project site and movement of staff, residents, visitors and guests’. The mitigation measures in relation to energy generation are summarized in Table 6.5.

Table 6.5: Mitigation Measures in relation to Energy Generation

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Environmental Impacts	Mitigation Measures
1.0 Operation of Stand by Diesel Generators to generate electricity.	1a. Excessive noise pollution to immediate surrounding areas	1a1. Increase in ambient noise levels as a result of energy generation use	1a1a. Attenuate noise levels by enclosing generators with sound attenuation material and by the proper use of mufflers and other sound reduction devices designed to minimize the ambient impact.
			1a1b. Examine and develop a best siting scenario for the operation of such generators at full occupancy and generator capacity.
	1b. Soil pollution due to hydrocarbon spills/leaks	1b1. Contamination of waterways and soil on direct contact	1b1a. Contain all fuel tanks in an enclosed concrete wall capable of storing 110% of the total stored volume.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Environmental Impacts	Mitigation Measures
			1b1b. Develop a contingency plan to address any spills and leaks that can occur both on land and at sea (refueling)
		1b2. Contamination of Ground water supply	1b2a. Boring of 4 monitoring wells, 1 in the utility zone and 3 along an E W line of the property along with constant monitoring for saline intrusion and hydrocarbons.
	1c. Air pollution due to generation process	1c1. Air pollution can impact on the ambient residential air, especially during prevalent winds.	1c1a. Develop and implement a preventative maintenance program to address all concerns related to repair and operation of the equipments
2.0 Alternative Energy Sources	2a.'Net or cumulative' noise pollution from the bank of wind turbines operating at the same time	2a1. Increase in overall ambient noise, especially around the turbine areas.	2a1a. Turbine not expected to supersede the L _{MAX} 65 dB threshold.
			2b1a. Varying wind speed and direction reduces shadowing instances.
			2c1a. Placement of the turbine units in areas not identified as 'primary migration routes for birds'.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Environmental Impacts	Mitigation Measures
	2b. Accumulation of battery waste, possible lead and acid pollution to receiving environment.	2b1. Health risks associated with lead poisoning to both human and animals.	2b1a. Judicious collection and appropriate disposal of batteries once discarded. This measure can also be applied to golf cart batteries no longer in use.
			2b1b. Possible recycling of lead components for commercial purposes.

6.3.6 Mitigation Responses in Relation to the Marina and Sea-Based Transportation

The mitigation responses to be implemented in regard to the proposed marina and sea-based transportation are in relation to both issues relating to pollution, as well as navigational safety. The sources of pollution for the marina derive from a range of activities including the following:

- Poorly flushed waterways where dissolved oxygen deficiencies exist;
- Pollutants discharged from boats;
- Pollutants transported in storm water runoff from parking lots, roofs, and other impervious surfaces;
- The physical alteration or destruction of epifauna and other bottom communities during the excavation of the marina basin and access channels;
- Pollutants generated from boat maintenance activities on land and in the water.

The mitigation measures that are to be put in place in regards to pollution issues entails the implementation of measures to prevent or reduce nonpoint source pollution from land-based sources as well as the wider marine environment. These measures are summarized in Table 6.6.

The mitigation responses in relation to sea-based traffic include regulating speed limits and the assignment of definitive sea-lanes for navigation. Other salient mitigation measures include empowering mariners with the technology and practices to avoid collision incidents between motorized crafts and manatees. These ranges from the installation of prop guards, to the use of polarized shades and navigating in deeper channels as opposed to shallow grassy and algal dominated areas (See Table 6.6).

The mitigation in relation to the marina and sea-based traffic in general are summarized in Table 6.6.

Table 6.6: Mitigation Responses in relation to the Marina and Sea-based Traffic

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
Dock-side fueling operation	Spillage of gas and diesel from inappropriate disbursement of fuel by Gas Station Attendant.	Direct toxic effects as well as long-term deleterious impacts particularly to sessile and slow-moving invertebrates.	Not leaving fuel nozzle unattended or over-filling tank and turning off engine when fueling.
Navigation within marina and access channels	Increase in dissolved fraction of petroleum from gasoline and diesel as result of revving engines beyond speed limit protocol and idling engine while parked.	Long-term deleterious impacts on sessile and slow-moving invertebrates in marina as well as nearshore reaches of site.	Posting Code of Conduct for operation of boats within the marina that prohibits excessive speeding, the racing of engines and the idling of motors for no good reason.
Bilging within confines of property.	The liberation of fuel, lubricating oils and other petroleum products in the water column.	Toxic and long-term deleterious effect on sensitive and vulnerable aquatic fauna.	Mandating that mariners turn off or disconnects automatic bilge pumps if gasoline, diesel or motor oil is found in bilge and ensuring that no bilging activity takes place within the marina or nearshore reaches of the property.
Littering and effluent pollution	Dumping or slow release of holding tanks and toilets within marina.	Increase in macro-nutrients and BOD substances, as well as fecal pathogens that would have negative implication for the biota in the area in terms of eutrophication and oxygen depletion of the water column as well as possible disease impacts on humans.	Including in Code of Conduct for marina prohibitions of any dumping or leaching of holding tanks and on-board toilets within marina and aquatic zone of influence of the project.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
	Disposal of poisonous and toxic substances such as paint, used or spent batteries, and cleaning agents at sea.	Lethal and sub-lethal effects on sensitive and vulnerable biota, including fin-fishes as well as errant and attached invertebrates.	Including in Code of Conduct for mariners prohibition of any disposal within marina basin or dumping at sea of any toxic or deleterious substances.
			Developing protocol of disclosure between mariners and Harbor Master of marina for presence of toxic or hazardous substances such as oils, batteries, fiberglass solutes etc., and ensuring that these would be disposed of in an environmentally responsible manner.
			Promoting the use of environmentally friendly products including anti-fouling paints, paint remover, cleaning chemicals and detergents.
	Disposal of plastic bottles, Styrofoam containers and other items comprising solid waste.	Interaction of solid waste with marine life such as sea turtles which consume transparent plastic bags and the entanglement of seabirds and sharks in plastic flotsam	Enshrining in Code of Conduct for mariners the prohibition that would entail dumping of any solid waste at sea and providing the facilities for their safe and judicious disposal once mariners reach shore.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
			Promoting the ethic among mariners for reporting violations at sea that is not consistent with good environmental practice to Harbor Master.
Navigation in marina and nearshore waters	Risk of collision at sea and injury and possible lethal effects to manatees and other marine vertebrates.	Injury and death to manatees from speeding boats, as well as injury and possible death to humans.	Posting of reduced speed limit signage for mariners to protect manatees: This is to be complemented by enforcement by Harbour Master of marina.
			Mandating use of prop guard for boats using marina to guard against propeller damage to manatees.
			Demarcation of definitive sea-lanes for mariners to protect fishers and recreational usage of nearshore areas from collision incidents with boats.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
			Empowering mariners with information to avoid collision with and injury to manatees such as the need to wear polarized sunglasses to better track the mud trails or ‘foot print’ of manatees on the move: Other measures include navigating in deeper channels as opposed to shallow seagrass and algal dominated areas, as well as posting lookouts on the bow to detect manatee trails as the boat approaches shallow areas.

The mitigation measures in relation to manatees are particularly important given the protected areas status of the Corozal Bay Wildlife Sanctuary. Although the marina basin is ‘internal’ to the shoreline in the area of the project and in effect is not a legal or functional part of the sanctuary, the lack of any definitive or tangible management intervention or material presence underscores the importance of the initiatives of the project proponents to conserve the species vis-à-vis the mitigation interventions to be implemented.

6.3.7 Mitigation Measures In Relation To Socio-Economic Concerns

Development projects of any kind can modify or enhance the economic viability of a given area. The social impact assessment in principle include the process of evaluating the intended and unintended consequences of the development, and identifying and articulating the mitigative measures that are to be put in place to circumvent and ameliorate these impacts (See Table 6.7).

Pertinent also in terms of resource use conflicts is the issue of tourism. The mitigation measures that are to be implemented in relation to the social concerns have been summarized in Table 6.7.

Table 6.7: Mitigations Measures In Relation to Socio-Economic Concerns

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1.0 Construction Activities	1a. Temporary but potentially marked increase in amount of people moving into the area.	1a1. Increased demand on services in the area.	1a1a. Construction will be planned and strictly scheduled such that only the absolute amounts of people necessary are in the area at any given time.
			1a1b. Belcan has transportation means to move the construction crews, thus no strain will be put on the present transportation infrastructure or service for the area.
			1a1c. The development will be responsible for the temporary establishment of an independent canteen to feed the construction workers. Thus no additional strain will be placed on existing establishments.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
			1ald. In terms of living accommodations, the proposed project may be required to construct temporary housing quarters to accommodate the construction crew.
			1ale. Proper temporary sanitary facilities will be constructed on site to provide the basic hygiene requirement.
	1b. Movement of materials and supplies and heavy equipment into the area.	1b1. Human health and safety issues.	1b1a. Transportation of materials to and from the project site observing traffic policies, and ensuring that equipment and supplies are securely stored and fastened during transportation.
			1b1b. Response to construction injury includes first aid kit on-site, and in severe case the transportation of injured to a medical institution.
	1c. Employment of foreigners and persons not from immediate areas.	1c1. Lack of economic opportunities to people in the immediate area	1c1a. Hiring people from immediate area in circumstances where requisite skills and competencies are available at competitive costs.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
2.0 Operational Phase of Development.	2a. Employment of foreigners and persons not from surrounding areas.	2a1. Lack of economic opportunities.	2a1a. Hiring people from immediate area in circumstances where requisite skills and competencies are available at competitive costs.
	2b. Health and safety issues.	2b1. Disease coupled with accident and incidents	2b1a. Implementation of a health and safety plan to address these issues especially during the construction stage.
	2c. Increase in marine traffic.	2c1. Increase in number of boats coming to the project site.	2c1a. A service station will be constructed to service the projected number of boats associated with the project.
3.0 Resource use conflicts	3a. Potential loss of diminishing fishing grounds	3a1. Potential decline in recruitment of fishermen and tour guides to the area.	3a1a. Much of dredging activities off north and south eastern side of the project site is away from the fishing grounds.
			3a1b. Dredging activities to be completed within the shortest possible time to limit negative impacts in both space and time.
	3b. Potential disruption of tourist activities.	3b1. Relates mainly to boat traffic through area.	3b1a. Installation of buoys, beacons and other navigational aids to ward off marine traffic from the silt curtains: Also relevant is relatively short duration of undertaking.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
	3c Potential disruption and harm to manatees traversing and or feeding in the vicinity of the marina	3c1 Relates mainly to boat related accidents with manatees	3c1a. Requiring that all vessels resident or using the marina install a prop guard so as to diminish the chance of chopping manatees with the propeller in case of an accidental collision.
			3c1b. The placement of GO SLOW signs in the marina access channels, in the marina itself and in areas approaching the channel entrances.

6.4 Environmental Monitoring

Comprehensive or targeted monitoring can be used as an integral component of responsible life-cycle environmental management of major projects, plans or programs. Current EIA process considerations are focused on the use of monitoring in conjunction with the implementation of mitigation measures. Additional valid purposes of environmental monitoring include, but are not limited to, establishing a database on baseline conditions, documenting and managing experienced impacts, evaluating the effectiveness of mitigating measures, and validating impact-prediction techniques (Canter, 1993).

6.4.1 Purpose of Environmental Monitoring

Numerous purposes (and implied benefits) can be delineated pre- and/or post-EIA environmental monitoring. For example, Marcus (1979) identified the following six general purposes or case of information gleaned from the conduction of post-EIA monitoring:

1. Environmental monitoring provides information that can be used for documentation of the impacts that result from a proposed action; this information enables more-accurate prediction of impacts associated with similar federal actions.
2. The monitoring system could warn agencies of unanticipated adverse impacts or sudden changes in impact trends.
3. The monitoring system could provide an immediate warning whenever a preselected impact indicator approaches a predetermined critical level.

4. Environmental monitoring provides information which could be used by agencies to control the timing, location, and level of impacts of a project. Control measures would involve preliminary of regulation and enforcement measures.
5. Environmental monitoring provides information which could be used for evaluating the effectiveness of implemented mitigation measures.
6. Environmental monitoring provides information which could be used to verify predicted impacts and thus validate impact prediction techniques. Based on these findings, the techniques for example, mathematical models could be modified or adjusted, as appropriate.

6.4.2 Principles of Environmental Monitoring

The principles underlying environmental monitoring as it relates to any given development is to observe for any changes over time that may be associated with the development. These changes would in principle vary over time in both magnitude and direction. In the case of the latter it is important to understand that changes in environmental parameters and functions may be positive or negative.

Thus in principle a monitoring plan does not necessarily focus on the perceived or anticipated negative changes precipitated by a given development, or indeed vice versa where the focus may be on the positive or beneficial changes only. The parameters chosen are those that have been identified in the analytical process as being affected in the most significant way by the development.

6.4.3 Specific Monitoring Plan

The proposed monitoring plan for the project will entail the components that have been identified through the Impact Rating matrix and other mitigation factors. These issues include:

- Water Quality Monitoring (Potable, Marine and Wastewater)
- Beach Dynamics
- Waste Management
- Soil contamination (spills)
- Biodiversity
- Environmental Health and Safety
- Engineering aspects
- Socio economic influence

6.4.3.1 Water Quality Monitoring Program

Surface Water

As with so many of the EIA's, the marine component plays an important role in the overall scheme of the proposed development. With this in mind, it is critical to conserve the marine environment and its resources in order to promote a healthy and stable marine ecosystem around the proposed project.

Pollution from all the different sources can pose a serious threat to the marine ecosystem and therefore considering the negative impacts, the proposed development plans to incorporate a complete water quality monitoring program. This program, which will further be developed by the proponent and DOE, will form part of the EMS and also of the water resources management plan previously discussed in Section 3.2.

Water samples will be collected and analyzed on a monthly basis for the following parameters using the recommended protocol required by the *Effluent Limitations Regulations* (this regulation recommends the use of the Standard Methods for the Analysis of Water and Wastewater):

a) *In situ Measurements*

- Salinity
- Temperature
- Dissolved Oxygen
- Ph
- Turbidity
- Total Dissolved Solids
- Conductivity

b) *Laboratory Analysis*

This will include the determination of

- Total Suspended Solids
- Total Nitrate
- Total Phosphate
- Total and Fecal Coliform
- E. Coli

Potable Water

It will be important to drill several monitoring wells within the project site considering the volumes of potable water to be used by the development (See Fig. 6.1). These wells will be primarily responsible for the monitoring of saline intrusion and pollutants. It is anticipated that these wells will be perforated up to 75 feet (See Fig. 6.2). Due to the layout and design of the project, the wells will be oriented in a east to west direction with an additional well at the fuel service station that is within the Back of House Area (See 'MW4' in Fig. 6.2).

Similarly, water samples will be collected from these wells and analyzed on a bimonthly basis for the following parameters using the recommended protocols required by the Standards Methods for the Analysis of Water and Wastewater:

a) *In situ Measurements*

- Salinity

b) *Laboratory*

- Hydrocarbons
- Total Suspended Solids

Table 6.8: Monitoring Plan for Surface Waters

Parameter	Frequency	Critical Level	Geographic Area	Priority	Agency Responsible
Nutrients (Phosphate and Nitrates)	Monthly	10 mg/l	Wastewater Plant along with several coastal sampling sites as shown in Section 2.1.2.6 and Figs. 2.6, 2.7 and 2.8	High Priority	DOE, Forest Dept
TSS/TDS	Monthly	100 mg/l	Wastewater Plant along with several coastal sampling sites as shown in Section 2.1.2.6 and Figs. 2.6, 2.7 and 2.8	High Priority	DOE, Forest Dept
Turbidity	Monthly	Observing disappearance of Secchi disc and comparing this over time at different locations.	Wastewater Plant along with several coastal sampling sites as shown in Section 2.1.2.6 and Figs. 2.6, 2.7 and 2.8	High Priority	DOE, Forest Dept
BOD	Quarterly	200 mg/l (EPA/WHO)	Wastewater Plant along with several coastal sampling sites as shown in Section 2.1.2.6 and Figs. 2.6, 2.7 and 2.8	High Priority	DOE, Forest Dept
Dissolved Oxygen	Monthly	< 4.0 mg/l (DOE)	Wastewater Plant along with several coastal sampling sites as shown in Section 2.1.2.6 and Figs. 2.6, 2.7 and 2.8	High Priority	DOE /Fisheries, Forest Dept
- Total Coliform - E. coli - Fecal Coliform	Monthly	0/100 ml of sample	Wastewater Plant along with several coastal sampling sites as shown in Section 2.1.2.6 and Figs. 2.6, 2.7 and 2.8	High Priority	Public Health, Forest Dept

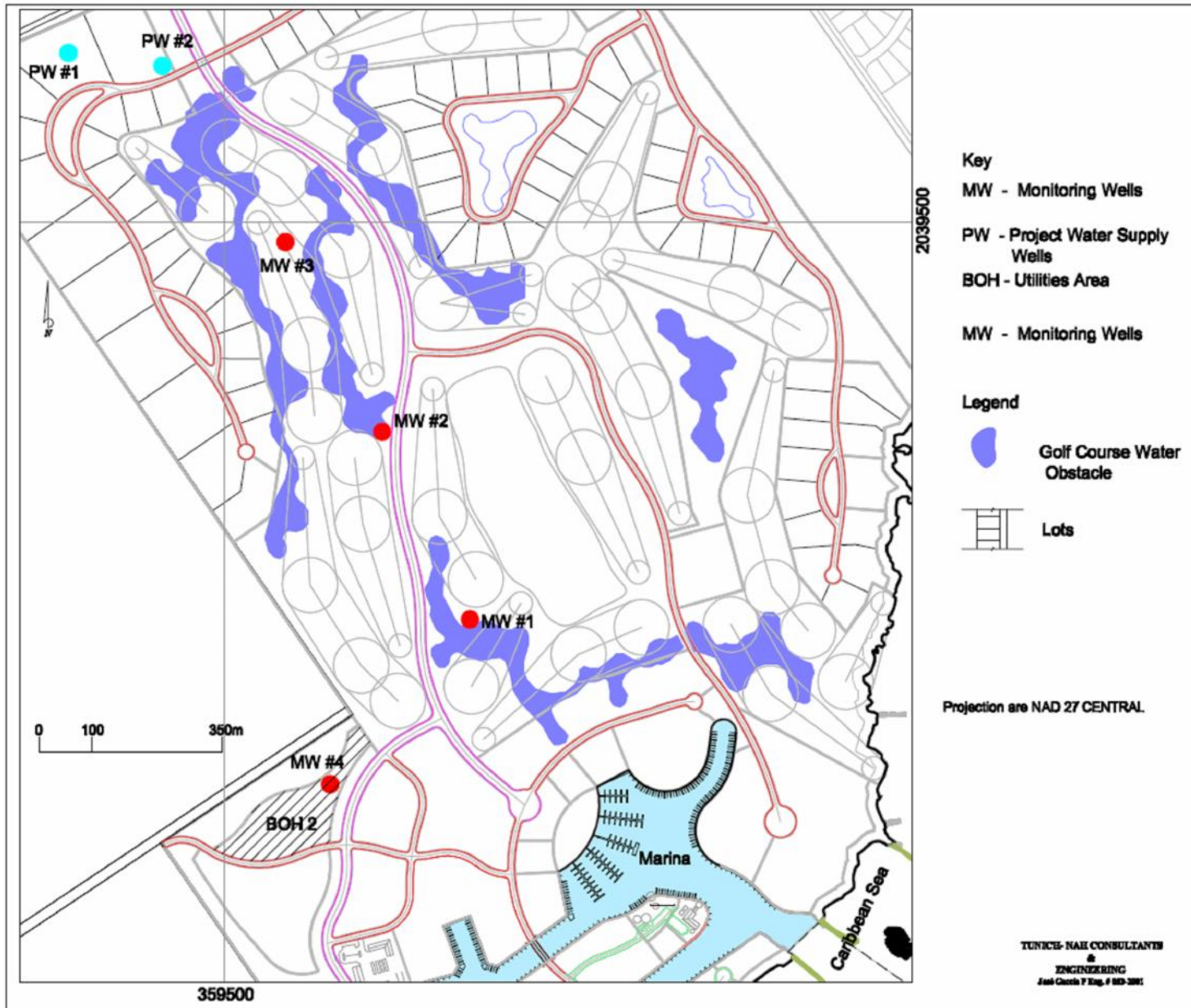


Fig. 6.1 Monitoring Wells

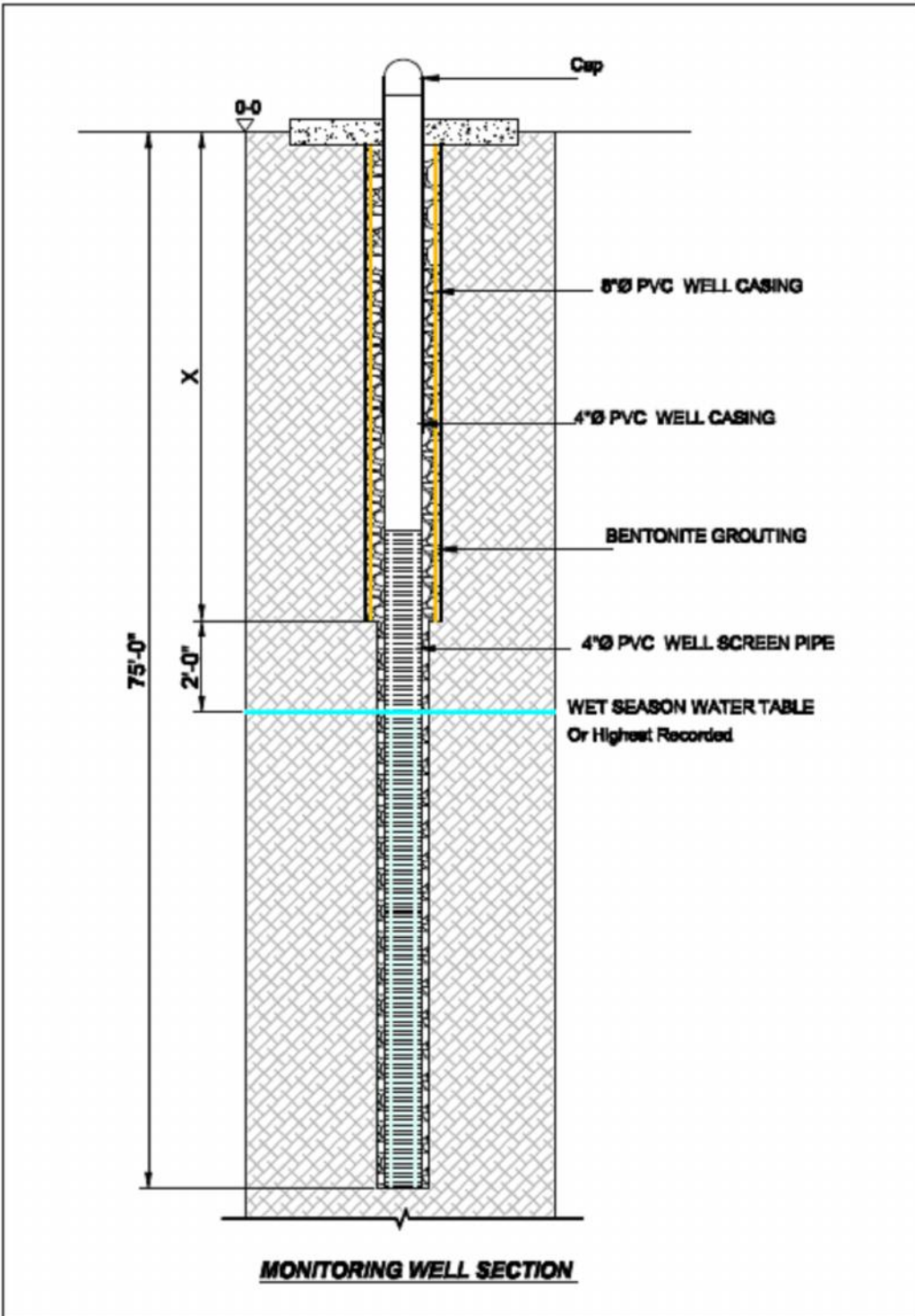


Fig. 6.2 Cross Section of Monitoring Wells

6.4.3.2 Energy Monitoring Program

In considering the general monitoring program for the proposed project, the anticipated development plans to integrate an energy monitoring plan to reduce the consumption of energy and prolong the use of electrical devices. This plan is an attempt to merge the common household energy saving measures with the proposed development outline. In so doing, energy saving tips must be considered and abided by in order to reduce energy consumption but at the same time live in a convenient and modest way.

Therefore in monitoring the energy consumed on the premises, all individual lot owners must set target ranges and adjust their lifestyles in order to reduce the consumption. Home owners can keep a tally of their monthly bill and reduce the rate every month as they may seem fit.

6.4.3.3 Wastewater Monitoring Program

Just as with the water resources monitoring program, the proposed development intends to develop a wastewater monitoring program that will be tied into the EMS. This program will monitor the quantity and quality of treated effluent (wastewater) generated by the treatment plant.

In addition, the program will also develop a maintenance plan encompassing structural failures, inspections, monitoring of equipment (treatment plant, grease traps, oil/water separators, etc.) short and long term repairs as well as training of employees in charge of managing the plant. Samples of the treated wastewater will be collected and sent to an approved DOE laboratory for testing or in default tested in-house (DOE permission required). In any event, the developer will comply with all applicable laws relating to this matter. Table 6.9 shows a proposed monitoring template that will be reviewed by the project and DOE.

Table 6.9: Wastewater Monitoring Template

Date (day/month/year)	Dissolved Oxygen (mg/l)	Ph (Units)	Total Phosphate (mg/l)	Total Nitrate (mg/l)	TSS (mg/l)	BOD (mg/l)	F. Coliform (count)	E. Coli (count)
____/01/____								
____/02/____								
____/03/____								
____/04/____								
____/05/____								
____/06/____								
____/07/____								
____/08/____								
____/09/____								

Table 6.9 Cont'd	Dissolved Oxygen (mg/l)	Ph (Units)	Total Phosphate (mg/l)	Total Nitrate (mg/l)	TSS (mg/l)	BOD (mg/l)	F. Coliform (count)	E. Coli (count)
____/10/____								
____/11/____								
____/12/____								
Annual Average								

6.4.3.4 Solid Waste Monitoring Plan

The proposed development plans to undertake an intensive solid waste monitoring plan in order to address all the relevant issues that can arise from the collection, storage and disposal of garbage (See Table 6.10). Indicators will be developed to keep track of this activity and report any incident/accident to the local authorities. Such examples include inadvertent spillage during transportation, flying or ‘blowing’ away of uncontained garbage etc.

Table 6.10 Parameters for Solid Waste Monitoring

Parameters	Frequency	Critical Levels	Area/ Locale	Priority	Agency Responsible
Collection	Daily	Clean Environment, visual ambience	Anywhere where available trash receptacles are located.	High	SWMA, DOE, Public Health
Disposal	Weekly	Clean environment	Collected waste will be transported to the Corozal municipal dump	High	SWMA, DOE, Public H.
Storage	Daily	Same as above	At Waste Transfer Site on the project site	High	SWMA, DOE, Public Health
Management	Daily	Development, implementation and documentation	All aspects of the management plan	High	SWMA, DOE, Public Health

Management Issues

Waste generated by residential and tourism industries normally includes paper and cardboard items, glass and aluminum products, plastic items, organic waste, building materials and furniture, and used oils and fats. Hazardous wastes may include batteries, solvents, paints, antifouling agents, and some packaging wastes. Foreign residents, guests, and tourists typically

may generate up to twice as much solid waste per capita as local residents, resulting in increased stress on local waste management infrastructure – the dumpsite.

The following principles of waste reduction in tourism and hospitality facilities should also be considered as part of a formal Waste Management Plan:

- ▶ Buying in bulk quantities whenever possible;
- ▶ Use of refillable, bulk dispensers (e.g. toiletries) rather than individually packaged products; Working with suppliers to limit use of, and establish recycling for, product packaging;
- ▶ Limiting use of plastic bags at supermarkets, malls etc.;

- ▶ Providing in-room recycling procedures and appropriate receptacles;
- ▶ Use of glass or biodegradable items instead of disposable plastic items (e.g. straws, cups);
- ▶ Implementing organic-waste composting;
- ▶ Disposing of wastes only after all waste prevention and recycling strategies have been explored and maximized.

The proposed project will carefully evaluate its options and implement a waste minimization strategy (See Section 3.4.8) to cope with the anticipated generated volume. Options however, are limited, especially considering the local infrastructure for the handling and disposal of solid waste.

6.4.3.5 Biodiversity Monitoring Program

The objectives of the monitoring programs are to minimize and reduce the environmental impacts on wildlife and their habitats, and to minimize detrimental effects on protected or endangered species.

Manatees will be at the center of the monitoring programme for the proposed development given the statutory designation of the area as a Wildlife Sanctuary, specifically to protect the species. Morales-Vela et al (1999) stipulates that for a manatee monitoring to be effective it needs to be conducted at least twice per year. Although the project proponents would not assume the responsibility of monitoring the entire Corozal Bay, the area within a radius of one (1) mile of the property will be monitored for sightings and life history conditions such as calving. This is expected to be a part of the Compliance Plan that would be stipulated by the DOE. The project proponents would go beyond this requirement and share any data collected with those from the NGO Conservation Community and academia as well as those GOB Agencies with a natural resources management mandate.

Wildlife monitoring will not be limited to manatees and will include aquatic fauna such as the crocodile. One of the interventions in this regard will be the preparation of a checklist with the pertinent data requirement. This initiative will entail co-opting the participation of residents of the facilities. In addition to the immediate data collection requirements, the environmental management initiative will also include:

- ▶ Assisting in any way possible the relocation of animals if found within the marina basin and the burrow site during the construction phase of the operation;
- ▶ Establish communications with relevant Government Departments or NGOs in the event of the need for relocation of wildlife (e.g. crocodiles);
- ▶ Forge and establish constant communication with local environmental groups;
- ▶ Implement a 15 feet to 35 feet buffer zone along the waterway lots, which comprise a part of the Restrictive Code of Covenants;
- ▶ Posting of warning signs throughout the property about wildlife, especially manatees;
- ▶ Confining construction activities to as small an area as possible, leaving sufficient 'Green Areas'.

The environmental monitoring programme involving the participation of residents of the facilities will be established for a minimum of three years in the first instance, with the option to renew the commitment. This programme would in principle focus on different species as well as features of different habitats, which are likely to reflect changes in environmental conditions.

Table 6.11 Proposed Biodiversity Monitoring Plan

Parameters	Frequency	Critical Levels	Area/Locale	Priority	Agency Responsible
Biodiversity					
Bird Abundance	Twice per year, during December and in June (i.e. winter and summer)	Population changes and diversity profile to be noted and compared with existing data	To be done on project site and neighboring areas,	Moderate Priority	Forest Dept.
Feral Animal Population (Crocodiles, coatis, others)	Twice per year during June and December	Population changes to be observed over time.	To be undertaken throughout the development	Moderate Priority	Forest Dept., Public Health
fish Populations	Twice per year during June and December, and any other time as requested by the Fisheries Department.	Population changes and shifts in diversity to be observed over time and compared with pre-development situation.	Known fishing grounds within the project area (if any).	High Priority	Fisheries Dept.

Parameters	Frequency	Critical Levels	Area/Locale	Priority	Agency Responsible
Manatee Population	Twice per year, during December and in June (i.e. winter and summer)	Population changes and shifts in abundance and habitat quality to be observed over time and compared to pre-development conditions.	To be done within a radius of one mile of the project site.	High Priority	Forest Dept., Fisheries Department

6.4.3.6 Social Monitoring

Due to the increase in the demand for permanent employment in the country, this project will result in positive benefits for the Corozal District and to the country on a whole. A number of new jobs will be created during the implementation of this project. These are mostly laborers who will be required to either live in or travel to the project site on a daily basis. Technical staff will also be required for the day-to-day operations of the development areas, restaurants, administration, golf course maintenance, marina services (repairs) etc. It is expected that employment will come mainly from around the project site (Corozal District) and from the Orange Walk District.

Table 6.12 Possible Social Monitoring Issues

Parameter	Frequency	Critical Level	Geographic Area	Priority	Agency Responsible
Employment	Annually	Ratio of locals to foreigners as well as migrant workers	Construction and administration	High Priority	Labour Department
Services	Annually	Acceptable/non acceptable	Commercial and residential component	High Priority	BTB, BTIA

6.4.3.7 Sediment Transport

Sedimentation of the marina and waterways will always be an ongoing natural process that occurs in the environment. These natural processes however, can at times be accelerated by anthropogenic activities which most often require human intervention. The source for these accelerated progressions vary and are often associated with tourism related activity. Table 6.13 describes the proposed Sediment Monitoring Program for the proposed residential subdivision.

Table 6.13 Sediment Entrapment and Dredging Activities

Parameters	Frequency	Critical Levels	Area/ Locale	Priority
Rate of sediment re-deposition in the marina and access channel for the marina entrances.	Semi-annually	When marina depth is < 8ft and entrance depth < 8ft.	Survey bathymetric profile across marina and access channels	High Priority
Integrity of Spoil Discharge or Conveyance Pipes	Daily & Weekly during dredging operations	Daily inspection of the discharge pipes to identify leaks along length of the pipes.	Entire length of pipe from dredged site to spoils area	High Priority
Monitor Human Safety Especially in Relation to Marker Buoys and Navigational Lights (Loss/Malfunction)	Daily Basis	The dredge, silt curtains and discharge pipes are to be adequately invested with marker buoys and navigational lights	Entire discharge pipes, dredge and silt curtains are to be marked by navigational buoys and lights	High Priority
Quantity of Sediment Deposited	Annually	< than maximum permissible limit stated in the maintenance dredging	Across marina and access channels	High Priority
Rate of sediment re-deposition (quantity) in dredged areas	Annually	When marina depth is less than 6 feet in navigable areas.	Dredged and navigable areas of proposed project.	High Priority
Rate of sediment deposited in sediment traps in line of the grand canal system on the periphery of the property	Annually	When movement of water or sediment is noticeable in the discharged water	Marina Entrances	High Priority

6.4.4 Performance Indicators

In the general context of the monitoring plan, there must be established target goals and objectives in terms of potable water, energy consumption and solid waste generation among others. The performance indicators are tools that the proposed residential subdivision along with the developer will be required to utilize in order to reduce their consumption and generation of

wastes as stipulated in the relevant mitigation and conservation measures previously discussed. These actions will result in huge savings for the residents, developer and ultimately the environment if collectively carried out. This is especially important when considering energy consumption and the petroleum price crisis being experienced globally.

It is imperative that each resident, guest, employee and visitor to the proposed development take into consideration the different conservation measures for potable water and energy as well as the waste minimization strategy for solid waste generation (See Sections 3.2, 3.3, 3.4 and 3.5).

6.5 Conclusion

Newton's Law provides that for every action there is an equal and opposite reaction.

The Council on Environmental Quality (CEQ) on the other hand provides that “Whenever a proposed project will result in potential significant adverse environmental impacts, measures must be taken which will limit or avoid that impact. These may include conditions of approval, revisions to the project, and, less frequently, approving an alternative project with fewer impacts. Where such measures are imposed, there must be a program for monitoring or reporting on the project's compliance with those measures”.

As described from the connotation above, the proposed project will have its degree of impact on the receiving environment. Based on these assumptions, the different monitoring programs plan to include as much activities that are related to the development and operation of the proposed subdivision. Once Environmental Clearance has been granted, the Environmental Compliance Plan will request a more formal and detailed monitoring program from the different activities.

Likewise, the mitigation plan presented in this document must also be included in the ECP. Furthermore the Department of the Environment, along with other interested parties, will be required to monitor the project site in both its construction and operational phases to ensure that the monitoring program and mitigation measures presented in the various tables are properly implemented with the findings regularly reported to the DOE and other relevant parties.

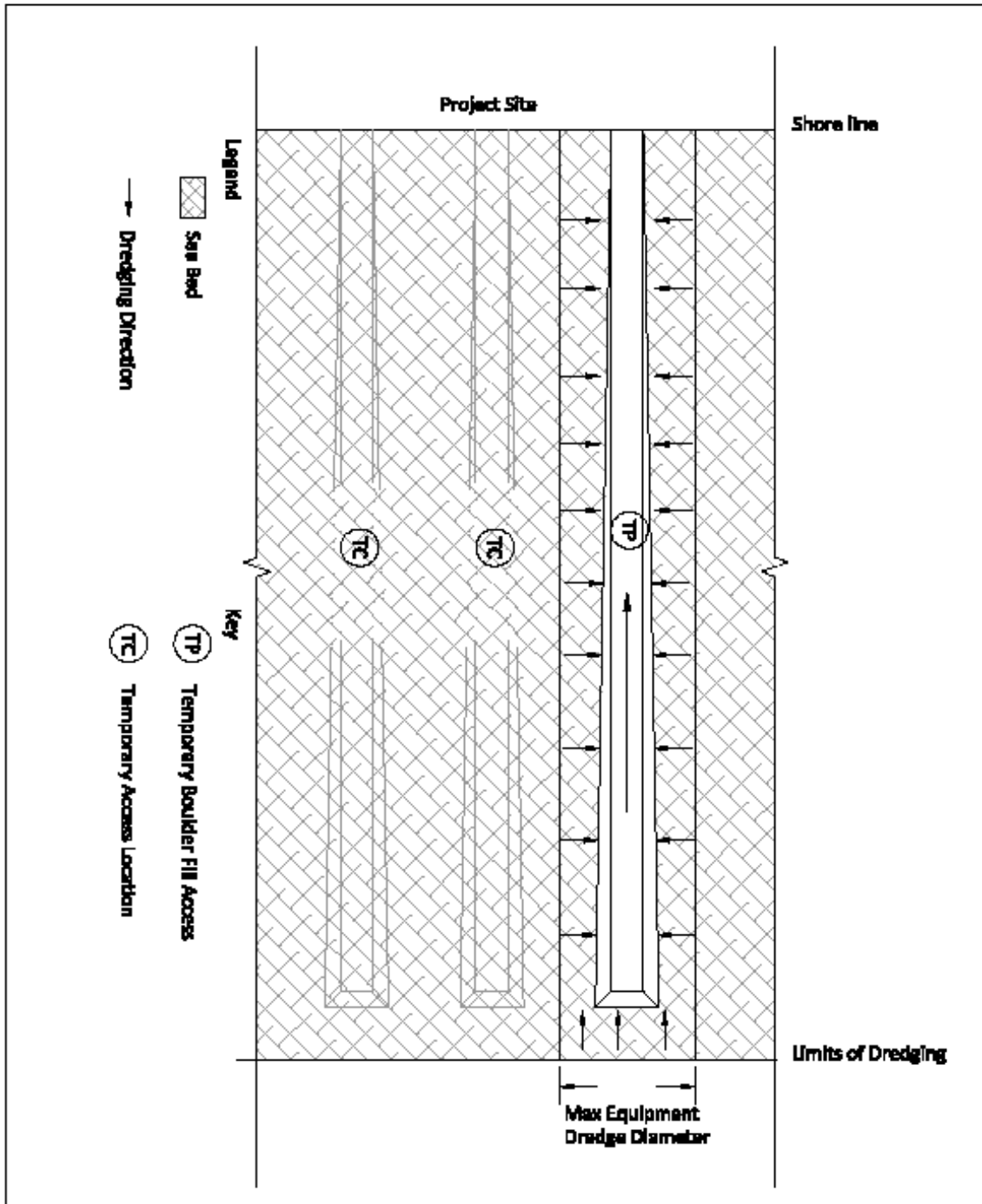


Fig. 6.3: Methodology to be used by excavator to dredge shallow near shore areas