
CHAPTER 5

5.0 ENVIRONMENTAL IMPACT ANALYSIS

5.1 Introduction

The following sections describe the environmental impact analysis from its conceptual approach to its cumulative impact analysis. This analysis is directly related to the environmental management plan described in Chapter 6 of this document.

5.1.1 Conceptual Approach

Environmental impacts are a definite effect of all development/projects and therefore the basic question is how much is acceptable under the circumstances? The obvious consensus is that the country needs development, however it must be sustainable and in conformity to national development priorities. The challenge throughout is to find an acceptable level that will strike the necessary balance between the need to develop and the need to protect vital environmental processes. Also important is the planned scale of the infrastructural development and their potential to unravel the social fabric and lifestyles of the people in the area within which they are based.

The impacts of this project will be felt mainly in the areas of physical alterations to the benthic, coastal and inland ecosystem, minimal solid and liquid waste disposal, effects on the native wildlife species of the area from a combination of factors, operational activities and transportation. The point has been made that no project of this size can be successfully implemented without some negative environmental impacts, however it is incumbent on the developer to reduce these to their lowest possible level, or negate them entirely if the situation allows.

The developer will be aided in this undertaking by the impacts and mitigation discussion in the relevant sections of this report and summarized in the tables below. These cover the aspects of project activities which have been identified by the DOE as liable to produce significant environmental impacts among others.

5.1.2 Environmental Principles in Impact Analysis

In principle the need to address some requirement(s) of the human species gives rise to the definition and implementation of some specific development project(s) or program(s). In the context of the proposed development, the human requirement to be addressed is the need for recreation and knowledge of the ecosystem. In the case of the latter this relates to the research and educational components of the project.

Inherent in development projects and programs are activities which alter the environment, or cause some “environmental disturbance”. These environmental disturbances have a number of

“effects” which in turn leads to “environmental impacts”, which are categorized as being either negative or positive.

Environmental impacts are in principle hierarchical and in this regard are described as being sequentially ‘primary’, ‘secondary’, ‘tertiary’, etc., in orientation. Primary impacts are those impacts arising immediately from particular activities such as those related with the operational activities, and affect basic ecosystem functions such as primary productivity, mechanical damage to anatomical structures and the physical destruction of habitats.

The ‘primary impact’ parameters in turn have another level of impacts on various ecosystem components, which are qualified by both magnitude and direction. This is unlike the ‘primary impacts’, which within the context of the current EIA varies in magnitude only (See EIA Rating Matrix outlined in Table 5.1). In the case of primary impacts, this may be explained by the fact that variations in the magnitude of these parameters in and of themselves are neither deleterious nor beneficial. Conversely, under the current analytical process outlined in the EIA Impact Rating Matrix (See Table 5.1), although a relationship may exist, the magnitude of change of the particular parameter may be so small or insignificant, that no discernible impact is identified.

5.2 Overview of Proposed Cumulative Impacts

In considering the proposed project, the importance of identifying the anticipated cumulative environmental impacts is of great value. This approach is designed in such a way as to preserve and conserve the environment as much as possible while undertaking the required activities necessary to bring life to the project.

In addition, a monitoring plan must also be visualized in order to quantify the potential adverse impact that may result as part for a developmental activity. These plans must be carefully designed, planned and implemented to techniques designed to reduce and possibly eliminate the severity of the effects.

Such circumstances have been extensively studied by the Council for Environmental Quality (CEQ) and they have defined the measures as those that include:

1. *Avoiding* the impact
2. *Minimizing* the impact by limiting the degree or magnitude of the action
3. *Rectify* the impact by repairing, rehabilitating, or restoring the affected environment.
4. *Reducing* or eliminating the impact over time
5. *Compensating* for the impact by replacing or providing substitute resources or environments.

These measures applied by the Council, can be adapted to suit the proposed project and assist the decision makers in the course of action. Figure 5.1 illustrates the generic impacts and its related influences in regards to the measures implemented by CEQ.



Fig. 5.1 CEQ’s Impact Structure

5.2.1 Impact Rating Matrix

Figure 5.2 summarizes the potential impacts that can be encountered during construction and operation of the project. These impacts can be view as affecting both sea and land environments and its associated cumulative impacts.

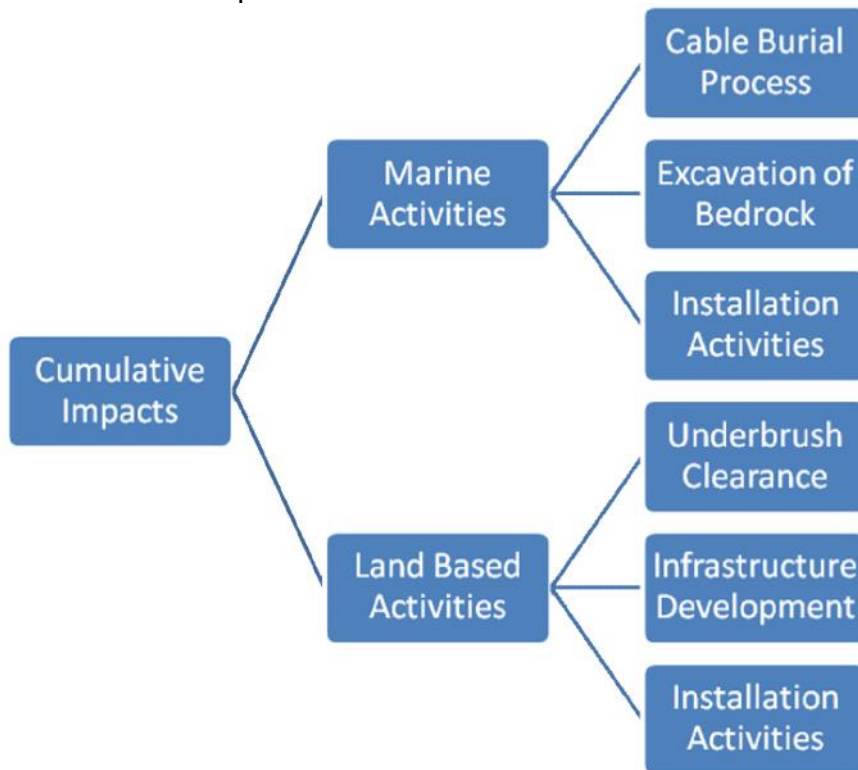


Fig. 5.2 Cumulative Potential Impacts

The impact matrix was designed as a tool to understand the level of adverse, or alternatively, beneficial impacts on the ecosystem and in general of any given area in question. It is a function of the scope of the project, the ecological fragility or sensitivity of the receiving environment, and the conceptual value assigned to the integrity of the natural resources of the area by the wider community.

The connectivity or hierarchical nature of the impacts of the proposed project has been reinforced by the integration of a residual impact rating matrix outlined in Table 5.1. This matrix evaluates the mitigation measures options in the following terms:

- **Magnitude:** High (H), Medium (M), or Low (L);
- **Direction:** Beneficial (+) or Adverse (-);
- **Duration:** Instantaneous (I), Short term (S), Medium (M) or Long term (L);
- **Scope:** Instantaneous (I), Short term (S) , Medium (M) or Long term (L);
- **Significance:** Not Significant (NS), Low (L), Medium (M) or High (H) significance

The primary activities that are likely to result in some environmental impacts of note are the installation activities at sea as well as the installation of the FOC on mainland. The potential for pollution from air, noise, solid waste and oil spill are also of relevance.

Table 5.1 Impact Rating Matrix

		Potential impact	Magnitude	Direction	Duration	Scope	Significance
Sea Based Activities	Trenching Activities	Benthic Fauna	M	-	S	S	L,M
		Marine Organisms	M,L	-	S,M	S	M
		Near Shore Ecosys./Reef	L	-	I,S	I,S	NS
		Toxic Bioaccumulation	L	-	S	S	L
		Water Quality	M	-/+	S	S	L
		Nutrient Re-suspension	L	+	M	M	L
	Bedrock Excavation	Sediment Re-suspension	M	-	I,S	I,S	L
		Benthic Fauna	M	-	S	S	M
		Toxic Bioaccumulation	L	-	I,S	S	NS
		Water Quality	L	-	S	S	L
		Nutrient Availability	L	-	I,S	S	L
		Marine Organisms	L	-/+	S	S	L
	Installation Activities	Sediment Re-suspension	L	+	I,S	I,S	L
		Benthic Fauna	M	+	S	S	M
		Toxic Bioaccumulation	L	-	S	S	NS
		Water Quality	L	+	S	L/+	L
		Nutrient Enhancement	L	+	S	S	L
		Marine Organisms	L	+	S	L/+	L
Socio-economic influence	M	+	S	S	M		

		Potential impact	Magnitude	Direction	Duration	Scope	Significance
Land Based Activities	Installation Activities	Soil Alteration	L	-	I,S	I,S	L
		Land Alteration	L	-	L	L	L
		Surface Water Alteration	L	-	S	S	L
		Noise Generation	L	-	S	S	NS
		Fugitive Emissions	L	-	S	S	NS
		Solid Waste Generation	L	-	S	S	L
		Socio-economic Influence	M	+	S,M	S,M	M
	Infrastructure Development	Soil Alteration/Pollution	L	-	I,S	I,S	L
		Water Contamination	L	-	S	S	L
		Spills and Leaks/Services	L	-	I,S	I,S	L
		Drainage Alteration	L	-	S	S	L
		Fugitive Emissions	L	-	I,S	I,S	NS
		Noise Generation	L	-	S,M	S,M	NS
		Aesthetic Enhancement	H	+	S	S	M
	Socio-economic Influence	M	+	L	L	H	
	Underbrush Clearance	Habitat Alteration	M	-/+	I,S	I,S	L
		Soil Alteration	M	-	I,S	I,S	L
		Land Alteration	L	-	L	L	L
		Surface Water Alteration	M	+	S	S	L
		Drainage Alteration	L	+	S	S	L
		Aesthetic Appeal	H	+	L	L	L
Fugitive Emissions		L	-	I,S	I,S	NS	
Socio-economic Attraction	H	+	L	L	NS		

5.2.2 Overview of Environmental Impacts

Based on the Table 5.1 above, various potential cumulative impacts were identified as part of the Impact Rating Matrix for the project. The level of adverse, or alternatively, beneficial impacts is a function of the magnitude of the development activity, the nature of the impact in question, the capacity of the environment to assimilate these influence and the methodology to be applied in relation to the particular project activity.

The primary activities that are likely to give rise to environmental impacts of note are the trenching activities, bedrock excavation and infrastructure development (See Fig. 5.2 and Table 5.1).

Other primary impacts arising as a consequence of trenching relates to habitat alteration. These have been categorized as “ecological” impacts and include: a decrease in nursery habitat, an increase in benthic habitat.

The most notable primary aquatic impacts that are likely to arise from the general commissioning of operation of the proposed development are an increase in macro-nutrients, sedimentation and turbidity.

Apart from water quality issues and aquatic impacts otherwise, the engagement of the land based facilities is also relevant in term of environmental impacts. This includes the related impacts such as underbrush clearance to gain access to the transmission lines, and the movement of light vehicles and personnel throughout the corridor area.

5.3 Details of Environmental Impacts

The following sections summarize the potential cumulative impacts related to the proposed project for *btl*.

5.3.1 Cable Installation Impacts

The most notable primary aquatic impacts arising from the installation activities are expected to be an increase in sedimentation and turbidity, and an increase in hydrogen sulphide in the water column.

The areas that are expected to be affected from the impacts are the near-shore ecosystems in the immediate vicinity of the ‘project corridor’, the access channel to the San Pedro marina canal and the crossing of the shipping channel.

The turbidity and sedimentation impacts has been estimated to be ‘low to medium’ at its most extreme (See Table 5.1), given the time-frame over which the activity spans, the physical form of the material, and the proximity of the project corridor to ecologically sensitive areas.

The project corridor runs through certain areas characterized by sparse sea-grass rooted on a fairly thin substrate of consolidate calcareous sediments, intermixed with organic carbonate debris. This layer sits on a fairly substantial layer of firm, semi-compacted ‘Halimeda’ sand, which is of calcareous origin. Halimeda sand is made up primarily of the ‘tests’ or skeleton of the marine calcerous algae *Halimeda spp.*

Given the nature of the sand and sediments, and its relatively mixed density, the sediments suspended by the process should re-settle in a relatively short time. Thus even those areas that are nearest to the project corridor should not be affected by the event. This particular area has been listed as the “Near-shore Ecosystem” in the EIA Matrix (Table 5.1), and is in effect the near-shore areas and Hol Chan Marine Reserve immediately southwest of Ambergris Caye.

The impact of sedimentation from the installation activities is for the most part rated as moderately adverse. This includes the sea floor of the surrounding impact sites which intermittently consists of some sparse sea grass and macro-algal productivity.

The magnitudes of the adverse sedimentation impacts associated with the installation activities are considered adverse mainly as a consequence of the length of the project corridor. These fine sediments stays in suspension for a period of time after the cessation of the activity, with the consequence of the impacts being felt over a larger geographic area and for a slightly more extended period of time.

Due to the fact that the volume of material to be removed is zero, the limited area that will be physically impacted relative to the expanse of the sea would result in minor environmental impacts. The adverse impacts, which are all considered to be low to moderate in nature, relate to the productivity of the near shore ecosystem.

In addition, some impairment can occur with the fishing activities carried out by the traditional fishers of the area. The rapid deposition of heavier sediments combined with the poor visibility associated the suspended solids in the water column, makes it difficult for fishermen to see their traps and or catch. The overall impacts of the installation activities of the proposed areas on the fishery activities are projected to be very limited and localized in time.

Impacts of Note

It is also anticipated that installation activities will have both physical and biological effects on the environment. The proposed operations can possibly affect the lagoonal environment in a number of different ways, most notably the following:

1.0 Possible Biological Impacts

a. Direct Possible Biological Impacts include:

- Possible death or temporary migration of fish and other marine life (only migration may occur)
- Destruction of sea grass beds (Sparse density in project corridor areas)
- Micro-algae and invertebrates are either entrained or crushed during operations (Minimal considering habitat)
- Loss of habitat (minimal expected)
- If crocs, manatees or other animal of interest are near the trench corridor site, disturbance would likely occur possibly causing injury and migration (considered minimal)

b. Indirect Possible Biological Impacts include:

- Possible decrease in primary productivity due to increased turbidity (minimal)
- Effects on habitat and benthos intolerant of high sedimentation (constant movement)
- Bioavailability of contaminants in disturbed material if presently accumulated in the sediments (Activities to be conducted in dry season only)
- Increased wildlife potential as increase area for benthic habitat is increased (post operations)

2.0 Possible Physical Impacts

c. Direct Possible Physical Impacts include:

- Possible increased siltation and turbidity (minimized by installing only during the dry season and only with the incoming tide behind San Pedro).
- Changes in topography and bathymetry of lagoon.

d. Indirect Possible Physical Impacts include:

- Indirect turbidity of water column from sediments that are continuously introduced into the water column
- Changes in current speed (minimal and only on dry season)
- Changes on water circulation due to changes in bathymetry (velocity during dry season will decrease)

5.3.2 Underbrush Clearance Impacts

The various underbrush clearance activities that will be carried out relate to accessing the transmission lines from Maskall to the coast. The cumulative impacts relating immediately to the process of the project site are: increased traffic in the corridor, and noise pollution. (See Table 5.1). Although there are identifiable primary impacts in relation to a number of these variables, these are not expected to translate into significant secondary and tertiary impacts as they relate to the various ecosystems and ecosystem components in the corridor that have already been altered in the area.

5.3.3 Domestic Effluent Impacts

The two (2) main generic impacts relevant to the proposed undertaking are sedimentation and possible heavy metals in the water column.

The situation of sediments in the water column is generally derived from the fine silty sediments that are disturbed by the installation activity.

The possibility of contamination by heavy metals into the water column is nil, as can be seen from Annex V and Fig 2.10(b), only four traces of metals were found, namely Arsenic, Chromium, Selenium and Zinc, but these were however in quantities well below the acceptable limits. All these metals occur naturally in the area, due to several activities that have and are occurring in the area, such as agriculture, sewage waste and the effluent from the rivers emptying into the Chetumal/Corozal Bay.

The level of phosphates and nitrates found in the waters as shown in Fig. 2.4 is relatively low and is in no way considered to be at a level where it can be considered as 'polluting'. The effect of increased levels of macro-nutrients in the water column is to, in general, increase 'primary production' or photosynthesis in autotrophic plant-life. This relates to micro-algae such as

Chaetocerus spp., and *Tetraselmis spp.*, flowering plants such as the sea grasses *Thalassia spp.*, and *Syringodium spp.*, and macro-algae such as *Halimeda spp.*, and *Udotea spp.*

Increases in nutrient levels for the proposed undertaking relates to the installation phase (See Table 5.1). The greatest nutrient impacts are associated with the installation phase of the project. It has been asserted that the level of primary impact should be of 'low change' (See Table 5.1). The most detectable nutrient impacts are expected to be in regards to the near shore ecosystem off the lagoon basin behind San Pedro.

It is noteworthy to point out that the change in nutrient profile associated with the development should not impact any coral reef ecosystem. This is a function of distance or more appropriately 'dilution effect' of the sea, as well as the relatively modest disturbance of nutrients from the sea bed during the operation.

Associated with this is the increased probability of sewage discharge from the boats used. The potential impacts of an increase in the levels of fecal coliform in the water column, is an indicator that there may be an increase in the probability contracting some pathogenic or infectious diseases. The impact associated with this, however, has been assessed to be low.

5.3.4 Potable Water Impacts

There will be sourcing of potable water for the proposed project for domestic and human consumption from a marina in Belize or the most practical area. The vessel utilized will more than likely, especially since it is outfitted for such a project undertaking, will have a huge built in holding tank that will provide sufficient water for the duration of the project. If additional water is required, it can always be barged to the vessel and pumped into the tanks.

The impacts associated with this undertaking are classified as not significant considering the volume required sufficing the project demands. These impacts would include the volume and its possible effect on the supply to the area, which again would not be significant noting the volume required.

5.3.5 Solid Waste Impacts

The proposed management scheme for the management of the solid waste will involve the collection of the waste and sorting to separate the organic from the inorganic waste. The organic and inorganic wastes are to be ferried to the nearest dump site on a regular basis. Therefore these will be stored on the vessel until enough has been accumulated to justify transportation.

The only two main generic environmental issues related to the generation and management of solid waste is the potential for the ingestion of inorganic waste by fauna in the area, such as manatees, crocodiles, fish, turtle and other mammals and birds, additionally the potential for increasing the incidence of pathogenic diseases. The attraction of animals, fish and birds to the main vessel would be as a consequence of the increased availability of food in the form of discards. The animals relevant in this regard would be predatory and omnivorous mammalian fauna such as predatory reptiles, the crocodile and opportunistic bird species such as the Grackle

(*Quiscalus mexicanus*), the Herring Gull (*Larus argentatus*) and the Frigate Bird (*Fregata magnificens*).

The impacts of feral animals in regards to the proposed project have been assessed as ‘minor beneficial’ impact in regards to crocodile, seabird and migrant bird populations. There are also some adverse impacts however and these relate to general species diversity and the possibility of injury from animals such as manatees and crocodiles. These impacts however have been all categorized as ‘low’.

5.3.6 Energy Generation Impacts

There will be no deleterious impacts associated with the generation of energy as the development will utilize energy from its on board generator. The only possible impact related to energy generation is as a result of the hydrocarbon spills and leaks as a result of generator operation (maintenance and refueling) and boat servicing.

In considering the hydrocarbon spills and leaks, these can be deleterious to the receiving environment. This issue has been labeled as ‘low’ in the Impact Rating Matrix (See Table 5.1). This impact considers both land and sea environments which usually cause localized contamination if not properly contained.

5.3.7 Impacts from the Installation Activities

The associated impact related to the installation activities is varied. The main impact associated with the installation includes the clearance of underbrush and the project activities relating to the seabed (including sand and bedrock) phase itself.

Considering that most of the project site will be narrow and shallow, the predicted impacts on the disturbed surface are considered to be ‘low’. Therefore the only plausible impact with this issue includes the actual installation phase that will primarily involve the generation of noise, siltation and turbidity. This impact is anticipated to be ‘short and low’ (See Table 5.1).

5.3.8 Roadway Impacts

The impacts of the roadway will consist primarily of the installation phase of the FOC on the transmission lines that will link the overhead FOC to the Submarine FOC. The designing and the routing of the FOC network would result in short term sedimentation, short term air pollution and sight pollution impacts (See Table 5.1).

In other words, the installation activities associated with the FOC will result in the suspension of particulate matter associated with the clearing and burial of the SFOC network.

5.3.9 Social Impacts

The social impact assessment will cover both the social and cultural impacts, and the social and economic impacts of the project. This assessment will also include the overall value and changes of the resources taking into account the future value of the natural resources by users and impacts of the proposed project on these areas; the general role of traditional users in response to both the telecommunication services (phone, internet etc.), fishery and tourism value, and future value of the fishery resource, as well as other impacts on increased usage of the area during post installation activities (See Table 5.2).

Installation Activities

- population and equipment movement and use during all phases of work
- demand for services
- marine traffic increase
- transportation of materials/equipment

During all phases of installation, both vehicular and boat, coupled with human activity to the region will increase. Increased traffic to and from the site will include worker populations, and transportation of equipment, supplies and materials to the site (not to include the already regular scheduled trips to the project site by the consultants/observers). Demand for services by worker populations will also increase during all phases of installation.

Current and Existing uses of the area

Potential or proposed Impacts

- disruption of traditional user activities
- regulated use of traditional activities
- access to the area by traditional users
- ability of users to adapt to changes

One of the major concerns indicated by stakeholders was proposed installation activities in traditional fishing grounds areas. Continued access and use of the area and views of the developers in respect to traditional uses is another main concern.

Economic & Cultural

Potential or Proposed Impacts

- impact on fishery resources
- decreased economic benefits by traditional users of the area
- Pressure on existing institutions and social groups
- Marginalization of minority groups and locals
- Pressure on existing lifestyles

Activities of this nature, especially in areas of marine importance to fisher folk, do have impact to some degree. The major impact could see decreased economic benefits to those small fishermen who utilize the fishing grounds and ultimately impact the fishery resources.

Employment

One of the major concerns is the availability of jobs, mainly for skilled laborers to satisfy the project's requirement. Major impacts include the lack of adequate training as well as minimum wages for unskilled labor.

Transportation / Sea Traffic

Potential or proposed Impacts

Increase in number of vessels to the area and the region
Impact on natural environment by increased boat usage
Operation of construction and all machinery
Safety for traditional users

Emergency and Health Services

Potential or proposed Impacts

Increased pressure on health facilities

Social Impacts of Note

The development is classified as a services oriented project for the country and people of Belize. The main concerns identified by those interviewed on the proposed development are:

- increased employment and job creation and the possibility for local residents to enter or expand their business;
- the availability of a faster and more reliable service will increase their income potential;
- a general increase in business activity and revenue generation during the construction phase of the development;

Other indirect benefits may result for existing tourism businesses that will cater to an increased up to date population and who may also specialize in tourism-related catering and related service businesses using this added medium and its reliability and speed. The main negative concerns identified, in no order of priority, are:

- the development is close to Hol Chan and the development activities may “destroy the main attractions (Hol Chan, Shark Alley and sport fishing) of the island; once Hol Chan is destroyed the tourists will not come to San Pedro thus resulting in total economic loss;

- impact of project activities to this area of flats where most of the sports fishing is done by the tour guides;
- the project activity will destroy the habitat for the three important species of sport fish, namely bone fish, permit and tarpon;
- project activity will kill the juveniles of the three main sport fishing species and also others such as snook, jewfish, cubera snapper;
- the sedimentation from the project activity “scare and chase” the important sport fishing species and will destroy the sea grass beds (feeding habitat) in the lagoon and corals on the reef;
- the resulting sedimentation of fine silt on the barrier reef and mangroves will also affect spawning aggregation sites, especially for lobster;
- displacement of sport fishers from their current tour guiding grounds due to the project activity thus resulting in loss of their traditional livelihood;
- the development may cause restriction of traffic to fishers; a buffer area may be “buoyed off” to prevent fishers and tour guides from using the areas close to the development;
- disposal of solid and sewerage waste will increase this already existing problem;

Table 5.2 Potential Social Impacts & Residual Impact Rating on Proposed Activities for Project Implementation

Activities and Conditions	Potential Impacts	Comments by Consultants	Residual Impacts, Magnitude/ Direction/Duration/Scope
Current and Proposed Land Use in Area	<ul style="list-style-type: none"> Location and size of project. 	Adequate control of proposals, especially during the installation phase, take into consideration future activities being undertaken in the island.	High/ positive/high/local
Activities during Installation Activities	<ul style="list-style-type: none"> Transportation of construction materials and equipment during all phases of development. Operation of construction machinery High population densities during construction and post construction Housing and sanitary facilities for construction workers at the development site. 	<ul style="list-style-type: none"> All vessels/vehicles transporting construction materials should be covered, and equipment secured to allow for safe transportation to the site; this should be monitored. Operators should be trained and involved in development plans. Workers should be trained in the safety procedures; operation of machinery and use of safety gear used. Adequate transportation, proper housing, and other basic facilities are available for workers in the island. 	<p>High/negative/years/ Central Coastal Zone (CCZ)</p> <p>High/positive/years/local</p> <p>High/positives/local/local</p> <p>High/positives/years/local</p>
Marine and Terrestrial Traffic	<ul style="list-style-type: none"> Increased number of sea vessels and vehicles Increased traffic of work boats and barges between Belize City and the island 	<ul style="list-style-type: none"> Movement of workers, machinery/equipment and cargo, should be scheduled in advance. Marine traffic should also be regulated by routing marine vessels to designated “shipping lanes”. Management systems such as buoys, markers, and signs should be designated Materials transported should be properly covered and secured to prevent them falling into the sea. 	<p>High/negative/years/CCZ</p> <p>High/negative/years/CCZ</p> <p>High/negative/decades/CCZ</p> <p>High/negative/years/CCZ</p>
Worker Population	<ul style="list-style-type: none"> Increased population density in the area during installation stages 	<ul style="list-style-type: none"> Temporary quarters are on vessel Workers be transported to and from the site during all phases of construction 	<p>Low/ no change/short term/local</p> <p>High/no change/decades/local</p>

Activities and Conditions	Potential Impacts	Comments by Consultants	Residual Impacts, Magnitude/Direction/Duration/Scope
Health Services	<ul style="list-style-type: none"> Increased pressure on existing health institutions. 	<ul style="list-style-type: none"> Local health facilities should be capable of handling the increase, especially since it is short term. 	Low/positive/short term/district
Employment	<ul style="list-style-type: none"> Skilled laborers from the region not employed during installation stages Skills training may be required for some local employees. 	<ul style="list-style-type: none"> Employment of individuals from other parts of the country encouraged and will strengthen local/regional skills and will include the potential for long-term employment Laborers should also be paid as per skill requirement (s) The Belize labor laws should also be observed. This skills training will be required especially in the post construction phase. 	<p>High/positive/decades/local</p> <p>High/positive/decades/district</p> <p>High/positive/decades/district</p> <p>High/positive/years/local</p>
Population	<ul style="list-style-type: none"> Temporary worker population increase to the area Pressure on existing resources 	<ul style="list-style-type: none"> worker population will come from the region, elsewhere in the country and abroad increased economic benefits and opportunities for local entrepreneurs 	<ul style="list-style-type: none"> Low/No Change/Weeks/ Local Low/Positive/Years/Local
Socio - Cultural	<ul style="list-style-type: none"> Pressure on existing customs, lifestyles People's perceptions of the project 	<ul style="list-style-type: none"> Improved local political and institutional networks Local organized groups work together to strengthen existing social structures, institutions, and regulatory systems Employment and entrepreneurial opportunities and cultural exchange; training and award of micro-credit for small businesses 	<ul style="list-style-type: none"> Medium/Positive/Decade/Local High/Positive/decade/Local

Labor and Employment	<ul style="list-style-type: none"> - Skilled labor from the area not employed - Employment opportunities of all labor types - Operators of equipment and machinery not fully trained 	<ul style="list-style-type: none"> - Locally skilled laborers employed and/or trained - Employment opportunity for all labor types - Long term employment - Skills transfer - Workers be provided with adequate facilities and services and safety equipment - Operators be trained - Workers be trained in the safety procedures and operation of machinery and safety gear - labor laws of Belize observed 	<ul style="list-style-type: none"> - Med/Neg./weeks/Local - Med/Pos/Decade/Local/ -Med/Pos/Decade/Local/ - High/Positive/Decade/Long - High/Positive/Decade/Local - High/Positive/Decade/Local - High/Positive/Decade/Local - High/Positive/Decade/Local
Economic Impact	<ul style="list-style-type: none"> - increased employment & increase in business sales and products and profits 	<ul style="list-style-type: none"> - Increased part time and full time workers of all types; increased business opportunities; increased sales and generation of profits; increased income and monies spent in the economy 	<ul style="list-style-type: none"> - High/Positive/Decades/Long

Noise, Dust & Visual Impact	<ul style="list-style-type: none"> - Operation of machinery and equipment - Disturbance from dust and smoke to neighboring facilities - Disturbance due to airborne pollutants and contaminants - Potential air pollution from boats - Visual impact of port and related lighting on residential area 	<ul style="list-style-type: none"> - Noise reduced by adoption of low noise equipment and/or installation of sound insulation fences - water scattering at construction site - green belt zone or open space between the construction site - prohibited the use of type-C heavy diesel oil - installation of lighting systems to minimize the intensity of light and/or establishing green belt buffer around the perimeter of the peninsula 	<ul style="list-style-type: none"> -High/Negative/Weeks/Local - High/Negative/Weeks/Local/ - High/Negative/Weeks/Local -High/Negative/Weeks/Local/ Long - High/Neg/Local/ Long
Marine Traffic	<ul style="list-style-type: none"> - Increase number of marine vessels to the area - Disruption of traditional transportation route 	<ul style="list-style-type: none"> - Increased marine traffic through and near the area be regulated - buoys and markers positioned and/or fitted to facilitate marine vessels - areas of traditional uses be avoided and coordinated (where possible) - maintain open communication with all users of the area - safety measures established for all users and workers - all materials transported over land and marine environment properly covered 	<ul style="list-style-type: none"> -High/No Change/weeks/Local -High/No Change/weeks/Local -High/No Change/Weeks/Local

Magnitude: Magnitude of impact (high, medium, low)

Direction: Direction of impact (positive, negative, no change)

Duration: Duration (none, weeks, months, years, decade)

Scope : Area affected (local, long)

5.4 Indirect Impacts

It is anticipated that the proposed program will have indirect cumulative impacts on the surrounding environment as summarized in the following sections below.

5.4.1 Impact on Fishing Activities

Very little difference exists in comparing the relative impact data in terms of the fishing activities for Ambergris Caye. It is important to note that the caye falls within an area that is productive and there are a number of fishing operations in the area. The species primarily targeted are lobsters and conch, followed by a number of finfish species such as the Silk and Cubera Snapper, the Yellowtail, Jew, Snook and the Hog Fish.

The impacts of sedimentation and turbidity on lobster and conch fishing in the immediate vicinity of the project activities has been assessed as 'low' and which has been previously discussed in Section 4. Two of the more important factors influencing this categorization have been the short-term and temporary nature of the activities.

5.4.2 Other Related Impacts

The 'boat access for fishermen catching bait fishes' is another pertinent issue potentially bringing foreign guests in contact with local resource users. The activities of the proposed project could interrupt or erode the access of traditional fishermen to the area and its resources. However the level to which this is expected to happen is not significant. The critical areas relevant to sport fishing are the Laguna de Boca Ciega along with the Boca Chico canal which forms part of the Hol Chan Marine Reserve. The project corridor however, passes due north of these areas, and thus will limit the amount of effect it will have on the said area.

The issue of 'injury and physical trauma' relates specifically to accidents and incidents that could occur on the project site either to an employee, fisher or observer. These include accidents and incidents while at the project site. Other associated incidents include the installation phase especially for the workmen and contractors since this phase could possibly experiences a high incident rate. Considering the potential for human safety being jeopardized, this impact was considered as moderate.

The issue of noise pollution would be associated mainly with construction phase of the project. This phase is expected to be short term and moderate only during the installation process. It is anticipated that the noise factor would slowly decrease as the project comes to completion. The other potential impact associated with noise generation is the commissioning of the generators and the plough during the project activities during Stage 2.

5.5 Conclusion

The analyses of the environmental impacts are an important tool in determining the appropriate mitigation measures to be employed. Identifying the related impacts is an exhaustive process that always has to be updated. In considering the anticipated project, the impacts are not that different from any other project involving similar activities. What sets this project apart is its size and magnitude. The most important impact for the proposed project is the activities and its associated effects on the environment. It is anticipated that the potential impacts of the project will not have any detrimental effect on the receiving environment, especially to Hol Chan Marine Reserve.