

# ENVIRONMENTAL IMPACT ASSESSMENT RESPONSE

MDL INVESTMENTS LTD.,  
DEADMAN’S CAYE AND BIG FLAT  
TURNEFFE ATOLL, BELIZE

## Contents

1.0 INTRODUCTION.....	2
1.1 STAKEHOLDER’S REQUESTS FOR EXTENSION OF RESPONSE TIME .....	3
2.0 OVERVIEW.....	3
3.0 GENERAL FINDINGS.....	4
3.1 ECONOMICS OF PROPOSED DEVELOPMENT .....	4
3.2 NET BENEFIT OR NET LOSS.....	6
3.3 BUSINESS MODEL.....	6
3.4 PUBLIC RESPONSE.....	8
3.5 DEVELOPER’S PRIOR LACK OF COMPLIANCE .....	8
3.6 EIA MIS-STATEMENTS .....	8
3.7 LAWS, REGULATIONS AND GUIDELINES FOR TURNEFFE ATOLL DEVELOPMENT .....	9
3.7.1 OVERWATER GUIDELINES .....	9
3.7.2 SEABED & 66 FT. BUFFER POLICIES AND GUIDELINES .....	10
3.7.3 MANGROVE ACT 2018 .....	11
3.7.4 COASTAL ZONE GUIDELINES AND RECOMMENDATIONS .....	12
3.7.5 TURNEFFE ATOLL MARINE RESERVE .....	14
3.7.6 NATIONAL SUSTAINABLE TOURISM MASTER PLAN .....	15
3.7.7 TURNEFFE ATOLL TRUST HABITAT MAPPING .....	16
3.7.8 BLUE BOND AND PROJECT FOR PERMANENCE FINANCING .....	19
3.7.9 WORLD HERITAGE SITE .....	20
3.8 GREEN APPROACH .....	20
4.0 SPECIFIC FINDINGS .....	21
4.1 PHYSICAL IMPACTS .....	21
4.1.1 OVER-THE-WATER STRUCTURES.....	21
4.1.2 BOAT TRAFFIC.....	22
4.1.3 TOXIC SPILLS.....	23

4.2	PHYSICAL ENVIRONMENT – ASSOCIATION WITH TURNEFFE’S FRINGE REEF .....	23
4.3	FLORA AND FAUNA .....	25
4.4	WATER RESOURCES .....	25
4.5	ENERGY PRODUCTION .....	26
4.6	WASTE MANAGEMENT .....	28
4.6.1	TOILET WASTE .....	28
4.6.2	KITCHEN WASTE .....	29
4.6.3	GREY WATER WASTE .....	29
4.6.4	SOLID WASTE .....	31
4.7	FUEL TRANSPORTATION AND STORAGE .....	32
4.8	EXTRACTION OF MATERIALS -DREDGING .....	32
4.9	WALKWAYS .....	34
4.10	DISASTER MANAGEMENT .....	34
4.10.1	HURRICANE PREPAREDNESS .....	34
4.10.2	FIRE PREPAREDNESS.....	36
4.11	SOCIAL IMPACT / COMMERCIAL FISHING .....	37
4.12	NO DEVELOPMENT OPTION .....	38
4.13	CONCLUSIONS.....	39
4.14	ANNEXES .....	39
4.15	REFERENCES .....	40

## 1.0 INTRODUCTION

This document formulates the combined response of **Turneffe Atoll Trust, Turneffe Atoll Sustainability Association and Turneffe Flats Resort** to the Final Environmental Impact Assessment by Tunich-Nah Consultants and Engineers for **MDL Investments Limited, Deadman’s Cayes, Turneffe Atoll, Belize**, which was presented at Public Consultation in Belize City on November 17, 2022. This report evaluates the environmental, social and economic impacts of the proposed development through the perspective of sustainability tourism development at Turneffe Atoll.

## 1.1 STAKEHOLDER'S REQUESTS FOR EXTENSION OF RESPONSE TIME

The Public Consultation for this EIA was scheduled on November 2, 2022. This was 15 days following Hurricane Lisa which passing directly over Turneffe Atoll causing major damage and loss of most communication structure throughout the atoll. Stakeholders were overwhelmed with property cleanup, in addition to lack of adequate communications because nearly all communication towers were destroyed. For these reasons, they requested that the Public Consultation be postponed; however, verbal and written requests were denied and the consultation proceeded as scheduled on November 17<sup>th</sup>. We recognize that the D.O.E. must consider their legal requirements and that the department has limited ability to change these deadlines. As expected, the consultation was poorly attended as several key stakeholders were unable to prepare or attend.

Turneffe stakeholder were then asked to submit written responses to Tunich-Nah Consultants and Engineers 150-page Environmental Impact Assessment by April 25<sup>th</sup>. Under the best conditions, a mere 12 days to identify consultants, make assessments and draft informed responses to an EIA would be nearly impossible. Conditions were, however, far from normal with Turneffe stakeholders experiencing continued communication issues and difficulties with repairs and cleanup.

Shortly after the Public Consultation, Turneffe Atoll stakeholders, including the Turneffe Atoll Marine Reserve, lodged a legal request for an additional 30 days to provide their written responses. Stakeholders felt this was a minimal time needed to obtain the required technical advice and provide informed feedback on this proposed development. We thank the Department of Environment for extending the deadline December 8, 2022, but note that this does not provide enough time for the robust response this EIA deserves. We hope that the Department of Environment will consider a 2<sup>nd</sup> Public Consultation as requested by Turneffe Atoll Sustainability Association.

## 2.0 OVERVIEW

The proposed development and business model presented by MDL INVESTMENTS LIMITED, DEADMANS CAYES, TURNEFFE ATOLL, BELIZE DEVELOPMENT is fundamentally flawed and should not be entertained by the Department of Environment, particularly within a Marine Protected Area. This proposed development, in fact, contravenes Guidelines developed by The Department of Environment through consultation with NEAC. These guidelines indicate over-the-water structures should not be allowed within 550 meters of the reef crest or in Marine Protected Areas.

The Environmental Impact Assessment for the proposed development lacks critical detail in several areas and is misleading or inaccurate in others. Additionally, the development proposes using unrealistic business concepts such as barging food, drinking water and fuel to the development twice per week (or as needed), and likewise regularly barging toilet waste from composting toilets to the mainland. This EIA does not present a legitimate or sustainable business plan and should be rejected on this basis as well.

MDL Investments Ltd. purchased three small cayes on Big Flat near Deadman's Caye knowing very well that the property was not adequate for the development they envisioned, and further, that it was situated within the Turneffe Atoll Marine Reserve. For their 22 cabanas, which they describe as the minimal number of units needed to make their project economically feasible, they have assumed that the adjacent seabed, reef and other ecosystem can be commandeered for their sole benefit, while ignoring that this area has been productively utilized by the majority of Turneffe stakeholders for more than four decades.

As a rationale for their environmental approval, the developers indicated that they have an inherent right to use their private property as they wish. This, of course, is not the case in Belize or elsewhere in the World; however, this circumvents the primary issue at hand in that the majority of the proposed development is not located on property owned by the developers. Rather, the majority of this proposed development is to be located on National Land (seabed) owned by the Government and People of Belize. The assumption that an individual or companies has an inherent right to use National seabed for their own purpose, at the expense of existing stakeholders and the people of Belize, is a nefarious assumption requiring thorough and thoughtful social and legal consideration.

The area of seabed proposed for use in the EIA, Big Flat, is one of Turneffe Atoll's most pristine and essential areas for tourism and commercial fishing. It currently provides considerable economic benefit for Belize, including many good-paying jobs (reference *The Economic Value of Turneffe Atoll* by Dr. Anthony Fedler). The area requested is located on the turneffe fringe reef, and the developers themselves indicate that this area is a conch nursery area and it would be within 140 meters of the crest of the reef. Commandeering this area for the private use of one company would be detrimental to Belize's tourism industry, cost Belizean jobs and clearly not be in the best interest of Belize.

As outlined herein, this proposed development contravenes a number of pertinent laws, policies and guidelines, including, but not limited to, the Coastal Zone Development Guidelines, the Mangrove Act, DOE's Overwater Development Guidelines, The Turneffe Atoll Marine Reserve Statutory Instrument and Management Plan, The National Tourism Master Plan and others. This proposal falls far short of meeting the basic standard of being beneficial for the people and Government of Belize.

In summary, issues related to this development go well beyond the use of private property. Seabed is National Land and its use for private purposes, particularly in such an environmentally sensitive and economically important area, must be carefully and reluctantly considered.

## 3.0 GENERAL FINDINGS

### 3.1 ECONOMICS OF PROPOSED DEVELOPMENT

A major consideration for approving (or prohibiting) this development, and others like it, is its economic impact. The MDL development at Deadman's Caye/Big Flat, if approved, would clearly

have significant, long term detrimental impacts on Turneffe's economy and the Atoll's economic contribution to Belize.

Turneffe Atoll serves as a major barrier from tropical storms and hurricanes for Belize City and Central Belize diminishing and/or preventing damage from storms like Hurricane Lisa, which recently passed directly over the Atoll and near Belize City. This protection is directly related to Turneffe's coral reef, seagrass beds and mangroves.

In his 2018 analysis, *The Value of Turneffe Atoll Mangrove Forests, Seagrass Beds and Coral Reefs in Protecting Belize City from Storms*, Dr. Anthony Fedler calculated the value of Turneffe's protection, based on damages avoided, at BZ\$382.3 million dollars annually (Full report attached). This project, which negatively impacts Turneffe's coral reef, seagrass beds and mangroves, would detract from the Atoll's ability to protect Belize City and Central Belize from storms, thereby reducing its economic value for Belize.

Tourism is the largest generator of economic activity at Turneffe Atoll with Scuba diving, flats fishing (for bonefish, permit and tarpon) and snorkeling/ecotours being the major tourism draws. The Center for Responsible Travel (CREST) analyzed this aspect of Turneffe's economy in 2011. Though this analysis is somewhat dated, and values have undoubtedly increased over the past nine years, CREST determined that "The Atoll's major industry, tourism, has largely focused on marine-based ecotourism with Turneffe earning an international reputation as a highly prized tourism destination for scuba diving, catch-and-release sport fishing, and ecotourism." Tourists stay either at one of Turneffe's three "all-inclusive" resorts or visit on day trips from elsewhere in Belize. Turneffe's tourism generates approximately US\$23.5 million per year in Turneffe-specific expenditures and nearly US\$37 million in total expenditures in Belize. An important component of tourism's economic impact is the number of jobs created through Turneffe's tourism supporting approximately 1,220 full-time jobs in Belize in 2011."

Scuba diving at Turneffe brings the largest number of visitors to Turneffe while flats fishing arguably generates the most economic activity. Belize is recognized throughout the World for this type of fishing and anglers travel from countries around the globe to enjoy this specialized type of fishing. Within Belize, Turneffe Atoll is particularly well-known for its firm-bottom wadable flats along the Eastern (seaward) side of the atoll, including Big Flat.

In 2015, an economic analysis by Dr. Anthony Fedler, vetted by economists in Belize, determined that this specific type of fishing (flats fishing for bonefish, permit and tarpon) generated BZ\$112 million dollars annually for Belize and employed 2,100 Belizeans in good-paying jobs. This survey has recently been updated and the value of this industry for Belize in 2022 is now in excess of BZ\$200 million annually with employment in excess of 2,500 Belizeans.

Although this analysis wasn't broken down by location in Belize, Turneffe Atoll, as one of the prime flats fishing destinations in the country, is responsible for a significant portion of this economic impact.

The third major economic engine for Turneffe Atoll is commercial fishing – primarily for conch and spiny lobster. According to CREST, "In 2009, commercial fishing at Turneffe generated approximately US\$500,000 while the social benefits of Turneffe's fishery remain very significant

with 180 to 200 fishermen supporting their families from the Atoll.” These numbers have increased significantly since 2009 with more than 1,200 fishers currently registered to fish at Turneffe.

The MDL project would adversely affect all of the key economic engines provided by Turneffe Atoll for Belize. Storm Protection would be adversely affected through the loss of mangroves, seagrass and damage to the Atoll’s fringe reef. Tourism would be adversely impacted with the loss of one of the Atoll’s most essential flats areas causing devastating consequences for the flats fishing industry. Dive tourism would additionally be impacted by the proposed developments adverse impact to the reef.

Big Flat is an important conch nursery and the forereef in this area is an important lobster fishing area. Both would be adversely impacted by this development. In summary, the MDL Investments Ltd. project would manifest broad and significantly negative economic impacts for Turneffe Atoll and Belize.

### 3.2 NET BENEFIT OR NET LOSS

At the Public Consultation on Thursday, November 17, 2002, representatives of MDL Investments Ltd. emphasized the need to ascertain the “NET BENEFIT” for their proposed over-the-water development on Big Flat, Turneffe Atoll. We agree that this is a relevant consideration and herein establish that this development would clearly result in a NET LOSS for Turneffe Atoll, the Turneffe Atoll Marine Reserve and Belize.

Big Flat has been productively used by tourism stakeholders and commercial fishers for decades. This is not merely a matter of utilizing an unproductive area for a new purpose, but rather a circumstance in which an individual developer is seeking to alter a current high-value, multi-use area for a lesser, singular purpose at the economic and social expense of existing stakeholders and the general public. Should the MDL project be approved, it would result in loss of tourism income and tourism jobs and a decisive NET LOSS for Belize.

This project would also damage a recognized conch nursery and the lobster fishery associated with the area’s forereef, costing additional commercial fishing jobs and resulting in negative social impacts in affected communities.

NET ENVIRONMENTAL LOSSES due to destruction of one of Turneffe’s most pristine backreef flats, deforestation of mangroves and damage to Turneffe’s fringe reef - whose crest is a mere 140 meters from the development - would be huge.

### 3.3 BUSINESS MODEL

Per the EIA, the proposed development proposes 22 guest Cabanas (12 over-the-water and 10 on land). This is noted by MDL as the “minimal economically viable scope for the development”. The developer’s operational approach, as outlined in the EIA, is unconventional and its feasibility appears doubtful.

The developer is adamant that tourism activities such as diving, fishing or snorkeling will not be provided at their location due to the high cost of liability insurance. Rather, guest activities for their clients are to be provided by “other operators at Turneffe”. Other operators willing or able to provide these services are, however, not identified, and it isn’t realistic that tourists will agree to visit a remote facility at Turneffe without being guaranteed access to the activities for which the Atoll is noted (Scuba diving, fishing and snorkeling). We are concerned that the developer is seeking environmental approval without addressing the myriad economic and environmental issues related to providing guest activities. It is likely that they anticipate adding these capabilities following environmental clearance. Without a verifiable contractual arrangements or definitive plans for providing guest activities, the MDL EIA is incomplete and their business plan is not feasible.

As we understand Tunich-Nah’s explanation, prepared food and drinking water are to be delivered from Spanish Bay – a separate development owned by MDL. Spanish Bay is at least 15 miles from this location with a substantial open-water crossing prone to high seas which are sometimes impassable. There will certainly be periods when it is not possible to deliver food or water from a location outside of Turneffe. This unusual approach to providing basic services does not appear practical, reliable or realistic. Likewise, as discussed later in this document, plans to remove fecal waste and solid waste are impractical as are the plans for processing grey water and kitchen waste.

Power for the development is to be provided by a poorly designed solar system likely to provide far less than the power required. Tunich-Nah indicated at the Public Consultation that power will be supplemented by gasoline generators placed outside of the Cabanas. This would be noisy, dangerous and impractical.

Although air-conditioning is not specifically mentioned in the EIA, the proposed design, with minimal power capability, precludes air-conditioning. Nights at Turneffe are often hot and humid making it difficult for tourists to sleep. For this reason, all resorts at Turneffe Atoll currently offer air-conditioning and we find it unlikely that a resort without air-conditioning is feasible.

This project is located in and around mangrove swamps where mosquito and sand flies are endemic. Again, this would create a difficult situation for tourists who would likely find the situation intolerable without air-conditioning. This issue should be addressed in the EIA and will likely require increased extensive use of pesticides.

In summary, MDL is offering un-airconditioned facilities in a hot, humid and buggy environment with questionable power and limited water resources. Food would be delivered on a daily basis assuming seas allow. There will have no defined activities available unless arrangements are made with other resorts for activities. It is unlikely that even the low-end, back-packer tourists will accept these conditions. This is not a feasible business plan and it should not be recommended for approval.

### 3.4 PUBLIC RESPONSE

The EIA reports that, *“the general consensus of the responses (from stakeholders) is opposed to the project description.”* There was no indication of how many respondents shared this sentiment or what percentage of the respondents actually responded to the questionnaire.

The EIA preparers indicated that the responses to the survey were low; however, we are aware that nearly all Turneffe tourism stakeholders responded. Less than 1% of commercial fishermen were notified and therefore did not respond. A second survey to increase the number of responses was not conducted. The EIA concluded that all of the NGOs (both national and international), resorts owners, and some key government agencies opposed the project due to the sensitivity of the area and the economic benefits it produces for other resorts, especially sports fishing.

Tourists, who have used the Big Flats area for years, have become aware of this potential development and several have made it crystal clear that they oppose this development. Related letters are attached.

### 3.5 DEVELOPER’S PRIOR LACK OF COMPLIANCE

It has been highlighted in the EIA that on several prior occasions the developer has failed to comply with permit conditions established by various government departments in other areas he is developing. The proposed development at Turneffe on the three islands near Deadman’s Caye is a highly sensitive area which will require extremely strict mitigation and prevention measures to meet environmental protection standards. The developers lack of prior compliance is clearly a significant concern.

The EIA notes that they were contacted by *“...several GOB Agencies/Departments who expressed that they needed to remain impartial. However, it has been mentioned that considering the developer’s performance on past and present projects, they would be especially hesitant in giving an approval to this project. This type of project requires strict compliance with regards to the conditions of a permit; and as a result, the time and manpower to monitor such a venture would be costly if it were to be approved.”* It also stated that *“Given the magnitude of the project, and considering its location and design, it is guaranteed to receive negative responses and garner much adversity. Especially when considering that many current organizations have already sought to protect this area and as such would oppose such a development to proceed as they fear the negative impacts would be deleterious to the environment.”*

### 3.6 EIA MIS-STATEMENTS

We make note of the following errors in the EIA:

- 1) 3.2 of the EIA improperly lists the Ministry of Sustainable Development CC&DRM as the ministry responsible for administration of the Turneffe Atoll Marine Reserve. The Ministry of Blue Economy and Civil Aviation is the correct Ministry and the EIA preparer needs to ensure the proper ministry is consulted regarding this development.



- 2) Belize has a Cabinet-approved Blue Economy Development Policy and Strategy; however, the EIA fails to mention this. It instead referenced old information related to the Blue Economy in the Caribbean.
- 3) Under the EIA regulations (revised edition 2007), the EIA document states "*The proposed cane farm and processing facility falls under Schedule I, for which a full EIA is required. This EIA has been prepared pursuant to this regulation*". This is clearly an indication of a 'copy and paste' action as this EIA is not for a cane farm.
- 4) On page 67, the EIA singled out Southern Environmental Association in the document and not TASA as the official co-manager. There was no rationale or purpose for the information on SEA and it seems completely out of place.
- 5) Section 6.2.10 of the EIA indicates that "Belize Electric Company Limited" will ensure that contractual obligations, if any, are fulfilled at all times, and any guidelines and the monitoring of these guidelines and practices will be done internally, wherever possible". This sentence is completely out of context as BEL has nothing to do with this development.
- 6) There are additional places in this EIA referring to other developers which leads to the assumption that the EIA preparer simply copied and pasted information from previous EIAs, rather than conducting full due diligence in preparing this EIA.

## 3.7 LAWS, REGULATIONS AND GUIDELINES FOR TURNEFFE ATOLL DEVELOPMENT

### 3.7.1 OVERWATER GUIDELINES

In 2010, the Department of Environment adopted Guidelines for overwater structures. Several sections are directly relevant to the MDL Development.

*2.1 Overwater structures will not be allowed to be constructed over the Belize Barrier Reef or any living coral reef structure(s).*

The development is on the backreef flat which is a critically important part of Turneffe's fringing coral reef. Further, the EIA states that this backreef flat contains corals.

*2.2 Overwater structures should be sited in sandy, muddy or coral rubble areas to avoid impacts on sensitive environments and conflicts with other uses of the area.*

The proposed development is sited on the backreef flat covered with seagrass and corals. As is well- documented in this Response, the proposed area has been used extensively for tourism and commercial fishing for several decades.

*2.3 Sites should have a minimum set back distance of 550 meters from the Belize Barrier Reef System or any atoll.*

The proposed site is actually on Turneffe's Reef and a mere 140 meters from the reef crest. The proposed development would clearly cause extensive environmental damage to all portions of the coral reef in this area.

*2.6 Construction of overwater structures should preferably be carried out on the leeward side of an island whenever possible.*

The proposed site is on a seaward site of the developer's property and very exposed to the elements including storms.

*2.7 Overwater structures intended to be accessed by boats should select areas of least currents and avoid sea grass beds and corals.*

The proposed site is on a backreef flats covered with sea grass and corals.

This proposed development contravenes numerous DOE Guidelines and Policies and should quickly be removed from consideration for environmental approval.

As of this date, only guidelines for overwater structures exist with no legislative framework. This being the case, overwater structures should only be allowed with extreme care until the legal framework is completed. This is extremely important, as overwater structures are associated with major pollution issues and are highly likely to cause major destruction of habitats, for which DOE will have no legal recourse.

### 3.7.2 SEABED & 66 FT. BUFFER POLICIES AND GUIDELINES

In 2012, the Physical Planning Section, Lands Department, Ministry of Natural Resources and Agriculture issued these relevant Polices and Guidelines noting that the seabed is the property of the Government of Belize and under the jurisdiction of the Lands and Surveys Department. Seabed cannot be sold to private developers, but may be leased for periods of 3 years, and possibly extended to 10 years.

Several of these polices and guidelines are relevant to this proposed development, many of which are left unanswered by the EIA.

*2.0 seabed adjacent to public roads, easements or open/public spaces are only considered if the application is made on behalf of the Government of Belize or Local Village, Town or City councils for use by the general public.*

The seabed proposed for the MDL development is clearly in public use and has been for several decades. As Turneffe has no Village, Town or City Council, the Turneffe Atoll Marine Reserve (TAMR) is the established governing entity. TAMR and TASA have not made application on behalf of the developers, and in fact, are on record as opposing this development.

*6.1 Licenses for use of the seabed and 66 feet reserve are issued based on the premise that these are considered national land under Section 2, Section 6 Clause 1, and Section 12 Clause 8 of the National Lands Act.*

As noted throughout this Response, the National Land proposed by the developer for their sole use has been in (productive) public use for decades.

Several pertinent questions should be answered in the EIA before environmental clearance is considered. These include the following.

- 1) Has the developer made application to and received approval from the Physical Planning Section?
- 2) Has the developer requested approval or support from the Turneffe Atoll Marine Reserve, Fisheries Department or other relevant agencies?

### 3.7.3 MANGROVE ACT 2018

The three small islands owned by MDL are low-lying, partially-inundated islands covered by mangroves (a portion of which are overwash mangroves, Plate 4.4 of the EIA) and littoral forest. To build the on-land structures required, the EIA indicates that a significant area of mangroves will need to be deforested.

Our survey indicates that the three islands owned by the developers include red, black and white mangroves with mangroves covering an estimated 50% of their property and littoral forest covering the remainder. Notably, all three islands have overwash mangroves.

Before mangroves can be removed or altered, the Forest Department must issue permits based on the Forest (Protection of Mangroves) Regulations, SI No 49 of 2018 (Mangrove Act). This development appears to directly contravene several sections of the Mangrove Act including sections 6.1, 6.2 and 14.2 as noted below.

Section 6. 1 of the Mangrove Act indicates that the Forest Department shall NOT grant a permit for alteration unless, after its consideration the relevant application, it is satisfied as to the following matters;

- (d) fish nursery, nesting sites, endangered or threatened species, other wildlife or their habitats will not be adversely affected;
- (f) fishing, recreation values or marine productivity in the vicinity of the proposed alteration, or more generally along the coast, will not be adversely affected;
- (g) tourism value of the area will not be significantly reduced;
- (i) storm surge protection function of the area will not be significantly reduced;

Section 6. 2 (b) of the Mangrove Act indicates that the Forest Department shall NOT grant a permit for alteration unless, after its consideration the relevant application, it is satisfied as to the following matters;

Impacts on nearby coastal and reef areas known to be of outstandingly high ecological value, including those within the National Integrated Coastal Zone Management Plan;

Section 14.2 of the Mangrove Act indicates that the Forestry Department shall not grant a permit for alteration or selective trimming of –

(b) overwash mangroves

(c) mangroves within existing national parks, nature reserves, wildlife sanctuaries, natural monuments or other protected areas as defined and described in the National Protected Areas System Act.

### 3.7.4 COASTAL ZONE GUIDELINES AND RECOMMENDATIONS

The area proposed for this development has been designated by the Coastal Zone as one of Turneffe Atoll’s “special and unique area” for several decades. The proposed development contravenes numerous recommendations for Turneffe’s development made over the past many years. With even minimal research, the developers should have been aware of these recommendations, and the EIA, to some extent, indicates that they are aware.

In 1996, John McGill et al surveyed all areas of Turneffe and made recommendations for development, or lack thereof, related to each specific area. 1.2.3 of the EIA addresses this matter for the Deadman’s Cayes noting “these cayes have been identified as important nesting sites for the American Crocodile and that they are also surrounded by valuable bonefish habitats”. Recommended uses for this area are conservation, wildlife sanctuary and research. Development was specifically not recommended.

Site Number	49
Name / location	<b>Deadman’s Cayes</b>
Primary land use	conservation / wildlife sanctuary / research & education
Secondary land use	none
Maximum lot size	n/a
Minimum lot size	n/a
Maximum No of lots per site	n/a
Minimum No of lots per site	n/a
Net site housing density	n/a
Maximum hab-room density	n/a
Maximum guest capacity	n/a
Maximum building coverage	n/a
Building set backs	n/a
Building height	n/a
Maximum No of floors	n/a
Water	n/a
Electricity	n/a
Solid waste	n/a
Liquid waste	n/a
Piers per site	n/a
Other	n/a
Comment	These cayes have been identified as important nesting sites for the American Crocodile, they are also surrounded by valuable bonefish habitats. They are entirely confined by the reef and therefore offer limited scope in use.

### Turneffe Island Coastal Advisory Committee (TICAC)

In 2003, the Turneffe Island Coastal Advisory Committee (TICAC) drafted recommendation for Turneffe Atoll. Key among the committee’s recommendation were that certain “special and

unique areas” should be protected. These specifically included the fringe reef and Turneffe unique Backreef Flats.

#### TICAC Recommendations: OVER-THE-WATER STRUCTURES

“TICAC feels that over-the-water closed structures should not be allowed at Turneffe. DOE has presented the following recommendations. The construction of over-water structures will be considered, by relevant agencies, on a case-by-case basis. However, in order to be considered, the following minimum requirements would have to be satisfied. “

- Siting of structures will not affect navigation of vessels
- Structures will be sited in areas where coastal waters are shallow for a considerable distance
- Clean technologies (approved by Department of Environment) will be utilized for liquid/sewage disposal
- Structures are not in close proximity to reef systems
- Structures will not affect general aesthetics of the area
- Structures are designed to withstand hurricane force winds.

TICAC’S Position: The siting of structures over-the-water is inherently averse to the aesthetics of Turneffe. The precedent set by allowing lodging quarters, restaurants and bars to be built over the water, is frightening and conjures up images of Bangladesh. Most coastal villages, such as San Pedro, Caye Caulker and Placentia, have addressed this issue. With the exception of a few “grandfathered” dive shops and bars; this type of development is not permitted. The economy of Turneffe is absolutely dependent upon the natural setting - ignoring this fact could cause substantial long-term economic detriment. Waste management concerns are more difficult with this type of development. Even though “clean technologies” may initially be required, any leaks, malfunctions etc., could cause immediately detrimental effects to the environment. Over-the-water construction would require significant on-going monitoring which may be beyond the scope of DOE or other monitoring agencies. All development at Turneffe is exceptionally vulnerable to hurricanes. This is born out in that Turneffe has been hit by three hurricanes (Mitch, Keith & Iris) in the past five years. Over-the-water development is certainly more susceptible to hurricane damage. In recent years, Turneffe has experienced winds far in excess of 70 MPH, the present definition of hurricane force winds. Protection of Turneffe’s environment, particularly the reef, the back reef flats and the sea grass beds is key to the survival of both commercial fishing and tourism, the two major economies at Turneffe. Over-the-water structures would have a negative impact on these habitats, and, as such, an adverse effect on the economy of Turneffe.

Compromise Recommendation: Over the water closed structures are strongly discouraged and will be considered by relevant permitting agencies only when the following requirements are met.

- Structures will not affect the navigation of vessels
- Structures may not be sited in environmentally sensitive areas such as back reef flats or sea grass beds.
- Structures may not be sited within 1 mile of any reef.

- Clean and proven technologies, approved by the DOE, must be in place for removing all waste, including liquid and sewage, to the shore for treatment and disposal.
- An on-going monitoring plan, including the financing thereof, must be in place and approved by DOE.
- Structures must be designed and warranted to withstand Category 4 Hurricane winds

### **Turneffe Atoll Advisory Committee (TACAC)**

In 2011, the Turneffe Atoll Advisory Committee (TACAC) made similar recommendations regarding the Atoll's special and unique areas and specifically related to Turneffe's backreef flats.

TACAC recommended the following: "Development practices that damage commercial fishing and sport fishing habitats, particularly the back-reef flats and sea grass beds, must be prevented."

In 3.9.2 "Conservation", The Deadman's Caye area was specifically addressed in the Conservation Recommendations.

"The following CZMAI recommendations for conservation sites, which were endorsed in 2004, are again hereby endorsed by the TACAC and these sites should be reserved.

- Soldier Caye - a nesting site for the roseate tern, least tern and white crowned pigeon;
- Grassy Caye - a nesting site for turtles, the roseate and least tern as well as flats for bonefish and juvenile conch;
- Portions of Blackbird, Deadman's and Calabash cayes - important nesting sites for the endangered American crocodile and turtles;
- Vincent's (or Northern) Lagoon, the Freshwater Creek area, Pelican Caye, the Crayfish Range in Central Lagoon, Sheg Caye / Cross Caye, Cockroach Caye Range, and Douglas Caye;
- Mauger Caye which is the site of a historic lighthouse."

### 3.7.5 TURNEFFE ATOLL MARINE RESERVE

The Turneffe Atoll Marine Reserve (TAMR) was formed in 2012 under SI 111 of 2012. As there is no village council, town council or other governmental entity at Turneffe, the Marine Reserve through its co-manager, Turneffe Atoll Sustainability Association (TASA), serves as the effective governmental organization. A detailed Management Plan was formulated in 2012 to effectively manage the Marine Reserve.

Several aspects of SI 111 of 2012, as well as the related Turneffe Atoll Marine Reserve Management Plan, are relevant to all development at Turneffe Atoll, including the proposed development;

3: A person shall not engage in any activity which may cause negative environmental impact on species, habitats or ecosystems without written approval from the Fisheries Administrator.

25: A person shall not

- a) remove from its place or disturb any species of flora or fauna, including rocks, dead corals, or sand unless authorized to do so in accordance with these Regulations;
- b) have in his possession any flora or fauna unless authorized to do so in accordance with these Regulations;
- c) discharge or deposit any toxic material, garbage, or litter in the reserve.

27: A person who contravenes these Regulations commits an offence and is liable on summary conviction to the penalty specified in section 15 of the Fisheries Act.

In summary, the proposed development contravenes the purpose, principles and mission of the Turneffe Atoll Marine Reserve, as well as and several specific Marine Reserve regulations. It also violates several conditions of the TAMR Statutory Instrument and we are not aware that permission has been granted by the Fisheries Administrator or TASA.

### 3.7.6 NATIONAL SUSTAINABLE TOURISM MASTER PLAN

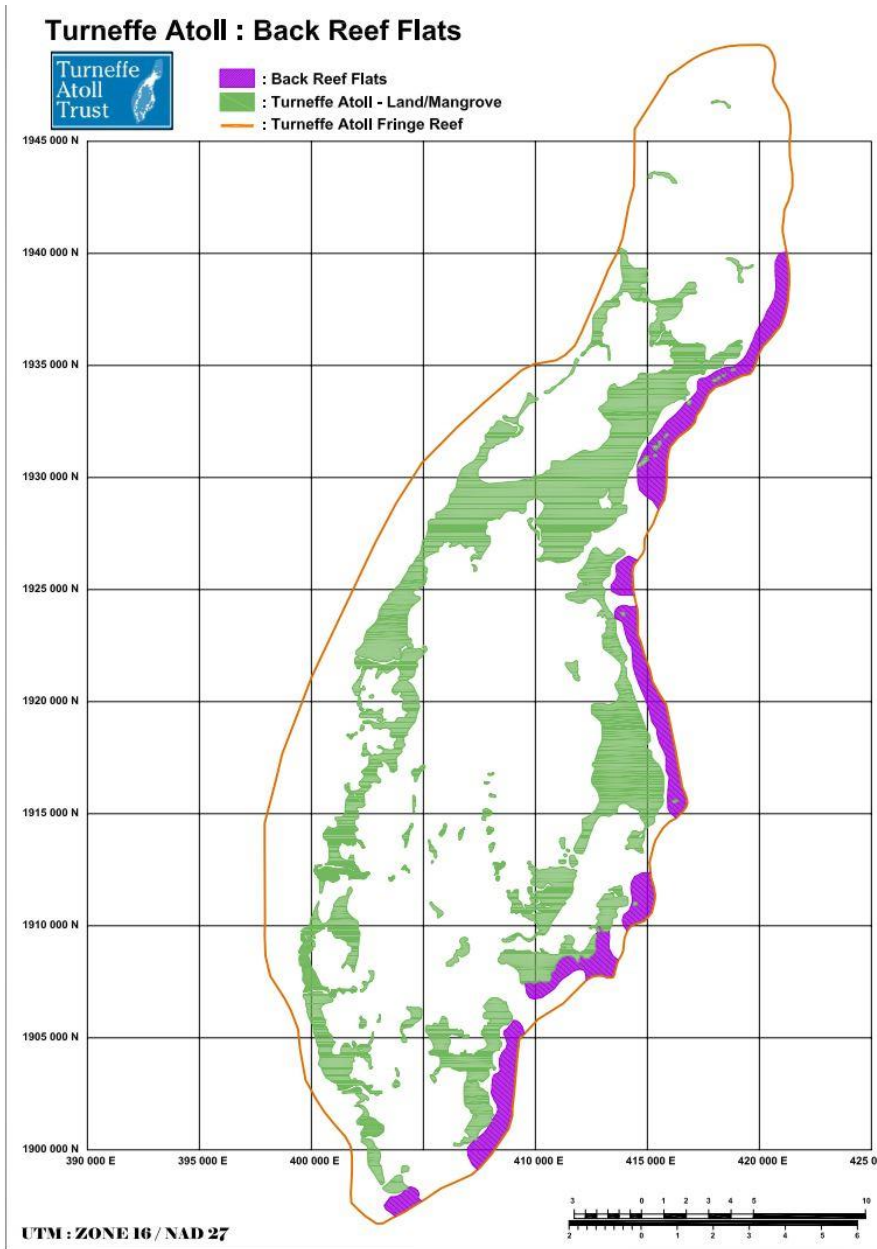
Our National Sustainable Tourism Master Plan is arguably the definitive guideline for tourism development in Belize. It contains a multitude of information and recommendations for sustainably developing the Country's and Turneffe's Tourism.

It strongly supports high value/low impact tourism, and likewise, suggests that high (environmental) impact/low value tourism be minimized. This development contravenes this principle and numerous others, as well as the following specific recommendations within the National Sustainable Tourism Master Plan.

- Dredging on the windward coast should be severely restricted because of the potential impacts this activity has on the reef system.
- Despite the significant importance that mangroves have on the environment, they are rapidly being cleared to make way for new mega-developments.
- Waste water discharge and the potential for pollution of the recreational waters is a major issue to be considered as part of future developments.
- Beach erosion as a result of coastal structures and developments is a major issue to be considered.

### 3.7.7 TURNEFFE ATOLL TRUST HABITAT MAPPING

Turneffe Atoll Trust has developed maps for the specific uses at Turneffe. Several critical uses for the atoll are pertinent to the Deadman's Caye area, Big Flat and the proposed development.

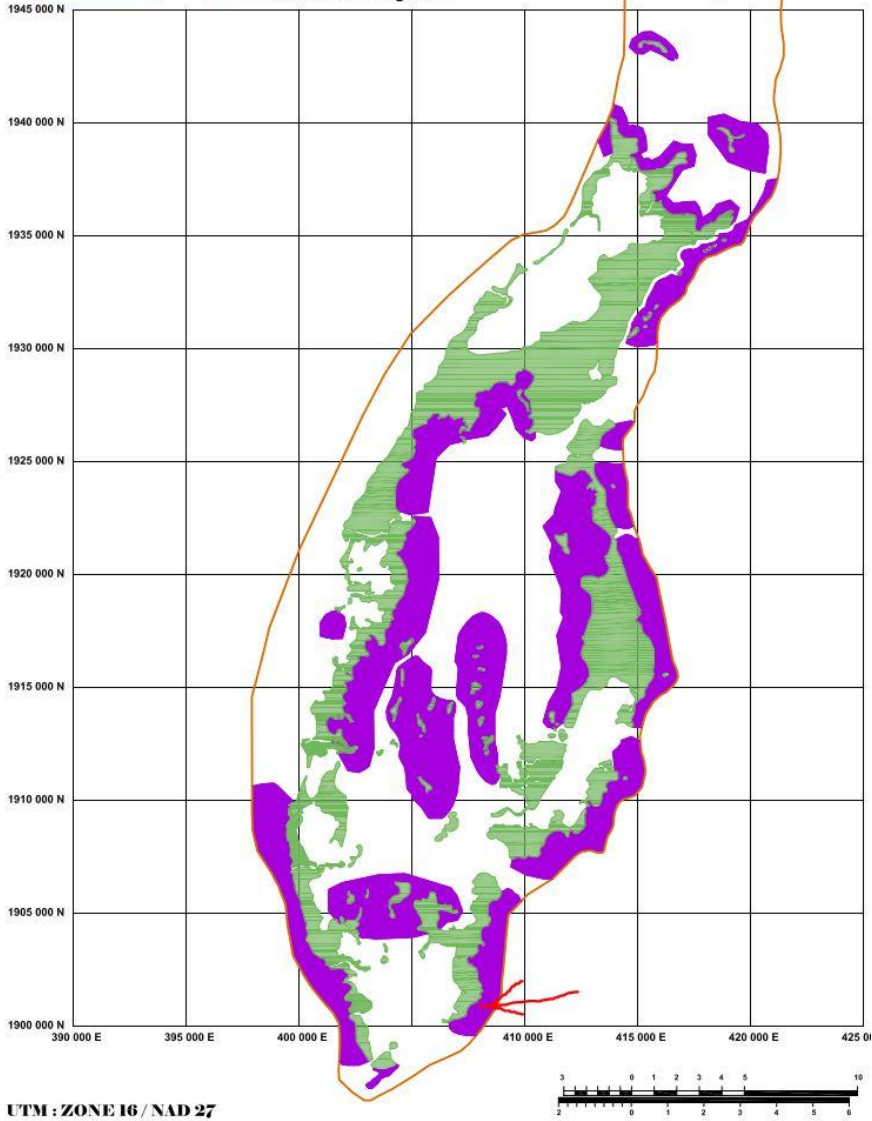




# Turneffe Atoll : Sport Fishing (Bonefish)



- : Sport Fishing (Bonefish)
- : Turneffe Atoll - Land/Mangrove
- : Turneffe Atoll Fringe Reef

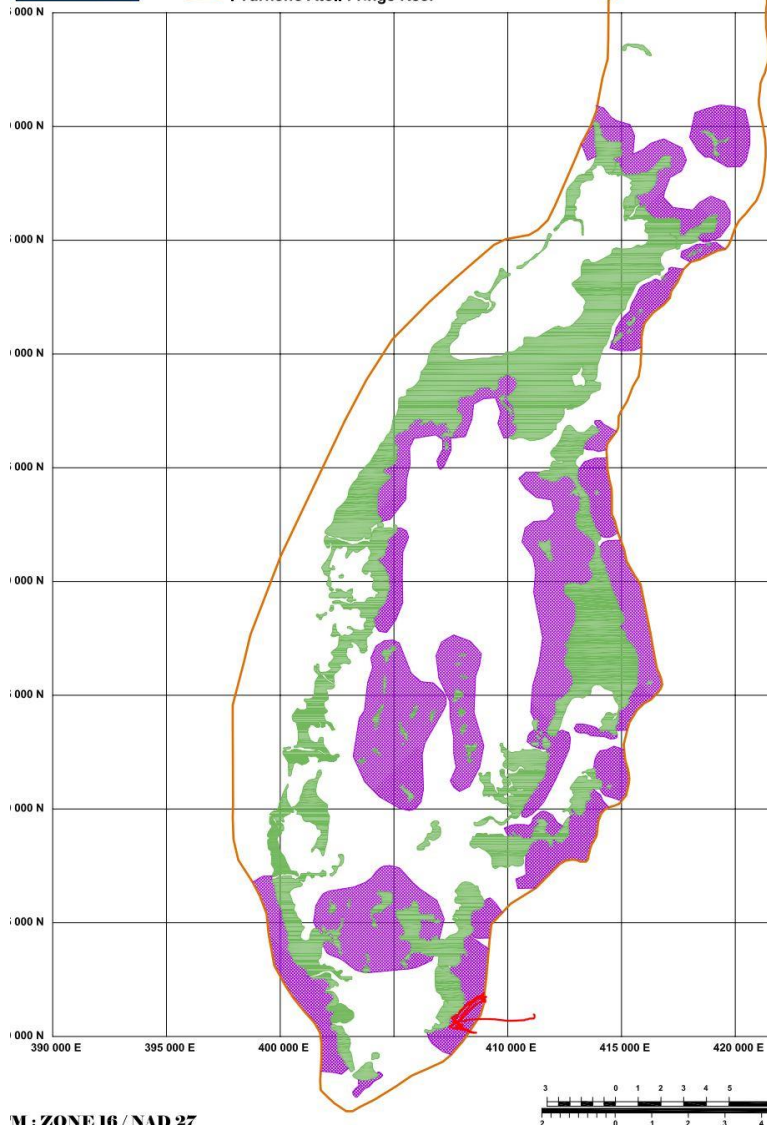


UTM : ZONE 16 / NAD 27

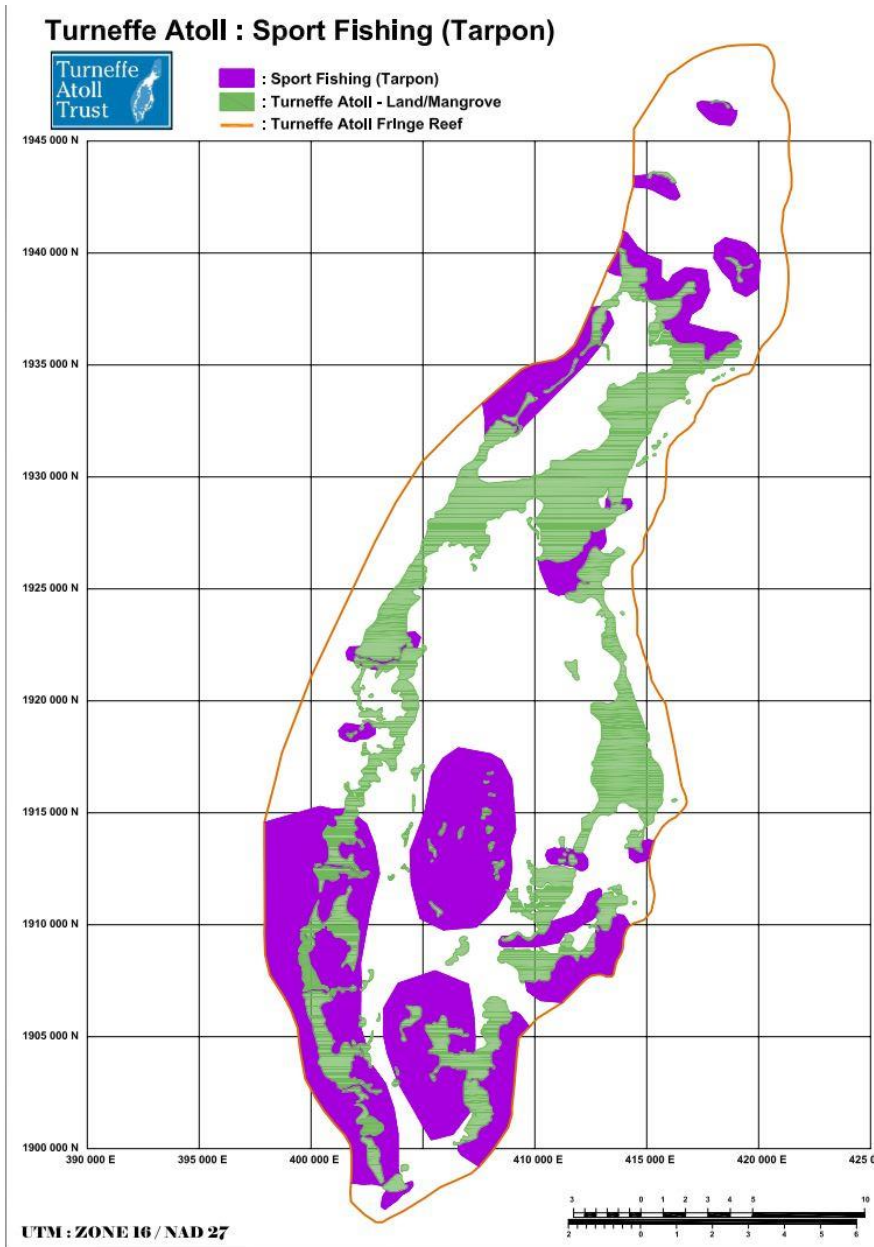
# Turneffe Atoll : Sport Fishing (Permit)



- : Sport Fishing (Permit)
- : Turneffe Atoll - Land/Mangrove
- : Turneffe Atoll Fringe Reef



M : ZONE 16 / NAD 27



### 3.7.8 BLUE BOND AND PROJECT FOR PERMANENCE FINANCING

Over the past two years, Government has worked to secure major funding for Belize related directly to protecting our unique and internationally valuable environment, particularly the world-renowned barrier reef system.

Approving destructive projects within Barrier Reef System particularly those that deforest mangroves and jeopardize the coral reef could violate Belize’s Blue Bond requirements. Approval of projects such as the proposed MDL development could very well detract large-scale developers from donating to the Project Finance for Permanence PFP.

### 3.7.9 WORLD HERITAGE SITE

In the EIA, Tanich-Nah notes the following: The site also falls under the classification of a World Heritage Site and therefore warrants additional scrutiny during decision-making. Whilst this does not hold any legal ground in terms of its designation, it is the direct responsibility of the Belizean Government to maintain and protect the Turneffe Atoll due to the **outstanding universal value** that it provides to the world and Belize.

In Chapter 13 (Cumulative Impacts) and the final ANNEX 9, the EIA attempts to minimize the effects of the proposed development indicating the proposed dredging, deforestation of mangroves and destruction of a portion of Turneffe's fringe reef are insignificant to its classification and unlikely to affect its World Heritage classification. Such claims are not justifiable.

### 3.8 GREEN APPROACH

The EIA constantly mentions that the development is using a 'green' approach to development; however, the details of the EIA prove to be just the opposite. Food and supplies will be barged in at least twice per week, solid and liquid waste will be barged out weekly or more frequently as needed, workers and guests only access is by boat and vessels are expected to travel from as far away as San Pedro or Caye Caulker to offer tourism services to the guests as the resort will not offer these services. The proposed solar energy system is not feasible and diesel and gas generators will be used as major energy sources. All these activities will use an extremely high volume of fossil fuel (both gasoline and diesel) due to the distance of the site from mainland and other service islands.

The carbon footprint calculated only considers the acreage of the buildings and the category of the resort but failed to take into account the high volume of greenhouse gas that will be emitted from the use of fossil fuel for transportation. The use of petroleum-based wood composite is questionable as, in some instances, the production and inadequate disposal of this material can result in greater emission of GHG than natural wood. Claims by developers that this is a "green approach" is simply false and their plans for energy, water and waste management are neither "green" nor feasible.

## 4.0 SPECIFIC FINDINGS

### 4.1 PHYSICAL IMPACTS

#### 4.1.1 OVER-THE-WATER STRUCTURES

The Terms of Reference (TOR) for this development from the Department of Environment, 1.16 section V, requires the developer to provide architectural drawings of infrastructure, and specifically the over-water-structures. The EIA does not provide said drawing and appears to be in breach of this requirement. Due to the sensitive nature of this development and its exceptional exposure to storm events, this information is critical to the Environmental Impact Assessment.

At the Public consultation, the EIA consultants discussed driving 600-1000 posts to support the over-the-water structures, walkways and land-based structures to include the restaurant, employee housing and support structures. Consultants indicated that these will be driven to a depth of 8-10 feet where bedrock will be reached.

600-1000 appears to be a conservative number in that each of 12 over-the-water cabanas would require 12 pilings – a total of 144 total. 1,730 feet of over-the-water walkway with piling every 8 feet would require 428 pilings, and an estimated additional 570 piles would be required for the over land structures. This totals more than 1100 piles driven to a depth of 8-10 feet and the disruption to the area related to this effort would be extensive and likely destroy much of the area.

Numerous questions about this process are not answered in this EIA. How will piles be placed? What type of pilings will be used? Will pile driving machinery be used? How will this be transported to Turneffe and moved from one location to the next?

An estimated 6.35 cubic yards of material would be displaced by each 10"x10" post (.84 ft x .84 ft x 9 ft) equals 6.35 cubic yards. With +/- 1100 posts, this would result in 6,985 cubic yards of waste material presumably spread over this backreef flats or adjacent forereef. This would create a substantial impact which has not been addressed in this EIA, and clearly should be.

Elevated walkways and cabanas, anticipated to be 5-7 feet above average sea level, will shade the sea floor beneath and have long-term impacts on the composition of organisms, seagrasses and other components that produce the now-productive environment of this backreef ecosystem. Additionally, this will destabilize sediments leading to erosion with tidal flows and storm waves. Eventually, this will have the effect of transitioning a healthy and productive marine environment to a barren area devoid of significant environmental value.

Extensive water flow due to tidal movement and storms would have a major impact on the anticipated 1,100 piling scouring the side of posts and causing turbulent erosion on the side opposite the flow. The type of posts to be used by the developers wasn't noted in the EIA, but wooden posts clearly would have a limited lifespan.

Once completed, the over-the-water structures and the posts supporting them will require considerable maintenance and occasional rebuilding, particularly following serious storms, and this will result in ongoing disruption of this sensitive environment. In short, driving 1,100 piles on this shallow flat and building multiple structures connected by walkways, would likely destroy the ecosystem structure of this entire area, along with all related benefits.

In 13.6 of the EIA, Impact Assessment for Construction of Buildings and Support Infrastructure, Tanich-Nah states that the Over-the-water structures will have positive impacts on the immediate environment through the provision of 'hard substrate'. However, these structures will be constructed over seagrass meadows and will shade out the sunlight necessary for photosynthesis. As a result, the seagrass, which are primary producers in the energy/food web, under the structures will die off and this will reduce the marine life dependent on seagrass for food, shelter and other services. This will clearly be a 'Long-term, irreversible' impact and should be stated as such.

The notion that the walkway rails will have a positive environmental impact by increasing bird population due to additional areas to perch is a mere assumption and not science-based. In fact, birds are known to avoid humans and human structures unless wildlife feeding occurs (which in this case should be highly discouraged). More than likely, the bird diversity in the area will decrease from the use of machinery during construction. This is also a long-term, irreversible negative impact and should be stated as such in the EIA.

The EIA highlighted the introduction of household pests (roaches, mice, etc) as a major, long-term negative impact and proposed the use of a rigorous pest eradication program; however, there were no details of what that rigorous eradication program would be. Some questions that come to mind are, what methods will be used, will it include the use of hazardous pesticides, how often will eradication exercises occur (knowing that this cannot be done with guests at the resort), how will the hazardous waste generated from eradication exercises be handled, who will conduct the eradication exercises (staff or government health authorities), among other concerns.

#### 4.1.2 BOAT TRAFFIC

Boat and barge traffic in this area of Turneffe would be increased considerably with this development, particularly due to the unconventional business plan requiring regular deliveries of potable and bottled water, food, fuel and other supplies, as well as regular barge visits to remove toilet waste and other waste.

Presumably, smaller boats would continually be coming and going, bringing new guests and picking up departing guests, transporting guests to other operators on the atoll for diving, fishing or snorkeling and handling occasional emergencies.

Each boat trip, particularly in these extremely shallow waters, produces prop wash and bow wakes which would continually erode this very shallow backreef area resulting in destruction of

seagrass and other backreef habitats. It will additionally, increase siltation that will smother nearby reef corals.

#### 4.1.3 TOXIC SPILLS

The MDL business plan relies on continual transportation of potentially toxic materials to and from Turneffe with a substantial likelihood of toxic spills. Materials to be transported on a weekly basis include fuel (diesel, gasoline and lubricants) and compost toilet waste. Additionally, we assume that cleaning materials, disinfectants and other chemicals will be likewise transported.

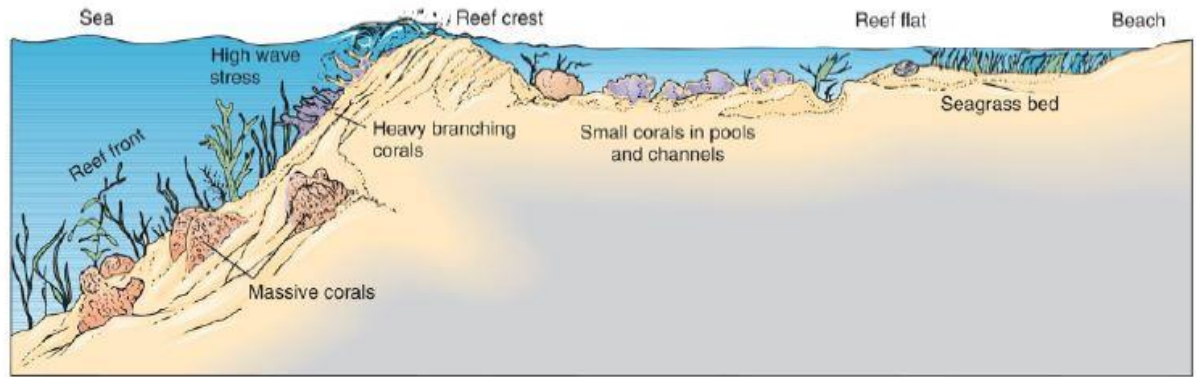
As we understand the EIA, effluent from all of the toilets is to be collected on a daily or other-day basis and loaded onto a barge (in extremely shallow water) for transport to the mainland. No contingencies are planned for storage of toilet waste at Turneffe Atoll. This process, along with the regular transportation to the mainland creates another substantial risk of hazardous waste spills at Turneffe and areas along the way.

Over the past several years, several such barges have sunk at Turneffe. There is no reason to think that this would not reoccur and particularly with the frequency of barges needed, this eventuality for serious contamination should be addressed in the EIA. This frequency of barge trips would be extremely expensive and is potentially infeasible.

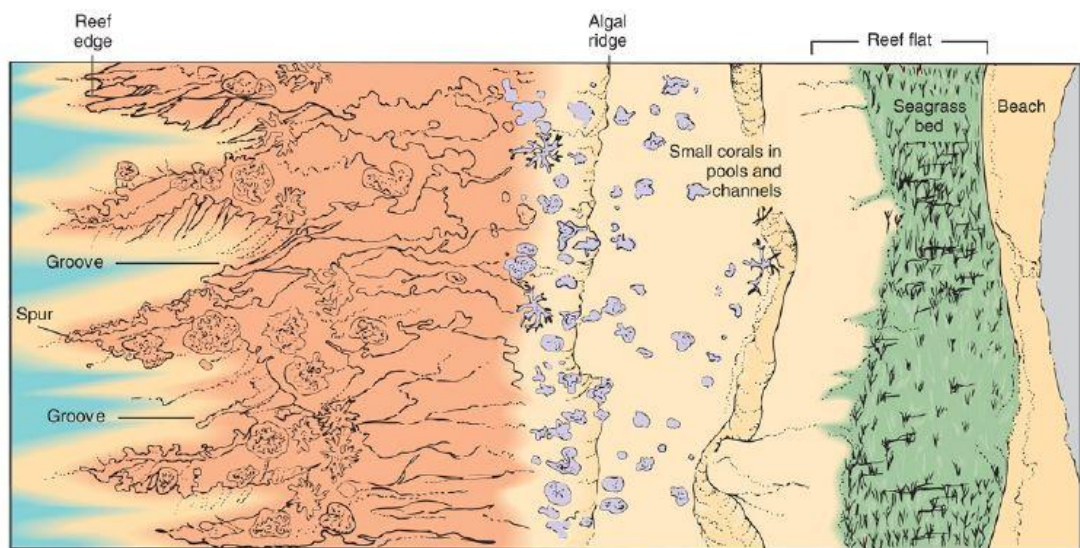
#### 4.2 PHYSICAL ENVIRONMENT – ASSOCIATION WITH TURNEFFE’S FRINGE REEF

By definition a coral reef includes three distinct zones - the fore reef, the reef crest and the back reef. All three areas are essential for a full and healthy reef structure. The EIA indicates that this development is a mere 140 meters from the reef crest; however, a major portion of this development is actually located on the back reef flat, which is ON THE REEF. A development directly on Turneffe’s fringing coral reef is impossible to justify and we suggest this fact alone places it well beyond the scope of what the Department of Environment should consider for approval.





(a)  
© 2010 Cengage Learning



(b)  
© 2010 Cengage Learning

Figure 14.5 (a) Reef structure and zonation (b) Spur and groove formation

Environmental conditions vary considerably from the fore reef to the reef crest and to the backreef, but all are part of an interrelated reef system. Corals and aquatic life change as the light and depth, tides, water circulation, wave action, sediments, nutrients, temperature variation and salinity transition from one part of the reef to the next.

Back reefs have adapted to tolerate a wide range of temperatures, light intensity, and salinity. Backreef corals tolerate low levels of dissolved oxygen and temperatures on the backreef can rise to 104°F/ 40°C) or greater. During low tide, backreef corals may be fully exposed to air. Species in this backreef zone have adapted to these extreme environmental conditions and many are found exclusively in this zone. Backreef flats are critical areas containing corals with the highest tolerances to the effects of global warming.

Over-the-water structures, including walkways and multiple buildings, will prevent adequate exposure to sunlight would permanently destroy this portion of the backreef. This is particularly



pertinent for this proposed development with a relatively narrow backreef area only 140 meters from the reef crest.

### 4.3 FLORA AND FAUNA

The EIA indicated that five of 12 transects were not surveyed due to jellyfish presence and heavy surge in the area. With less than 60% of transects completed, the biodiversity information presented is incomplete and cannot be used to make any decisions.

Notwithstanding the limited number of transects completed, 22 species of hard and 16 species of soft corals, 64 species of fish, 16 species of birds, and a few reptiles and marine mammals were observed from the transects completed indicating that the area is high in biodiversity and thus is very sensitive. Both Elkhorn and Staghorn corals are critically endangered and both of these species were observed in the area. The EIA provide no indication of the IUCN conservation status of the coral or fish species found in the area.

### 4.4 WATER RESOURCES

The EIA estimates that the 99 persons occupying this resort will require 2,125 gallons of fresh water per day. Water is to be barged to the resort twice per week (or as needed) in a 10,000-gallon water tank. Drinking water is to be delivered in (plastic) bottles. A pump is to be installed on the dock to offload water to a reservoir, which will then be distributed through an undefined distribution system.

Based on observations of resorts operating at Turneffe for many years, estimates for fresh water are woefully underestimated in this EIA. Turneffe Flats, a resort at Turneffe holding a maximum of 60 persons on site (guests and staff) operates primarily on rain water, and meticulously manages water consumption. This facility uses an average of 4,286 gallons of fresh water per day, which includes zero water used for toilets. Toilet water would add an additional 4000 gallons per day. Based on this information, the proposed MDL project would require 7078 gallons of fresh water per day at full occupancy. The EIA, therefore, grossly underestimates fresh water needs by approximately 70%.

Significantly, this plan offers no backup contingency or reserve storage capacity for fresh water making the entire operation dependent on boats/barges functioning on schedule and without issues. The barges and boats mentioned are to transport water, food and fuel from Spanish Bay or Belize City. This is an open sea crossing which is difficult, or impossible, at times due to high seas. Minimal reserves of at least two-three weeks (estimated at 7,078 gallons/per day) should be required for this EIA. Adequately addressing MDL's water issues, including transportation, storage and distribution would require a significant redesign of the proposed project and likely render it infeasible.

## 4.5 ENERGY PRODUCTION

The developers plan for energy production was reviewed by Mr. Silvan Kuffer, owner and operator of SESB (Solar Energy Solutions Belize Ltd) and a recognized local expert on solar energy. Mr. Kuffer offers the following analysis of the projects solar design.

I, Silvan Kuffer, having worked for more than 20 years in Belize as the co-founder of SESB designing and installing Off-Grid Solar Systems, have been asked to evaluate the EIA for MDL Investments Ltd, Deadman's Caye, Turneffe Atoll, Belize.

SESB is a full-service Solar Provider for residential, commercial and some industrial size photovoltaic systems. We serve individuals and communities living off-grid throughout Belize, as well as clients being connected to the grid and looking to reduce their power bills. We cover all aspects of a solar project design and installation including power consumption analysis, system planning & design, installation, maintenance, remote monitoring and service support.

The proposed usage of 424kWh per day by MDL would provide 4.28 kWh per person with a "Full-House" of 99 people. Based upon our knowledge of dozens of Off-Grid Systems throughout Belize, this is not realistic. Requirements for a hospitality business at that location would require a much higher per-person power supply.

For instance, a similar size resort on the mainland with only fan and light in the cabins, a restaurant and kitchen but no laundry, water treatment or air-conditioning, averages usage per person (guests and staff) of 13.7kWh per day. MDLs estimate of 4.3kWh / day, underestimates the power needs for this project by approximately 70%.

Additionally, it is well known in the Off-Grid Solar Industry that centralized, photovoltaic systems are more efficient and far less polluting than individual small systems spread out throughout the development, such as planned for this development.

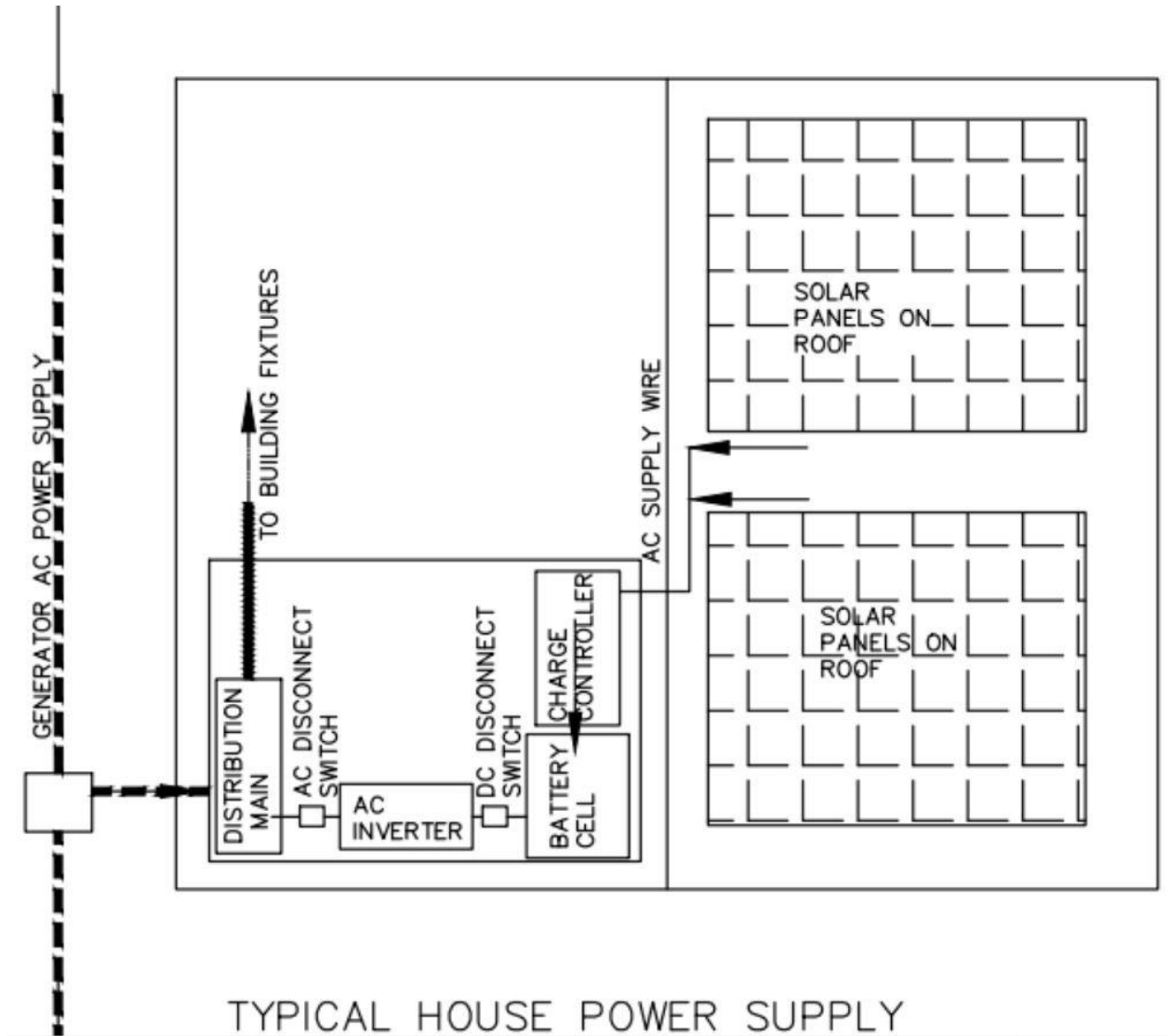
As described at the Public Consultation, power for the project is to be provided with solar panels placed on roofs. Lead/Acid batteries were mentioned at the consultation but 48VLithium batteries are noted in the EIA writeup. It was noted that these will be tied together in some manner, but this was not defined. This is of course a serious safety issue which should be comprehensively addressed.

Another critical concern is storage and maintenance of the system's lithium batteries. The EIA anticipates that each cabana, including the over-the-water cabanas, will contain individual solar panels, lithium battery storage and inverters. Lithium batteries pose significant risks for explosion and fire, particularly if they are not maintained in low temperatures/low humidity conditions, which the EIA specifically notes will not be the case. These individual units, particularly the over-the-water units, will be exposed to an extremely corrosive environment. For safety reasons, these issues need to be comprehensively addressed.

The EIA (Page 145) indicates that back-up electricity will be provided through the use of portable gasoline generators including emergency lighting and security and cabanas/bungalows. I understand that small gasoline generators are to be placed outside of cabanas when needed for

this purpose. In my opinion this is not practical and would present a number of safety concerns. Gasoline generators exposed to the marine elements won't last long and gasoline generators are less efficient than diesel costing more per KWh.

I do not feel that the energy/power production and set-up discussed in this EIA will power the operation as is suggested. For instance, the "Power House" would require sizable "grid forming" diesel generators, and more than one for redundancy. An automatic transfer switch would be required. Without an automated system, guests would have to do this manually which would be dangerous and impractical. I also note that the battery cell portion of Power Grid is for old lead-acid batteries and not lithium-ion batteries.



Additionally, I see many other "stumble-stones" in this proposal.

Silvan Kuffer  
Solar Energy Solutions Belize Ltd. / SESB AG

## 4.6 WASTE MANAGEMENT

### 4.6.1 TOILET WASTE

“Black water” originating from toilets has an extremely high bacterial content which must not be mixed with other discharged water. Table 6.4 of the EIA indicates that 595 gallons of black water will be generated by the proposed project each day at full occupancy. Section 6.1.4.2 of the EIA then indicates that black water projections are not included due to the use of composting toilets which removes the necessity for treatment of the black water via a treatment system. How black water would actually be handled is not clear.

Some composting toilets separate liquid (black water) from fecal waste. As there appears to be no process for handling black water, we assume that black water would be contained in the composting toilets. The EIA indicates that waste from the toilets is to be removed on a twice per week, or more frequently as needed, basis. Presumably, this means remaining black water waste as well as solids.

Removing human fecal waste from 22 composting toilets on a twice per week, or more frequently as needed, basis would require a great deal of time, effort and expertise. And, it would be associated with numerous public health concerns, including for the employees required to do the removal.

The EIA indicates that compost can be utilized on the island OR transported to the mainland, but doesn't indicate which option will be used or how this decision will be made or where this waste might be stored on the island.

The EIA references “composting of the fecal waste and black water, but it must be recognized, that this material is not the same as composted food. This is highly toxic human waste potentially containing a variety of lethal pathogens, and until this “compost” is fully processed and matured, which will take considerably longer than one week, it must be treated as toxic material. The EIA does not adequately address the processing/composting of human fecal waste as compares to other potential compost from, for instance, food waste.

If this waste is kept on the island, where it will be stored, how will it be processed and what measures are in place to ensure proper treatment before releasing into the environment. These concerns remain unanswered by the EIA.

If it is to be transported to mainland, how and where will it be disposed of? Collecting, processing and transporting fecal waste to Belize City by barge presents high potential for toxic spills during collection and transportation.

Composting toilets are generally meant for small-scale usage. Large scale use of composting toilets generating high volumes of human waste, which must be regularly collected, transported and processed, is a unique and potentially dangerous concept for dealing with human fecal waste. If the developer wishes to propose this as an alternative to more conventional sewage treatment, these issues must be clearly and realistically addressed. The EIA does not adequately address these matters and we are skeptical that this is feasible.

#### 4.6.2 KITCHEN WASTE

Kitchen waste (including fats, oils and grease) is arguably the most difficult waste product to effectively and safely process. Kitchen oils, fats and grease are not suitable for composting or treatment with as typical “grey water”. Appropriate treatment of kitchen waste requires food particle traps and a grease trapping system along with methodologies for effectively disposing of this effluent. Effective treatment of kitchen waste is not adequately discussed in this EIA.

Fats, oils, and grease often accumulate around the insides of sewer pipes. This can lead to blockages, backups, pipe bursts, and overflows. The United States Environmental Protection Agency (EPA) reports that “grease from restaurants, homes, and industrial sources are the most common cause (47 %) of reported blockages.” When sewer malfunctions occur, raw sewage directly enters the environment untreated and ultimately makes its way into streams, rivers, lakes, and oceans. This raw sewage carries excess nutrients as well as bacteria and other disease-causing pathogens that have a negative impact on human health, fish, and wildlife. As such, kitchen fats, oils, and grease should not be treated as or mixed with other types of ‘gray or black water’.

This EIA anticipates that kitchen waste will be discharged to the grey-water garden after passing through a grease trap. This is not close to an adequate solution for treating kitchen waste which requires a series of grease traps along with food particle traps and then still likely requires further chemical treatment to remove remaining grease. Simply using a grease trap and then discharging it to the grey-water garden would result in a greasy toxic mess within weeks.

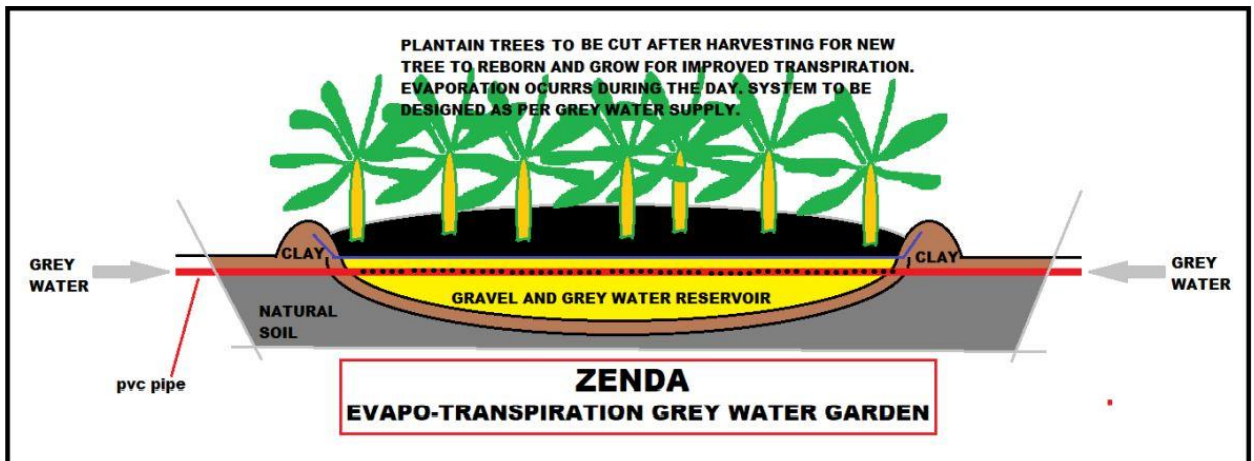
#### 4.6.3 GREY WATER WASTE

The EIA proposes a “evapotranspiration garden” for processing grey water. A typical evapotranspiration garden can be designed in a number of ways; however, in the end they are simply a method for disposing of grey water on a vegetated area with the anticipation that waste water nutrients and contaminants will be absorbed by the plants and the remaining water will be decontaminated enough to be absorbed into the underlying ground and eventually into a water source, Big Flat in this case, without consequence (see schematic below).

The feasibility of an evapotranspiration garden, however, depends on several factors related to the location including elevation from water entry to the sea, plant life, soil structure and percolation ability and enough area to process the effluent anticipated.



It is important to point out that Plate 6.1 of the EIA (below) is not a typical evapotranspiration garden. Rather, it is a glorified septic tank with a presumably impermeable clay liner sealing it at the bottom. Particularly if any kitchen waste is discharged into this facility, it will quickly fill the gravel layer with contaminants rendering it non-functional.



The EIA anticipates 893 gallons of grey water per day which appears to be an extremely low estimate. Considering that the fresh water needs for the development have been underestimated by 70%, grey water processing is likely underestimated by a like amount. There is no way of knowing whether the size of the planned facility is adequate to facilitate the volume of greywater (especially given that this volume is grossly underestimated.)

The elevation of the area is a key consideration for any grey water facility. With maximal elevation of the island being 1.5 to 2.0 feet, this would be easily inundated with any significant surge. To prevent swamping of any open processing facility, it would need to be elevated several feet above sea level.

Other questions also remain unanswered. What vegetation will be used for the evapotranspiration garden? Are mangroves or littoral forest suitable for this purpose. If not, how many mangroves would need to be removed. Plants typically used for an evapotranspiration garden (including plantains) would not prosper on the eastern side of Turneffe due to strong winds, salt-air and other difficult environmental conditions.

In the EIA, landscaping and the “Grey Water Garden” were given a positive environmental impact rating which accordingly, will increase abundance and diversity of birds. This is a patent misrepresentation. First, bird habitats will be destroyed to establish the grey water garden and these resident birds will more than likely never return; secondly, an increase in primary and secondary producers can only result from an increase in availability of nutrients, i.e. pollutants from kitchen waste. This means that the EIA preparers are expecting/predicting that the effluent from grey water treatment will not meet environmental standards.

In summary, this grey water facility indicated does not represent an evapotranspiration garden and the minimal elevation of these islands does not lend itself to any type grey water processing plant. The negative, long-term, and irreversible impacts highlighted in sections 13.5 and 13.6 far outweigh the positive ones listed (which are largely misrepresented as positive). The negative impacts and problems with building a grey water facility are underestimated, understated and misleading in this EIA. Stated mitigation measures are obviously inadequate.

#### 4.6.4 SOLID WASTE

The EIA estimates 0.5lbs/person/day of solid waste production. Based on experiences of other Turneffe-based resorts, this seems low as typically, estimate volumes for visitors tend to be higher. UNEP has estimated that European tourists generate about 1 kg per person per day of solid waste (when touring in Europe), while tourists from the USA generate up to 2 kg per person per day (when touring in the USA).

The EIA indicated that incineration of waste is not an option and not considered; however, it further states that “Organic materials such as wood that cannot be recycled further will be collected and burned in open air fires or given to the workers as firewood.”

In section 6.2.8 (Garbage collection) the EIA indicated the “Inorganic waste will be divided into combustible and non-combustible. Combustible waste would include cardboard, paper, and certain plastics”. Why would there be a separation of garbage into ‘combustibles’ if this is not an option for disposal on the island? These seem contradictory and the developers should make it clear whether they will or will not incinerate waste.

The EIA states that “Used tires, batteries and waste oil will be adequately stored and discarded by a certified disposal company”; however, the name and location of this ‘company’ are not noted. The same vague process is mentioned for disposal of used batteries, noting that “An arrangement can be made with a battery company where the old batteries are sent to them for recycling, or sent to the hazardous waste section of the Mile 21 Sanitary Landfill”. This is not acceptable as the DOE cannot monitor compliance if it does not know how these petroleum-based and old batteries, which are classified as hazardous waste, will be treated.



As an option for reducing waste, the EIA uses the green mantra of - Reduce, Recycle, and Reuse. However, none of these appear to be principles of this development. For instance, they note that items will be recycled in or near Belize City; however, there is no viable recycling facility in Belize. Additionally, no options were presented for use of biodegradables even though there are some companies in Belize that are manufacturing and selling biodegradable/compostable products. Of note, is their plan to regularly deliver drinking water to guests in plastic water bottles potentially adding to marine plastic pollution.

#### 4.7 FUEL TRANSPORTATION AND STORAGE

The EIA references a central generator facility as well as plans to use portable gasoline generators at cabanas when the solar production is inadequate, which, based on our analysis, will be quite frequent. Technical information related to the required power distribution system is not provided; however, much of the system will be over-the-water with special considerations, including waterproof materials, insulation and corrosion-proof measures. These concerns are not clearly addressed in the EIA.

With most of this property at or near mean sea level, it will be extremely difficult to build fuel containment areas for storage of fuel for operations, or for storage of used petroleum products until they can be removed from the Atoll. Even relatively small weather disturbances will likely cause much of the island to become inundated and potentially allowing fuel to contaminate the back reef flats and the closely-adjacent reef crest.

The transportation, handling, storage and safety of fossil fuels is only minimally addressed in the EIA. With most of this development little more than a foot above sea level, these issues need to be comprehensively addressed. Considering the physical limitations of this site, this will be difficult and likely expensive; however, this is particularly pertinent due to the potential risk of contamination to this highly sensitive area located on the coral reef. Standards for this development should meet or exceed the stringent standards previously established for other tourism operators at Turneffe Atoll.

Boardwalk made from wood composite, which typically is petroleum-based (thermoplastic), will eventually end up in landfill or releasing microplastics and other chemicals used to manufacture this material into the environment when broken down. Debris from wood composite should not be incinerated or treated as wood.

#### 4.8 EXTRACTION OF MATERIALS -DREDGING

The dredging anticipated for the proposed project would clearly have major impacts which are not recognized and appear to be intentionally minimized in this EIA. The EIA proposes dredging a channel for boat access through the seagrass meadow. The dredged area is to be very shallow in some places (less than 0.5 m) and wave action is often very high in this area due to the location, predominant wind direction and proximity to the reef crest.



Dredging a channel, per the EIA, would cause significant hydrological changes for this area including erosion along the length of the channel leading to destruction of additional seagrass habitat. In response to tidal movement, rainfall, runoff from the larger island, and storm waves, the dredged channel would funnel water from Big Flat. This would lead to channelization and would further alter this area. The ramifications of this are unknown and this needs to be analyzed and considered.

Once this area has been dredged, a long-term dredging program will be required to maintain the desired dredging depths due to wave actions causing sand from the surrounding area to fill the channel. This has continued significant ongoing and permanent impacts which have not been addressed in the EIA.

The EIA team indicated that they were unable to collect scientific data due to unfavorable sea conditions. Note that from our experience, this is the normal sea conditions at Turneffe throughout the majority of the year.

The EIA indicates that dredge spoils will not be used for reclaiming land; however, the EIA is misleading as they will be used for exactly that purpose. Page 49, the EIA indicates that the “dredge materials from the boating canal will be placed around the island for beach recovery” - which is land reclamation. On Page 137 it notes that 950 yd<sup>3</sup> (726.5 m<sup>3</sup>) of dredge spoils, after the spoils have dewatered sufficiently, “would then be deposited onto Islands 2 & 3 to fill only where needed”. These areas are not identified in the EIA specify nor is it clear if areas will be deforested for filling. Further, the matrix in 13.5, Impact Assessment for Land Reclamation and Land Clearing, specifically refers to land reclamation.

This section also mentioned that as a mitigation action for ‘Selective land clearing’, 90% of the vegetation will be retained; however, in previous sections it says clearing will be 20%. In such a small space, 10% difference is a lot; as such, the developer needs to clarify what percentage of land will be cleared to avoid uncertainties.

The duration of the land clearing impacts was classified as ‘Short-term’ and ‘Reversible’; however, once land is cleared for buildings, the habitat will never recover so the impact is actually ‘long-term and irreversible’. The impacts of land clearing were limited to the on-land impacts; however, on small islands like these, any land cleared directly affects the associated marine flora and fauna. The effects on the marine environment related to additional runoff, water and wind erosion, etc., would likely be substantial and should be addressed in the EIA.

In the EIA and at the Public Consultation, Tanich-Nah indicated that spoils will first be placed in large dewatering bags and then used to fill portions of the three small cayes. Again, this is land reclamation whether in a dewatering bag or not. The structure of these dewatering bags, how long they will last and their environmental impact is not clear.

Both the original dredging and the required follow up dredging will cause significant siltation of the backreef, reef crest and forereef, particularly with the close proximity of the reef crest. The forereef in this area is a lobster fishery and also includes several scuba diving sites, as noted in the EIA.

What exactly is to be dredged, where the dredge spoils will be placed and the impacts of the dredging and filling are inconsistent within the EIA. This leads to confusion and the ability for the developer to choose which of these plans he will follow after environmental clearance has been granted. The developer must decide exactly what is to be dredged, where dredge spoils will be placed and what land will undergo reclamation. This must be clear and include the necessary plans, scope, mitigation measures for damages resulting from the reclamation. In light of the developers past non-compliance, we are concerned that this is intentionally vague to allow the developer leeway after environmental clearance has been granted.

In Section 13 of the EIA, mechanical removal of the seafloor, suspension and re-suspension of sediments over time, and navigational hazard were all classified as 'short-term reversible' impacts; however, these actions will be continuous over time as the access channel will require constant maintenance, including re-dredging. Removal of the habitat of an area is a long-term impact as the habitat will never be able to recover. This is misrepresented and should be classified as 'Long-term and Irreversible'

#### 4.9 WALKWAYS

Wood composite can be highly flammable and possess higher fire risk than traditional wood. The EIA failed to indicate how much wood composite will be required except that the total length of the elevated boardwalk will be over 3,000ft long.

Particularly due to high fire risk related to individual cabanas containing solar inverters and lithium batteries, as well as the extreme fire risk posed by using individual gasoline generators for each cabana, each cabana should be designed with two separate exits onto the walkways.

#### 4.10 DISASTER MANAGEMENT

##### 4.10.1 HURRICANE PREPAREDNESS

The hurricane preparedness plan in the EIA is woefully inadequate and does not address many issues related to highly relevant concerns. This development faces the open ocean and is a mere 140 meters from the reef crest making it exceptionally vulnerable to tropical systems, including hurricanes.

As noted in this EIA, "the country has been hit by a hurricanes and storms." The entire Hurricane Preparedness Plan for the EIA is encompassed on page 41 of the EIA and consists of the following statement "adequate construction methods and designs for the project site is a MUST so as to prevent any environmental damage to the area of the development." The EIA contains little information about building design related to hurricane preparedness. Considering the extreme vulnerability of this development, particularly the over-the-water structures, this is absolutely essential for a comprehensive EIA

10.1 of the MDL Terms of Reference for this EIA requests that it "Identify emergency preparation and response management measures for the proposed development (e.g.,

hurricane, fires, medical emergencies, etc.). This should include evacuation and hazard management plans in conjunction with:

- i. Human health and safety
- ii. Fire
- iii. Explosion
- iv. Equipment malfunction
- v. Fuel Spills
- vi. Hurricanes and storms
- vii. Flooding and Inundation

These plans should be inclusive of adaptation measures, such as building design consistent with the climatic conditions and natural disaster threats related to the project – including emergency transportation measures.

This EIA provides no a clear idea of how MDL's proposed development will address the many pertinent issues related to Hurricanes, including the following;

1. No structural specifications are provided for buildings over the water nor for the elevated walkways.
2. There are no contingencies related to handling solar batteries or compost toilet systems. Both are to be located on the backreef portion of the reef and present a serious pollution hazard with a hurricane.
3. The TOR specifically asks for a plan to address fuel spill, explosion, but the EIA does not address these concerns. The representation that little fuel will be needed is erroneous.

During both the construction phase, there would be a significant amount of fuel needed to provide power for equipment. During operation, fuels would be needed for backup generators. Likewise for maintenance and a fuel spill plan needs to be in place. For many reasons, including high boat and barge traffic, use of lithium batteries in cabanas and use of multiple small generators near cabanas, a fuel spill plan and explosion plan is critically important. No fuel spill plan is mentioned which is, again, a breach of the TOR.

The EIA anticipates over-the-water structures elevated on stilts to be built 5-7 feet above mean water level. According to the National Oceanic and Atmospheric Administration, there are many factors that influence storm surges, but a category 1 hurricane can produce a storm surge 6 - 11 ft in areas where there is no surge protection (as in the case of this development. Section 2.3, Pg 40 of the EIA, in fact, indicates that the “this causes the project site to be extremely vulnerable to flooding/inundation low pressure systems/storms” and notes that the entire development would easily be inundated with even moderate storms. Due to its extremely susceptible location and design, total devastation would be likely with a major hurricane.

The EIA additionally fails to point out that climate change will lead to an increase in the frequency and intensity of hurricanes and fails to recognize the effects of sea level rise or wind damage.

Major hurricane-related considerations include highly toxic lithium batteries which would likely need to be removed from over-the-water structures prior to a hurricane event to prevent major pollution to the ecosystem, including the adjacent reef.

#### 4.10.2 FIRE PREPAREDNESS

Fire issues are of high concern for a number of reasons. The photo below is the “Possible Style” noted in the EIA.

The EIA indicates that all Cabanas will have solar panels to operate each Cabana and that each Cabana will also include a Solar Inverter and lithium batteries for storing the solar energy. This is a formula for disaster which should never be permitted. First, no legitimate solar vendor would install solar panels on a thatch roof, but even with a different roof type, the panel connections, lithium batteries and inverters present high fire risks and should not be installed in living quarters.

Due to the high fire risk to the Cabanas with this power design, robust fire response measures should be required, including two exits per Cabana.



Plate 1-4: Possible Style for Over-the-water Cabanas (Not Official)

Wood composite is highly flammable so it possesses higher fire risk than traditional wood. The EIA failed to indicate how much wood composite will be required except that the total length of the elevated boardwalk will be over 3,000ft long. It also fails to indicate fire prevention and/or suppression on the boardwalks leading to the over-the-water cabanas.

The EIA indicated that it is the responsibility of the construction workers to have “...*fire-fighting (fire extinguisher), First Aid (CPR, Symptom recognition), Personal Protective Equipment use and tourism related training*”. Note, however, that in adhering to standard Environmental and Social Safeguards, it is the responsibility of the developer to ensure the contractor they hire have these safeguards in place and not to leave the responsibility to the contractor who may or may not have these safeguards in place.

The health and safety plan for the construction phase is almost non-existent. Since there will be limited means of communication during the construction phase, how emergencies will be handled should be clearly planned? Note that the risk of injuries during construction phase is exponentially higher than the operational phase, a comprehensive health and safety plan must be in place and is the responsibility of both parties.

Table 10.2.2 lists the expected chemicals to be used; however, it does not indicate whether these chemicals have been approved for use by the DOE? Several of these chemicals are highly toxic to plants and/or animals and the EIA does not specify how or where they will be used, nor how they will be applied to avoid contamination.

The EIA proposes to use nonflammable materials for the project; however, the elevated walkways measuring 3,187ft will be constructed with highly flammable wood composite and the proposed Cabanas are anything but fire resistant.

Fire response is limited to the use of handheld fire extinguishers, however, there was no indication of how much will be used or where they will be placed. As indicated above, handheld fire extinguishers are insufficient to address the possible fires, and/or explosions, caused by lithium batteries in highly flammable cabanas accessed by wood composite walkways.

#### 4.11 SOCIAL IMPACT / COMMERCIAL FISHING

There are currently 1,290 licensed commercial fishers at Turneffe representing four fishing communities. The livelihoods of these fishermen depend directly on the health of the Turneffe ecosystem with its interconnected network of the reefs, backreef flats, seagrass beds, creeks, lagoons, littoral forests and mangroves.

As discussed at the Public Consultation on November 17, 2022, commercial fishers at Turneffe were not adequately consulted for this Environmental Impact Assessment. According to the EIA preparers, less than 1% of the fishers were contacted about the proposed development. This likely resulted in the EIA failing to adequately consider impacts on the commercial fishery, the associated fishermen and their communities.

Turneffe needs healthy marine ecosystems to maintain productive commercial fisheries. Key habitats include mangroves, seagrass beds and the coral reef system, particularly the back reef. A recent study of the Mesoamerican reef showed that there are 25 times more fish species on the back reef close to mangroves areas than areas where mangroves have been removed.

A substantial portion of the proposed project is not to be on private property, but on the back reef flats and seagrass beds belonging to the Government and people of Belize. This portion of the proposed development includes critical conch nursery grounds essential to Turneffe's conch fishery. As conch and lobster are the two main, high-value products for commercial fishermen at Turneffe, this would have a substantially long-term negative impact on these fisheries as recruitment of juvenile fish would be prevented.

The mangroves at the proposed development site currently provide a multitude of environmental services for Turneffe’s coral reef and commercial fisheries. Likewise, the seagrass beds on Big Flat provide juvenile habitat and feeding ground for many types of fish, mollusks, and crustaceans, including Queen conch. The fore reef at Big Flats provides shelter for many marine organisms including fish, conch and lobster.

This project would damage critical fisheries ecosystems including a recognized conch nursery and an important lobster fishery on the forereef costing commercial fishing jobs and resulting in negative social impacts for several fishing communities. The EIA fails to adequately consider or quantify these impacts.

#### 4.12 NO DEVELOPMENT OPTION

The developer has indicated that any diversion from the plans put forth in the EIA would render the project unfeasible as all components are necessary for an economic return. The developer is clearly not open to suggested changes by the authorities or stakeholders, and this development will move forward as indicated in the EIA or presumably be abandoned. Therefore, the consequences of ‘No Development’ although not addressed in the EIA, should be carefully considered.

For approval, the EIA needs to show that this development will improve the socioeconomic and environmental conditions for the local community and Belize. Conversely, the ‘No Development’ option needs to demonstrate the environmental, social and economic benefits that the area is currently providing and show that the development, if authorized, would diminish these existing benefits resulting in net negative socioeconomic and environmental impacts.

As primary stakeholders of Turneffe, we are fully aware, and have highlighted the vital economic and social benefits that ‘Big Flat’ is currently providing. These include a healthy commercial fishery with an important conch nursery, an economically important use for sports fishing tourism and the area’s role in providing storm mitigation for Central Belize including Belize City.

Since this site is already providing immense environmental, social and economic goods and services, the proposed project, and particularly it’s use of productive National seabed, would result in significantly negative impacts that would disrupt the provision of nature-based goods and services resulting in a significant “net loss’ for existing stakeholders, Turneffe Atoll and Belize.

The proposed development threatens the existence of the very product upon which it depends for its economic return on investment – which, in its most fundamental sense, is a horrible business model. It is also important to recognize that should this development be approved and subsequently fails, the pristine marine and terrestrial environment in the area would sustain long-term irreversible damage, with resultant in permanently negative economic and social impacts.

#### 4.13 CONCLUSIONS

This proposal by MDL Investments Ltd., as outlined in the Environmental Impact Statement by Tunich-Nah, to develop three small islands near Deadman’s Caye and a large portion of National Seabed on an area of Turneffe Atoll named Big Flat, should be readily denied as it is seriously flawed for many reasons.

As stated by the developers, the project is only feasible if a portion of National seabed is used for this overwater development. As documented herein, the area requested is on the backreef portion of Turneffe’s reef and a mere 140 meters from the reef crest.

The area of seabed requested is a well-known backreef flat that has been in productive use by Turneffe Atoll stakeholders for decades. It is a recognized conch nursery important to Turneffe’s commercial fishermen and the areas lobster fishery on the forereef would be further impacted.

Turneffe Atoll is known Worldwide for it’s unique and valuable “flats fishing” and this area, Big Flat, is one of the Atoll’s essential flats fishing destinations. Commandeering this area for one developer, to the exclusion of long-term stakeholders, would have profoundly negative economic impact for Belize.

This development as described contravenes numerous guidelines, governmental recommendation and laws including DOE’s National Environmental Guidelines on Overwater Structures and the Mangrove Act of 2018. It would violate long-standing recommendations from Coastal Zone and contradict the basic principles of the Turneffe Atoll Marine Reserve.

It is notable that nearly all Turneffe stakeholders have spoken up in opposition to this project and further, that government officials have volunteered information that MDL has violated their agreements related to other projects.

The proposal, as outlined in the EIA, describes an unconventional development with questionable feasibility. It is repeatedly referred to as “green” but in reality, it has extensive negative environmental ramifications. We urge the members of the National Environmental Appraisal Committee to carefully review and consider the concerns and weaknesses highlighted in this EIA review as you deliberate your recommendation to the Ministry of Sustainable Development, Climate Change and Disaster Risk Management on this development. We respectfully ask that NEAC recommend the ‘No Development Option’ for the MDL Investment Deadman’s Caye development.

#### 4.14 ANNEXES (Provided by Email, aside from Dr. Boles Report)

- Addendum Report, Dr. Ed Boles
- The Economic Value of Turneffe Atoll, 2015 by Dr. Anthony Fedler
- The Value of Turneffe Atoll Mangrove Forests, Seagrass Beds and Coral Reefs in Protecting Belize City from Storms, Dr. Anthony Fedler
- Study from Center for Responsible Travel (CREST) 2011

- Turneffe Island Coastal Advisory Committee Guidelines 2003
- Turneffe Atoll Coastal Advisory Committee Guidelines 2011
- Turneffe Atoll Trust habitat mapping report
- Turneffe Atoll Marine Reserve Statutory Instrument
- Turneffe Atoll Marine Reserve Management Plan
- Letters from past visitors who opposed the development

#### 4.15 REFERENCES

1. Blue Bond and Project Finance for Permanence documents
2. John McGill et al, 1996 Turneffe Survey and recommendations
3. National environmental guidelines on overwater structures
4. National Integrated Coastal Zone Management Plan
5. National Sustainable Tourism Master Plan
6. Physical Planning Section, Lands Department, Ministry of Natural Resources and Agriculture Policies and Guidelines
7. Reef structure (Cengage Learning)?? (I did not see the exact source of the images for the reef structure)
8. SI No 49 of 2018 (Mangrove Act)
9. Turneffe Atoll Marine Reserve Management plan
10. United States Environmental Protection Agency (EPA)