

GOVERNMENT OF BELIZE

STATE PARTY REPORT

ON THE STATE OF CONSERVATION OF THE BELIZE BARRIER REEF RESERVE SYSTEM (BELIZE) (N 764)

February 2023

WHC Decision 44 COM 7B.193
Extended Forty-fourth Session.
Fuzhou (China) / Online meeting
July 16-31, 2021
Belize Barrier Reef Reserve System (Belize) (N 764)

The World Heritage Committee,

1. Having examined Document WHC/21/44.COM/7B.Add,
2. Recalling Decision **43 COM 7B.21**, adopted at its 43rd session (Baku, 2019),
3. Welcomes the further progress reported by the State Party in addressing most of the previously raised concerns regarding pending legislative improvements, including the official approval of the amended Environmental Impact Assessment (EIA) regulations, which now specifically include consideration of the Outstanding Universal Value (OUV) of the property and the adoption and implementation of a new Fisheries Resources Act and associated policy and strategy documents;
4. Also welcomes the State Party's confirmation that the land tenure verification process has been completed and requests the State Party to submit to the World Heritage Centre the final legislation for the designation as strict mangrove reserves of the remaining public lands within the property, identified through this process, as soon as it is adopted;
5. Congratulates the State Party for further improving the management of the property since its removal from the List of World Heritage in Danger at its 42nd session in 2018, and concludes that the reported progress, particularly the finalization of the land verification process and the final approval of the amended EIA regulations, has now almost fully resolved the pending issues noted at that time;
6. Also requests the State Party to submit to the World Heritage Centre detailed information on the current status of the project "Cargo extension and construction of the cruise terminal and cruise tourism village" and its possible impacts on the OUV of the property, including any relevant EIAs, for review by IUCN, and to ensure that no activity, including dumping of dredged materials at sea, is allowed to proceed if it can result in negative impacts on the property;
7. Finally requests the State Party to submit to the World Heritage Centre, by **1 December 2022**, an updated report on the state of conservation of the property on the implementation of the above.

Executive Summary

The 2022 State of Conservation Report illustrates Belize's continued progress in maintaining the Belize Barrier Reef Reserve System (BBRRS). On June 26th, 2018, the World Heritage Committee decided to remove the BBRRS from the list of World Heritage in Danger for all the efforts and progress made by the people and country of Belize. For the year 2020-2021, Belize has further progressed in achieving Indicator 1 among other activities to maintain the Outstanding Universal Value (OUV) of the Property.

In Decision 44 COM 7B.193, the WHC requested that the Government of Belize submit the final legislation for the designation of the remaining public lands within the property as mangrove reserves. Belize continues to make progress through its submission of Statutory Instrument Number 72 of 2022 which protects remaining public property within the BBRRS and by way of on-going initiatives focused on funding reliability to achieve national conservation goals and reforming of Belize's loan arrangement and prescription of targeted conservation commitments to be fulfilled.

Additional efforts and progress have also been made as it relates to taking action for mangrove management and environmental protection, expanding Belize's ocean protection, and developing strategic and conservation focused plans taking into account ecological, economic or social considerations. The culmination of actions taken further illustrates the country's efforts in maintaining the OUV of the property and in maintaining the status of the Belize Barrier Reef Reserve System.

INTRODUCTION

At the 44th meeting of the World Heritage Committee held online in Fuzhou, China during the period July 16-31, 2021, Belize was commended for the progress made and for improving the management of the property since its removal from the List of World Heritage in Danger at its 42nd session in 2018 and concludes that the reported progress has now almost fully resolved the pending issues noted at that time.

This report represents the State of Conservation of the Property for the year 2021-2022 and it includes the further advances and Belize's progress to address the issues identified by the World Heritage Committee at the 44th Session as well as the corrective measures stipulated in 2009. The report also includes the implementation and achievement of the final indicator of the adopted Desired State of Conservation (DSOC).

The response to Decision **44 COM 7B.193** is now being presented for examination by the World Heritage Committee at its upcoming 45th session.

Response from the State Party to the World Heritage Committee's Decision 2018

1. **Having examined Document WHC/21/44.COM/7B.Add,**
2. **Recalling Decision 43 COM 7B.21, adopted at its 43rd session (Baku, 2019),**
3. **Welcomes the further progress reported by the State Party in addressing most of the previously raised concerns regarding pending legislative improvements, including the official approval of the amended Environmental Impact Assessment (EIA) regulations, which now specifically include consideration of the Outstanding Universal Value (OUV) of the property and the adoption and implementation of a new Fisheries Resources Act and associated policy and strategy documents;**

As mentioned in the 2021 State of Conservation Report, the Government of Belize has made considerations for the Outstanding Universal Value (OUV) of the Property, and it has been integrated into the EIA Regulations via an amendment of the regulations and adopted on February 8, 2020. The amendment to the regulations addresses the inclusion of the words "OUV" and/or "WHS designation" under Sections 19 and 24 which states that any possible impacts to the WHS must be addressed in the development of an EIA and during a public consultation/hearing. *This is*

*now being exercised through the EIA process in Belize for specific proposed offshore developments regardless of distance from the property (*this is illustrated below on the topic of the proposed expansion of the Port of Belize).

Since the adoption of the 2020 Fisheries Resources Act, both the National Fisheries Policy, Strategy and Action Plan (NFPSA) and the Mariculture Policy have been endorsed by Cabinet. Presently, there is an ongoing consultancy to develop mariculture regulations for Belize and should be completed in 2023. Belize continues to review and draft regulations which complement the Fisheries Resources Act. However, in the upcoming fiscal year of 2023-2024, the Belize Fisheries Department through the Government Strategic Allowance (GSA), under the Blue Bond Agreement (*see below for more information*), will seek to review and develop a comprehensive set of regulations to complement the Fisheries Resources Act. For the next three to four years, funding through the GSA will be made available to the Fisheries Department to improve the management of the marine reserves and replenishment zones, improve the overall governance framework of the sector, increase the compliance of the fisheries legislation, improve the research and monitoring of fisheries resources and promote economic growth in the sector.

4. **Also welcomes the State Party's confirmation that the land tenure verification process has been completed and requests the State Party to submit to the World Heritage Centre the final legislation for the designation as strict mangrove reserves of the remaining public lands within the property, identified through this process, as soon as it is adopted;**
5. **Congratulates the State Party for further improving the management of the property since its removal from the List of World Heritage in Danger at its 42nd session in 2018, and concludes that the reported progress, particularly the finalization of the land verification process and the final approval of the amended EIA regulations, has now almost fully resolved the pending issues noted at that time;**

The Government of Belize continues to make progress in achieving the corrective measures as well as achieving Indicator 1 of the Desired State of Conservation as it relates to the land tenure verification process. These efforts initially experienced some delays due to unforeseen circumstances, however, the land tenure assessment for the remaining public lands within the Property was completed in mid-2020; it was assessed that remaining public lands remained in both the South Water Caye Marine Reserve and the Sapodilla Cayes Marine Reserve. The survey plans, which were assessed through a consultancy, were also authenticated by the Ministry of Natural Resources through the Lands Department in November 2020. By December 2020, the

GIS Unit of the Forest Department began preparing the shapefiles for these areas and their physical description to be designated as forest reserves. In March 2021, the process of legal drafting commenced for the regulations, however, it wasn't until April 2022 when the Statutory Instrument number 72 of 2022 **(see Annex 1)** was signed and adopted not only as a target under the DSOC but also as a milestone under the Blue Bond Agreement. Shapefiles of the reserves have been also submitted to the Land Information Center of the Lands Department under the Ministry of Natural Resources.

6. **<u>Also requests</u> the State Party to submit to the World Heritage Centre detailed information on the current status of the project "Cargo extension and construction of the cruise terminal and cruise tourism village" and its possible impacts on the OUV of the property, including any relevant EIAs, for review by IUCN, and to ensure that no activity, including dumping of dredged materials at sea, is allowed to proceed if it can result in negative impacts on the property;**

In December 2021, the Port of Belize Limited's request for environmental clearance for the development of a cruise port terminal and the expansion of a bulk cargo facility was not granted by the National Environmental Appraisal Committee and adopted by the Department of the Environment. The decision was made considering views expressed at public consultations held on the 26th November 2020 and 23rd September 2021, information gather at a site visit held on the 18th February 2021 and the 2021 Environmental Impact Assessment (EIA) Report. Among the concerns, the EIA report, addendum, and other information submitted failed to adequately address the request for the provision of alternative options for the dredge spoils.

The developer appealed and submitted its Environmental and Social Impact Assessment Report – Volume II **(see Annex 2.A. and 2.B.)** in August 2022. A site inspection in September 2022 highlighted concerns by NEAC and additional information was requested. Public consultations were held on 1st September 2022 and 11th November 2022. NEAC deliberated on 24th November 2022 and did not approve environmental clearance for the second proposal, primarily because of the EIA report failing to address the main areas of concern, which included dredge spoils.

Table 1 below shows the implementation progress and achievement of the DSOCR:

Indicators	Method of Verification	Timeframe	Progress
. The area of mangrove coverage in the property is maintained at least at the same level as when the property was inscribed on the List of World Heritage in Danger in 2009. There is no further loss of cover within the entire property, including all mangrove types that are unique and irreplaceable, measured against the 2009 baseline.	▪ Strengthening, adoption, implementation, and effective enforcement, of the currently proposed Mangrove Regulations ▪ Satellite imagery/aerial photography of the property indicating the current mangrove coverage, measured against the 2009 baseline. ▪ Maps showing the distribution of the different categories of land ownership within the property and cadastral data of land tenure compared against the 2009 base year (the date when the site was inscribed on the List of World Heritage in Danger) ▪ Adoption by law of a permanent cessation of all sales and leases of state-owned land throughout the property, measured against the 2009 baseline ▪ Adoption by law of a zoning plan covering the entire property that specifies clearly defined regulation for allowed development and use for each zone, based on scientific, ecological and biological information about the property's OUV and its attributes.	To be completed by 31 December 2016	Revised Mangrove Regulations were adopted on June 23, 2018 by the Government of Belize. GEF-SGP project on mangrove coverage, measured against the 2009 baseline completed in 2018. The mangrove coverage is 95.3% of what it was in 1996 (year of inscription). The government maintains a voluntary moratorium on the sale of nationally held lands. The survey plans from the land tenure assessment were authenticated by the Land's Department in November 2020. Shapefiles and physical description for the national lands within the South Water Caye Marine Reserve and the Sapodilla Cayes Marine Reserve were completed by the end of February 2021. **Regulations to designate the national lands as "forest reserves" were adopted on April 19, 2022.** Adoption of Integrated Coastal Zone Management Plan in 2016. Area specific plans define what types of developments and standards are suitable for the various coastal areas.
II. No areas within the property and in its	▪ Adoption by law, implementation and adequate enforcement regulations that	To be completed by 31 December 2016	The amendment of the EIA regulations was adopted on February 8, 2020.

immediate vicinity are developed in ways that affect the property's natural outstanding beauty and status as a globally significant natural phenomenon of Outstanding Universal Value	specify the type, scale and density of coastal development consistent with the requirements to maintain the property's natural outstanding beauty and that of its immediate surroundings, including establishment of areas where no development should be permitted.		Area specific development guidelines were developed under the ICZMP. Mangrove regulations provide special protection/stricter measures to mangroves in "Priority Mangrove Areas".
l. All areas within the property and the surrounding areas that support the ecological functioning of the system are excluded from oil exploration and exploitation	▪ A map that defines, on the basis of oceanographic, ecological and other scientific information, the property's surrounding areas where no oil exploration and exploitation can be permitted. ▪ Legal adoption of a permanent exclusion of the entire property and the defined surrounding areas from oil exploration and exploitation	To be completed by 31 January 2016	The Parliament of Belize approved the Petroleum Operations (Maritime Zone Moratorium) Act No. 54 of 2017 in December 2017, which states that all oil exploration and exploitation is now prohibited in the entire maritime zone of Belize.
. The property is managed effectively and in an integrated way that will ensure the protection of its Outstanding Universal Value, and appropriately allows for achieving both sustainable socio-economic and environmental goals	▪ Adoption, implementation and effective enforcement of the Integrated Coastal Zone Management Plan, reflecting the World Heritage status of the property and its conservation and sustainable use requirements and consistent with the plan's draft version of January 2015.	To be completed by 31 December 2016	ICZM plan approved on Feb. 9th, 2016.The ICZM plan was also being implemented through funding under the Marine Conservation and Climate Adaptation Project (MCCAP). Area specific development guidelines were developed under the ICZMP. The process to update the ICZM Plan and its regional guidelines was proceeding in 2021 however through the Blue Bond Agreement, the CZMAI launched the marine spatial planning process to be integrated into the plan.

Updates on other conservation initiatives identified by the State Party

I. The Government of Belize and The Nature Conservancy entered into agreement for the largest debt refinancing for ocean conservation to date. The 364 million US debt conversion for marine conservation will reduce Belize's debt by 12% of the GDP in order to create long-term sustainable financing for conservation and commit to protect up to 30% of Belize's national waters. Under the Blue Bond agreement, key conservation commitments were established:

1. Increase in Biodiversity Protection Zones up to 30% of national waters by 2026; this includes coral reefs, seagrass, mangroves and other key habitats under protection.
2. Completion of a Marine Spatial Plan (MSP) by 2026 (to determine where to expand ocean protection and management and for sustainable economic opportunities);
3. Protection of public lands within Belize's WHS- Belize Barrier Reef Reserve System, as mangrove reserves;
4. Revision and implementation of Belize's Integrated Coastal Zone Management Plan (supported by the MSP)
5. Designate three marine protected areas as International Union for Conservation of Nature (IUCN) Green List areas; and
6. Other non-binding conservation commitments such as the creation of a blue carbon policy, sustainable aquaculture and mariculture, evaluating the manage access program, etc.

Under the Conservation Funding Agreement (CFA), a fund was established and named the Belize Fund for Sustainable Future (BFSF) which will support national projects and programs over the next 20 years to support coastal and marine conservation in realizing the milestones and commitments under the CFA.

II. Since the signing of the CFA referred locally as Blue Loan Agreement (BLA), Belize has achieved three out of eight milestones; these include: Expanding the High Biodiversity Protection Zones (HBPZ or replenishment zones) up to 11.63% of Belize's oceans (**see Annex 3 – 8)**; designating all remaining public lands within the BBRRS World Heritage Site as forest reserves (South Water Caye Forest Reserve, Sapodilla Cayes Forest Reserve

and Bacalar Chico Forest Reserve); and initiating the marine spatial planning process. In addition to the expansion of HBPZ, Belize also has a Medium Biodiversity Protection Zones of 9%, and total Biodiversity Protection Zones and Marine Protected Areas of 20.6%. Belize is further committed to achieving the remaining percentage as outlined in exhibit A of the Conservation Funding Agreement **(see Annex 9)**. Over the next 7 years, the remaining milestones will be achieved.

III. On January 25, 2022, Cabinet approved the establishment of the Blue Bond and Project Finance for Permanence Unit within the Office of the Prime Minister. This unit is charged with ensuring that the Government of Belize meets all commitments outlined in the CFA and the design of an innovative new financing model: Project for Finance Permanence (PfP) to further assist Belize in meeting and sustaining its Nationally Determined Contributions and conservation goals. The PFP aims to take on an approach that secures important policy changes, and all funding necessary to meet specific conservation goals of a program over a defined long-term timeframe. Moreover, there are provisions in the Blue Loan Act number 28 of 2021 **(see Annex 10)** to develop regulations to implement the CFA. The World Wildlife Fund is leading the design of the PFP and should have plans for conservation, fundraising and stakeholder engagement developed by 2025.

IV. Belize is one of five beneficiary WHS sites under the **Resilient Reefs Initiative** by the Great Barrier Reef Foundation, AECOM, the Rockefeller Foundation and other partners to respond to the call to action by bringing together local communities, reef managers and resilience experts at the centre of decision making to effectively manage and build the resilience of important coral reef ecosystems. Resilient Reefs Initiative was launched in Belize in May 2021 with the appointment of the Chief Resilience Officer within the Coastal Zone Management Authority & Institute. The main goal of the initiative is to create and deliver a Resilience Strategy for the Belize Barrier Reef System. Since its launch, the initiative has conducted wide stakeholder engagement and policy review to inform the resilience assessment; and multiple action scoping workshops to inform the development of the Resilience Strategy. Through multiple engagement sessions with stakeholders, the initiative has also built important partnerships by connecting the knowledge network partners with local stakeholders for future work.

RRI is currently working to finalize and release Belize's first Resilience Strategy for the BBRS in early 2023, along with three grant application proposals focused on: coral

restoration & disease response strategies, livelihood diversification efforts, and blue carbon potential for Belize. Following the release and implementation of the Strategy in 2023, the initiative will continue to work alongside stakeholders to identify opportunities for embedding resilience-based management and long-term solutions for building resilience of the BBRS and communities dependent on it.

Measures/Efforts to maintain and improve OUV of the Property

I. For the past two years, Belize established a national chapter of the Global Mangrove Alliance named the Belize Mangrove Alliance. This alliance brought together multiple stakeholders including Government agencies, NGOs, academia, private sector and others to work together towards the conservation, management and restoration of mangroves in Belize. The alliance is being led by the World Wildlife Fund through the assistance of Pew Charitable Trusts and DSW Group. Multiple meetings and workshops resulted in the development of the Belize Mangrove Alliance Action Plan 2022-2027 (**see Annex 11**).

The five-year plan aligns with national and international commitments and addresses key thematic areas:

- Strengthened legislative and policy framework for protection of mangrove values
- Reduced illegal clearance of mangroves
- Engaged and informed general public
- Successful mangrove restoration and protection
- Reduced contamination in the watershed

II. The Conservation Funding Agreement was signed in November 2021, and Belize embarked on the process of developing a stakeholder driven MSP called Belize Sustainable Ocean Plan (BSOP), which will essentially determine areas for ocean protection and management to cover up to 30% of Belize's oceans. The Coastal Zone Management Authority and Institute (CZMAI) leads and chairs the MSP steering committee which is comprised of multiple agencies, authorities and stakeholders making it an inclusive process. The BSOP is public, inclusive, and participatory process through which stakeholders will determine the optimal distribution of human activities across marine areas to achieve Belize's ecological, economic, and social objectives. Its vision is "a healthy, resilient, and equitably shared ocean that supports a thriving national economy and

nurtures the culture and well-being of all Belizeans," which complements the objectivity of maintaining or improving the OUV of the property. There are efforts to continue building the CZMAI's technical capacity, developing a comprehensive workplan and sourcing attainable funding to deliver the objectives of the BSOP.

III. In November 2022, Belize's National Environmental Appraisal Committee (NEAC) submitted its non-endorsement to the proposal for the PBL/Waterloo Cruise Port and Cargo Expansion Development Project at the Port of Belize, Volume I and its Annex II. The decision was made as a consequence of the Department of the Environment's environmental screening process, which evaluated the project's purpose and activities, examined its environmental and social impacts, considered concerns from site inspections and feedback expressed from public consultations. Importantly, the proposal is a modification to the initial EIA report submitted which ultimately was rejected due to its failure to properly address a range of concerns.

Conclusion

In conclusion, this report reiterates the commitment in maintaining the inscription of the Belize Barrier Reef Reserve System as a World Heritage Site. Belize continues to make efforts in conserving our natural habitats for present and future generations. Despite the many challenges which arose post Covid-19 Pandemic and from climate change, the Government of Belize has still made significant progress to the DSOC as well as other measures, evident through the passing of new legislation, the development of national policies, signing of the CFA, and the many measures and efforts to maintain the OUV of the BBRRS.

ANNEXES

Annex 1: Statutory Instrument number 72 of 2022
Annex 2. A.: Port of Belize Environmental and Social Impact Assessment Volume I - Main Report 2022
Annex 2. B.: Port of Belize Environmental and Social Impact Assessment Volume II - Annexes
Annex 3: Statutory Instrument number 69 of 2022
Annex 4: Statutory Instrument number 70 of 2022
Annex 5: Statutory Instrument number 71 of 2022
Annex 6: Statutory Instrument number 73 of 2022
Annex 7: Statutory Instrument number 74 of 2022
Annex 8: Statutory Instrument number 75 of 2022
Annex 9: Exhibit A – Conservation Funding Agreement
Annex 10: Blue Loan Act number 28 of 2021
Annex 11: Belize Mangrove Alliance Action Plan 2022-2027

BELIZE:

FORESTS (SOUTH WATER CAYE FOREST RESERVE, SAPODILLA CAYES FOREST RESERVE AND BACALAR CHICO FOREST RESERVE) ORDER, 2022

ARRANGEMENT OF PARAGRAPHS

1. Citation.

2. Interpretation.

3. Declaration of Forest Reserves.

4. Maps of Forest Reserves.

5. Freehold rights.

BELIZE:

STATUTORY INSTRUMENT

No. 72 of 2022

ORDER made by the Minister responsible for forestry in exercise of the powers conferred upon him by section 3 of the Forests Act, Chapter 213 of the Substantive Laws of Belize, Revised Edition 2020, and all other powers thereunto him enabling.

(Gazetted 21st April, 2022).

1. This Order may be cited as the

FORESTS (SOUTH WATER CAYE FOREST RESERVE, SAPODILLA CAYES FOREST RESERVE AND BACALAR CHICO FOREST RESERVE) ORDER, 2022.

2. In this Order– **Interpretation.**

"Bacalar Chico National Park" means the area declared to be a national park under the National Parks (Bacalar Chico) Order, 1996; **S.I. 89 of 1996.**

"Sapodilla Cayes Marine Reserve" means the area declared to be a marine reserve under the Fisheries Resources (Sapodilla Cayes Marine Reserve) Order, 2020; and **S.I. 141 of 2020.**

"South Water Caye Marine Reserve" means the area declared to a marine reserve under the Fisheries (South Water Caye Marine Reserve) Order, 1996. **S.I. 118 of 1996.**

3. All national lands within South Water Caye Marine Reserve, Sapodilla Cayes Marine Reserve and Bacalar Chico National Park are hereby declared to be Forests Reserves. **Declaration of Forest Reserves.**

Maps of Forests Reserves.

4. The maps of the Forests Reserves listed in paragraph 3 may be seen at the office of the Forest Department.

Freehold rights.

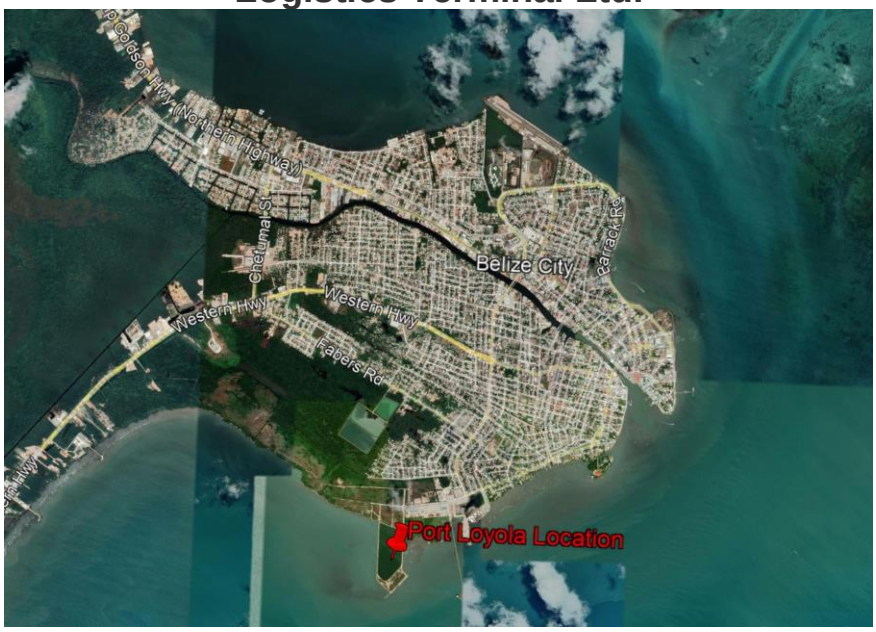
5. This Order shall not affect any freehold rights subsisting at the commencement of this Order in the areas declared forest reserves under paragraph 3.

MADE by the Minister responsible for forestry this 19th April day of April, 2022.

HON. ORLANDO HABET
Minister of the Sustainable Development, Climate Change and Disaster Risk Management
(Minister responsible for forestry)

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Port of Belize Ltd. and Belize Logistics Terminal Ltd.



Cargo Expansion and Construction of Cruise Terminal & Cruise Tourism Village

Port of Belize, Belize City

Environmental and Social Impact Assessment

Volume I – Main Report

Final

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August 2022

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Environmental & Social Impact Assessment

Cargo Expansion and Construction of Cruise Terminal & Tourism Village at the Port of Belize

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Abstract

The Port of Belize (Port) is a private, deep-water shipping facility owned by Port of Belize Ltd. Originally built in 1978 and privatized in 2002. In 2005, an effort was made by the previous owner to expand the Port to accommodate the shore-side berthing of cruise ships. An Environmental Impact Assessment (EIA) was produced, and this EIA was granted environmental clearance in 2008. For numerous reasons, including the global recession of 2009, the project was never undertaken.

Regional developments and changes within the cruise and cargo industries have precipitated a reinitiating of efforts toward the creation of the cruise port and expansion of the cargo operations. Accordingly, Port of Belize Ltd. (the current owner of the Port) and Belize Logistics Terminal Ltd. (the owner of numerous undeveloped parcels in the vicinity of the Port) have elected to jointly pursue the Port of Belize Expansion Project (Project) to meet current and future cruise, bulk, and cargo demands. The project scope includes the construction of two cruise piers, the building of a cruise tourism village, the dredging of the access channel, berthing pockets, and turning basin, as well as the construction of a new cargo and bulk facility.

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List of Abbreviations

µs/cm	micro-Siemens per centimeter
AR5	Fifth Assessment Report
ASR-BSI	American Sugar Refining, Inc. (now ASR Group) - Belize Sugar Industries
ASSHTO	American Association of State Highway and Transportation Officials
ASTs	Aboveground Storage Tanks
AWWA	American Water Works Association
BCC	Belize City Council
BCMP	Belize City Master Plan
BDF	Belize Defense Force
BEL	Belize Electricity Limited
BET	Belize Environmental Technologies
BOD	Biochemical oxygen demand
BOD_5	Biochemical oxygen demand (test ran for five days)
BPF	blows per foot
BTB	Belize Tourist Board
BTL	Belize Telemedia Limited
BWS	Belize Water Services Limited
Ca	Calcium
CaO_3	Calcium Carbonate
CAT	Category
CD	Chart Datum
CEMO	City Emergency Management Organization
Cl	Chloride
CLO	Community Liaison Officer
cm	centimeter
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSD	Cutter Suction Dredger
dB(A)	A-weighted decibels are an expression of the relative loudness of sounds in air as perceived by the human ear.
DEMO	District Emergency Management Organization
DO	Dissolved Oxygen
DOE	Department of Environment
DRM	Disaster Risk Management
EAs	Environmental Audits
EC	Environmental Clearance
ECP	Environmental Clearance Plan

EIA	Environmental Impact Assessment
EPZ	Export Processing Zone
ESMP	Environmental and Social Management Plan
FSTV	Fort Street Tourism Village
ft	feet
ft^2	square feet
gals	gallons
GDP	Gross Domestic Product
GOB	Government of Belize
gpd	gallons per day
GPH	George Price Highway
Ha	hectares
HDPE	High-density polyethylene
hPa	hectopascal an SI unit of pressure
IDF	Intensity-Duration-Frequency
IMMARBE	International Marine Registry of Belize
IPCC	Intergovernmental Panel on Climate Change
ISPS	International Ship and Port Facility Security
JDN	Jan De Nul
K	Potassium
kg	kilograms
KHMH	Karl Heusner Memorial Hospital
km/hr	kilometer per hour
kWh	kilowatt-hour
L	Liter
lb(s)	pound(s)
LLES	Limited Level Environmental Study
LOA	Length Overall
LPG	Liquid Petroleum Gas (Propane-Butane mixture)
LUA	Land Subdivision and Utilization Authority
m	metres
m^2	square meter
m^3	Cubic meters
MEAs	Multilateral Environmental Agreements
mg	milligrams
mg/kg dm	milligram per kilogram dry matter
MGD	Millions of Gallons per Day
MLSS	mixed liquor suspended solids
mmHg	millimeter of mercury (atmospheric pressure)
MOH	Ministry of Health

MOW	Ministry of Works
mph	miles per hour
MSL	Mean Sea level
mV	millivolts
Na	Sodium
NCL	Norwegian Cruise Line
NEAC	National Environmental Appraisal Committee
NEMO	National Emergency Management Organization
NGOs	Non-Governmental Organizations
NH_4	ammonia
NMS	National Meteorological Service
NO_3	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NOx	Oxides of Nitrogen
NTU	Nephelometric Turbidity Units (Turbidity)
ORP	Oxidizing and Reducing Potential
PAH	polycyclic aromatic hydrocarbons
PET	polyethylene terephthalate
PGH	Philip Goldson Highway
PGIA	Philip S.W. Goldson International Airport
PO_4	Phosphorus
PoBL	Port of Belize Limited
ppm	parts per million
ppt	parts per thousand
psi	pounds of force per square inch
PVC	Polyvinyl Chloride
R.E.	Revised Edition (Laws of Belize)
Regs.	Regulations (Laws of Belize)
Rev. Ed.	See R.E.
RO-RO	Roll-on/roll-off
s	second
S.I.	Statutory Instrument (Laws of Belize)
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
SO_4	Sulfate
SOx	Sulphur Oxides
SPC[ond]	conductivity
SPM	Suspended Particulate Matter
SPTs	Standard Penetration Tests
SRT	solids retention time

SWaMA	Solid Waste Management Authority
SWM	Solid Waste Management
TAOS	The Arbiter of Storms
TASA	Turneffe Atoll Sustainability Association
TDS	Total Dissolved Solids
TNTC	Too numerous to count
TOR	Terms of Reference
TSHD	Trailing Suction Hopper Dredger
TSS	Total Suspended Solids
UTM	Universal Transverse Mercator
UV	Ultraviolet
WGS84	World Geodetic System 1984
WHO	World Health Organization
WRF	Waste Reception Facilities
WWTP	wastewater treatment plant
yd^3	cubic yards

Executive Summary

Project Justification

The major cruise lines have expressed their intention to cease tender operations by 2024. To avoid port call interruptions, Belize City must have a cruise capable, shore-side berthing option available within that timeframe. To that end, the dredging and expansion of the Port of Belize channel and construction of fixed piers will ensure the long-term survival of Belize City cruise tourism.

Pre-Covid-19, the projected operational capacity of the country's cruise industry was 850,000 to 900,000 annual passengers, with an anticipated average increase of 5% a year to a potential, theoretical maximum capacity of 2,500,000. COVID-19 severely impacted the cruise industry, and the expectation is that cruise passenger volumes will not return to their record 2019 numbers until 2025-2026. The Western Caribbean is not immune the pandemic's effects, and the cruise terminal is likely to operate at a reduced capacity for 2024-2026, with passenger volumes starting at 500,000 per year in 2024 and gradually increasing to the initially projected 900,000 passengers by 2026.

The Port of Belize Cruise and Cargo Facility will single-handedly revolutionize the way Belizeans do business for decades to come, offering the country and Belize City the bulk handling it so desperately needs, and a state-of-the-art mainland cruise facility that delivers the Belizean guest experience all major cruise lines seek. Further, the Port of Belize site allows for the combination of these two key infrastructure developments within a brownfield project envelope, rendering it the only non-greenfield proposed port project, and substantially reducing its net environmental impact.

The proposed modern bulk facility requires deep water (-12 meters of water depth) but cannot carry the dredging costs alone. The justification for cruise is bulk, and the justification for bulk is Belize's largely diminished competitive position as a bulk importer and exporter, which has significantly hindered Belize's GDP growth potential through limited job creation and trade deficiencies, specifically within the agriculture and commodity sectors. Indeed, these deficiencies have forced Belize's sugar industry out of Belize City and to the South of the country, forcing on it unnecessary cost burdens while further diminishing any potential competitive advantages. In total, the new bulk terminal is expected to generate 545,000 tons of new bulk trade across both imports and exports and across the agricultural, chemical, construction material, aggregate, and petrochemical sectors.

As a single facility, the proposed Port of Belize expansion will effectively support the growth of two major pillars of Belize's economy and allow each to serve as a hedge against each other. The Government of Belize itself underlined the necessity of bringing cruise to Port of Belize via its 2011 National Sustainable Tourism Master Plan. A study that specifically identified the Port of Belize site as the ideal location for a new mainland cruise facility capable of handling the cruise volumes of today and tomorrow.

Cruise lines have supported the Port of Belize's proposed development for a number of factors, including its location, the development team's track record of successful infrastructure development, the project's financial viability, and the extensive and thorough environmental and engineering assessments upon which the development plan is built. The Project's ideal location allows cruise passengers more time onshore and deeper access to Belize's interior through improved connectivity and the elimination of tendering. With a projected 90% of cruise passengers disembarking at the proposed facility vs. 60% currently, an additional US $1 Million per day in additional guest spending in Belize is anticipated. Further, there will be a broader distribution of cruise benefits throughout Belize as a whole, with Belize City's southside specifically experiencing much needed economic growth opportunities, social inclusion, and quality of life enhancements.

Additionally, it is estimated that 90% of passengers will disembark at a shore side call as compared to between 30 and 60% with the current tender port. The highly enhanced debarkation rate would mean significantly higher tourist expenditures for Belize. The increased flow of passengers will create a significant increase in tourism jobs for Belizeans. Shoreside berthing would further increase the amount of time spent by passengers onshore, leading to more passengers taking inland tours and creating additional tour products.

The increased money spend will support the local economies yielding more revenues for Belize. These additional revenues going to Belize will then subsequently allow for better environmental improvement efforts, offsetting the impacts from increased passenger tour volumes with net environmental and economic gains.

The Port expansion would transform the current Port of Belize by establishing a bulk facility and creating four fixed docking facilities for container and bulk cargo ships. The modernization of Port of Belize, along with the establishment of a bulk facility, will provide a significant boost to Belizean agriculture and energy sectors, particularly for businesses in the North.

Project Location

The Port of Belize Project Site is located on the south side of Belize City, at WGS84 UTM coordinates 372351m E 1933285m N. The Project site is made up of approximately 675 acres of private land, as well as the Port Access Channel, Berthing area, and Turning Basin area, which is located on submerged, sovereign lands.

Project Description

The proposed redevelopment of the Port and adjacent properties broadly conforms to the plan proposed in the approved 2005 EIA, varying primarily in scale. At its core, the proposed development includes the capital dredging of the Port Access Channel, Turning basin, and berthing areas (both cruise and cargo) to a depth of 12m, the reclamation of various near-shore areas, the construction of two Oasis-class ship piers, the construction of a cruise tourism village, the construction of an expanded bulk and containerized cargo area, and the construction of necessary access and ancillary infrastructure.

When compared to the approved project from 2005, the major differences are a significant increase in the volume of dredged material (up to 7.5 million m^3), the size and configuration of the cruise piers, and the inclusion of the expanded cargo operation.

Once completed, the cargo port will be able to accommodate larger, bulk carrying vessels and will ultimately draw up to an estimated 500,000 tons of bulk cargo traffic to Belize City. The Cruise facility will permit the simultaneous berthing of four Oasis-class cruise ships, representing up to 24,000 passengers per day. At full capacity, the completed site is able to comfortably host approximately 2.5 million passengers per year.

Description of Existing Facilities at PoBL

In its current configuration, the Port is engaged almost entirely in containerized cargo, offloaded from a single, deep-water berth and existing pierhead of 67m capable of accommodating vessels up to 148m LOA and 7.4m of maximum draught. The Port also has a low berth, accessible by roll-on/roll-off (RORO) vessels. The Port facilities include a 12-acre container yard and approximately 4-acres of RORO yard. The Port is currently accessed through the Port Access Channel and Turning Basin, dredged in 2001/2002 to a depth of between 8.5m and 9m.

The remaining parcels that will make up the Project site are primarily vacant, former dredged material containment sites (used during the previous dredging project). Over time, they have become overrun with vegetation of little to no environmental significance.

Project Requirements

The Project's Master Plan anticipates the differentiation between the Cruise and Cargo areas, and from a core use standpoint anticipates the following major construction elements;

- Construction of two Oasis-class ready Piers
  (Approx. 320m long by 20m wide);
- Construction of the Cruise Tourism Village
  (Approx. 40 Ac. Site with 19,000 m^2 total building area);
- Construction of expanded cargo facility
  (Approx. 67 Ac. Site with 36,000 m^2 total building area);
- Construction of the Jane Usher Blvd extension;
- Construction of Cruise Terminal access/arterial roads;
- Deepening of 7.5km-long Port Access Channel to 12m;
- Deepening of Turning Basin to 12m, and widening to 550m;
- Dredging of Berthing Area to 12m.

Additionally, the Project will require various ancillary support activities, including the establishment of:

- Water supply
  (approx. 138,000 gpd at peak capacity, sourced from BWSL);
- Wastewater treatment
  (approx. 95,000 gpd at peak capacity, to be treated on-site by sequencing batch reactor);
- Solid waste treatment
  (operational phase waste estimated at approx. 14,000 lbs./day to local landfill);
- Power generation
  (approx. 11,000-megawatt-hours per year sourced from BEL grid).

The project development team is committed to minimizing consumption and waste generation. As a part of the development's planning, best practices guidelines to be encapsulated within a comprehensive Environmental Management System (EMS) will be implemented to ensure the conservation of water and power and reduction of waste generation within the project facilities.

Anticipated Impacts and Proposed Mitigations

The proposed construction and development activities will create minimal environmental and significant positive social impacts. The following section details the areas that could potentially be impacted by the proposed development in the absence of appropriate mitigation measures. The development team has expended significant effort in studying and developing appropriate mitigation and management strategies to ensure that any net negative impact of the Project is eliminated or reduced to insignificant or minimal levels. The team does see the positive economic impacts that will be associated with this development to be substantial not only for the communities within the projects immediate sphere of influence but for the country on a whole.

Flora and Fauna – The Project's footprint will be situated entirely within previously disturbed areas. No new or virgin terrestrial habitats will be impacted by the development activities.

The dredging of the Port Access Channel, Turning Basin, and Berthing area will be situated within the footprint of the existing navigational area. Due to the existing high turbidity levels the project area has been found to have impoverished biological communities of marine flora and fauna. As such, the dredging and active excavation within the designated project footprint is expected to have minimal impacts. All dredging activities will be accompanied by an active monitoring of water quality using internationally recognized protocols.

Dredging - The volume of dredged material that will be generated by the dredging operation will require placement in *onshore and nearshore* locations. Very little of the dredged material is anticipated to be suitable for use in construction or for landfilling. The *onshore* site selected for material placement has been previously used for this purpose (in the 2001/2002 dredge campaign). Baseline surveys have shown that the placement area has limited to no environmental

value and is composed mostly of invasive species and disturbed scrublands. No impact is expected from reverting the site to its previous use as a dredged material containment area.

The proposed location for the *nearshore* dredge spoils disposal site is located just south of the current Project parcels. The area is made of relatively shallow waters, characterized by a top layer of fine sediment that is easily suspended by minor disturbance, yielding very high natural levels of turbidity. Accordingly, the area is not suitable for marine flora or fauna and is characterized by a very low diversity and abundance of both. The proposed activities within the nearshore area will therefore have no impact. To limit the potential impact to areas outside the immediate Project site, the entire nearshore will be enclosed in geotextiles and turbidity curtains, and active water quality monitoring will take place throughout the construction process.

The containment of dredge spoils will occur through the application of underwater geotextile curtains, connected to semi-submersed floats at the top, and anchor lines at the bottom. Anchor blocks will be placed to the shoreside of the containment curtain, which in combination with shore-linked wires will keep the curtains and floats in place. As the placement area is filled with dredge spoils the anchor lines and anchor blocks will become buried and immovable, effectively cemented in place.

This mitigation and containment method offers a flexible and thorough solution while complying with the requirement of having no visible surface impact on the Sibun Bay waters. Once the dredged materials have finalized consolidating the disposal is fail-safe, and the geotextile structure will have no function anymore. The deposited material will form a new seabed, similar in nature to the existing seabed, effectively creating a shoal that will dissipate incident waves and storm-surges. This subsequently lessens the risk of flooding and any impact a storm event will have on the existing coastlines surrounding the Port Loyola area and its nearby communities.

Terrestrial/vertical construction is contemplated within current Port lands and in the vacant parcels adjacent to the Port. These parcels are all previously developed or disturbed lands and accordingly no flora or fauna will be impacted by these activities. All construction will be governed by a comprehensive Environmental Management Plan (EMP) that will ensure that globally accepted best management practices are followed at all times.

Social – The Project site is located in the Port Loyola area, one of the most impoverished and most deprived constituency within Belize City. The entirety of the proposed development is taking place on existing Port lands, historically vacant lands, or submerged lands currently making up the Port's navigational features. Accordingly, the activities contemplated by this development will have no direct social impact in reference to displacement of peoples but will have significant economic opportunity for the community.

Once completed, the expanded Port operations and new cruise operations will create potential stable employment opportunities for the area. The developer will institute a local hiring plan to ensure that the local populace is incorporated as much as possible into the workforce. The construction of the Jane Usher Blvd extension will create a much improved road available

for public use and which will provide for a convenient connection between the Port Loyola area and the Western Highway, relieving congestion within Belize City. This will also lead to improved property values for landowners in the area. Additionally, the shore-side offloading of cruise passengers will divert traffic from the Fort Street area, substantially reducing the traffic impact on the center of the city.

To ensure that there is no negative impact from the project on the neighboring populace, all construction activities will be governed by a comprehensive environmental plan.

Ancillary Activities – Electricity and water will be sourced from local public utilities. Both BWSL and BEL have advised that the Project's anticipated demands are well within their capabilities and would therefore have no negative impact on provisioning for the city. All solid waste originating from both the construction and operation of the Project will be sent to the local sanitary landfill site, while wastewater will be treated on site by a Sequencing Batch Reactor plant. All ancillary activities will be governed by a comprehensive conservation program, aimed at minimizing energy and water consumption while limiting waste generation.

Summary

The extensive investigation of potential impacts of the Project has shown the proposed development to be feasible and minimally impactful. The Project represents a significant investment and modernization of Belize's marine infrastructure and would also serve to substantively expand both cargo and cruise operations at a national level. All activities undertaken as a subset of this development will adhere to the highest international standards of environmental compliance and sustainable development and will positively impact the Belizean economy in direct and indirect opportunities.

CHAPTER 1: PROJECT DESCRIPTION AND LAYOUT PLAN

1.1 Introduction

Since the 1990's, Belize has become a popular destination for cruise guests, offering a unique blend of heritage and soft-adventure experiences. Cruise line operators continually express a favourable view of Belize as a cruise destination in terms of the number and variety of popular and lucrative shore excursion offerings available. Belize cruise traffic like the rest of the Caribbean, receives cruise guests year-round, with November to April being the primary (winter) cruising season. Carnival Corporation's vessels are Belize's main clientele, with approximately 50% of cruise guests arriving on Carnival vessels (490,521 in 2017).

Several cruise lines have expressed an interest and desire for new cruise facilities in Belize, especially one that can accommodate shore-side berthing of ships. All the major cruise lines are operating vessels of greater than 5,000 passengers; a size of vessel considered too large for a tender port within an eight-hour cruise call. Therefore, the creation of a new, land-based facility would allow larger vessels to call at Belize City and leverage high rates of guest disembarkation and participation on shore excursions. It may also encourage overnight cruises which can effectively create a new revenue stream.

The project proponents are aiming to address this apparent shortcoming in the existing offerings by offering shoreline berthing of ships which would reduce turnover time for cruise ships at the port and make Belizean inland and offshore destinations more accessible and attainable. This Environmental Impact and Social Assessment (ESIA) addresses the updated and revised plans for the tourism development of the Port of Belize captioned "The Proposed Dredging of The Port of Belize and the construction of a Cruise and Cargo Terminals and Other Supporting Related Activities."

1.2 Project Justification

As cruise ships become larger, tendering becomes increasingly difficult. Indeed, a cruise ship with capacity larger than approximately 3,500 passengers is considered a shore-side berth only vessel, as tendering becomes impossible within a normal call window. Currently, Cruise ships calling at Belize City are limited to tendering to the mainland from the deep-water anchorage.

The major cruise lines have expressed their intention to cease tender operations by 2024. To avoid port call interruptions, Belize City must have a cruise capable, shore-side berthing option available within that timeframe. To that end, the dredging and expansion of the Port of Belize channel and construction of fixed piers will ensure the long-term survival of Belize City cruise tourism which has become a mainstay revenue for the Southside of Belize

It is estimated that 90% of passengers will disembark at a shore side call as compared to between 30 and 60% with the current tender port. The highly enhanced debarkation rate would mean significantly higher tourist expenditures for Belize. Directly or indirectly cruise tourism is a major employer at the national level. Increased flow of passengers along with the new facility is predicted to create a significant increase in tourism jobs for Belizeans. Shore side berthing would further increase the amount of time spent by passengers onshore by two hours. The increased time onshore combined with increased passenger flow would lead to more passengers taking inland tours and spending more money in Belize. With additional exposure, customers may even return as overnight visitors.

A modern welcoming facility with a significantly increased passenger flow creates ample opportunities for Belizean entrepreneurs ranging from retail to crafts. In addition to entrepreneurial opportunities, this new facility will offer retail, entertainment, and hospitality spaces that would provide decent and stable direct employment for hundreds of Belizeans and spill-off employment to thousands.

At current estimates, the elimination of tender operations and the creation of a modern upland facility would potentially translate into US$500,000 to US$975,000 more daily spending onshore, bringing in crucial foreign currency into Belize. Furthermore, the Government of Belize receives direct revenue from every passenger that arrives in Belize. As more passengers alight due to accessibility this automatically translates into more revenue for GOB, which translates into more revenue for public services.

The proposed development is also providing for the expansion and addition of bulk handing capacity at Port Loyola. Port Loyola's expansion would transform the current Port of Belize by establishing a bulk facility and creating four fixed docking facilities for container and bulk cargo ships. The modernization of Port of Belize along with the establishment of a bulk facility will provide a significant boost to Belizean agriculture and energy sectors, particularly for businesses in the North. There will also be capacity for regional use which further drives up profitability.

The establishment of a bulk facility is expected to bring in an additional 500,000 tons of commodity traffic to Belize City. This enhanced volume means a direct positive impact on the Belizean economy through development of business opportunities and creation of jobs at the port and at expanding Belizean businesses.

Bulk facility and docking facilities built with new and modern cargo-handling equipment would increase the competitiveness of Belizean exporters by significantly increasing the speed at which goods can move and providing scale for Belizean exporters to grow and help to bridge the importation imbalance that currently exists.

1.3 Background to this Project

In 2005, an Environmental Impact Assessment (EIA) was prepared by Tunich-Nah Consultants and Engineering for the "Belize Cruise Terminal and Free Zone Located at the Deep-Water Port Area of Belize City Port" and was granted environmental clearance in 2008. The proposed

Cruise Terminal and Free Zone Project proposed at that time a number of components, which included the following:

- dredging and land reclamation,
- pier/berthing construction,
- sea defences,
- utilities, and
- the construction of buildings.

Since then the Port of Belize went into receivership and the project was suspended, however, with significant time now elapsed the new owners of the Port Of Belize would like to re launch the project given the many benefits it promises to the Belizean economy and the growth of tourism in the country which can support the business case of the project.

The primary proposed development remains similar in nature to the original proposal with the dredging of the 2005 'Turning Basin' and 'Access Channel' increasing in scope to satisfy the eleven (11) meter design-draft requirement to allow the shore-side berthing of four (4) Oasis-class cruise ships, the modification of the present docking facility and trestle or pier to accommodate the shore-side docking of the ships, the construction of a 'Tourism Village' to accommodate the guests from the ships and the upgrading of the cargo terminal to allow the docking of cargo vessels.

1.4 The Port of Belize

The Port of Belize was established in 1978 and officially privatized in 2002. The port's channel and deep-water berth has a draft of 27.6 ft (8.5 m). The current Port of Belize has two cranes with an average lift capacity of 40 metric tons, 75,347 ft^2 (7,000 m^2) of storage warehousing, and two unpaved container yards of a combined 12 acres or 50,000 m^2 unpaved area. Container loading and offloading occurs through use of a berth consisting of a 218 ft (67 m) dock face along with berthing and mooring points totalling 492 ft (150 m) and connected via a 2,500 ft (762 m) long trestle to port. This main berth is capable of accommodating container ships and other similar vessels of up to 489 ft (148 m) Length Overall (LOA). Located on the north- east corner of the dock is the 82 ft (25 m) Roll-on/roll-off (RO-RO) berth with total area of ± 4.34 acres (1.76 Ha) (**Figure 1.1**).

The Port can presently handle container ships with a nominal capacity of up to 1,100 TEU and bulk ships to 10,000 deadweight tons (payload). The capacity for containers is roughly 60,000 TEU per year (constrained by yard space) and is presently 75percent utilised (44,000 TEU/year). With no storage yard for bulk cargoes, the present operations are (discharge) to truck for direct delivery which results in logistics inefficiencies.

The Port primarily handles containerized cargo but is also capable of handling bulk/breakbulk and RO-RO project cargo. The container capacity for the Port is approximately 16 container moves per hour (or 85,000 lifts per year), while priority is given to container vessels over bulk

shipments. The lack of a dedicated bulk handling facility pushes many traditional bulk commodities into containers and increases the costs of exporting bulk commodities (primarily agriculture goods) from the Port.

Port of Belize handles 100% of containerised Belizean import cargoes and over 70% of containerised exports and serves as the primary and most favourably located port serving the main districts of Corozal, Orange Walk, Cayo and Belize, with reasonable access to Stann Creek and Toledo. Belize port is also a viable port of entry/exit for southern Quintana Roo (Mexico) and Peten (Guatemala) provinces.

In 2017, 90% of the total volume (excluding barged sugar exports by ASR-BSI and oil imports through Puma Energy Limited, Belize) by tonnage was containerized, 75% of which were imports.



Figure 1.1: Current Port of Belize Facilities.

1.5 Present National Drivers for Improvement and Expansion of Port Facilities

Seaports have been centres of commerce for centuries, and they remain crucial to the growth of a country's economy. Most exports and imports to Belize are moved through Belize's two major ports – namely the Port of Belize and the Big Creek Port. These two ports generate substantial business activity through their operations, but those benefits are dwarfed by the huge importance of water transportation to other industries, in particular the tourism, agricultural, and trade industries.

While Belize does not have any statutory requirement to produce a Port Master Plan, it has long recognized the value of master planning to determine the shape and direction of transportation infrastructure investments. Recently, the country produced a strategic National Transportation Master Plan which addressed future planning for roads, airports and seaports.

Presently, two destinations welcome cruise ships and guests:

1. Fort Street Tourism Village (FSTV) in downtown Belize City is the main hub for arriving cruise guests in Belize City. Cruise vessels anchor offshore and tender guests to FSTV. Cruise passengers disembark from tenders and are connected to transportation and shore excursion services or explore Belize City on foot. Within the Fort George Tourism Zone, there are shopping centres, restaurants and live entertainment.
2. Norwegian Cruise Line (NCL) made a direct investment in one of their first ever purpose-built destinations at Harvest Caye, south of Placencia and opened in October 2016.

The current trend in the cruise tourism industry is towards bigger ships and faster port turnover. The design of the new Port of Belize facility will address these emerging trends and priorities. The advantages of the Port of Belize's dedicated cruise facilities will include:

1. Ability to accommodate the industry's largest cruise vessels.
2. Operational surety, from fixed piers linked to Belize's mainland to an adjacent labour force and equipment available from Port of Belize facilities.
3. The ability to quickly and efficiently move guests to transportation and logistics facilities, equating to more time onshore potentially eliminating 60 to 90 minutes of time needed for tendering from an anchorage or offshore position to/from mainland.
4. Higher cruise passenger participation levels for offshore excursions.
5. Existing navigation facilities (with deepening and expansion) already in maritime use, and activation of existing land parcels owned by the Port of Belize thereby eliminating the need to create additional facilities in undisturbed natural areas.
6. Additional land for expansion if the need arises.

1.6 Project Description

1.6.1 Project Location

The Port of Belize is located on the south side of Belize City, south of the mouth of the Haulover Creek with offices located at WGS84 UTM Coordinates 372351 m E 1933285 m N. The facility lies within an area of +/-674.63 acres (+/-273 ha) of private land (**Figure 1.2 and Annex III**). Of this acreage, 30.04 acres (12 ha) is jointly owned with Carnival Cruise Lines as Belize Cruise Terminal Limited (red outline) and 12.184 acres (4.9 ha) parcel is under Belize Ports Limited

both of which are not included in the proposed development. The new development will be adjacent to the existing Port of Belize cargo facility and both will share the same port Access Channel and the Turning Basin.



Figure 1.2: Satellite Image of the Project Area.

The property is accessible by land via the Central American Boulevard and Caesar Ridge Road. The latter runs parallel to the north boundary of the facility for some 0.4 miles (0.6 km) ending at the entrance of the Belize Port Free Zone parcel. It is at this point that access to the new development will be created via a proposed boulevard from the project area north to intersect with the Jane Usher Boulevard. The Jane Usher Boulevard will then be extended westward to intersect with the George Price Highway.

The proposed access boulevard will separate existing Port of Belize facility and the new development, giving the cruise tourism project its own access road (**Figure 1.3**).

To the north, across from Caesar Ridge Road and on the corner with Central American Boulevard, is Rig Parts which provides heavy-duty truck parts and repairs and next to it is Lopez Equipment Co. Ltd (Lopez), a commercial and industrial equipment supplier. Across the street from Lopez, is the Customs Department. The residential neighbourhood of Jane Usher Boulevard is also to the north. The north property line of the Port of Belize is demarcated by tall mangrove stands.

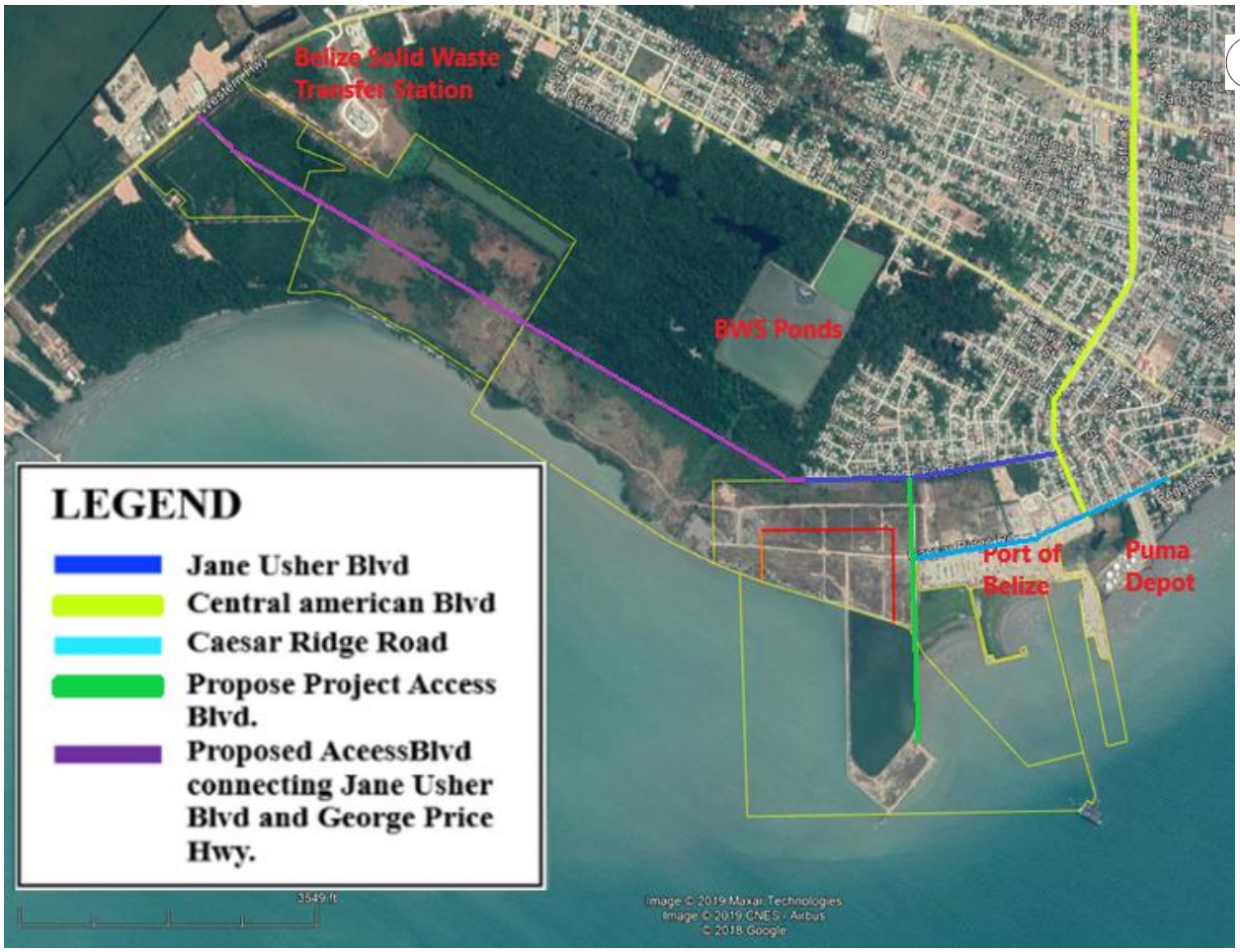


Figure 1.3: Existing Access Points and Proposed New Access Points.

The Belize Water Services Limited (BWSL) Sewer Lagoons are located at the midpoint of the northern boundaries of the property, some 725 ft (221 m) due north. To the east, Puma Energy Limited, Belize (formally ESSO) terminal property serves as the boundary and to the west; the property reaches as far as the George Price Highway. Adjacent to the George Price Highway the Belize City Solid Waste Transfer Station forms the northern boundary. The southern property line includes part of the seabed as depicted in **Figure 1.3. Table 1.1** shows some of the coordinates of the proposed development. **Annex IV** list the entire projects UTM Coordinates based on Land Titles.

Table 1.1: Projects UTM Coordinates – WGS84 Datum

	Points	m Easting	m Northing	Observation
1	P1	369049.71	1934669.50	South West boundary George Price Highway
2	P2	369438.27	1934973.44	North West Boundary George Price Highway

3	P3	371421.17	1933525.50	North Boundary Jane Usher Boulevard
4	P4	371867.12	1933526.43	North East Boundary Jane Usher Boulevard
5	P5	372346.09	1933280.19	Port of Belize Main Office
6	P6	372527.07	1933000.59	Low Berth Facility
7	P7	372512.07	1932385.27	Deep Water Berth
8	P8	371845.10	1932455.57	Proposed Cruise Terminal Piers Area
9	P9	370743.04	1933739.16	Project land

1.6.2 The Physical Development Plans and the Description of the Facilities.

The Port of Belize Master Plan calls for separate and distinct cruise and cargo zones to maximize the overall functional attributes of each area as well as to reduce the negative impacts that could be associated with aesthetics, noise and safety. The Plan includes the following elements:

1. Cruise Centre Gateway Boulevard – As envisaged, a large, 50 m x 650 m area will be set aside to allow for the creation of an appealing arrival and departure experience to the Cruise Centre, as well as buffer cruise and cargo zones.
2. Landscaping - Sound attenuation elements and visual screening will be incorporated into design elements of both cargo zones and cruise port areas.
3. Separate gates and main entry points for both the Belize Cruise Centre and Trade Centre. Both cargo and cruise traffic will share space on the extension of Jane usher Boulevard west through Port of Belize lands to link to the George Price Highway.

Statistics indicate that about 35% of the total passengers alight whenever cruise ships make port calls, therefore, it is estimated that at full operation the cruise terminal will be handling four large cruise ships calling simultaneously, with the potential to have 13,500 cruise guests onsite along with 300 crew members.

It should be noted that the original development plan in the approved 2005 ESIA has been totally replaced by the development plan in this new ESIA. This ESIA addresses the latest national environmental protection measures, improved techniques, most advanced technologies and most recent legislations. These safeguards will help to protect the environment while implementing the investors' vision. Central to this new way of thinking is the implementation of new and more environmentally friendly approaches. The project will consist of the following (**Figure 1.4 and Table 1.2**).

1.6.3 The Turning Basin and Access Channel

The Port of Belize is proposing to dredge the 'Turning Basin' and 'Access Channel' to allow the safe transit of cruise ships having a design-draft of 11 meters. The plan entails the deepening of the existing channel and turning basin associated with the expansion of the existing cargo

terminal, and the construction of a new cruise terminal and tourist village to accommodate the guests from the ships. The cargo terminal will also be upgraded to allow the simultaneous servicing of 3-4 larger vessels, and the construction of an extended trestles or piers to accommodate the shore-side docking of ships (**Figure 1.5**).

The proposed undertaking will result in increased dredge materials volume, from approximately 1.75 million cubic meters (m^3) in the initial 2005 proposal to a new total dredge volume estimated at 7.5 million m^3, including over dredging[1]. This will provide access for the industry's largest cruise vessels, including ships greater than 365 m Length Overall (LOA). This difference is attributed to the need to cater for Oasis-class cruise ships requiring deeper navigation channels.

The dredging scope will entail the dredging of a 7.5 km long access channel with a depth of 12 m CD[2] and width of 190 m with side slopes between V1:H1 and V1:H5, the dredging of a 550 m wide - 12 M CD deep turning basin, as well as the dredging of berth pockets along the two proposed piers to the same depth. The indication of V1:H1 indicates the ratio of the slope and projected dimension of the side slopes of the channel, meaning that per each vertical meter of side slope there will equally be a horizontal meter of side slope. "V" indicates "vertical slope", and "H" indicates "horizontal slope. A V1:H5 side slope presents a flatter side slope of the channel, with 1 vertical meter per 5 horizontal meter of side slope.

Chapter 5 further discusses the proposed deepening of the existing channel and turning basin, the type of dredging equipment to be used and excavated material that will be produced and the alternative methods for their safe disposal with an elucidation of the pros and cons of each option considered.

[1] Overdreding refers to the vertical dredging tolerance below the project's designed depth
[2]CD: Chart Datum is the level below which depths are indicated and above which heights of the tides are expressed; usually mean level of low water at a spring tide.

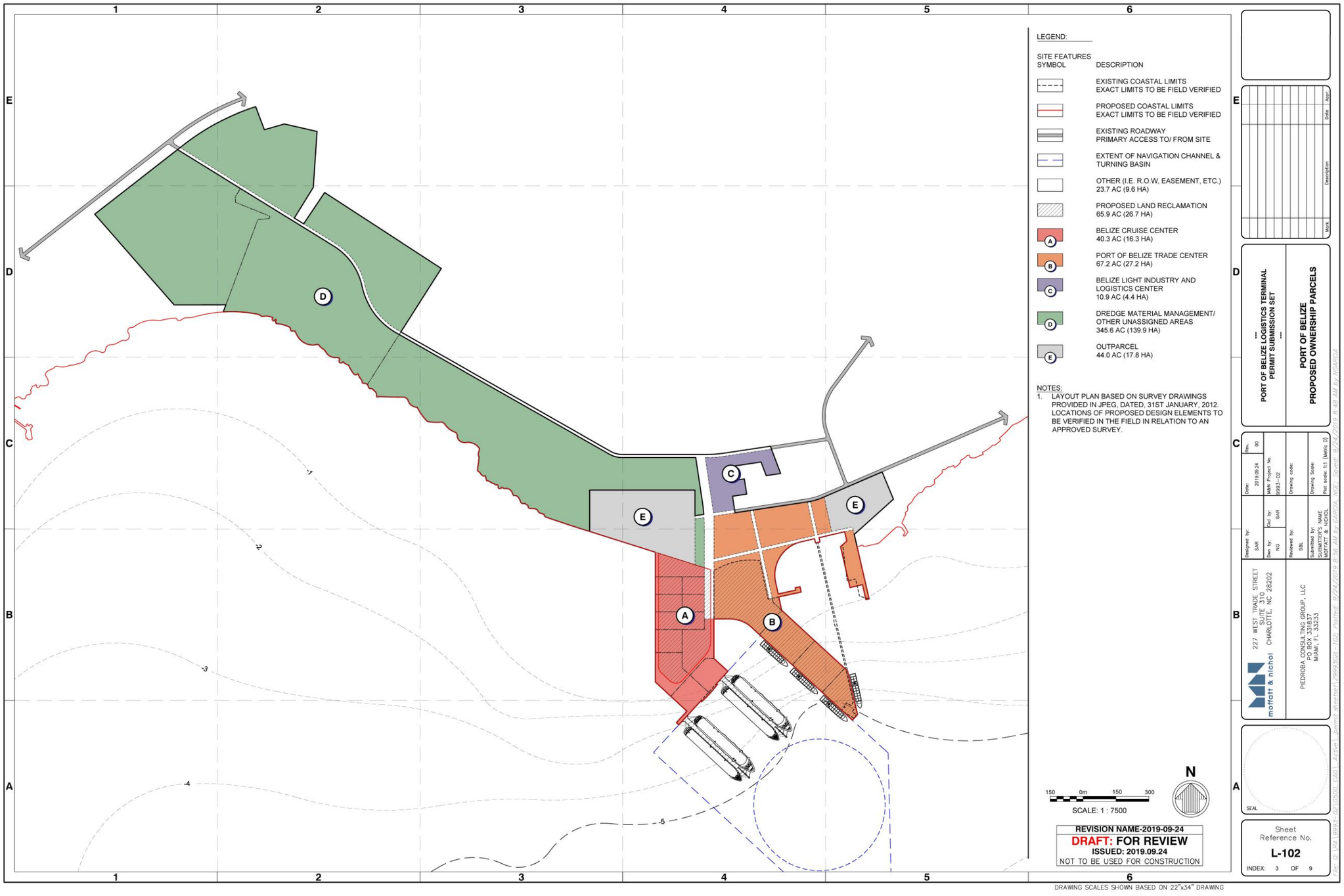


Figure 1.4: Plan for the proposed project showing the terrestrial area and cruise and cargo berthing facilities.

Table 1.2: **Development profile summary (footprint).**

LOCATOR		PARCEL			BUILDINGS					
ZONE	PARCEL	GENERAL LAND USE	AREA (Acres)	AREA (ha)	DEPTICTED BUILDINGS (in plan)	DEPICTED BUILDING FOOTPRINT (in plan, sqm)	DEPICTED BUILDING TOTAL AREA (in plan, sqm)	PERMITTED HEIGHT (m)[1]	PERMITTED FAR[2]	PERMITED GFA (sqm)[3]
Belize Cruise Center	A1	Maritime (cruise arrivals area), Commercial, Logistics	4.1	1.66	4	3,000	5,250	10	0.7	11,615
	A2	Maritime (cruise arrivals area), Commercial, Logistics	3.7	1.50	3	2,700	4,725	10	0.7	10,481
	A3	Commercial, Attraction, Logistics	5.4	2.19	2	1,695	2,543	40	1.0	21,853
	A4	Commercial, Attraction, Logistics	6.4	2.59	2	2,830	4,245	40	1.0	25,900
	A5	Commercial, Attraction, Logistics	3.2	1.29	1	1,430	2,145	40	1.0	12,950
	A6	Commercial, Attraction, Open Space	4.4	1.78	0	0	0	40	1.2	21,367
	A7	Commercial, Attraction, Hospitality, Open Space	2.4	0.97	0	0	0	80	2.5	24,281
	A8	Commercial, Attraction, Open Space	2.0	0.81	0	0	0	40	1.2	9,712
	A9	Commercial, Attraction, Hospitality, Open Space	2.4	0.97	0	0	0	80	2.5	24,281
	A10	Commercial, Attraction, Open Space	2.0	0.81	0	0	0	40	1.2	9,712
	A11	Commercial, Attraction, Open Space	4.3	1.74	0	0	0	40	1.2	20,882
		SUB-TOTAL	**40.3**	**16.3**		**11,655**	**18,908**			`
Port of Belize Trade Center	B1	Maritime, Industrial	8.5	3.44	2	4,800	4,800	20	0.7	24,079
	B2	Maritime, Industrial	10.3	4.17	2	5,520	5,520	20	0.7	29,178
	B3	Maritime, Industrial	2.6	1.05	4	1,855	1,855	20	0.7	7,365
	B4	Maritime, Industrial (agro-bulk center)	18.8	7.61	5	12,000	24,000	90	2.0	152,162
	B5	Maritime, Industrial	3.6	1.46	0	0	0	20	0.2	2,914
	B6	Maritime, Industrial (low berth domestic freight)	4.4	1.78	0	0	0	20	0.2	3,561
	B7	Maritime, Industrial (container yard)	7.6	3.08	0	0	0	20	0.2	6,151
	B8	Maritime, Industrial (container yard)	6.9	2.79	0	0	0	20	0.2	5,585
	B9	Maritime, Industrial (container yard)	4.5	1.82	0	0	0	20	0.2	3,642
		SUB-TOTAL	**67.2**	**27.2**		**24,175**	**36,175**			
Belize light Industry and Logistics Center	C1	Logistics, Industrial, Maritime, Commercial	10.9	4.41	7	18,857	37,714	20	1.2	52,933
		SUB-TOTAL	**10.9**	**4.4**		**18,857**	**37,714**			
Dredge Material Management/ Other Unassigned Reserved Areas	D1	Open (Dredge Material Management)	2.3	0.93	0	0	0	10	0	-
	D2	Open (Dredge Material Management)	126.3	51.11	0	0	0	10	0	-
	D3	Open (Dredge Material Management)	91.0	36.83	0	0	0	10	0	-
	D4	Open (Dredge Material Management)	79.5	32.17	0	0	0	10	0	-
	D5	Open (Dredge Material Management)	42.2	17.08	0	0	0	10	0	-
	D6	Open (Dredge Material Management)	37.4	15.14	0	0	0	10	0	-
		SUB-TOTAL	**378.7**	**153.3**		**0**	**0**			
Outparcel	E1	Commercial, Attraction, Hospitality, Open Space	31.3	12.7	n/a	n/a	n/a	n/a	n/a	n/a
	E2	Maritime, Industrial	12.7	5.1	n/a	n/a	n/a	n/a	n/a	n/a
		SUB-TOTAL	**44.0**	**17.8**		-	-			
Road ROW(s), Utility Easement(s), Other	n/a	Road ROW(s), Utility Easement(s), Other	23.7	9.59	n/a	n/a	n/a	n/a	n/a	n/a
		SUB-TOTAL	**23.7**	**9.6**		-	-			
		TOTAL	**564.8**	**228.6**		**54687.0**	**92796.5**			

(1) Total permitted height of buildings and structures in the parcel.
(2) Floor Area Ratio.
(3) Total permitted gross floor area based on site of parcel and assigned FAR.



Figure 1.5: Diagram showing the channel and turning basin to be dredged.

1.6.4 Improvements to the Present Port Facilities (*Annex V*)

(i) General Cargo Area and Bulk Cargo

Material from the dredging of the channel and turning basin will be used to fill property that presently lies under water to extend the Port of Belize cargo area. Once filled, the general cargo area will have a length of 622.7 m and 250m wide at its base covering a total area of approximately 8.67 ha. The proposal is to habilitate this area in three phases viz:

- Phase 1 - The first section (immediately in front of the Bulk cargo) will have a measurement of 204 m by 250 m,
- Phase 2 - the second section will adjoin the first section and will have a measurement of 185 m by 250 m and
- Phase 3 - the third section, will adjoin the second section with a measurement of 186 m length and 250 m height.

This new cargo area will end at the present deep-water berth and will have the ability to dock four ships at once with easy access to land specifically the existing container yard and the new bulk cargo area.

A new bulk cargo area will be built to allow for easy handling of import and export bulk cargo handling which is presently lacking. This area will have four storage silos and bulk storage shed. The entire area will cover approximately 6.36 ha.

(ii) Local Berthing Facility

The present local berthing facility will be improved and an additional section will be added immediately across from the present one to improve navigational access. This new section will have the ability to service an additional two local cargo vessels. The total area will cover 3.12 ha (7.7 acres).

(iii) Container Yard

The present container yard will also be improved and an additional 3 storage sheds will be constructed to facilitate the expected increase of container cargo once the project is completed. This area will be paved and will cover an estimated 7.95 ha (19.6 acres).

1.6.5 Cruise Terminal Facilities

1.6.5.1 Cruise Terminal Piers

Cruise and cargo operational areas often hold proximity to one another, and in some cases, utilize the same vessel berths. For the Port of Belize Master Plan, cruise and cargo areas have been provided distinct zones to maximize the overall functional attributes of each area as well as reduce negative visual, noise, odour and/or air quality impacts.

To achieve this, two similar cruise terminal piers extending southeast from the Tourism Village will be constructed to accommodate shore-side berthing of four (4) Oasis-class cruise ships. Each pier will be 21m wide by 320m long with three mooring dolphins 30 m apart, extending the berthing area by another 72m. The distance between piers is planned at 230m. Each pier will fall within the Port's defined security zone and will meet the requirements of international Ship and Port Facility Security Code (ISPS Code) (**Figure 1.6**).

The program for the Tourism Village development may be split into two phases, with construction of a single pier (Pier A) first and a second pier (Pier B) will be built as resources become available for consolidation of reclaimed land.

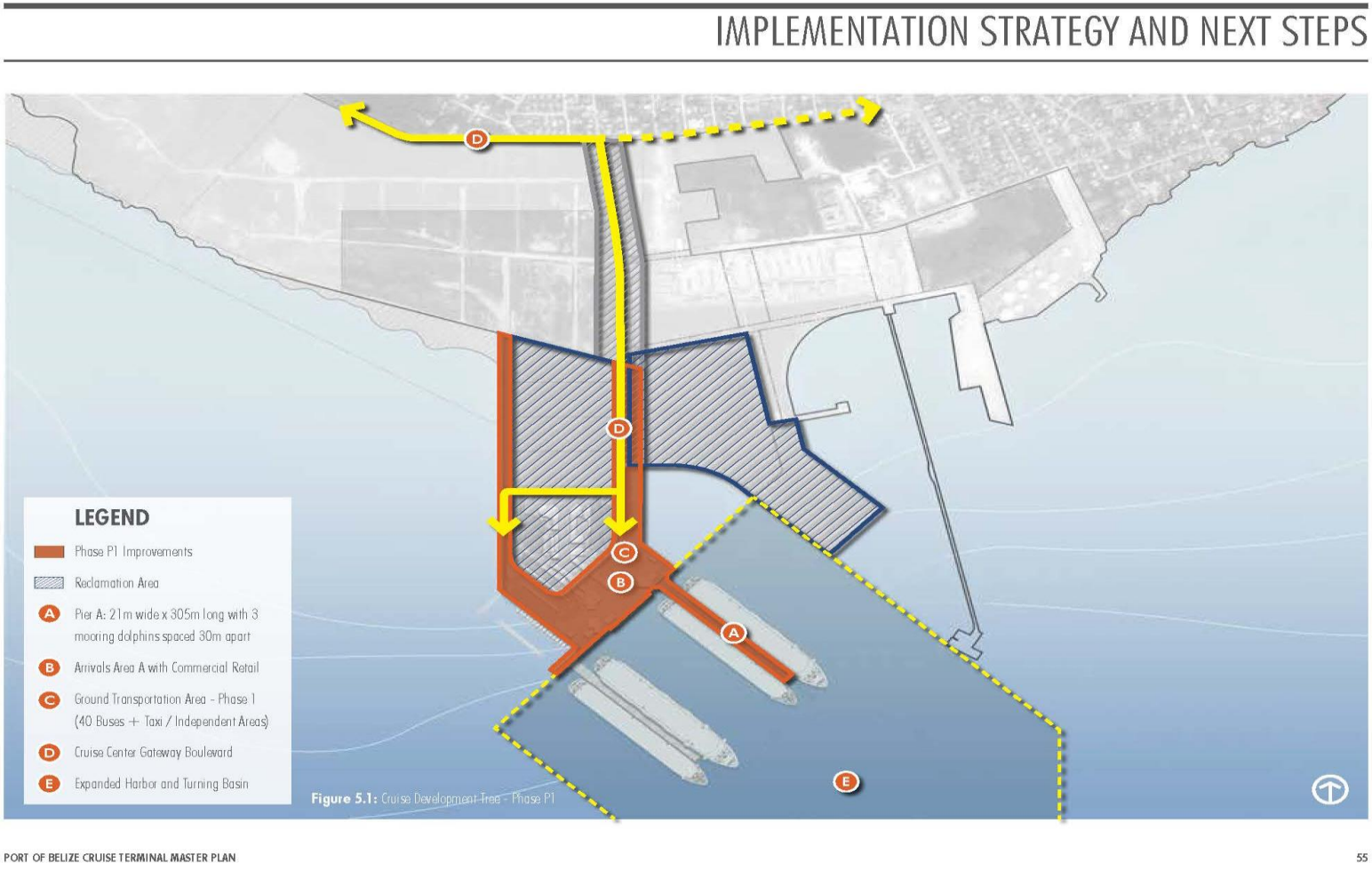


Figure 1.6: Proposed development of Pier A and its related cruise terminal amenities. (Inset: Satellite imagery of the present area).

1.6.5.2 Cruise Terminal and Tourism Village

The Project will utilize the existing 5ha peninsula located at the terminus of the new turning basin, along with an additional 12ha of area that will be created through filling the manmade lagoon found at the center of this area and extending back to the shoreline. This new area will comprise a total of 16.3ha (40.3 acres) and provide the area needed for linkage to the cruise piers and engineered shoreline protection, passenger arrivals and logistical zones, commercial areas and developable plots (**Figure 1.7 and Annex V**).

The Developer is aware that any major changes after the issuance of Environmental Clearance (EC) will require notification and approval by Department of the Environment (DOE) and may involve changes to the Environmental Compliance Plan (ECP) addressing these changes.

In the following narrative please refer to the numbers in **Figure 1.7**.

(i) North and South Pier Arrivals (#1 and #2)

The North and South Pier Arrivals (# 1 and #2) will be similar in size and design covering an estimated area of 800m each. They will serve as the port of entry building for cruise ship visitors and will house the immigration and customs offices and welcome and information centre which will orient visitors and give guidance to their destinations while in Belize.

(ii) Arrival Plaza and Performance Area (#3)

The Arrival Plaza and Performance (#3) area will have a footprint of approximately 5,000m^2. This will be an open space with a covered stage, semi-circular in shape and with an area of 350m^2 for local cultural performances as well as a building with dimension of 500m^2 to serve as changing room and for storing props. The area will be located between the North and South Pier Arrivals.

(iii) Tourism Village (#4)

The Tourism Village (#4) will be located in the centre of the cruise terminal facilities. Linking the north and south area and arrivals plazas will be a singular 20m wide pedestrian avenue, sequenced plazas and smaller attraction areas. Retail shops, food and beverage outlets, open air market(s) and other amenities will line the central avenue and connecting side streets and alleys.

This village will have a total footprint of approximately 15,000m^2 of commercial space most of it as the ground floor. Three such spaces will line the right-hand side of the pedestrian avenue and four of these will be located to the left of the pedestrian avenue. If need be this can be scaled further to meet the needs of the developer and tenants.

Also contemplated are open-air arrivals halls, tourist information centers, independent shore excursion booking area, restrooms, port administration and space for other operational requirements.

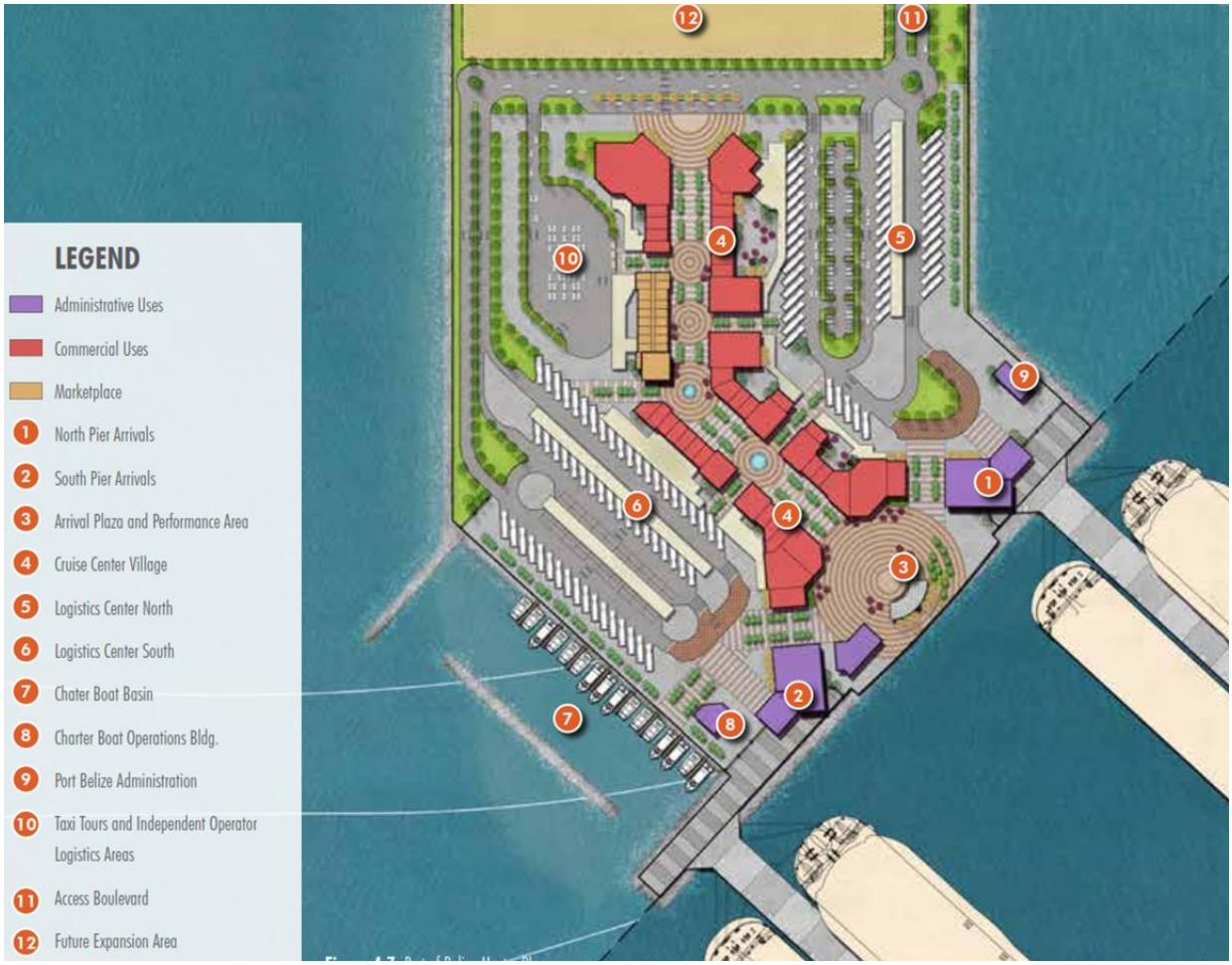


Figure 1.7: Proposed Cruise Terminal and Tourism Village.

(iv) Logistics Area (Parking Areas) (#5, #6 and #10)

Three logistics areas or parking areas (#5) will be constructed and will be located to the right of the Tourism Village (#4). This area will consist of three passenger bus-bays with two covered waiting areas and an open space staff parking bay between two of the passenger bus-bays. The other logistic area (#6) will be located to the bottom left of the Tourism Village (#4).

This will consist of three passenger bus-bays with two covered waiting areas. A taxi and independent tour operator logistic area (#10) is also being proposed and will be located to the top left of the Tourism Village (#4). This will be used by individual tourists who opted out of group tours and who prefer personal city tours etc.

(v) Charter Boat Basin and Operation's Building (#7, and #8)

A Charter Boat Basin (#7) will have a length of 196m and a width of 70.8m to give a total area of 13,877$m^{2.}$ This facility will be located along the southwest edge of the Belize Cruise Centre and immediately above Pier B. The basin will be equipped with eight slips covering three

quarters of the area to accommodate 16 water vessels of various sizes. The remaining area will be set aside for future berthing expansion if needed. Also included in the design is a small boat excursion harbour.

This basin will serve as the location for pick-up and drop-off of guests travelling on tours to the Blue Hole, Goff's Caye, Starfish island and other waterborne tour venues. The harbour can also support water taxi operations to bring guests to/from Belize City" (Please refer to Port of Belize Cruise Terminal Master Plan, 2019).

A Charter Boat Operation's Building (#8) (15m by 15m or 225m^2 footprint) will also be built for the management and operation of the boat basin.

(vi) Port of Belize Administration Building (#9)

Although Port of Belize, in cooperation with Belize Logistics Terminal Ltd. (the upland property owner) is the proposed developer, the Cruise Terminal and the Tourism Village will be a separate and independent entity. The administration building (#9) will house the administrative offices for the Cruise Terminal and Tourism Village. The building will be a 20m by 10m for a total foot footprint of 200m^2.

(vii) Cruise Activity and Operations Centre

The portion of land on Parcel 2232 that lies between Jane Usher Boulevard and Belize Cruise Terminal land (Parcel 4) and to the west of the Customs and Excise Department complex is being designated as the Cruise Activity and Operations Centre. This area will cover approximately 5.37ha (13.3 acres). Seven building of varying dimensions will be constructed in this area to house the following:

1. Construction Camp and Maintenance building for working area and equipment storage during the development and operation of the project,
2. Utility Zone (Back-up Generators and Waste Treatment Plant, etc.).

1.6.6 Road, Street and Drains

An efficient and well planned new roadway will be key to moving passenger buses, taxi and other traffic from the Tourism Village into Belize's hinterland where much of the nation's attractions exist and to share the economic benefits of the Cruise Port with national stakeholders. The Master Plan calls for separate gates and main entry points for both the Tourism Village and the Port of Belize. Both cargo and cruise traffic will share space on the extension of Jane Usher Boulevard west through Port of Belize lands to link to the George Price Highway. The two primary investments in this area that are envisioned include:

1. A new north-south boulevard (#11) 60 m wide running parallel to the port's west boundary from the Tourism Village (#4) to the Jane usher Boulevard. This boulevard will provide the main gateway to/from the project, and as such, should provide attractive

layout, landscaping and other features aligned with the Tourism Village brand and destination overall. This boulevard with its greenway buffer will cover a total acreage of 6.20 ha (15.3 acres) and

2. An extension of the current Jane Usher Boulevard west through Port of Belize lands to connect to the George Price Highway. This roadway link will likely reduce travel times to heritage and other excursion sites by 5 to 15-minutes, avoiding the current roadway network and traffic associated with current Port of Belize activities which now must pass through Belize City (**Annex V**).

The section of Caesar Ridge Road running parallel to the project area will also be improved to facilitate easy alternative access to the project site. The present internal road network at the Port of Belize will also be improved to facilitate easy manoeuvring of export and import cargo. A road network will be constructed to give access to the new General Cargo Area and Bulk Cargo areas.

The road network will be paved, with adequate drains following the natural contour of the land. All drains discharging to the sea will be outfitted with sumps and weirs to prevent the discharge of debris. The traffic flows will be organized as a series of one-way loops to maintain safe, efficient traffic flows (See **Chapter 11**).

1.6.7 Supporting Structures, Amenities and Auxiliary Facilities

The site will require substantial supporting facilities and amenities to function smoothly and to promote visitor appeal. These include:

(i) Landscaping

Sound attenuation elements and visual screening through the use of green belts will be incorporated into design elements of both the cargo zone and cruise port area. Clustering of vegetation and berms will offer a cost-effective approach, allowing these elements to become integrated pieces in the overall landscaping plan for the Tourism Village and non-operational areas of the cargo zone.

(ii) Employees' Quarters

There will be no Employee's Quarters as permanent, managerial and essential staff such as maintenance crew, shift and security personnel, and non-essential employees will be housed in Belize City and nearby residential urban and peri-urban areas with transportation provided to and from work.

(iii) Proposed Land Filling

The proposed Turning Basin and Access Channel dredging will produce an estimated total volume of dredge material of 7.5 million m^3. Based on the findings of the JDN's Site Investigation Report (2018), the areas to be dredged are composed of loose sand, soft silt/clay,

firm/stiff clay, peat, clayey marl, gravely marl, weak limestone, and general undefined material. The soft silt/clay, firm/stiff clay, peat, clayey marl, and undefined material are classified as unsuitable material to be used for the development of the port.

The gravely marl and limestone are classified as suitable material for development. This material of approximately 2.5 million m^3 by volume will be used for primary reclamation activities, with priority given to the creation and extension of the land area at the Tourism Village followed by the cargo zone. The remaining 5 million m^3 will require suitable areas for disposal (See **Chapter 5**).

The dredging is expected to be undertaken by JDN, one of the world's largest dredging and marine contractors. This company has significant experience in the Caribbean and recently in Belize.

(iv) Utility Zone

The Project will require a backup energy-generation station, an area to house the potable water supply system (well pump and supply line pumps etc.), sewage treatment and solid waste management facilities. The location of the utility zone takes into consideration the wind direction, to avoid potential residual impacts associated with odour and noise pollution during the operations of equipment. The sewage treatment facilities and solid waste management site will also be sited in such a way that any malodorous smell that may be produced is carried away from areas on site frequented by visitors, dwellings and business adjacent to the project area.

(v) Energy Generation

It is estimated that the total energy consumption of the Port of Belize development will be 11,698-megawatt hours/year. Since Belize Electricity Limited's (BEL) power line currently and satisfactorily serves the Port of Belize's cargo and administrative facilities the Project will use this provider.

The project will acquire a backup generator to meet energy demands during periods of power loss due to BEL's power outages or during load shedding for repair and maintenance of the transmission's lines. There is also the possibility of using solar powered lighting in certain areas of the site.

It is anticipated that a small supply of fuel will be required for the operation of the backup generator. In addition, LPG (Propane-Butane) fuel will be used for cooking, etc.

At commercial units (restaurants etc.), fuel will be stored in approved containers. Boat and generator fuel will also be properly stored. Other types of fuel such as LPG will be stored using recommended guidelines. A full description of the project's energy requirements is given in **Chapter 10** of this document.

To meet the demand of 11,698-megawatt hours /year, the developers have scheduled preliminary discussion with BEL.

(vi) Potable Water Supply

The project site currently has access to the Belize Water Services Limited (BWSL) water supply main and it is expected that this source will be adequate to meet the projects projected demand. The project will rely on purified water for human consumption and this demand will be outsourced to a local supplier (See **Chapter 7**).

As part of the water conservation plan, Port of Belize will integrate both direct and indirect reuse of post-treated water for landscaping and irrigation, non-potable uses with the remainder subjected to surface disposal when applicable. The recycled water will meet and exceed the national requirements for treated gray water. The recycled water will be stored in cisterns to be located near the wastewater treatment plant.

(vii) Sewage Treatment

Consistent with the objectives of ensuring an environmentally friendly development, the project proponents intend to utilize the best applicable technology and practices in wastewater management to mitigate the negative ecological impacts that are often associated with improperly treated sewage. Wastewater generated on the project site will be coming from the administrative offices, commercial complexes and the sanitary facilities that are expected to be placed at strategic locations within the tourism village. Based on the information provided on available options with their advantage and disadvantages, the proposed Cruise Terminal and Tourism Village has decided to select the "Sequencing Batch Reactor (SBR)" plant or a plant with similar treatment capacity and efficiency. These compact plants are widely used nationally due to their availability and proven performance record. SBR plants can reduce the Biological Oxygen Demand and Total Suspended Solid mass to less than 10 mg/L. The treatment plant can also reduce TSS and BOD5 total loading by some 97%, and decrease the daily Organic Nitrogen Total Loading by 67%. Additionally, this system is able to reduce Total Free Ammonia Loading by 97.5% and Total Phosphate Loading by some 80%.

(viii) Solid Waste

The Solid Waste Management Plan proposed for the Port of Belize Project could be divided into two main phases: a) Construction Phase and b) Operational Phase.

During the construction phase, the amount and characterization of the solid waste produced will be primarily in the form of construction waste. In the operational phase, it is projected that almost the entire amount of waste generated will be from domestic sources with lesser amounts from maintenance and construction.

The project will take advantage of the proximity of the Belize Waste Control Company and will be using their services to conduct bi-weekly inorganic non-biodegradable domestic waste collection and disposal. Solid waste will be temporarily stored in a 20 ft. x 20 ft. chain-linked fenced area in covered industrial waste metal bins (see **Chapter 9**).

The final disposal option for solid waste will form part of a more integrated solid waste management plan that incorporates measures to reduce, reuse, and recycle the domestic solid waste from the day-to-day operations of the facility.

(ix) Transportation

Land-based transportation during the construction phase will be limited to the movement of materials to and from the project site. During this phase most transport movements will be to dispose of dredge material at landfills and to transport construction materials for the construction of the Tourism Village and other amenities.

The operational phase, will include substantial numbers of land and marine transportation activities. On land, the proposed development will involve movement of personnel and visitors to the various attractions and recreational areas. Water vessels, primarily those involving Cruise liners and the charter boats will transport visitors via the dredged port channel.

It is expected that cargo ships will use the access channel and turning basin to offload and unload cargo at the Port of Belize and to off load fuel at the PUMA Energy Limited terminal. There is the possibility that other cruise lines and guests may use the channel to visit other cruise terminals and amenities (see **Chapter 11**).

1.6.8 Archaeological or Cultural Interests

There are no visible cultural remains located on the property. This however should not suggest the absence of archaeological remains since previous archaeological work along the coast of Belize has unearthed many inundated sites in low lying areas, some down to two (2) meters deep. If during construction and operation of the Cruise Facilities, any finds are made, the Port of Belize will follow the Institute of Archaeology's requirements and report any new sites or artefacts discovered.

1.6.9 Construction Phase

It is anticipated that the construction phase for the Tourism Village and associated amenities will take place over a 4-year period (**Table 1.3**). In order to provide access to the project area during this First Construction Phase, the roadways to the Bulk Cargo area and Tourism Village must first be constructed and paved (**Chapter 11**).

A construction camp will be placed at the north-eastern corner of the development property. Temporary energy supply will be source from the national grid for daily operations and lighting for the area. As the construction progresses, this facility will be converted to permanent structures to service the project during the operational phase.

1.6.10 Operational Phase

The following assumptions apply to the operational phase of the cruise tourism project:

(i) Capacity

Considering that on average only 35% of passengers and crew members alight cruise ships while in port, the Port of Belize Tourism Village is expected to accommodate on average 13,140 potential cruise ship guests and 300 crew members provided there are four cruise ships calling port at once.

Table 1.3: Pre-Construction and Construction Phases

	TIME FRAME			
PROJECT	**YEAR**			
Concepts and Components	1	2	3	4
Pre-Construction				
Construction Camp	X			
Construction				
Road, Street and Drains	X	X	X	
Cruise Activity and Operations Centre	X	X	X	
Cruise Terminal Piers	X	X		
General Cargo Area and Bulk Cargo	X			
Construction of Buildings:				
❑ Tourism Village		X	X	
❑ Arrival Plaza and Performance Area		X	X	
❑ Port of Belize Administration Building		X	X	
Construction of Infrastructure Logistic Areas (Parking Areas)			X	
Charter Boat Basin and Operation's Building			X	
Commercial Areas: Restaurants/Bars, gift shops, snack shops and exhibits and other tourist commercial ventures.			X	X
Reception Area			X	
Security House and main Tourism Village Entrance	X			
Maintenance and Utilities				
Service - Maintenance Facility	X	X	X	
Installation of back up Energy Supply			X	
Liquid and Solid Waste Treatment Facility			X	
Other Activities				
Dredging	X			
Land Filing- for land reclamation	X	X	X	
Landscaping and site consolidation	X	X	X	X

In order to service this number of visitors the project is expected to employ 250 employees (management and staff) including permanent and temporary staff in addition to staff employed by the independent business franchises operating in the village.

(ii) Management Structure

The Developer has proposed the following provisional management structure for its new development (**Figure 1.8**).

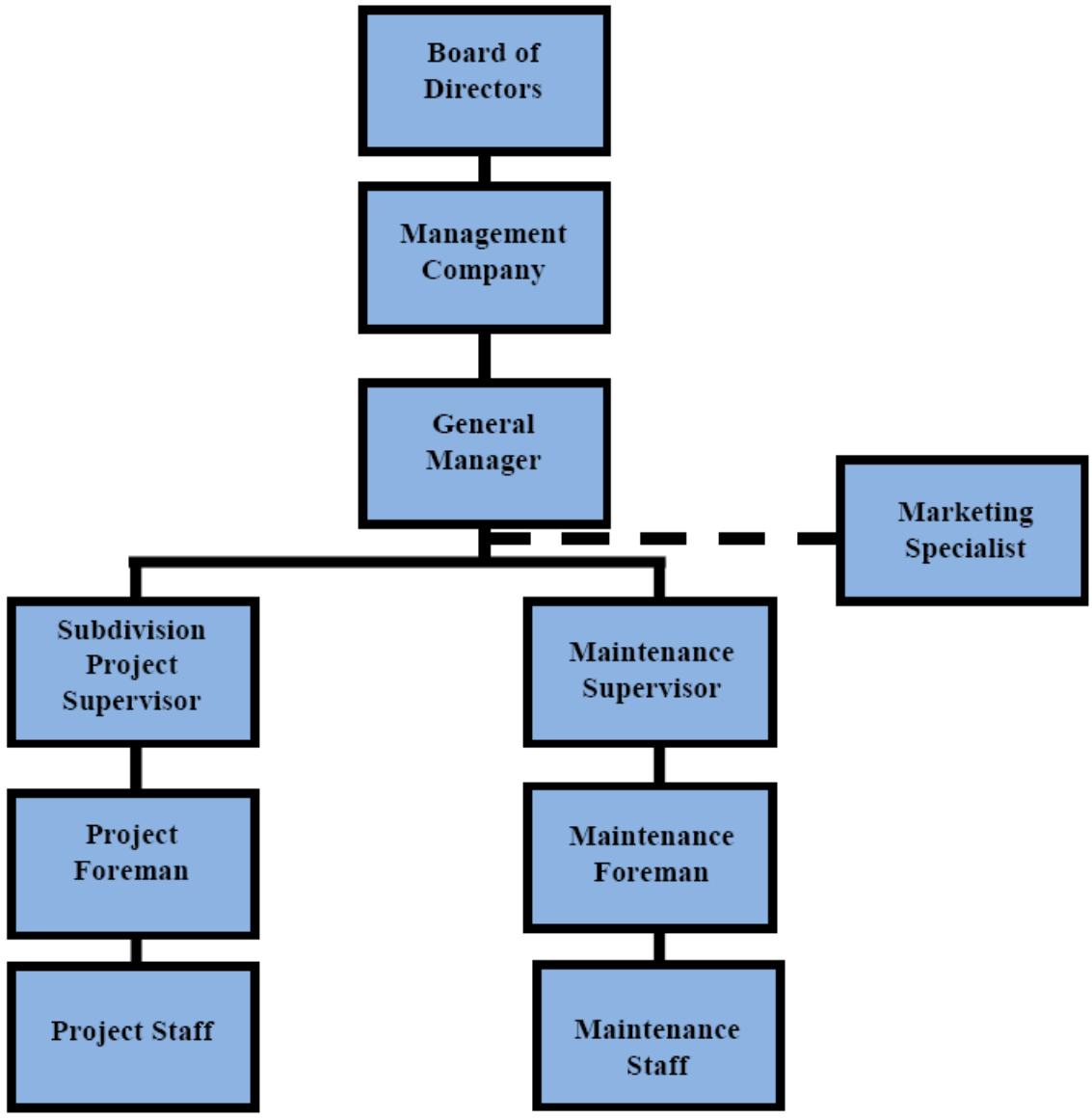


Figure 1.8: Proposed Management Structure of the Project

CHAPTER 2: ENVIRONMENTAL AND SOCIAL BASELINE

2.1 Physical Environment

2.1.1 Climate and Climate Variability

The following describes the main climatic patterns and influences within the project area:

(i) Weather and Rainfall

Climatic conditions at the Port of Belize project site (Southside Belize City) is tropical maritime, typical of other localities along the coastal zone of the country. **Figure 2.1** is a Google Map of Belize City and the Port of Belize relative to the National Meteorological Service (NMS) weather station at the Philip S.W. Goldson International Airport (PGIA) near Ladyville. The data presented in this section has been predominantly generated by the National Meteorological Services of Belize.

The annual rainfall regime is bimodal, with rainfall peaks in June and October at the Philip S.W. Goldson International Airport (**Figure 2.2 and Table 2.1**), and June and September in the Belize City area at St. John's College, Landivar (**Figure 2.3**). The rainfall maxima are separated by a characteristic mid-summer dry spell in early August (*maga season*). A marked dry season is evident from March through May.

The cool transition period runs from November through February with its characteristic cool air incursion from the north. Mean annual rainfall is about 1,892 mm (74 in) at PGIA and 1,963 mm (77 in) in the Belize City area. **Figure 2.3** shows the climate chart for St. John's College, Belize City based on the historical period 1970 – 2005.

Surface air temperatures in the Belize City area is strongly moderated by fresh sea breeze, and the climate shows less variability than inland. The average annual temperature is 27 °C (**See Figure 2.3**). The warmest months are April through June with daily average temperature of 29 °C. The coolest month is January when the daily average temperature drops to about 24 °C. The maximum temperature record for Belize City is: 37.8 °C and the lowest recorded was 7.8 °C (NMS, 2010; WMO, 2016). The monthly average mid-afternoon humidity at the Airport is about 65% during the dry season, and near 70% in the wet season (**See Table 2.1**).



Figure 2.1 Port of Belize is located on the Southside of Belize City.

Table 2.1: Climate statistics for key weather elements for Philip Goldson International Airport.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Yrs
AVG TMP Daily ºC	**24**	**24.9**	**25.9**	**27.3**	**28.3**	**28.5**	**28.1**	**28.2**	**28**	**27**	**25.6**	**24.5**	**26.7**	**30**
AVG MAX TMP Daily ºC	**27.9**	**28.8**	**29.8**	**31**	**31.8**	**31.7**	**31.4**	**31.6**	**31.5**	**30.6**	**29.3**	**28.3**	**30.3**	**30**
AVG MIN TMP Daily ºC	**20.2**	**21.1**	**22**	**23.6**	**24.8**	**25.4**	**24.9**	**24.9**	**24.5**	**23.5**	**21.8**	**20.7**	**23.1**	**30**
RH IN Afternoon (%)	**69**	**66**	**65**	**65**	**66**	**70**	**70**	**70**	**70**	**70**	**70**	**69**	**70**	**68**
AVG PPRECIP Monthly (mm)	**153**	**73.7**	**47.8**	**57.2**	**137**	**229**	**194**	**194.4**	**249.4**	**281.9**	**114**	**145**	**1892**	**30**
Num Rain Days > 1 mm	**11**	**7**	**5**	**4**	**7**	**13**	**15**	**15**	**17**	**15**	**13**	**12**	**11**	**30**
AVG EVAP TOT Monthly (mm)	**135**	**109.4**	**148.6**	**167.1**	**172**	**141**	**149**	**139.1**	**115.4**	**102.3**	**87.4**	**83.7**	**129.2**	**30**
Monthly WND SPEED (Knots)	**4**	**5**	**6**	**6**	**6**	**6**	**6**	**5**		**4**	**4**	**4**	**5**	**30**
Monthly WND Direction	**E**	**SE**	**SE**	**SE**	**SE**	**SE**	**E**	**E**	**SE**	**SE**	**N**	**E**	**SE**	**30**
Num Days w/ Thunder	**1**	**1**	**1**	**2**	**4**	**9**	**11**	**12**	**14**	**8**	**4**	**1**	**6**	**30**

Source: Historical and current records at the National Meteorological Service located at the Philip Goldson International Airport, Ladyville, Belize District. Lat. 17º 32 N Long. 088º 18 W. Elevation 5 meters.

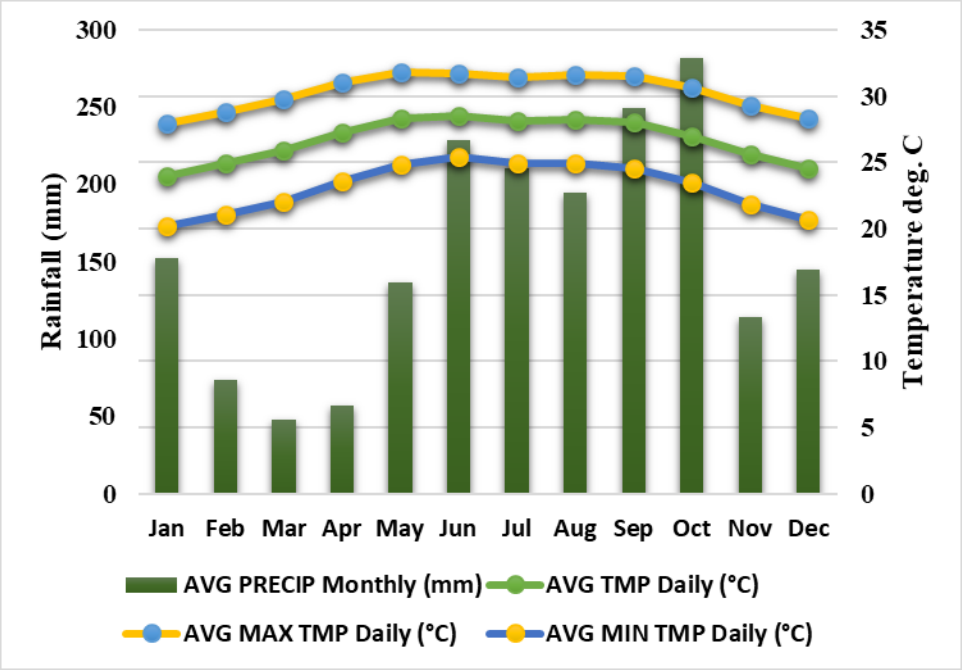


Figure 2.2: Climate chart for Philip Goldson International Airport, Ladyville.

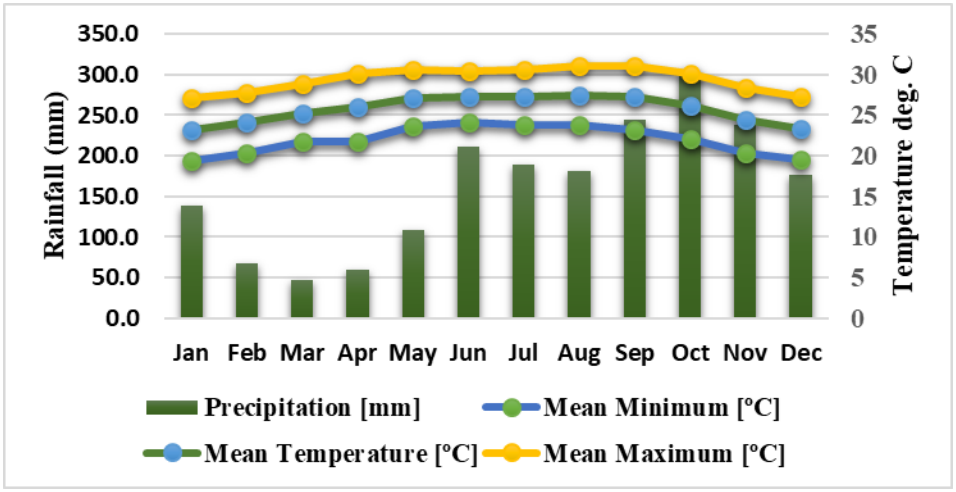


Figure 2.3: Climate chart for St. John's College, Landivar, Belize City.

A time series plot of monthly rainfall and maximum/minimum temperature for Port of Belize is shown in **Figure 2.4**. High monthly rainfall occurred in December 2016 and November 2017. Monthly maximum temperatures were in the lower to mid-30 °C.

Figure 2.5 shows the monthly average rainfall for the Port of Belize area derived from the TRMM_3843_v7 Time Series for the period 2005-2014. The monthly rainfall regime is bi-

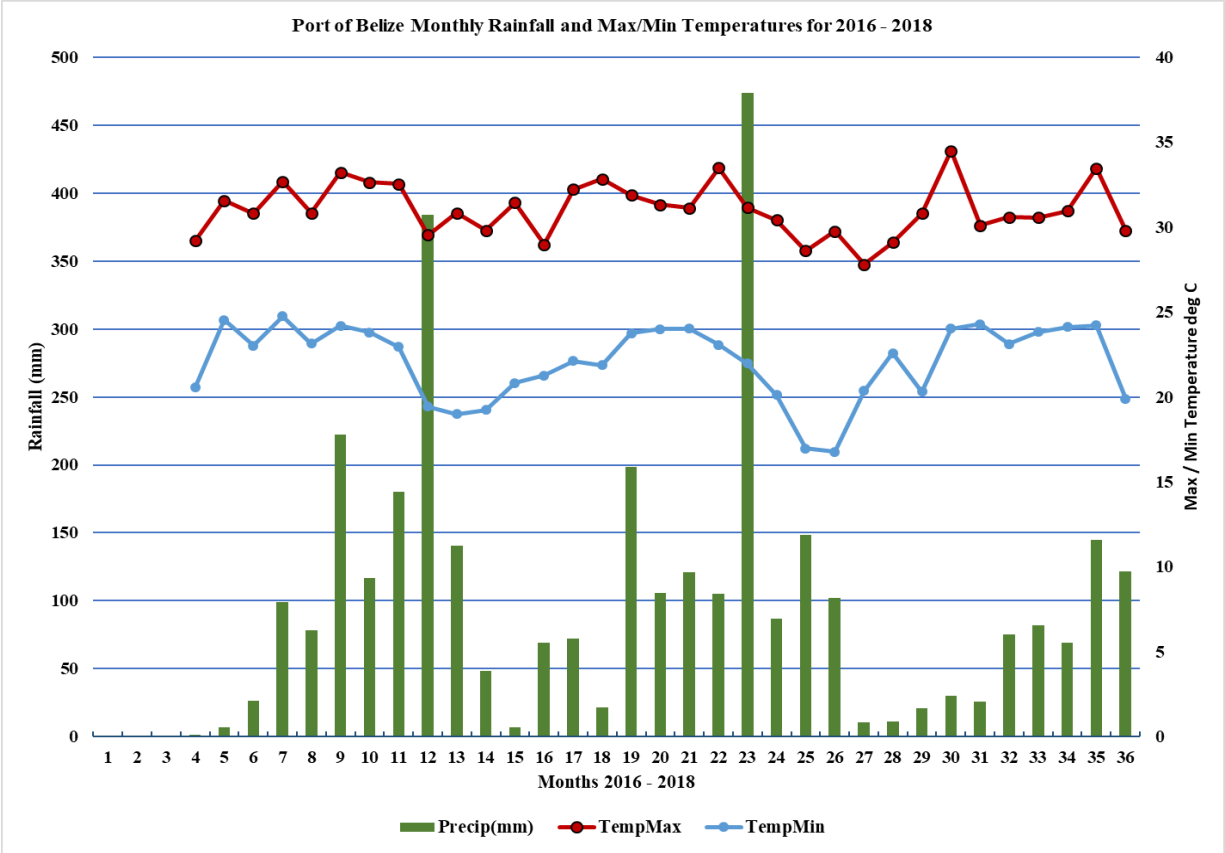


Figure 2.4: Monthly rainfall and temperature time series for Port of Belize (2016-2018).
(Source: Data – NMS. Analysis: R Frutos).

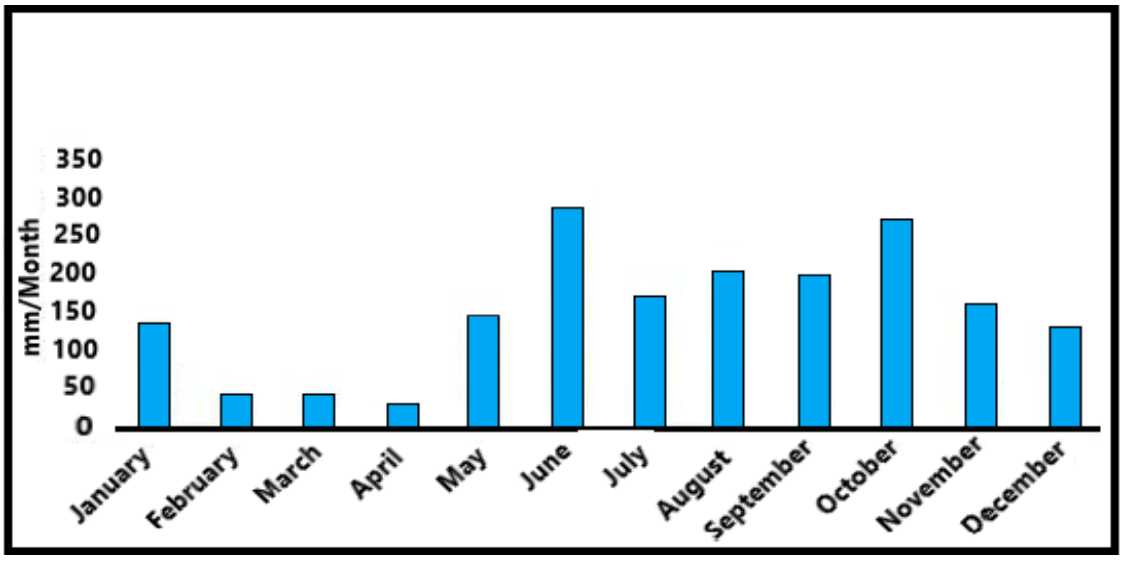


Figure 2.5: Average monthly rainfall for the Port of Belize (2005-2014).
(Source: Giovanni TRMM 3843 V7 Time series – 2005-01 to 2014 -12, in JDN 2018).

modal with peaks in June and October, similar to the profile for St. John's College, Landivar, Belize City. The dry season months with monthly average less than 50 mm run from February through May.

(ii) Winds

The prevailing winds along the coastal zone of Belize are predominantly out of the southeast and east at about 5 – 15 knots, as can be observed from the historical mean wind-rose (**Figure 2.6**) for the Philip Goldson Airport. In the Belize City area and the project site the winds generally blow moderately from the east and southeast at about 8 – 18 knots during the dry season months of March, April and May. In the summer months of June through August, the prevailing winds are out of the east and northeast at about 8 – 16 knots.

During the cool transition period from October through early March incursions of cool, continental air masses and associated frontal boundaries (cold fronts) move across the Gulf of Mexico and spill into the north-western Caribbean, occasionally reaching the central Caribbean. The northerly winds associated with these cool air mass incursions are often gusty, generating turbulent seas and unfavourable condition for marine operations in exposed regions of Belize's coastal waters. Such events may persist for a day or two but may also extend for 3 to 4 days during intense cold air outbreaks from the north.

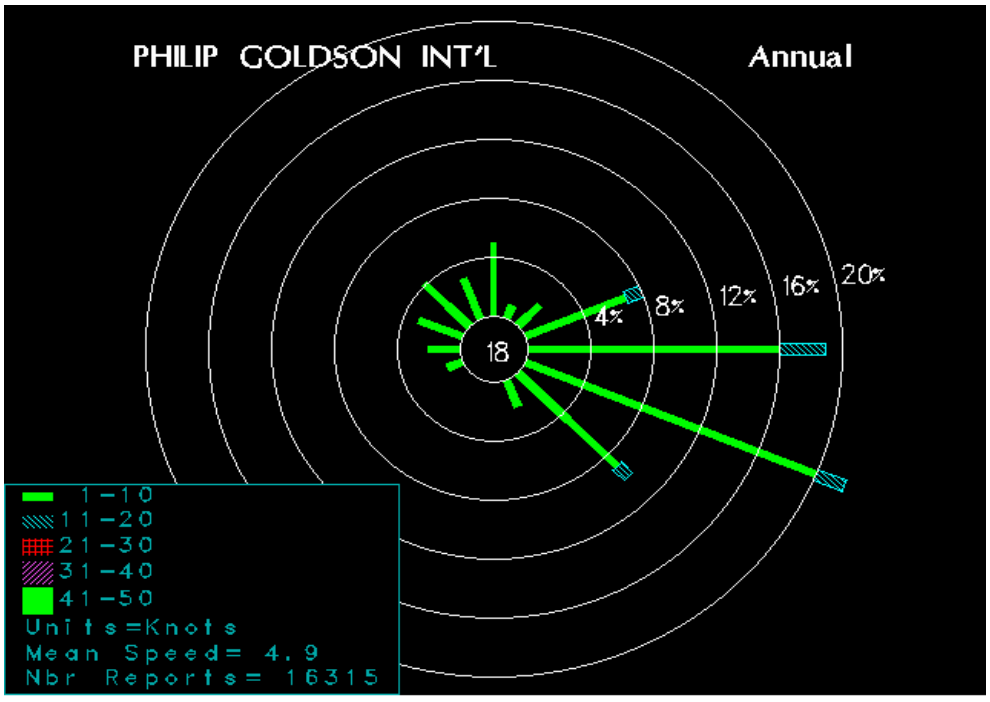


Figure 2.6: Annual mean wind-rose for the Philip Goldson Airport

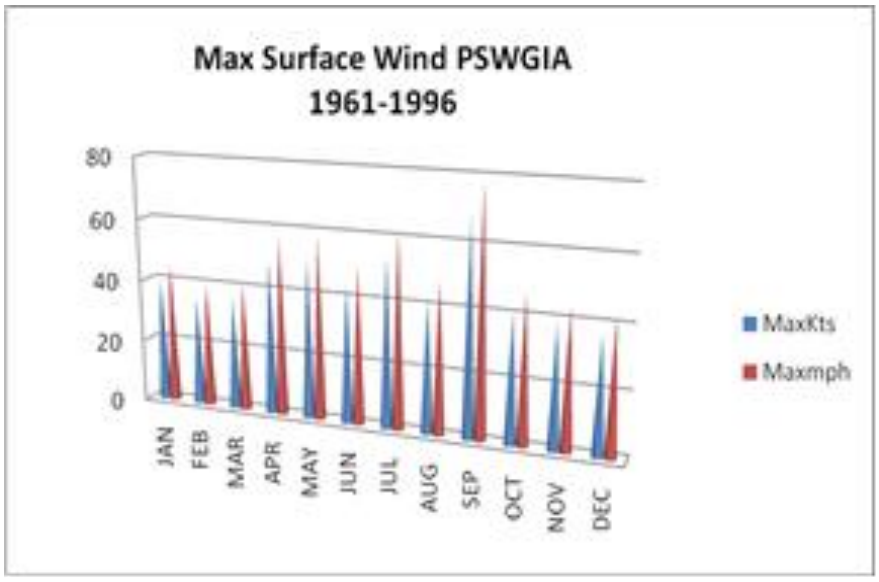


Figure 2.7: Monthly maximum surface wind at PGIA.

Historical extreme wind speeds are associated with tropical cyclones and tropical disturbances that traverse the north-western Caribbean and impact the coastal zone of Belize. These events are more frequent during the hurricane season or summer months, but invariably are also associated with strong northerly airflow generated by cold air mass movement over the region during the cool transition period.

Figure 2.7 is a graph showing records of historical Daily Maximum wind speeds recorded at the Philip Goldson Airport for the period 1961 to 1996. As can be observed, September holds the record for the highest surface wind speed at the Airport with a value of 64 knots or 75 mph. September also marks the month with peak hurricane activity for the North Atlantic Basin. Recent landfalling hurricanes along the coast near Belize City (i.e. Richard in October 2010, and Earl in August 2016) had winds of near 90 mph as they came on shore.

Wind Characteristic in the Deep-Water Port Area

Wind records from an Automatic Weather Station (AWS) at the Port of Belize for the period March 2016 to November 2018 were analysed to determine the prevailing wind speed range and direction around the Cruise Terminal project site. **Table 2.2** is a summary of the proportion of monthly windspeed in knots for the period.

The highest proportion (approximately 45%) of surface winds was in the range of 12 to 14 knots, while 31 % were between 10 to 12 knots. Thus, the proportion of monthly average wind strength in the 10 to 14 knots range was about 76% for the period in the study.

Table 2.2: Monthly distribution of wind speed (knots) at the Port of Belize for 2016-18.

Range (knots)		Monthly Distribution of Wind Speed in Knots at the Port of Belize for the Period 2016-2018													
Lower	Upper	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Prop %	Total
6	8											0.034	0.034	6.9	2
8	10	0.034	0.034										0.034	10.3	3
10	12		0.034	0.034	0.034	0.069	0.034	0.034	0.034		0.034			31.0	9
12	14			0.034	0.069	0.034	0.069	0.069	0.069	0.034	0.034	0.034		44.8	13
14	16									0.069				6.9	2
														100.0	**29**

The prevailing monthly wind direction at the site for the period 2016-2018 was from the East-Southeast and East, accounting for near 62% of events reviewed, as can be observed in **Table 2.3**. ENE and SSW winds were also prevalent.

Table 2.3: Distribution of wind direction at the Deep-Water Port derived from monthly averaged wind data for the period 2016 – 2018.

Wind Dir	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNE	NW	NNW
Freq. Count				3	5	13		1		3	1	2	1			
Proportion				10	17	45	0	3	0	10	3	7	3			

(Source: Data – NMS; Analysis: R Frutos)

Tunich Nah (2005) reported that the prevailing winds at the Port of Belize Tourism Village development site (Port of Belize) have been observed from the east-northeast, the east, and the east-southeast. These winds account for over 63% of the recorded events in the area. The docking facilities at the Port of Belize Tourism Village are designed for the loading and disembarkation of passengers in wind velocities of at least up to 40 mph. It is envisioned that the Pier/Trestle for the Port of Belize Tourism Village development site will be designed to withstand higher than normal winds speeds for ships moored at the facilities.

The JDN (2018) Site Investigation Report for the proposed development, summarized results from their March 8-28, 2018 oceanographic, geotechnical, hydrometeorological and environmental baseline surveys conducted using advanced technology and software.

These results are project-site specific and will be briefly presented in relevant sections of the ESIA as additional scientific baseline information to inform final designs and impact mitigation.

For the assessment on prevailing wind and wave characteristics around the project site, JDN (2018), collected data from an offshore location close to Belize City. Offshore wind and wave conditions were taken from the Global Wave Watch III (WW3) model through the BMT ARGOSS online service. The point where data were extracted was located at 17° N 87°30' W. Historical data from 1992 to 2017 were used for simulation experiments. A map showing the offshore data extraction point relative to the project site can be viewed in **Figure 2.8**.

The results of the wind statistics for the project site are displayed in **Table 2.4**, and the wind rose in **Figure 2.9**. From these wind statistics, it can be further concluded that moderate easterly winds are dominant, with prominent wind directions ranging from 45° to 110°.

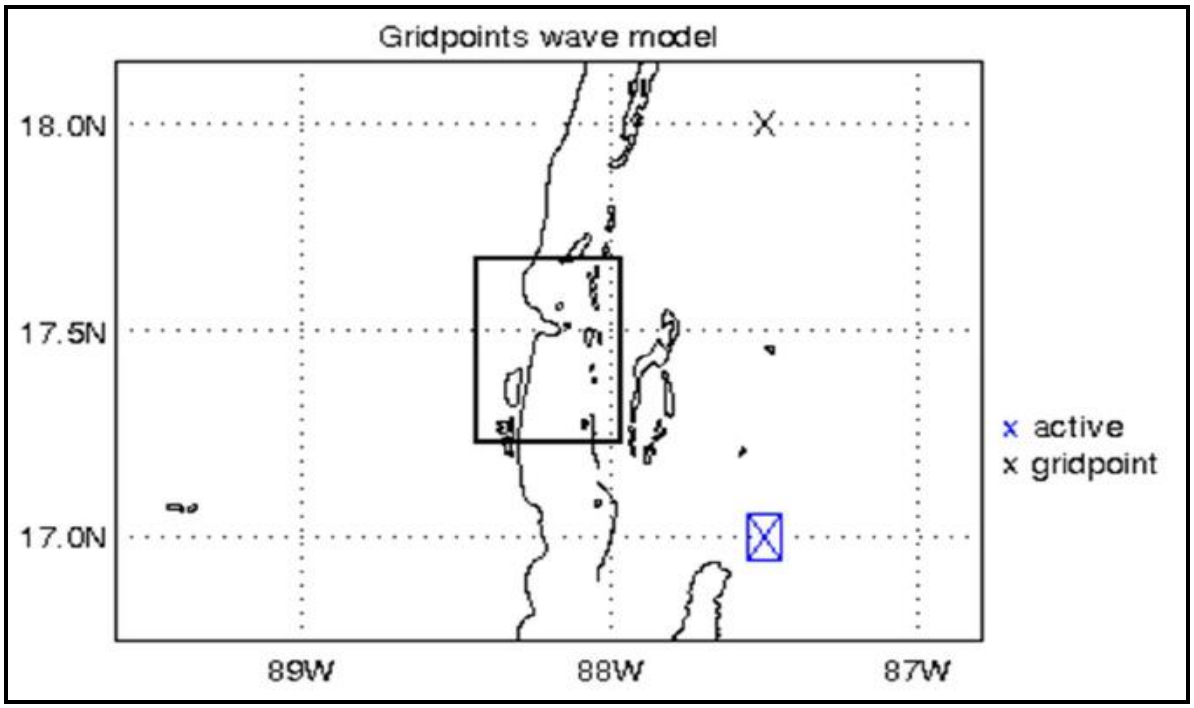


Figure 2.8: Offshore data collection site.

Table 2.4: Monthly distribution of mean wind for project site from simulation using 1992 to 2021 for an offshore location 17° N 87°30' W.

lower	upper	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
00	01	0.027	0.103	0	0.014	0.027	0.042	0.040	0.040	0.056	0.067	0.056	0.027
01	02	1.116	0.840	1.008	0.847	1.465	1.139	0.376	1.331	2.347	2.742	1.556	1.774
02	03	3.306	2.919	2.863	2.667	3.817	3.139	1.465	3.777	5.778	6.559	4.139	4.543
03	04	5.914	4.864	4.597	5.292	5.981	5.222	3.266	6.599	10.028	11.223	8.292	7.594
04	05	10.296	8.461	8.562	8.889	8.831	6.250	6.317	10.242	13.347	15.632	14.486	12.070
05	06	13.347	13.532	13.642	12.750	12.903	8.597	11.989	13.669	16.042	17.137	17.764	17.285
06	07	17.030	17.438	17.298	18.472	15.591	11.583	15.430	16.546	16.792	16.062	17.389	18.642
07	08	17.218	18.087	18.212	17.708	17.702	15.528	19.126	16.277	14.931	11.962	14.014	15.806
08	09	13.938	15.124	15.148	15.208	14.556	16.444	17.419	14.489	10.819	8.535	9.611	11.102
09	10	8.750	9.685	9.341	9.472	11.237	15.264	12.473	9.516	6.153	4.987	5.764	5.981
10	11	5.282	4.953	5.108	5.236	5.094	9.625	7.863	4.960	2.681	2.634	3.403	3.078
11	12	2.258	2.417	2.487	2.403	2.097	5.139	3.172	1.761	0.750	0.860	1.903	1.290
12	13	0.914	1.047	1.022	0.639	0.565	1.556	0.927	0.618	0.222	0.430	0.917	0.551
13	14	0.309	0.280	0.430	0.333	0.094	0.444	0.121	0.134	0	0.323	0.458	0.202
14	15	0.202	0.192	0.188	0.056	0.027	0.014	0.013	0.027	0.042	0.282	0.111	0.027
15	16	0.054	0.044	0.040	0.014	0.013	0	0	0.013	0	0.242	0.069	0.027
16	17	0.013	0.015	0.054	0	0	0.014	0	0	0.014	0.121	0.056	0
17	18	0.013	0	0	0	0	0	0	0	0	0.054	0.014	0
18	19	0.013	0	0	0	0	0	0	0	0	0.054	0	0
19	20	0	0	0	0	0	0	0	0	0	0.013	0	0
20	21	0	0	0	0	0	0	0	0	0	0.013	0	0
21	22	0	0	0	0	0	0	0	0	0	0.027	0	0
22	23	0	0	0	0	0	0	0	0	0	0.013	0	0
23	24	0	0	0	0	0	0	0	0	0	0.013	0	0
24	25	0	0	0	0	0	0	0	0	0	0	0	0
25	26	0	0	0	0	0	0	0	0	0	0	0	0
26	27	0	0	0	0	0	0	0	0	0	0.013	0	0
27	28	0	0	0	0	0	0	0	0	0	0	0	0
total		100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000

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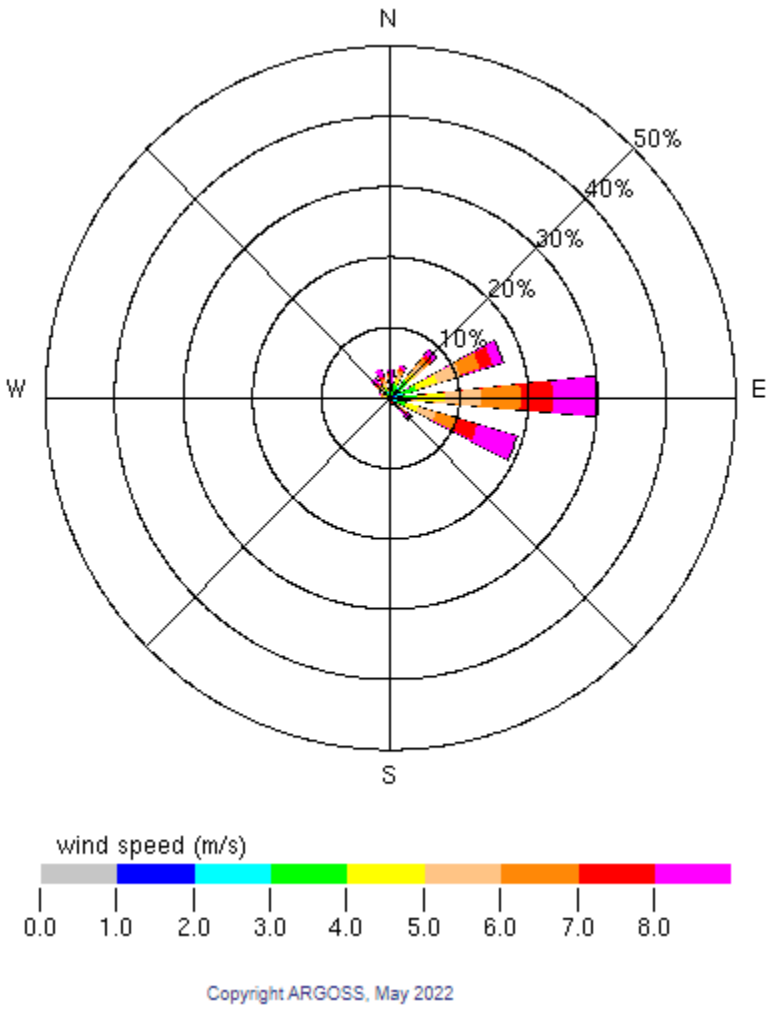


Figure 2.9: Wind rose for the project site

2.1.2 Hurricane Risk

Belize is prone to hydrometeorological and geological hazards such as: hurricanes, tropical storms, storm surges, floods, drought, earthquakes and tsunamis. The coastal zone of Belize is highly exposed and vulnerable to the majority of these natural hazards, as a large proportion of its population and economic activity (mainly fisheries, tourism, commerce and agriculture) is concentrated along the low-lying coastal zone, as well as, along the flood plains of the main river systems.

Between 1960 and 2016 tropical cyclones and hurricanes, storm surges and floods affected more than 300,000 people, resulting in 69 deaths, and caused more than US$607.5 million in economic damage (**See Table 2.5**). **Figure 2.10** shows the trajectory of several major historical hurricanes that impacted the country during the period 1931 and 1978. **Figure 2.11** shows tracks of recent hurricanes affecting coastal Belize and the Port of Belize area.

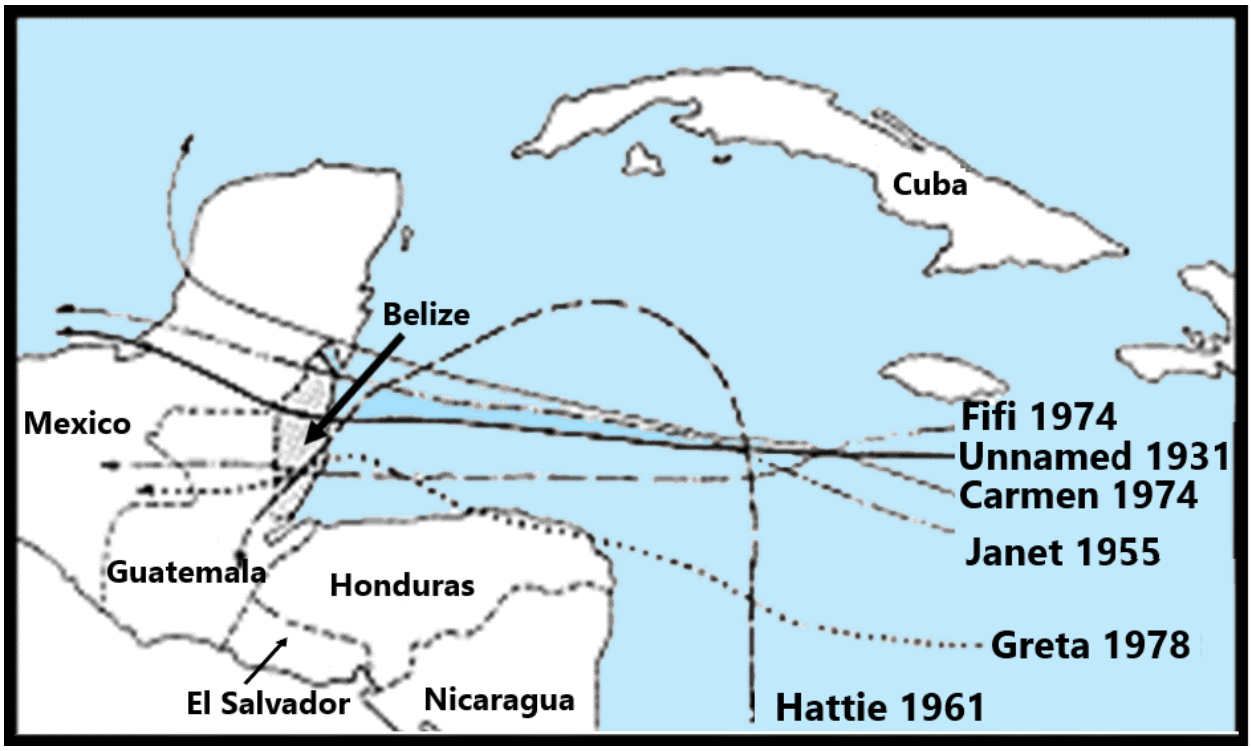


Figure 2.10: Track of some major historical hurricanes over Belize.

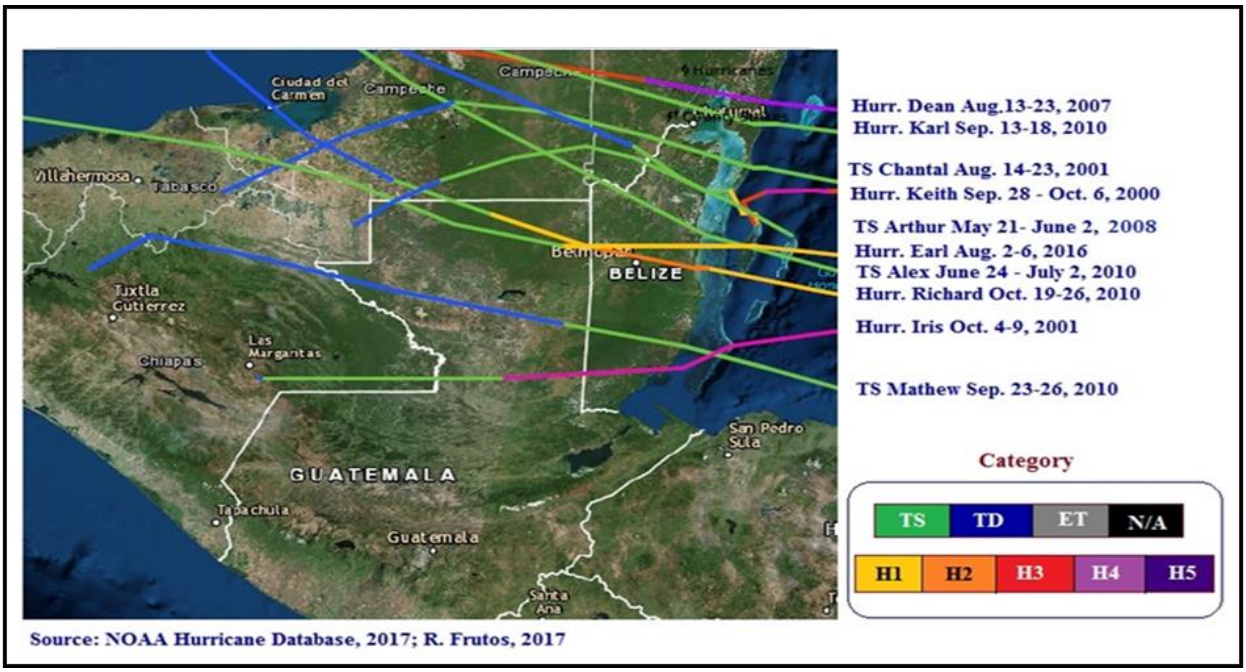


Figure 2.11: Tracks of recent hurricanes affecting Belize

As with any coastal development, the proposed expansion of the existing Port of Belize to facilitate berthing of cruise liners, will be vulnerable to hazards of future land-falling hurricanes

near and over the central coastline of Belize. Updated analysis based on hurricane tracking maps and reports for the past three decades (1994-2018) showed that seven (7) hurricanes and six (6) tropical storms affected the country of Belize (**See Table 2.5**). This does not include the extensive floods across central Belize generated by Tropical Depression 16 in late October-November of 2008. Six of these hurricanes impacted Belize City and the Port of Belize area with torrential rainfall, storm surge and sustained, hurricane force winds, resulting in much structural damage to property and assets, and extensive beach erosion.

Table 2.5: Tropical storms and hurricanes affecting Belize during the past three decades.

NAME	YEAR	MONTH	DAY	CATEGORY	SPEED mph	LANDFALL
EARL	2016	AUGUST	2-6	HURRICANE (CAT I)	90	NORTH OF GALES POINT MANATEE
ERNESTO	2012	AUGUST	07	HURRICANE (CAT 1)	85	NO LANDFALL IN BELIZE (JUST NORTH OF CHETUMAL MEXICO)
HARVEY	2011	AUGUST	21	TROPICAL STORM	50	SOUTHERN BELIZE, JUST NORTH OF DANGRIGA TOWN
RICHARD	2010	OCTOBER	25	HURRICANE (CAT I)	90	NEAR GALES POINT MANATEE
MATTHEW	2010	SEPTEMBER	25	TROPICAL STORM	40	SOUTH OF DANGRIGA TOWN
KARL	2010	OCTOBER	15	TROPICAL STORM	65	NO LANDFALL IN BELIZE, JUST NORTH OF CHETUMAL MEXICO
ALEX	2010	JUNE	26	TROPICAL STORM	60	JUST NORTH BELIZE CITY
ARTHUR	2008	MAY	31	TROPICAL STORM	40	NORTH OF BELIZE CITY
DEAN	2007	AUGUST	21	HURRICANE (CAT. V)	165	MAHAHUAL, Q. ROO AND COROZAL DISTRICT
IRIS	2001	OCTOBER	09	HURRICANE (CAT. IV)	145	STANN CREEK DISTRICT, SOUTH OF PLACENCIA
CHANTAL	2001	AUGUST	22	TROPICAL STORM	60	COROZAL/ ORANGE WALK
KEITH	2000	OCTOBER	01	HURRICANE (CAT. V)	140	SAN PEDRO, AMBERGRIS CAYE
MITCH	1998	OCTOBER		HURRICANE (CAT. IV)	155	NO LANDFALL IN BELIZE (HONDURAS)

Mangrove forests in the Coastal Plain to the south of the Port of Belize suffered significant wind damaged. Consequently, overwater structures and other buildings at the Port of Belize to be erected to accommodate the proposed cruise terminal will be in compliance with Belize's building codes for hurricane force winds and storm surge impact reduction.

Table 2.6 shows estimated losses in US dollars totalling just over 605 million for various sectors of the economy resulting from the impacts of several recent land-falling hurricanes in Belize.

Table 2.6: Estimated losses in US$ resulting from impacts of recent hurricanes in Belize.

No.	EVENT	Date	Sector	Direct Cost	Indirect Cost	Total Damage
			Impacted	US $	US $	US $
1	Hurr. Keith	Oct 1, 2000	All	204,779,630	0	204,779,630
2	TS Chantal	Aug. 22, 2001	All	8,737,005	11,771,000	20,508,005
3	Hurr. Iris	Oct. 8, 2001	All	107,841,500	53,250,925	161,092,425
4	Hurr. Dean	Sep. 21, 2007	All	50,279,000	45,350,000	95,629,000
5	TS Arthur	May 31, 2008	All	42,806,908	0	42,806,908
6	TD 16	Oct. 30, 2008	All	1,390,937	0	1,390,937
7	Richard	Oct. 24,2010	All	24,590,000	0	24,590,000
8	Earl	Aug. 4, 2016	All	56,750,000	0	56,750,000
					Total	**607,546,905**

(Source: NEMO Impact Assessment Reports.**)**

2.1.2.1 Extreme Events: Major Hurricanes in Belize

Table 2.7 shows a list of Category IV or V hurricanes passing within 100 nautical miles of Belize.

A total of 7 major storms were identified, of which 4 passed at least 50 nm from Belize City and one (Keith) weakened to a tropical storm before reaching the Belize mainland. These five storms had no major impact on Belize City. The storms of 1931 (not named) and 1961 (Hattie) on the other hand, made landfall close to Belize City and caused major damage and casualties:

- 1931: 1500 people died; a major section of the city was flooded.
- 1961 (Hurricane Hattie): 275 people died, gusts were estimated at 170 knots, 75% of Belize City was destroyed, 13-15 feet surge inundated of areas of the Belize City, and the highways leading out of the city toward the north and west.

The extensive flooding, caused by an enormous surge of 13 to 15 feet (4 to 4.5 meter), had an enormous impact on the whole region. The loss of life and property associated with passage of Hattie (1961) stimulated the authorities to construct a new capital in the interior, at higher elevation and with less exposure to the hazards of hurricanes. However, Belize City was rebuilt and continues to expand. Building codes have been legislated and design of structures is required to consider the risks of hurricane impacts and storm surge risk. Since these surges only occur in extreme event limited data exist.

Table 2.7: Summary of Category IV or V Hurricanes within 100 miles from Belize.

		(NEAREST TO) BELIZE CITY							MAX within 100 NM			
NAME	DATE	Distance Belize City to nearest point of storm (NM)	Category at nearest point to Belize City	Intensity at nearest point to Belize / max sustained wind speed (kt)	max wind gusts (kt)	Max surge Belize coast (ft)	Max surge Belize coast (ft)	Rainfall Belize City (inch)	Distance Belize City to max wind speed point of storm	Max category	Max intensity / max sustained wind speed (kt)	Min pressure (mbar)
NOT NAMED	10/09/1931	3	H Cat 4	115					3	H Cat 4	115	
JANET	28/09/1955	60	H Cat 5	150					60	H Cat 5	150	914
HATTIE	31/10/1961	17	H Cat 4	120		13	13		60	H Cat 4	140	920
CARMEN	02/09/1974	70	H Cat 4	120					100	H Cat 4	130	928
KEITH	01/10/2000	25	TS	60		-4 (Belize ma	5 (caye Caulker)	32	60	H Cat 4	120	939
IRIS	09/10/2001	57	H Cat 4	125		8 (Placencia)	15 (Placencia)		57	H Cat 4	125	948
DEAN	21/08/2007	80	H Cat 5	150					80	H Cat 5	150	904

(Source: Jan De Nul, 2018)

A review of historical records of storm surge levels related to landfalling hurricanes are listed for reference. These include the following:

- 1864: 5 feet surge in Belize City due to Cat. 1 hurricane (not named).
- 1931: 10 feet surge in Belize City due to Cat. 3 hurricane (not named)
- 1955: 5 feet surge in Corozal Town due to Cat. 5 Hurricane Janet that demolished Chetumal, Quintana Roo, Mexico.
- 1961: 13-15 feet surge in Belize City due to Cat. 4 Hurricane Hattie.
- 1974: 2-4 feet surge in Belize City due to Cat. 2 Hurricane Fifi
- 1978: 2-4 feet surge in Belize City due to Cat. 2 Hurricane Greta
- 2000: 5 feet surge at Caye Caulker (offshore Belize mainland) due to Cat. 4 hurricane Keith; 6 to 8 feet in San Pedro, Ambergris Caye; 4 feet lower water level in Belize City (due to storm center stayed in same position for 24 h at location 40 km offshore)
- 2001: 2-4 feet surge in Placencia (100 km south of Belize City) due to Cat. 4 hurricane Iris.
- 2016: 4-6 feet surge in Belize City due to Cat. 1 hurricane Earl

This information was used by Moffatt and Nichols in the preparation of the Master Plan and will be key in developing the Final Engineering and Architectural Designs of all structure being considered. Additionally, the data and new plans will be utilized to develop a comprehensive Disaster Preparedness Plan for the project addressing Hurricane and Storm Surge impacts.

2.1.2.2 TAOS Storm Surge Model

Hazards associated with land-falling hurricanes along the coast of Belize include torrential rainfall, tornadoes, storm surge and coastal flooding. The TAOS storm surge model (OAS, 1995) projected a 1.8 meters surge in the Project site for a Category I hurricane, 5.2 meters for a Category II hurricane, 7.2 meters for a Category IV hurricane and about 7.6 meters for a Category V hurricane making landfall just south of the Project site. **Figure 2.12** below is a graphic of the storm surge result for a Category V hurricane crossing the central Belize District. The coastal zone in the Belize City area would be inundated by a storm surge in excess of 18 feet of water in a Category V hurricane, bearing in mind that such an extreme event has a return period of 50 to 100 years. The coastal flooding associated with a storm surge produced by a land-falling Category V hurricane in the vicinity of the project zone is between 6 – 7 m along Belize City coastline, (shaded in light brown).

The flood hazard map (**Figure 2.13**) shows flood hazards from storm surge generated by hurricane categories 1 to 5. It does not show results for a particular event but is a combined map showing flood risk for the coastal zone in the Belize City – Ladyville area with a defined probability (World Bank Group, 2016). Cherrington and Courtney (2017) created a detailed digital elevation model (DEM) which highlight the risk zone in the vicinity of the project site in Port Loyola. The City's most flood-prone areas are indicated in blue (**See Figure 2.14**).

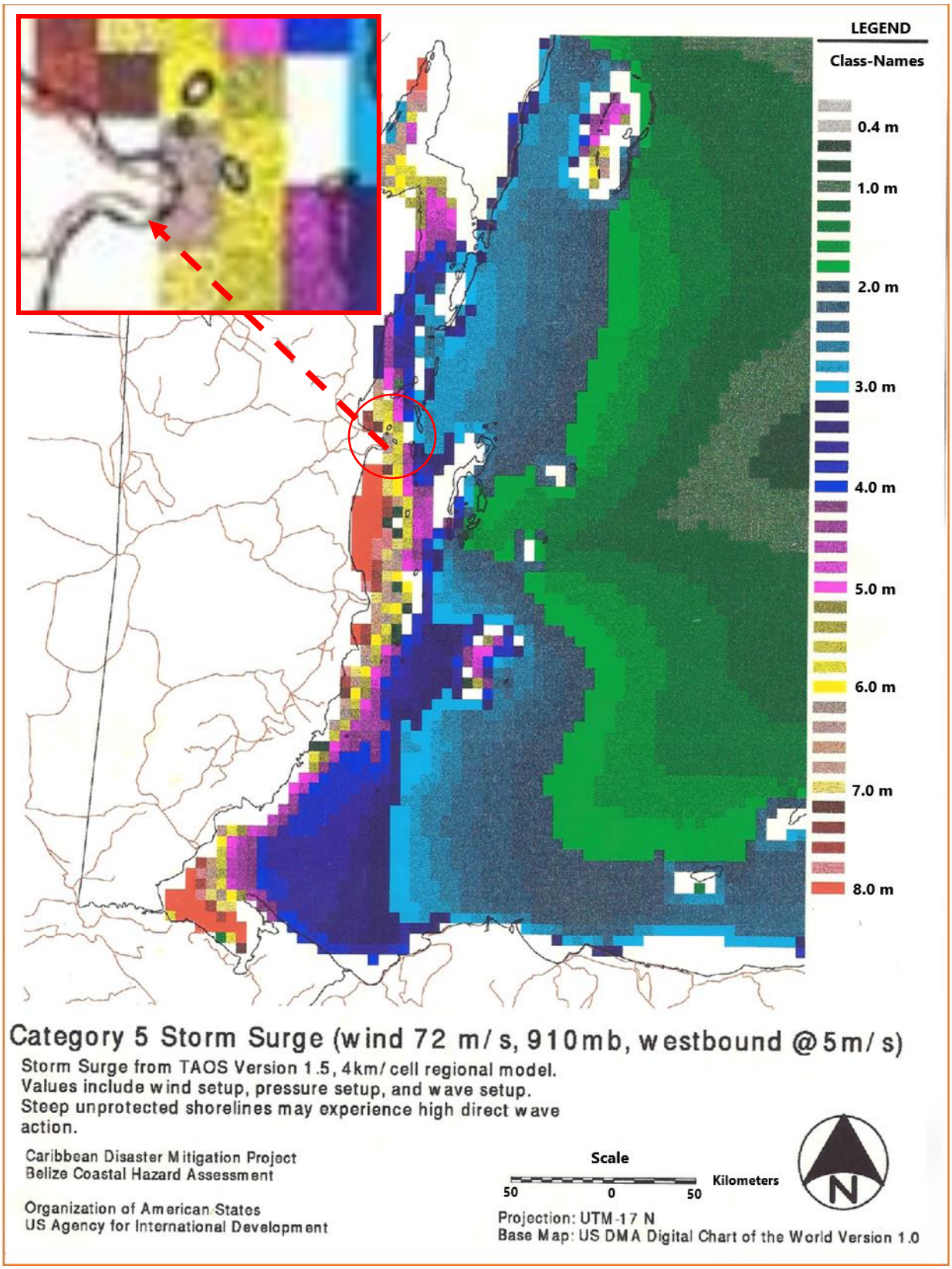


Figure 2.12: TAOS Storm Surge Model Projection.

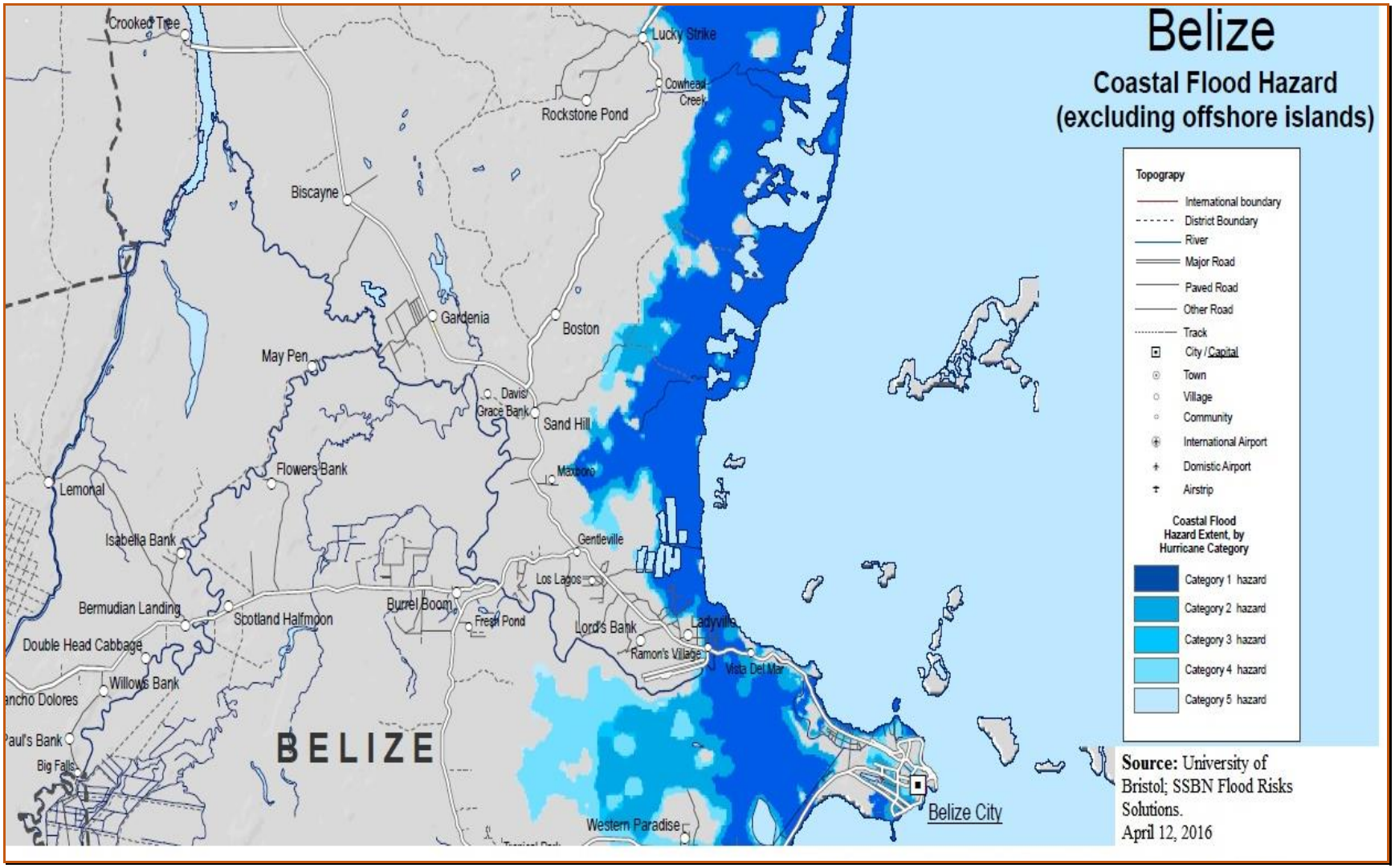


Figure 2.13: Coastal Flood Risk Map for Lower Belize River Watershed. Source: University of Bristol in World Bank Group Report, 2016.



Figure 2.14: Flood prone areas in Belize City.
(Source: Cherrington and Courtney, 2017.)

2.1.3 Tides

Three main factors contribute to the formation of tides. These are: the gravitational pull of the moon, the centrifugal force acting on the oceans as the Earth and the moon revolve around a common center of gravity, and to a lesser extent, the gravitational pull of the sun, which is estimated to be about 46% that of the moon, because of its longer distance from Earth.

The tides in Belize are semi-diurnal, meaning that two low and two high tides occur daily or in tide cycles that last about 24 hours and 50 minutes. The highest tide is followed by a low and lowest by a high, but not necessarily in the same sequence. The Earth rotates on its axis every 24 hours so that both sun and moon appear first on the eastern horizon and traverse the sky to the west. Likewise, the tidal bulge caused by the moon, and modified by the gravitational pull of the sun, also travels from east to west like a wave.

For this reason, tides on the east coast of the Americas behave as expected, rising and falling twice every 24 hours. The tidal amplitude or range over coastal waters of Belize is of the order of 0.3 m to 0.5 m, but this may vary during strong northerly flow associated with cold front passage when the range may increase to around 0.8 m (Tunich Nah, 2004). Generally, in the project zone tidal fluctuations are on the order of about 0.31 m (1 foot) above Mean Sea level (MSL).

JDN (2018) cites local source (ESIA for Stake Bank, 2006) on waves and tidal motion in the vicinity of the propose Cruise Terminal development, indicating that the wave climate near Belize City typically features 1-meter waves from the east. However, during storm events, storm surge can cause water levels to increase dramatically, for example the 10 – 18 feet storm surge associated with Hurricane Hattie in October 1961.

Tides in the Caribbean are typically microtidal, with ranges less than 0.5 meters. In Belize City, the tidal range is typically 0.3 meters with the largest recorded range of 0.41 meters.

2.1.4 Currents

Ocean waters are constantly on the move. Currents flow in complex patterns is affected by wind, the water's salinity and heat content, bottom topography, and the earth's rotation on its axis or the Coriolis effect. The currents influencing the depositional and erosional processes are derived from both wind-driven and tidal sources. The wind driven currents are greater in magnitude and are in general more influential in affecting the dynamics of the coastal ecosystems.

The prevailing water movement entering the Caribbean is the wind-driven Guiana Current (**Figure 2.15**) flowing from southeast to northwest; this becomes the Caribbean Current, flowing through the Lesser Antilles with the majority reaching the Yucatan Strait (Hanson & von Twistern, 1996; Gyory, J, et al. 2013). The current breaks at Rocky Point, northern Belize, to form a small gyre that drives the sea off Belize to flow from north to south as illustrated in **Figure 2.16** (Perkins, 1983). While the prevailing current flow travels from north to south, powerful northerly winds during cold fronts or other storm events may generate temporary

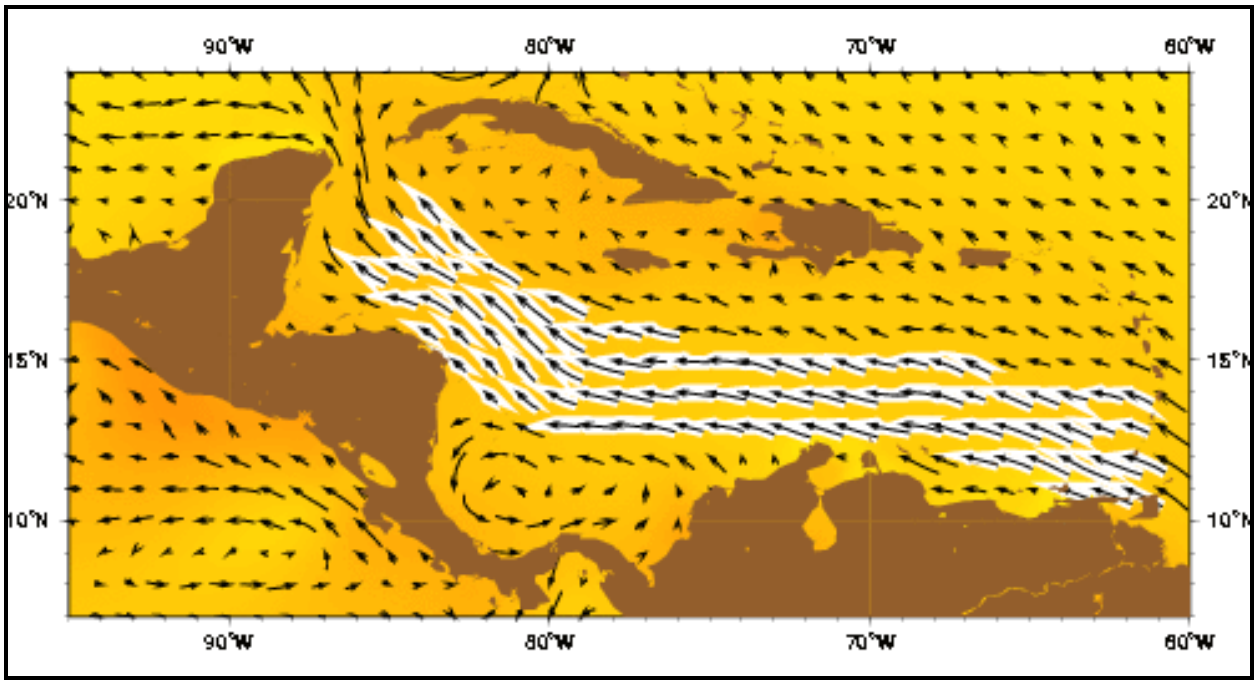


Figure 2.15: Caribbean current originating from the wind-driven Guiana current.
(Source: Hanson & von Twistern, 1996).

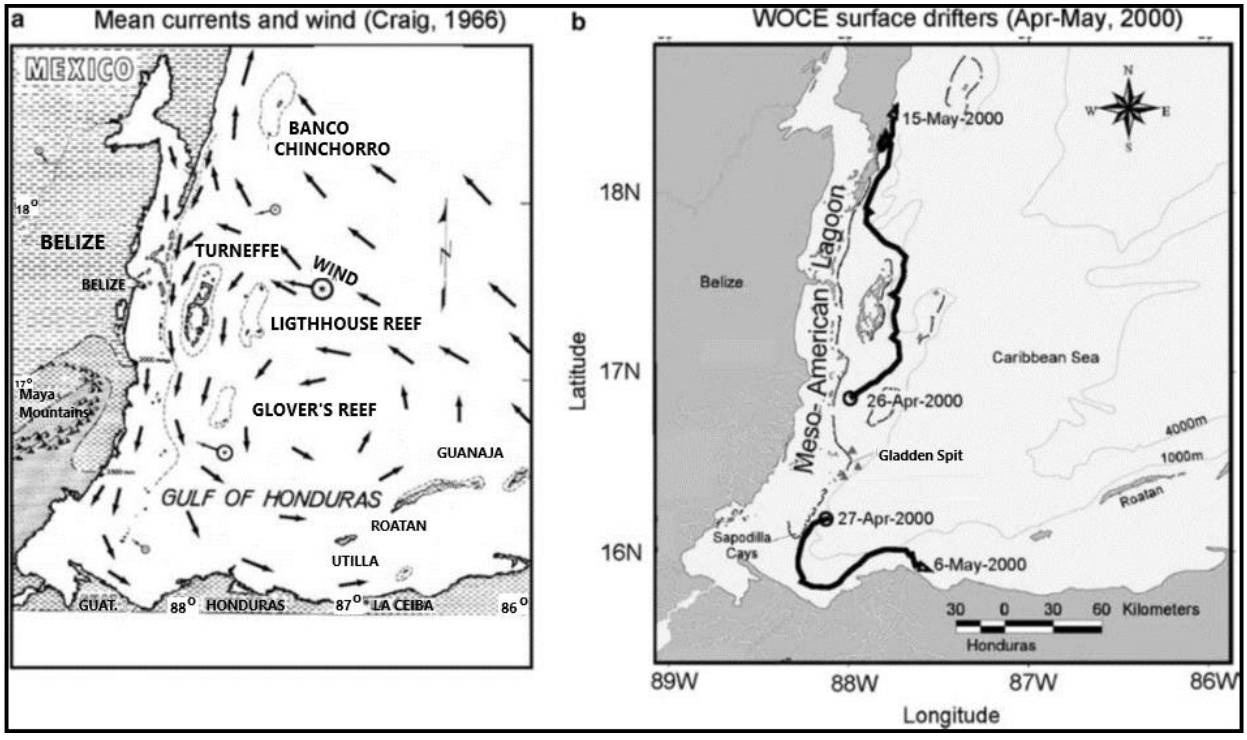


Figure 2.16: Observed flow field near the MBRS. (A) Mean currents (arrows) and wind (arrows with circles as composed from various observations (based on a larger map from Craig, 1966). (B) Two WOCE drifters at 15 m depth (launched on April 2000 at locations indicated by circles) (Perkins, 1983)

These currents do not only affect sediment transport but also the distribution of sessile organisms including sea grasses (e.g. sargassum) and algae. These currents vary seasonally and, though charted in general, have not been studied in detail (Hanson & von Twistern, 1996). Strong currents that may carry materials such as sediments as far as the Mesoamerican Barrier Reef System (MBRS).

Localized flows off the central coast of Belize are influenced by longshore currents, and discharge from the Belize River to the north and the Sibun River to the south. The trajectory and strength of the currents off Belize City and the Port of Belize is influenced by the prevailing north-south flow in the Inner Lagoon, surface winds and tidal effects. Prevailing winds are the main driving force for waves and surface currents in coastal waters of Belize (Tunich Nah, 2005, JDN, 2018).

The prevailing winds also result in marine wave action moving predominantly towards the South and Southwest. The deepest area near the project site in excess of 12 m, is within the turning basin of the existing Deep-Water Port navigation channel leading to the extended pier. **Table 2.8 and Figure 2.17** shows the results of drogue drifts a short distance south of the project zone as observed on the showery morning of 29 June 2019.

As can be seen, the surface drift on that occasion was south south-eastwards, influenced partially by the receding tide and the river discharge. Superficial currents range from around 0.21 m/s to near 0.43 m/s.

The literature indicates that wind driven currents in the Belize City areas have been recorded at 0.51 – 0.77 m/s (1.0 - 1.5 knots) at the immediate sub-surface depths and 0.10-0.30 m/s (0.2-0.6 knots) at a depth of 1.8 meters (FAO/UNDP unpublished report, 1983; EIA Stake Bank 2006). In the vicinity of Drowned Caye, the currents varied throughout the hydrographic profile from 0.09 m/s to 0.22 m/s. The direction of the current was generally from the Northeast towards the Southwest (BET, 2012) or in a southerly direction.

Historical records on currents in the vicinity of the Port of Belize based on field measurements by Ocean Surveys Inc. during the period July 14-23, 2004 showed that the maximum 6-minute current was 0.62 m/s (1.2 knots) near the surface, which was observed on July 23, 2004 around 3:18 pm (Tunich Nah, 2005). The direction was 356 degrees (true north). The maximum hourly current recorded was 0.44 m/s (0.85 knots) near the surface on July 16th, 2004 around 10:00 am.

The measurements were taken using a current meter anchored in 5.5 meters of water approximately midway between the existing Deepwater Port pier head and the ESSO offshore fuel mooring buoys.

Tunich Nah (2005) also asserted that Intersea Research Corporation (Jan. 1976), which was associated with the design of the existing Deepwater Port of Belize, indicated that currents as high as 0.514 m/s (or 1 knot) were recorded near the existing turning basin site. Southwest

Table 2.8: Drogue displacement just south of the Port of Belize on 29 June 2019.

Date	Drogue	Start Time	Eastings	Northings	End Time	Eastings	Northings	Time (s)	Distance (m)	Velocity (m/s)
19 June	D1	9:00 am	0367370	1926877	12:02 pm	0368896	1925139	10920	2277.9	0.209
	D2	9:01 am	0367283	1926880	11.55 am	0368558	1925454	10440	1881.9	0.180
	D3	9:03 am	0367178	1926893	11:52 pm	0368246	1922561	10140	4332.5	0.427

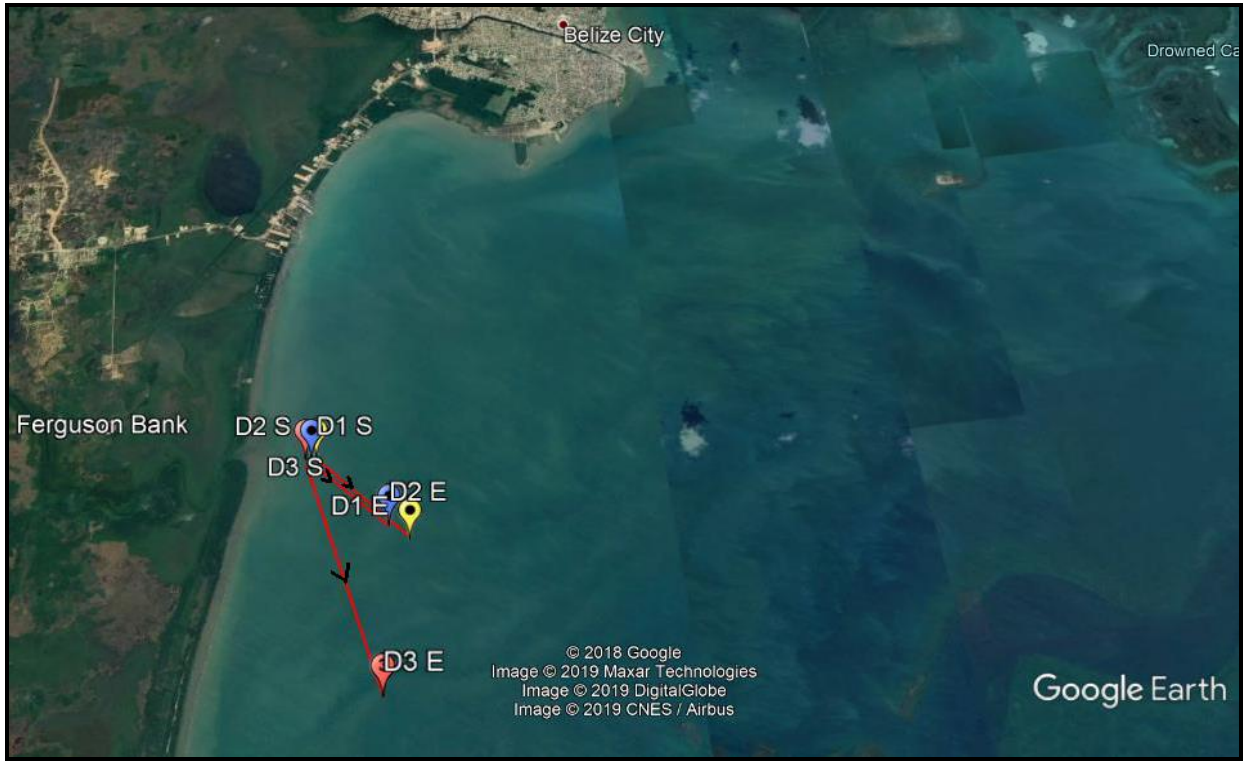


Figure 2.17: Drogue displacement near coast east of the Sibun River mouth and south of the Port of Belize on 29 June 2019.

currents driven by the wind and stream runoff were the strongest. Intersea Research Corporation also indicated that the weaker northeast currents during calm nights and early morning appeared to be driven primarily by tidal forces.

The 2001 Environmental Impact Assessment for the dredging of the Port of Belize and the mouth of the Haulover Creek stated that currents resulting from tidal amplitude on the Yucatan Shelf generally varied from 0.15 to 0.22 m/s (0.30 to 0.42 knots). Consequently, for normal currents a speed of 0.77 m/s (1.5 knots) can be used. The design features for the existing pier and other sea-based infrastructure associated with the proposed Belize Cruise Terminal shall be based on the 100-year flood and a Category V Hurricane landfall.

Wind driven currents in the Belize City area have been recorded at 1-1.5 knots at the immediate subsurface and 0.2-0.6 knots at depth of 1.8 m. The net direction of surface currents in the shelf lagoon and the project area is in a southerly direction. (EIA Stake Bank 2006).

However, in 2018, JDN assessment measured over a 12-day period for the location N 17°27’13.3” W 88°12’31.2” (9/3/18 – 21/3/18) showed that generally the current speed was slow, ranging from 0.00 m/s to 0.15 m/s in an ENE-WSW direction (**See Figures 2.18 - 2.20**).

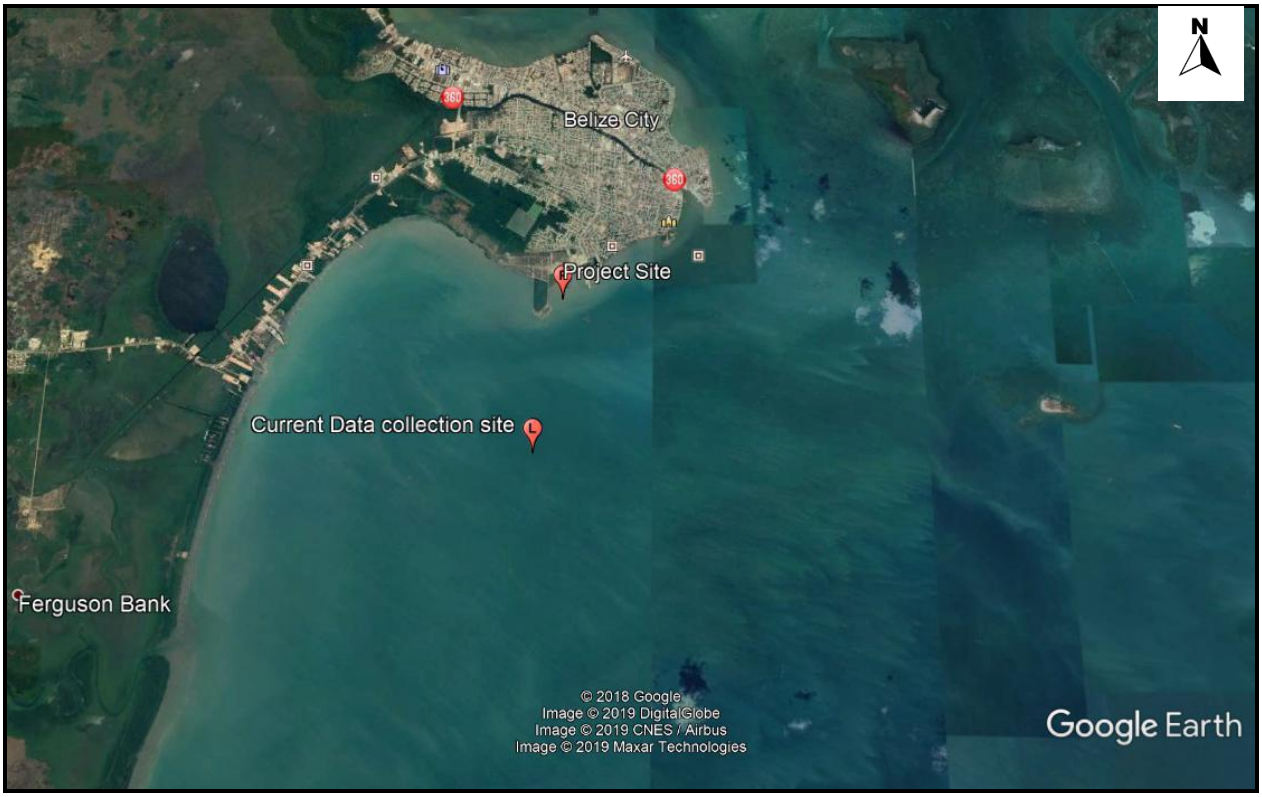


Figure 2.18: Location of JDN’s Current Data Collection Site.



Figure 2.19: Current flow speed and direction (JDN 2018).

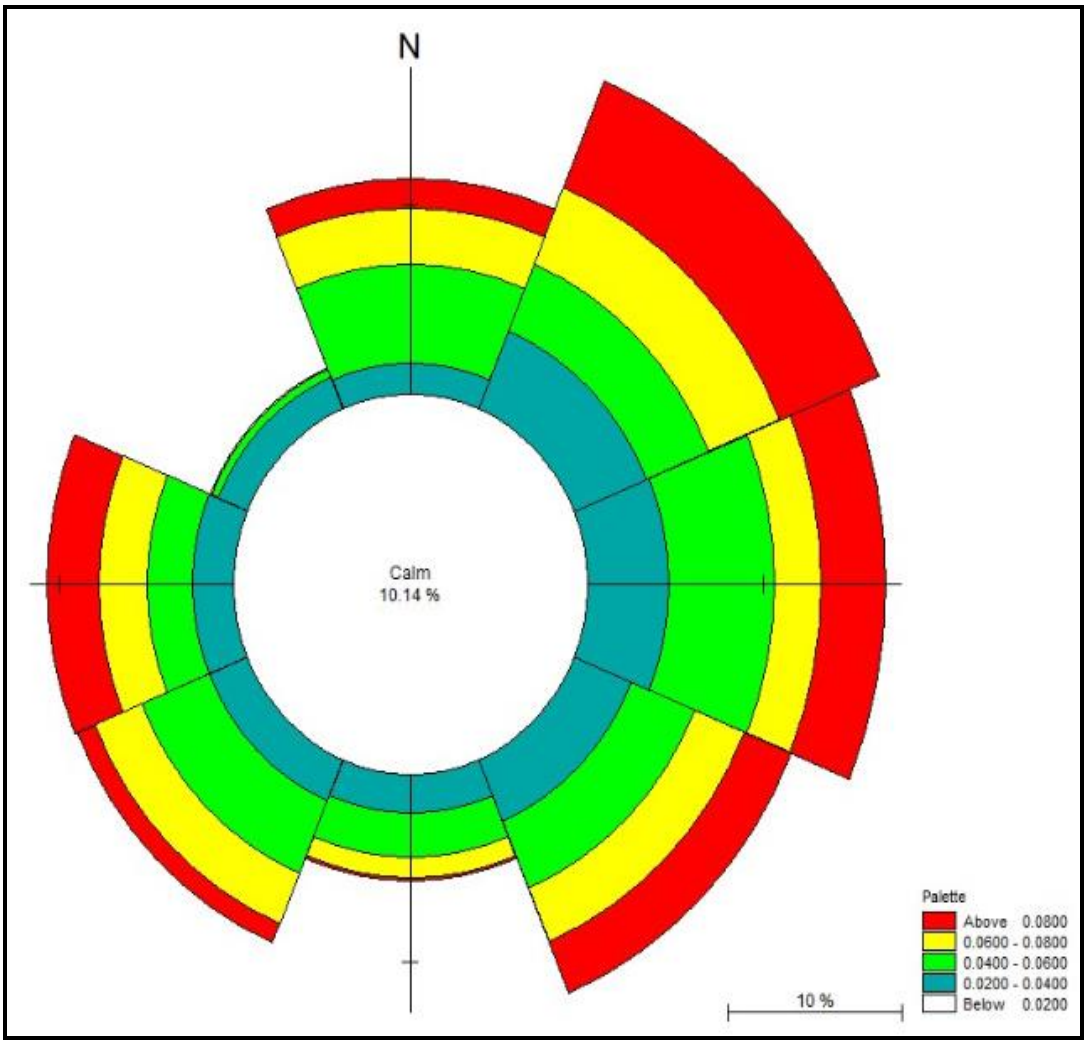
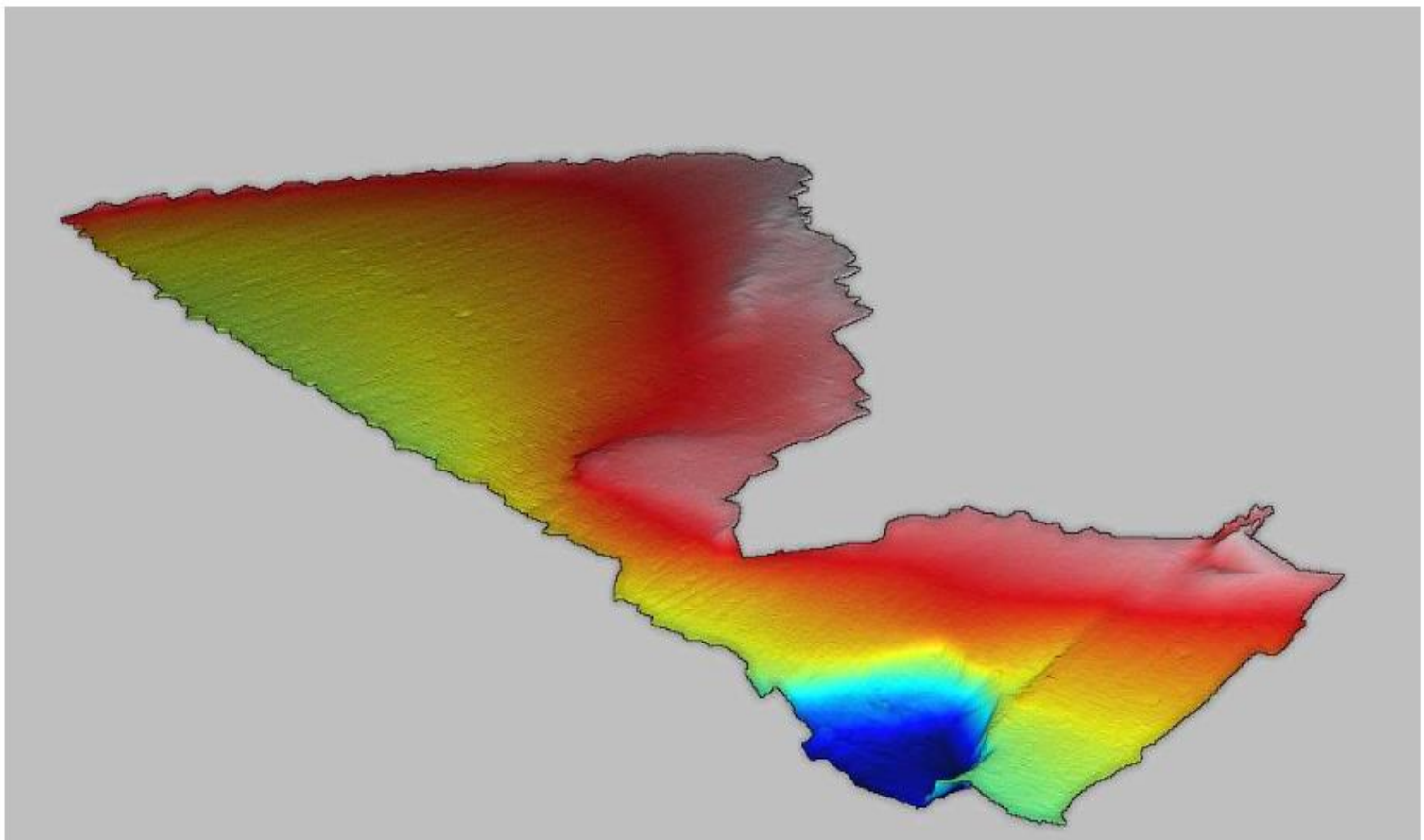


Figure 2.20: Current Rose
(JDN 2018).

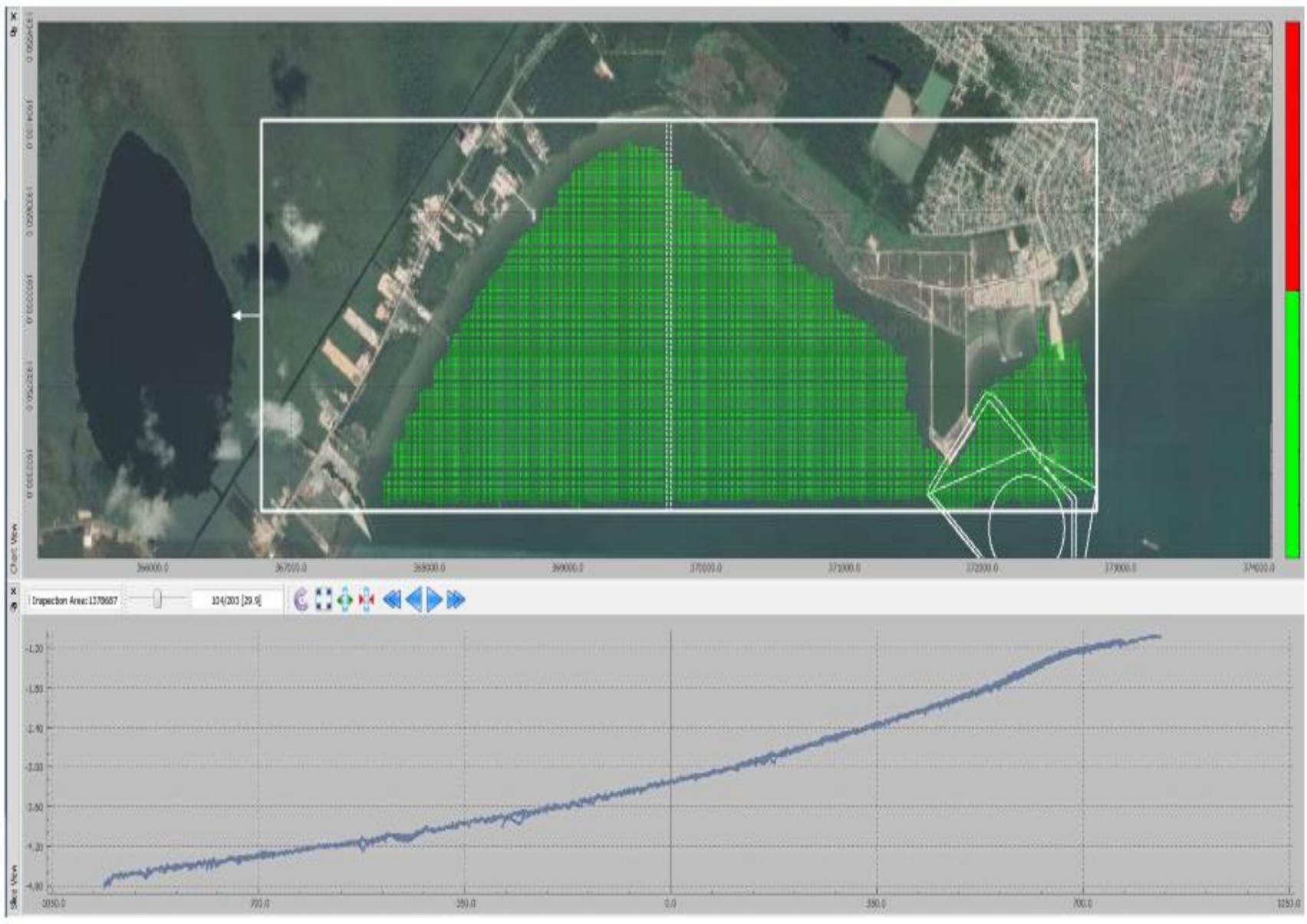
2.1.5 Bathymetry

Near-shore water depth ranges from near 0.6 to 0.91 m (2-3 ft.) at the newly constructed seawall along the shoreline of the Cruise Terminal Bay, to about 6.1 to 10.7 m (20-35 ft.) in the area of the Turning Basin for the existing Deepwater Port Trestle. A maximum depth of 12.47 m was measured at water sampling site AC3-2 (0.38 km from sample site AC3-1 (Canal)). Tidal fluctuations are on the order of about 0.3 m or 1 foot above MSL (Tunich Nah, 2005).

The 2018 JDN report (**Annex VII**) had results from two types of Bathymetric Surveys done Vertical and Horizontal or Single-beam and Multi-beam Surveys (**Annex VII**). The single-beam echo sounding was done in the shallow areas, such as those that will be reclaimed (1 m – 4 m below MSL) and the results show that a total area of 551 hectares were surveyed (**Figure 2.21**). **Figure 2.22** shows the results of Bathymetric Survey by JDN 2018.



3D view of the (interpolated) single beam survey.



Typical section showing the gentle slope towards the coast.

Figure 2.21: Data from single beam survey in shallow water (JDN 2018).

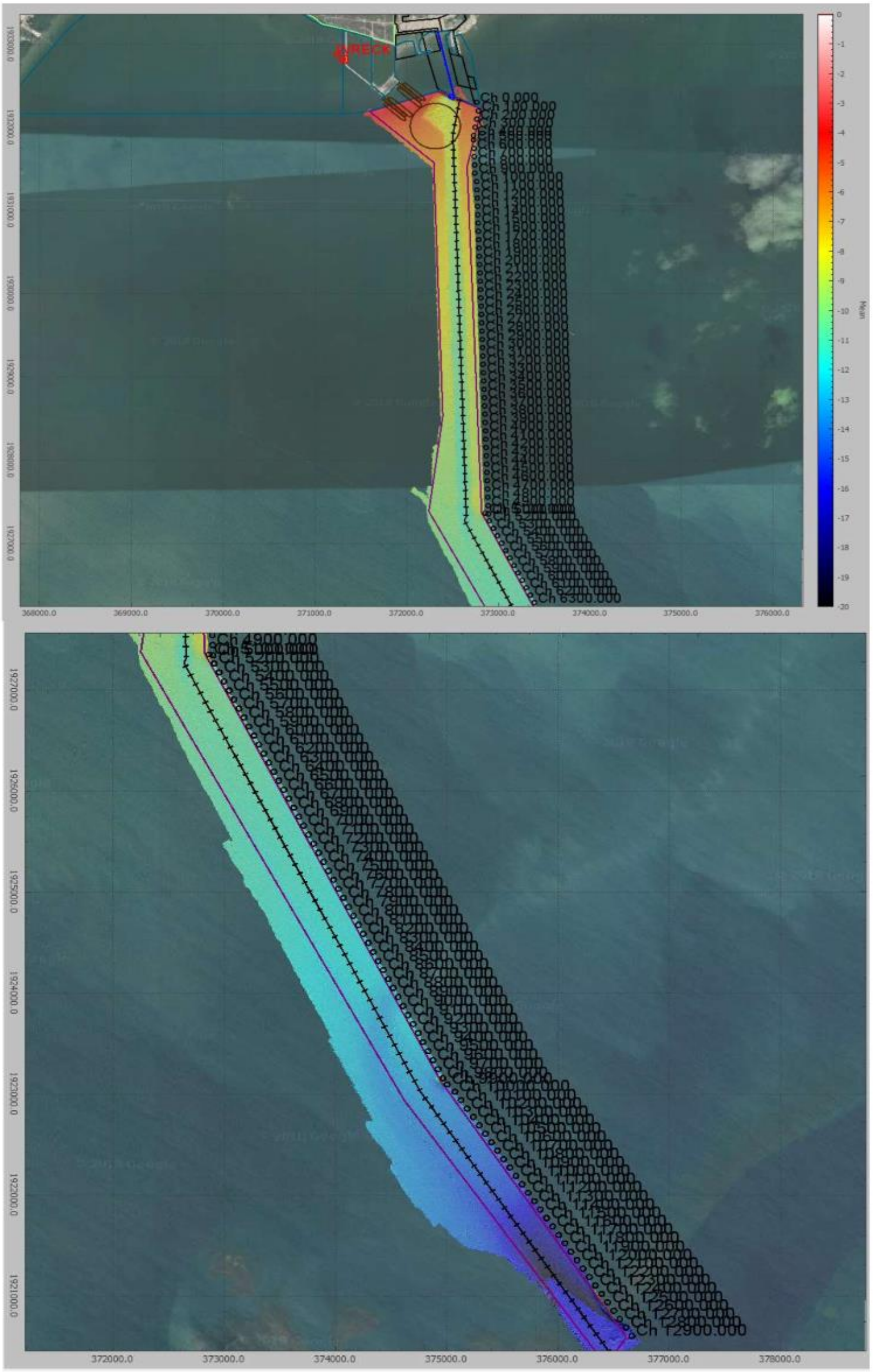


Figure 2.22: Multi beam sonar results.

Seabed depths encountered during survey operations ranged from 3.5 m below MSL along the edge of the channel in the northern section of the survey area to 25 m in depth in the farthest offshore portion.

This survey encompassed a ranged of 800 m along the pier face, to 400 m along the northern corridor, up to 800 m at the widest point along the southern stretch of the channel. In **Figure 2.22**, one can see the area covered by the multibeam survey. A total area of 714 Ha was covered. For both further information on the data, methodology and results of both surveys, please see **Annex VII**.

A third single-beam survey of the nearshore disposal area was performed in April of 2022. Belize Coastal Science Alliance (BCSA) surveyed the area of interest over a three-day period from April 21st to April 23rd, 2022. BCSA was founded in 2018 to fill a much-needed gap of quality coastal and oceanographic data collection in support of research or development projects. BCSA supports a wide range of large and small-scale environmental monitoring activities throughout Belize, contributing to client goals through the production of quality data resulting in informed planning and decision making.

BCSA's interdisciplinary team consists of highly qualified professionals and technical personnel with experience in the fields of engineering, marine sciences, oceanography, and bathymetric surveying. To date BCSA's clients have included local and international companies, government institutions, and non-governmental organizations. The data collection experts have gained experience in the use of a range of oceanographic and water quality data collection software and tools for measuring conductivity, temperature, depth, bathymetry, sound velocity, and other water quality parameters. The experts can adopt a wide range of methodologies and tools to meet the requirements of specialized projects. To achieve desired objectives BCSA works with equipment such as:

1. SonTek M9 Hydrosurveyor 5-beam depth sounding device (50° swath) for water column velocity mapping, multibeam depth sounding and acoustic bottom tracking.

2. Castaway-CTD with an integrated GPS capable of measuring salinity, temperature, and depth up to 100m with a 5 Hz sampling rate.

3. SonTek EXO 2 Sonde for capturing continuous water quality parameters such as pH, Optical DO, TSS, Chlorophyll, etc.

4. Hypack software used for processing and visualization of data.

5. Boats, consisting of a 28ft boat with 200hp Yamaha two-stroke and a 19ft Boston Whaler Sentry with 115hp four-stroke engine.

BCSA consists of specialists in Water Science and Engineering, Coastal Engineering and Management, and Hydrographic Surveying who have a deep knowledge of watersheds, coastal morphology, and tools and techniques for conducting bathymetric surveys. BCSA's track record demonstrates that our projects have been executed solely in Belize, and in support of a wide range of industries, including transportation, tourism, and marine research.

The objective of the study was to determine the bed levels and provide the data and maps, allowing for the communication of accurate and recent bathymetric data and informed decisions regarding the disposal of dredge spoils during the development of the cruise port. The area surveyed covered the entire projected nearshore disposal area and its immediate surrounding area.

The data presented in the BCSA report, attached in **Annex VIII** shows the summary of the nearshore data collected and the profiles of sound velocity and salinity of the water column. Individual casts are represented by different colours that are consistent in both figures. The data collected at Sibun Bight show that the sound velocity of the area is slightly lower that the accepted sound velocity of saltwater (~1560 m/s). The lower measurements are likely a result of the area's proximity to the freshwater outflow of the Belize River, Haulover Creek, and Sibun River. There was also some rain in the area during the time of the surveys.

After the tidal and sound speed corrections where made, the point data where then interpolated in QGIS using TIN Interpolation tool. The interpolation resulted in the bathymetric map below with a 20-metre pixel size. The results show that the bathymetry of the area gradually decreases in a southward direction from the shoreline.

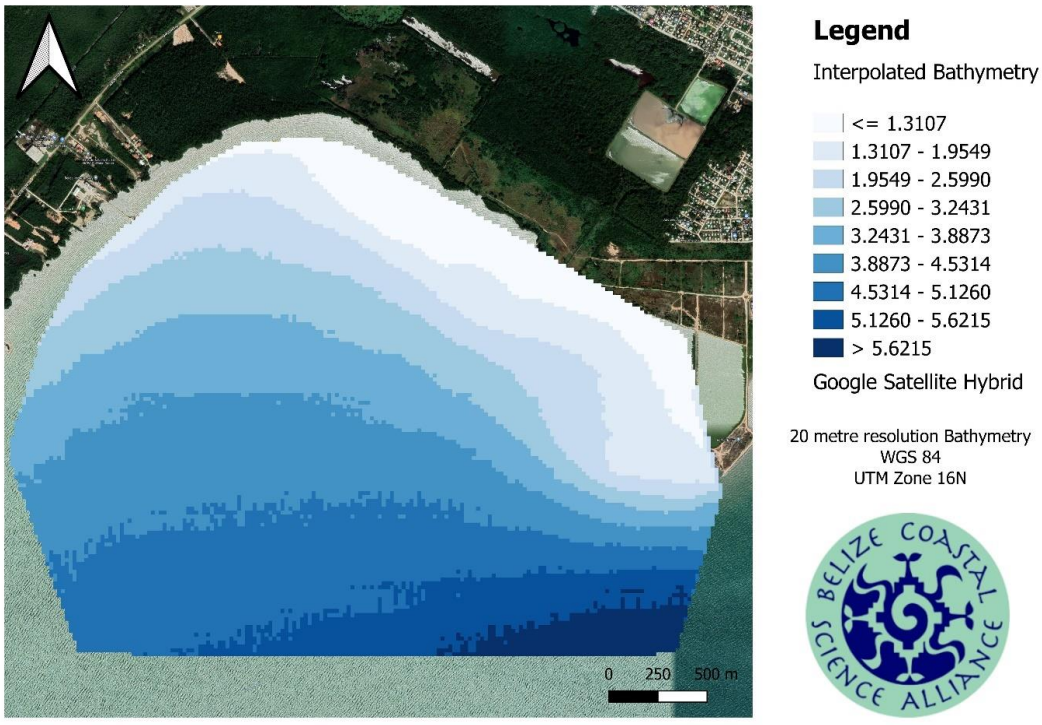


Figure 2.23 Interpolated bathymetry of the nearshore area and its immediate surroundings superimposed on a Google Satellite Hybrid basemap.

Figure 2.23 indicates the shallow depth of the nearshore placement area, and its gradual increase in depth towards the south. No irregularities were found that would indicate the presence of trenches or outcrops. The resolution and data presented in BCSA's report conclusively indicate a nearly flat and regular area, providing sufficiently accurate and up to date data points to complete a hydrodynamic modelling study. The same bathymetric data is ample for any additional detailed modelling of the nearshore placement area and surroundings, like the assessment of any extreme weather event impacts.

2.1.6 Waves

Waves at the shoreline and pier/trestle of the proposed Cruise Terminal facilities may arise from two main sources, namely: passing ships, barges and other sea-going vessels, and wind force. The wave height for the larger sea-going vessels can be of the order of 2 to 4 feet (Tunich Nah, 2005). Wave heights impacting a particular location as a result of the wind are a function of the *fetch*, or the horizontal distance travelled by the wind uninterruptedly across a body of water such as the sea. The wave heights computed for areas in the vicinity of the project site are based on the methodology used by the U.S. Army Corps of Engineers. The results are summarized in **Table 2.9**.

The proposed docking facilities for the Belize Cruise Terminal are to be located in a fairly sheltered area with respect to the prevailing winds. Hence, wave heights impacting this area are expected to be attenuated or reduced. The longest fetch is from the south. This fetch measured approximately 25.5 miles. Thus, from the analysis the maximum wave height for wind speed from the ESE in the range of 18 to 35 mph is roughly 1.16 m (3.8 ft), and for wind from the E it is 0.91 m (3.0 ft.) See details in **Table 2.9.**

Software model output for wave characteristics generated from offshore wind data and simulation for the location 17°N 87°30'W (see **Section 2.1.2**) as carried out by JDN (2018), showed significant wave height values of mostly below 0.8 m at the project site and low to moderate wind speeds. Extreme events such as hurricane and tropical storm events were not considered in these statistics **Table 2.10** shows the results of the proportion of wave height values near the Cruise Terminal development site.

Table 2.9: Computed wave heights for varying fetches based on direct observation in the project site.

Wind Direction	Fetch Length (mi)	Wind Speed (mph)	Wind Speed used in Calculations (mph)	Wave Height (ft)	Wave Period (s)	Percent of Time
ENE	4.8	6-12	12	1.2	2.3	4.9
		12-18	18	1.6	2.5	2.7
		18-35	35	2.4	3.0	<0.1

E	7.1	6-12	12	1.3	2.4	8.5
		12-18	18	1.7	2.8	1.6
		18-35	35	3.0	3.4	<0.1
ESE	9.3	6-12	12	1.8	2.8	5.2
		12-18	18	2.3	3.2	1.0
		18-35	35	3.8	3.8	<0.1
SE	17.3	6-12	12	2.2	3.2	7.8
		12-18	18	2.9	3.6	1.2
		18-35	35	4.1	4.2	<0.1
SSE	11.1	6-12	12	1.9	2.9	2.1
		12-18	18	2.5	3.3	0.4
		18-35	35	4.0	4.0	0.0
S	25.5	6-12	12	2.7	3.6	<0.1
		12-18	18	3.5	4.0	<0.1
		18-35	35	5.4	4.8	<0.1

Table 2.10: Monthly distribution of significant wave height (m).

Monthly distribution of wave height (m)													
lower	upper	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0.2	62.7	49.5	38.4	32.8	35.9	30.5	36.4	48.2	56	72.7	80	74.1
0.2	0.4	19.8	26.2	30.4	32.9	32.5	24.3	30	26.8	24.7	15	12.9	16
0.4	0.6	12.9	17.8	21.5	25.8	24.1	28.3	24.1	18	14.8	8.9	5.6	7.8
0.6	0.8	3.9	5	7.7	7.5	6.3	13.8	7.9	5.8	3.8	2.8	1.4	1.8
0.8	1	0.6	1.3	1.8	1	1	2.7	1.4	0.9	0.7	0.3	0.1	0.4
1	1.2	0	0.1	0.2	0.1	0.1	0.3	0.2	0.2	0	0.1	0	0
1.2	1.4	0	0	0	0	0	0	0	0.1	0	0.1	0	0
1.4	1.6	0	0	0	0	0	0	0	0	0	0	0	0
1.6	1.8	0	0	0	0	0	0	0	0	0	0	0	0
1.8	2	0	0	0	0	0	0	0	0	0	0	0	0
2	2.2												
2.2	2.4												
2.4	2.6												
2.6	2.8												
2.8	3												
3	3.2												
3.2	3.4												
3.4	3.6												
3.6	3.8												
3.8	4												
4	4.2												
4.2	4.4												
4.4	4.6												
4.6	4.8												
4.8	5												
total		100	100	100	100	100	100	100	100	100	100	100	100

2.2 Oceanography

2.2.1 Climate Change

On 15 May 2019, the Secretary General of the United Nation warned that, "climate change is an existential threat to most life on the planet, including and especially humankind." Later, on 18 December 2019 at COP 24 (Katowice, Poland), the Secretary General reiterated that "failing to agree on climate actions would not only be immoral, but suicidal!" The alarm is that if mankind does not change, we risk missing the point where we can avoid runaway climate change, with disastrous consequences for people and all the natural systems that sustain us.

According to newly released data from NASA, the first six months of 2019 finished up as the second warmest half-year on record. In addition, each of the last five January through Junes are now the five warmest such *spans* on record. Only 2016 started hotter than 2019 (Kaufman, 2019).

NOAA (2019) reported that the month of June 2019 was characterized by warmer-than-normal temperatures across much of the world. The global land-only surface temperature for June 2019 was 1.34° C (2.41 °F) above the 20th century average. This was also the highest June temperature in the 140-year record, exceeding the previous record of +1.30° C (+2.34° F) set in 2015 Asia and the Caribbean region had their eighth and ninth highest June temperature in the 110-year regional record, respectively. Meanwhile, North America and Oceania had their coolest (or least warm) June since 2009 and 2012, respectively.

The global ocean-only temperature for June 2019 tied with 2016 as the highest June temperature on record at 0.81° C (1.46° F) above average. Junes 2016 and 2019 are the only June global ocean-only temperature departures from average that have surpassed +0.80° C (+1.44° F). June 2019 tied with August 2015, April 2016, and June 2016 as the 10th highest monthly global ocean temperature departure from average among all months (1,674 months) on record. The 10 highest global ocean monthly temperature departures from average have all occurred since September 2015 (NOAA, 2019).

The preceding climate update from NOAA indicates that Global Warming is a reality and is now impacting every continent and maritime ecosystem. Therefore, impacts of climate change and climate variability must be considered in any economic venture, particularly in high risk coastal zones in the Caribbean and Central America. According to the IPCC (2013) climate change is being manifested in form of increased in the mean averaged surface temperature and sea surface temperatures, increased rainfall variability, increased global seas level rise, and increased frequency of more intense hurricanes.

Coastal Belize will remain vulnerable to rising sea level, increased temperature, and increased frequency of intense hurricanes with their associated hazards in the form of torrential rains, catastrophic winds and destructive storm surges under a future, warmer environmental regime.

Hence, it is imperative that the proprietors for the proposed Belize Cruise Terminal at the Belize Deep Water Port project, develop an effective hurricane/natural hazard plan for the establishment in coordination with National Emergency Management Organization (NEMO) and City Emergency Management Organization (CEMO), and key partners operating in the tourism sector and the coastal zone.

2.2.1.1 Climate Change Projections

The impacts of climate change resulting from global warming are expected to threaten the sustainability of social, economic and ecological systems. Coastal zones in tropical regions are especially vulnerable (IPCC, 2007). Rising sea levels are expected to threaten low-lying coastal areas and islands, with increase evidence of beach erosion, flooding, inundation, and salinization of surface and groundwater resources.

Global projections of future sea level rise range from 0.18 to 0.59 meters relative to the average for 1980-1999 by 2099, however sea level rise is not expected to be geographically uniform. Sea level rise in the Caribbean region by the end of the 21st century is expected to range from 0.44 m to 0.70 m for the high climate model scenario (IPCC, 2007).

Haites et al. (2002) estimated the economic impacts of climate change for CARICOM countries across a range of economic sectors including tourism. The authors cite a range of potential effects of climate change on tourism, including the loss of beaches due to erosion, degradation of ecosystems (e.g., coral reefs and littoral forests), inundation, and damages to infrastructure. The economic impact is calculated as the difference between a “low” and “high” climate scenario.

In the low scenario, the temperature increases are 1.5 °C in 2050 and 2 °C in 2080, and the projected sea level rise is 0.08 m in 2050 and 0.13 m in 2080. In the high scenario, the temperature increase is 2.0 °C by 2050 and 3.3 °C by 2080, and the projected sea level rise is 0.44 m in 2050 and 0.7 m in 2080. Precipitation is projected to decrease in the low scenario, particularly in the rainy season; the high scenario projects an overall increase in precipitation.

The impacts of Climate Change are already being experienced across the productive sectors of Belize, affecting the livelihood of much of the population (GOB-NCCO, 2015). As a small, insignificant contributor to global greenhouse gas emissions, Belize has limited capacity to contribute to mitigation of global climate change. However, the country is committed to play its part in support of the UNFCCC target to limit the increase of global average temperature to 1.5 °C compared to pre-industrial levels. In this respect, Belize’s Nationally Determine Contribution (NDC) is guided by its commitment to strategically transition to low carbon development, while strengthening its resilience to the effects of Climate Change.

The future climate for Belize will likely be characterized by increasing temperatures and declining levels of precipitation possibly arising due to a shift in the rainy season and extended dry season. One study projected a median temperature increase of 2.0 °C (3.6 °F) for the Caribbean region and 3.2 °C (5.7 °F) for the Central American region, and they project a median

decrease in annual precipitation of 12% for the Caribbean region and 9% for the Central American region (UNDP, 2009). Average annual temperatures are expected to increase 3.5 °C (6.4 °F) over the 90-year period, while average rainfall is expected to decrease by 100 mm (IPCC, 2007).

The coastal lowlands in northern Belize are vulnerable to sea-level rise (McSweeney, et al. 2012). The climate models project sea-level rise in the region by the 2090s, relative to 1980-1999 sea-level as follow: 0.18 to 0.43 m under SRES B1; 0.21 to 0.53 m under SRES A1B; 0.23 to 0.56 m under SRES A2 (McSweeney, *et al.* 2012). The damages to infrastructure resulting from sea level rise, coupled with increased frequency of intense tropical cyclones, and the economic effects on the tourism sector, the largest contributor to Gross Domestic Product, could negatively impact the sustainable development of Belize (UNDP, 2009).

In summary the global effects of climate change will be in three forms, namely:

i) Increased ambient and sea surface temperatures;
ii) Sea level rise; and
iii) Increased frequency of more intense hurricanes (Cat III or stronger) in hurricane basins around the world (IPCC, 2013).

The impacts on the coastal zone of Belize and the Port of Belize area in particular, is increased seas level rise and tidal influence on flood conditions, stronger hurricane making landfall along the coast of Yucatan and Belize, provoking destructive storm surges and coastal flooding, and extensive coastal erosion (e.g. the on-going Monkey River village situation).

The construction methods and project design of Port Loyola Cruise Terminal and Cruise Village will consider Sea-Level Rise (SLR) according to the latest IPCC projections (August 2021: see below). Appropriated waterfront structures will be integrated in order to secure potential erosion. In that respect, reclaimed land levels and shore-protections will be designed accordingly in order to mitigate the vulnerability versus climatic changes and sea-level rise. The retainment bunds that surround the areas, will be built with sufficient height to ensure free return of the excess water from the dredging process and stormwater. Long term impact will be a raised ground level, able to withstand sea level rise.

Submerged disposal facilities are designed to contain the dredged materials and are, in essence, not affected negatively by climate changes, saltwater intrusions, coastal erosion, etc.The detailed design incorporated the latest projections edited by IPCC (August 2021) regarding the Climatic Impact-Drivers (CID) for the SCA Region (Southern Central America). It should be noted that IPCC expects a decrease in mean precipitation and an increase in aridity. This might be beneficial regarding the risks of river-flooding. But as outlined in the flood risk assessment, the Project will not affect the overall hydrology of the rivers and will maintain the existing drainage system.

Surrounding communities will not be impacted by the climatic changes induced by the Project since there are none.

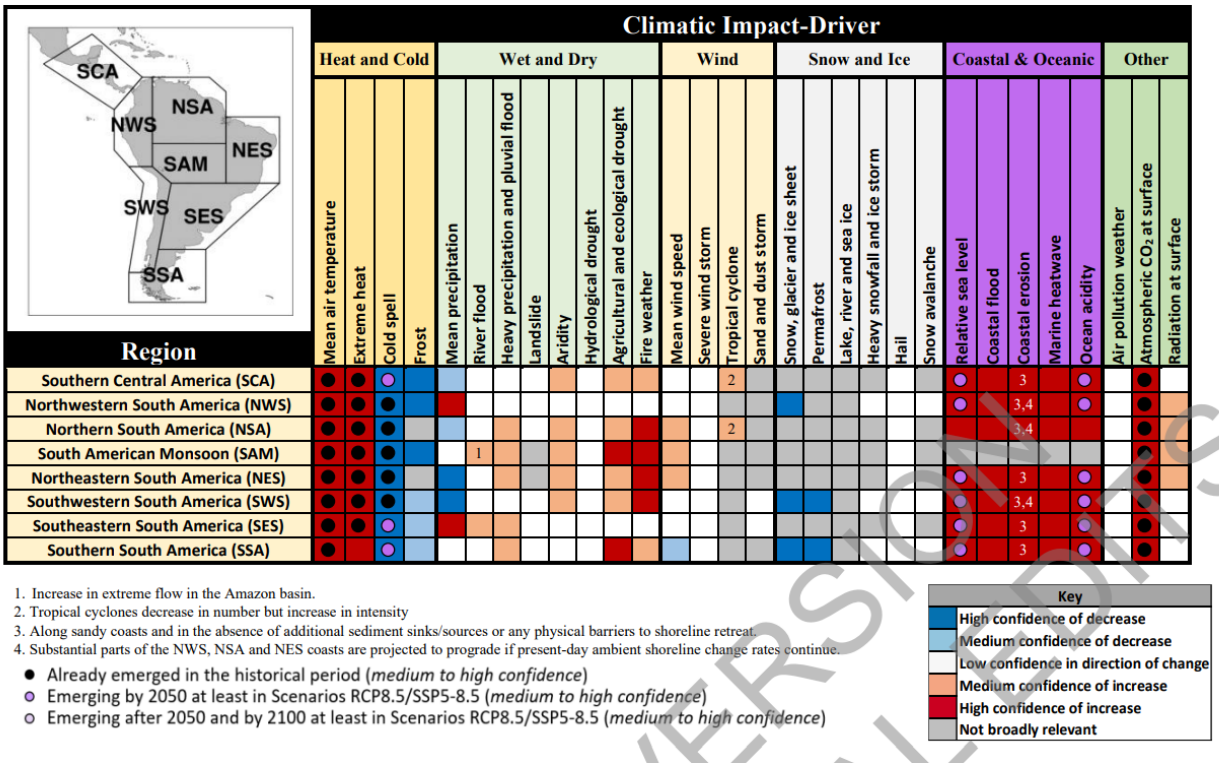


Figure 2.24: Latest version of IPCC Report (Aug 2021)

2.2.1.2 Summary Climate Change Model Projections for Belize

Table 2.11 is a summary of the regional climate change model projections for Belize

Table 2.11: Regional Climate Model Projections for Belize.

- **Temperature**: 2-4° C increase in temperature projected for 2050 to 2080
- **Precipitation**: -20 to -30% by 2050 & -50 to -60% by 2080 – Increased in spatial and temporal variability
- **Sea Level Rise:** 0.32 to 0.63 m by 2080
- Storm surge: 2040 – 2065
  - Category 2 hurricane = 2.47 m
  - Category 5 hurricane = 5.87 m
- Storm surge: 2081 – 2100:
  - Category 2 hurricane = 2.91 m
  - Category 5 hurricane = 6.31 m
- Increased frequency of major hurricanes (Category 3 or stronger)

(Source: NCCO-NAP, 2019).

2.2.2 Seismicity and Tsunamis

2.2.2.1 Earthquake

Belize is close to the northern margin of the Caribbean plate and North America plate Earthquake risk is concentrated in the south-eastern region of the country, away from the main population centers. The records show that large earthquakes do occur in the area offshore SE Belize where the Caribbean transform plate boundary runs, and these have damaging potential for Belize City, Belmopan, san Ignacio/Santa Elena as well as other communities in Southern Belize (e.g. May 30, 2009 event). The map in **Figure 2.25** shows locations and strength of historic seismic epicenters in the neighbourhood of Belize and its coastal zone.

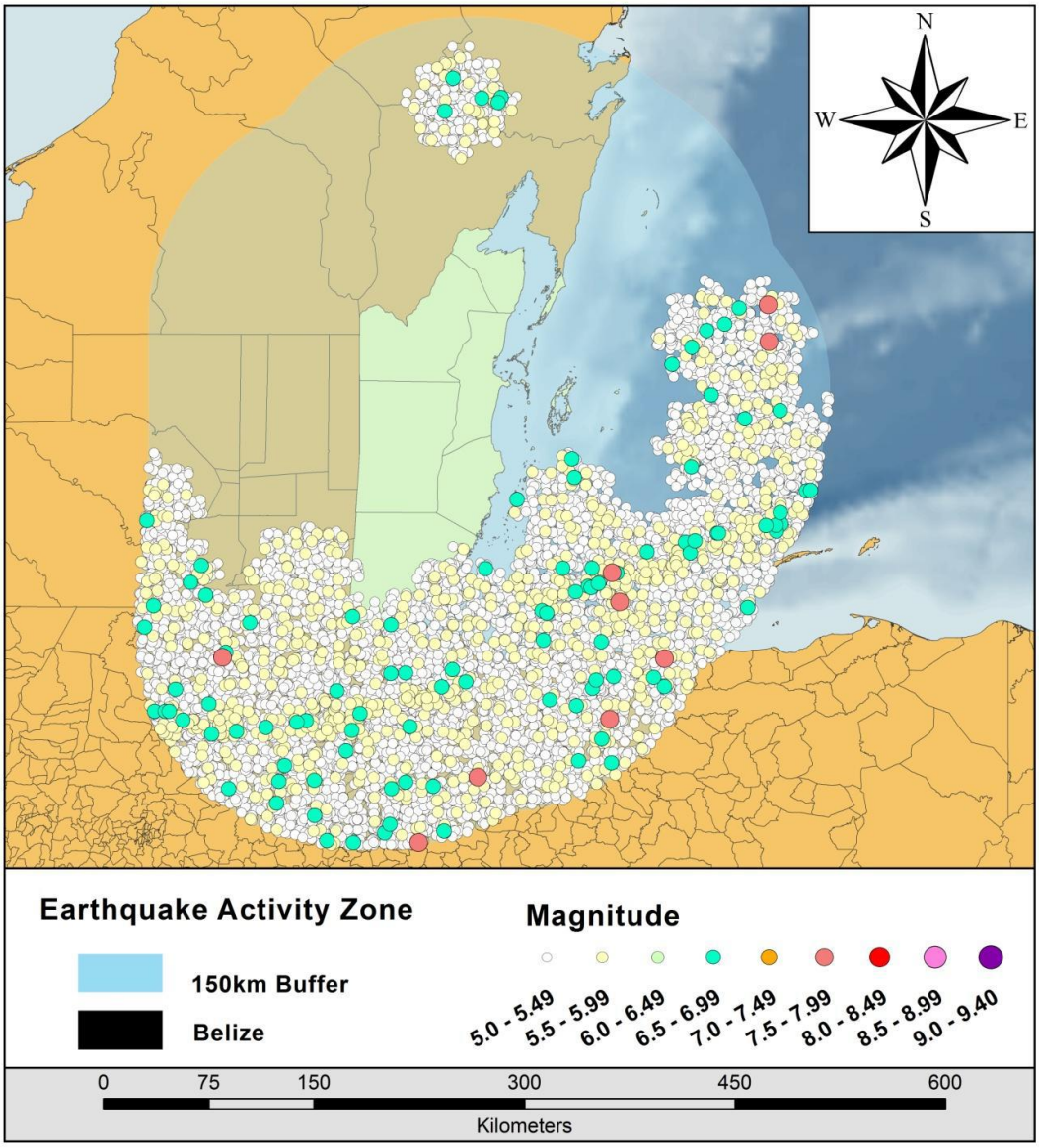


Figure 2.25: Caribbean Catastrophe Insurance Fund stochastic earthquake catalogue for the region of southern Belize, Honduras and Guatemala (CCRIF, 2013.

2.2.2.2 Tsunami Threats

Tsunamis are generated by marine earthquakes, massive underwater landslides and island volcano eruptions. **Figure 2.26** is an illustration of the mechanics of a tsunami.

According to the Belize Development Trust (BDT, 2000), Belize has a 100% chance of experiencing five (5) earthquakes and 75% of seeing 10 in the next century. **Figure 2.27** is a United States Geological Survey map showing the major fault lines across the Caribbean and the Gulf of Honduras.

Belize does not have a National Earthquake Information Center or seismic station and all earthquake disaster preparedness rests with NEMO. Unlike hurricanes that normally allow sufficient time to prepare, earthquakes strike suddenly, violently and without warning.

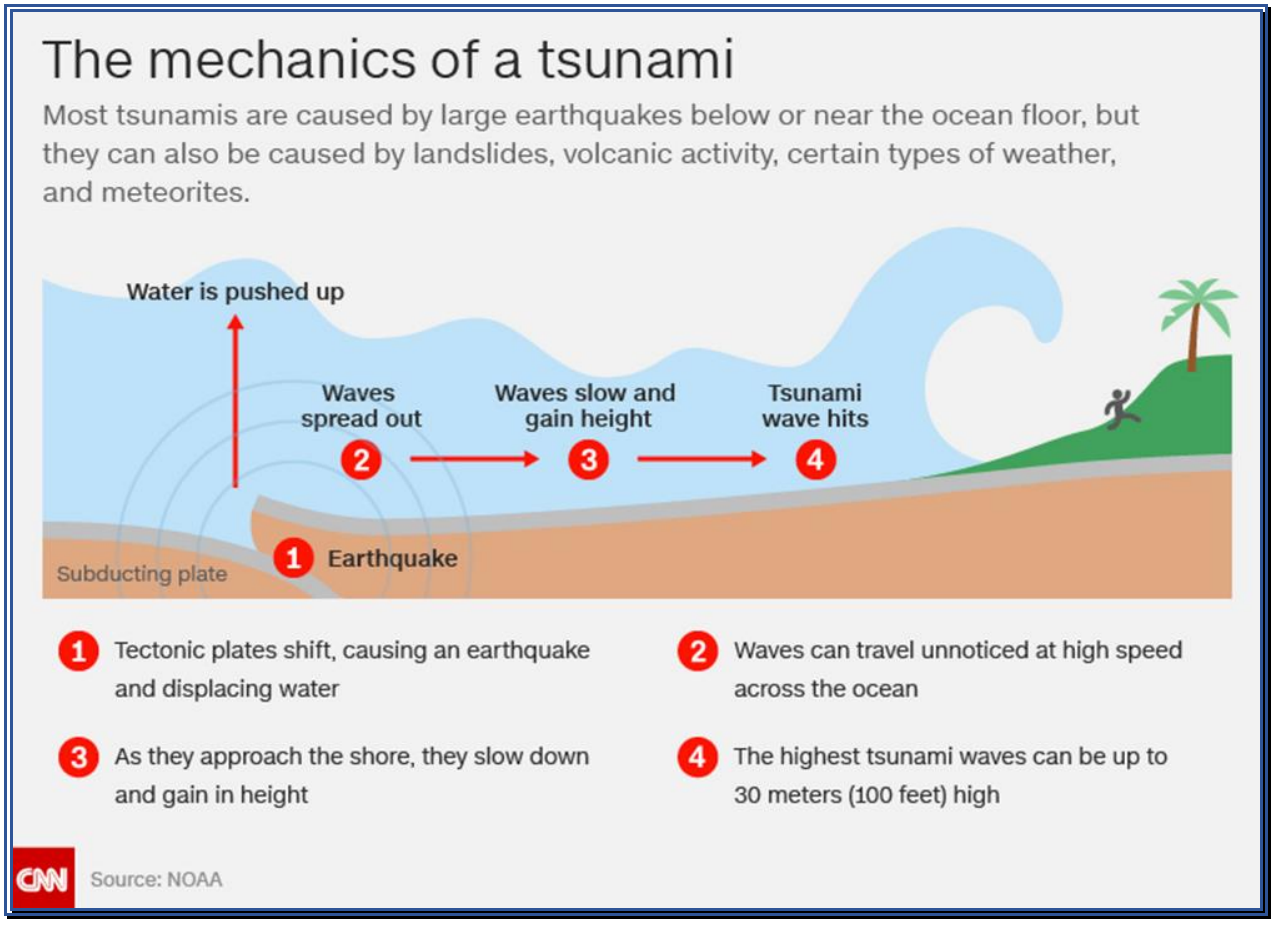


Figure 2.26: How a tsunami is generated.

(Source: NOAA 2016 in https://www.ambergristoday.com.).

Earthquake preparedness depends to a great extent on the early measure taken to plan for these seismic movements by ensuring that the construction of building and other structures, particularly in the coastal zone, take these into consideration, and by identifying potential hazards associated with sudden earth movement ahead of time. Major hazards associated with marine earthquakes are tsunamis.

Historical records indicate that the Caribbean region have been affected by tidal waves or tsunamis generated by earthquakes. **Figure 2.28** is a map of historic earthquakes and tsunamis in the Caribbean/Central America sub-regions.

The map depicts the locations (green squares) and water heights of historic tsunamis in the Caribbean (gold and blue bars) and locations of significant earthquakes (circles). Red triangles mark significant volcanic eruptions.

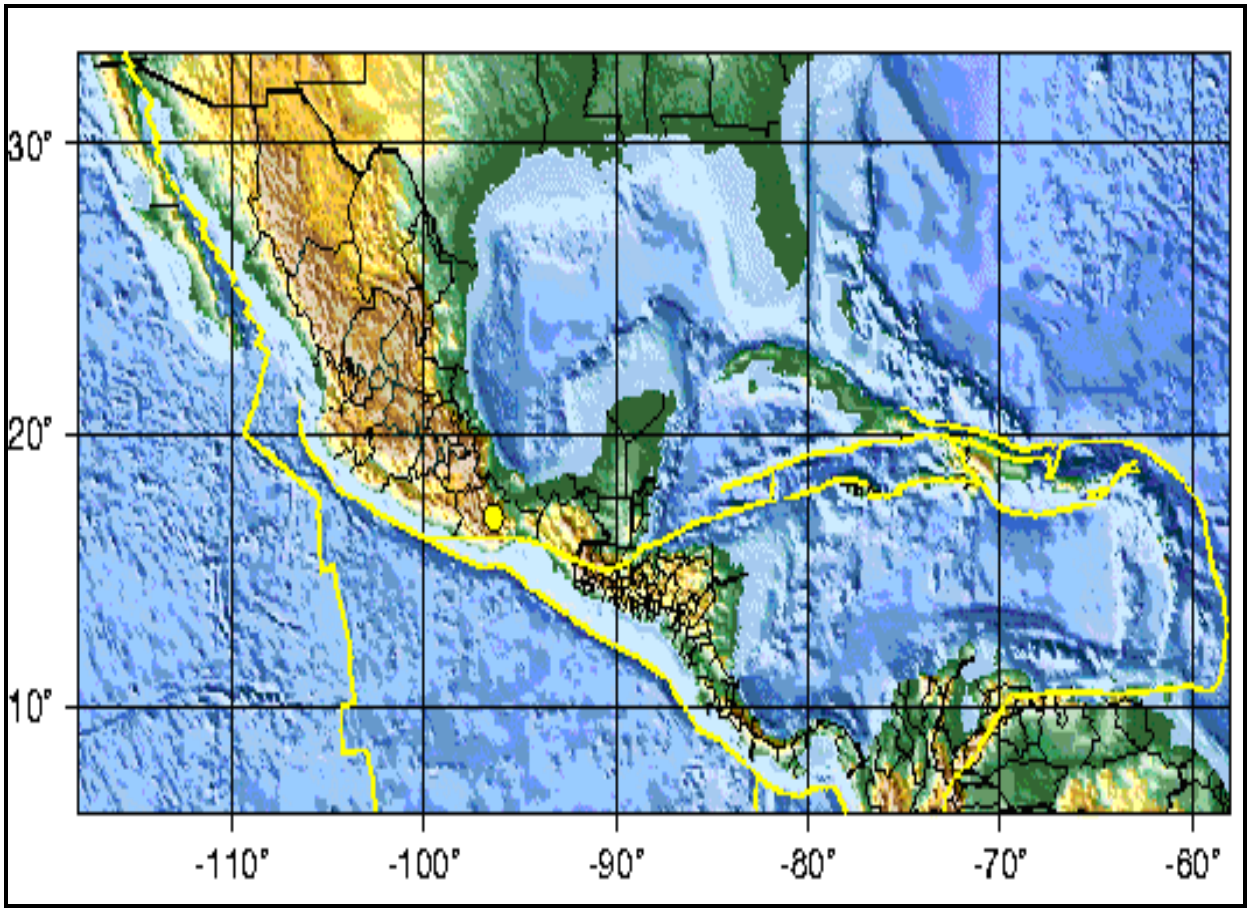


Figure 2.27: Map of Major Faults Affecting Belize.
(Source: USGS Nat'l Earthquake Info Center.)

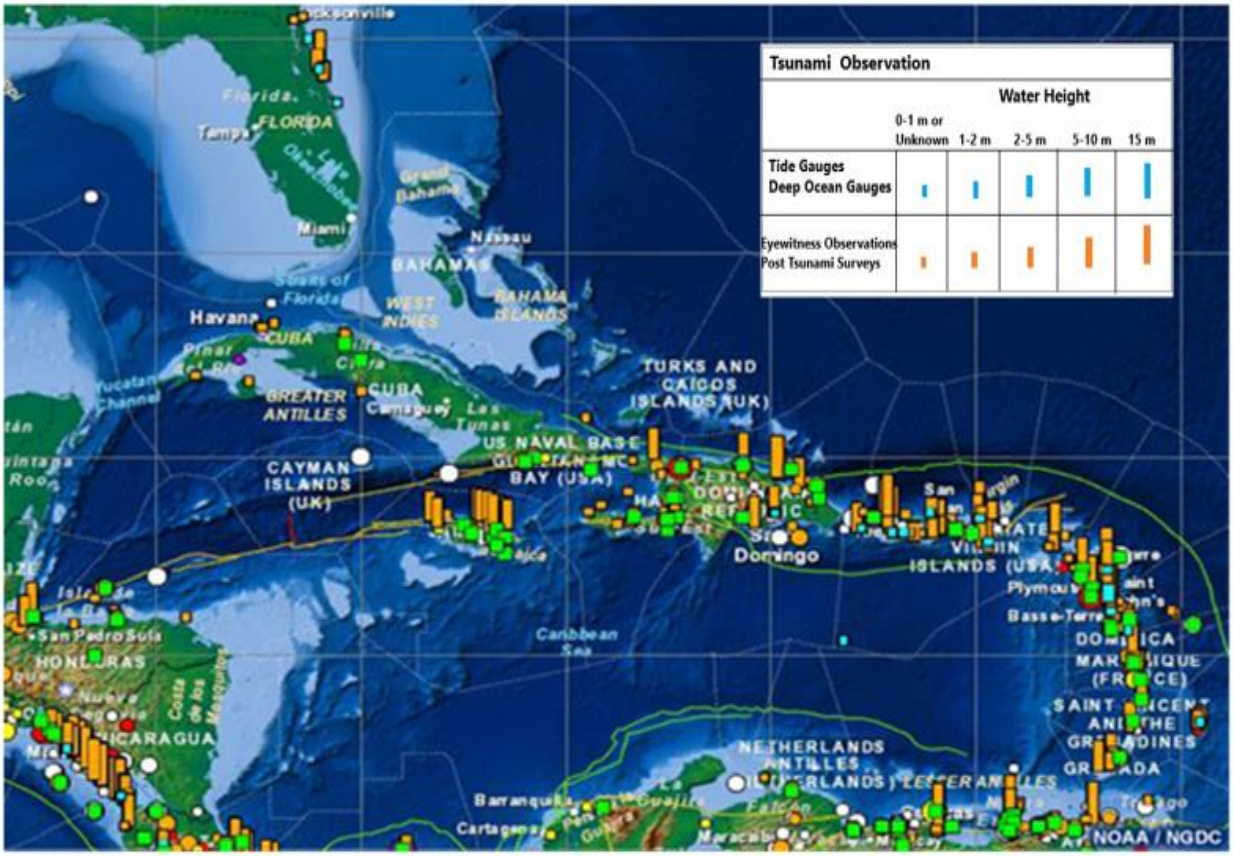


Figure 2.28: Historic Caribbean Earthquakes and Tsunamis.
(Source: www.meted.ucar.edu/tsunami/community/media_gallery.php

2.2.3 Hydrology

Belize City and the Port of Belize are in the estuary of the Belize River, and strongly influenced by the discharge of the Belize River, the maritime environment and to a lesser extent by the discharge from the Sibun River to the south. The lower Belize River is the major water channel influencing the project zone, as it meanders towards Caribbean Sea from Banana Bank to its main discharge zone near Haulover Bridge, and the diversion of the Haulover Creek that passes through central Belize City. The average height of Belize City above MSL is about 3 feet.

The Philip Goldson Highway (PGH) and the George Price Highway (GPH) running north and west from the Old Capital, respectively, act like dams (running at an average of 4-5 feet above the natural level of the floodplain/wetland) which divides the wetland into an eastern and western section and disrupts the interconnectivity of this wetland with the Crooked Tree Lagoon system. During four extreme rainfall events, namely: the November 1979 disturbance, Hurricane Keith of October-November 2000, TD 16 of November 2008 and Hurricane Richard of 2010, sections of Belize City and portions of the PGH from Belize City to Gardenia were inundated for a couple days.

The Port area sits on a natural wet land that was once a dense mangrove forest. The area was drained and filled during the construction and development of the Port and surrounding area of Port Loyola. Hence, low-lying zones in this portion of Belize City are prone to pluvial flooding and storm surge. Special attention will need to be given to ensuring proper drainage of project area and adjacent properties.

2.2.3.1 Depth, Frequency and Intensity Rainfall

Table 2.12 below contain rainfall rates and return periods for extreme rainfall values from the records at the PGIA area for the period 1983-1994 inclusive. The mean of the highest daily rainfall at this location is 149 mm or 5.9 inches. The corresponding 5-year, 10-year, 20, 50 and 100-year return period depths are summarized in the table. Mean highest rainfall value for 5, 10, 15, 30 and 60-minutes range from around 11 mm to 59 mm.

Table 2.12: Rainfall Intensity-Duration Frequency for PGIA—1983 to 1994.

Duration	**5m**	**10m**	**15m**	**30m**	**60m**	**2hr**	**6hr**	**12hr**	**24h (daily)**
Mean (mm) of highest value	11.2	20.1	28.8	42.2	58.9	72.5	90.7	111.8	149
Std Dev. (mm)	3.1	5.2	13.1	18.4	26.8	25.5	22.3	33.1	46
Return Period									
5 years	14	25	42	61	85	98	113	145	196
10 years	17	29	52	75	106	118	130	170	231
20 years	19	33	62	88	125	136	147	195	265
50 years	22	38	74	106	151	161	168	226	310
100 years	24	42	84	119	170	179	184	250	343
Ratio (d/d24)	0.075	0.13	0.19	0.29	0.39	0.49	0.61	0.75	1
Note: Analysis based on an EVI distribution; BECA International Consultants Ltd, 1994									

Hence, from the analysis it can be deduced from the records, that the mean highest 1-hour rainfall for the Airport is about 91 mm or 3.57 inches. The 1-hour maximum rainfall for a return period of 10 years can be 106 mm and for 50 years it can total 151 mm. Extreme rainfall is typical of climatic conditions along coastal Belize during the rainy season and have generated coastal flood in Belize City and along the northern highway in the Ladyville area in the recent past.

For engineering use, the characteristics of the rainfall behaviour are usually captured in so-called Intensity-Duration-Frequency curves (IDF curves). IDF curves developed from daily rainfall values for the PGIA during the earlier feasibility study for the PGH can be seen in **Figure 2.29** below.

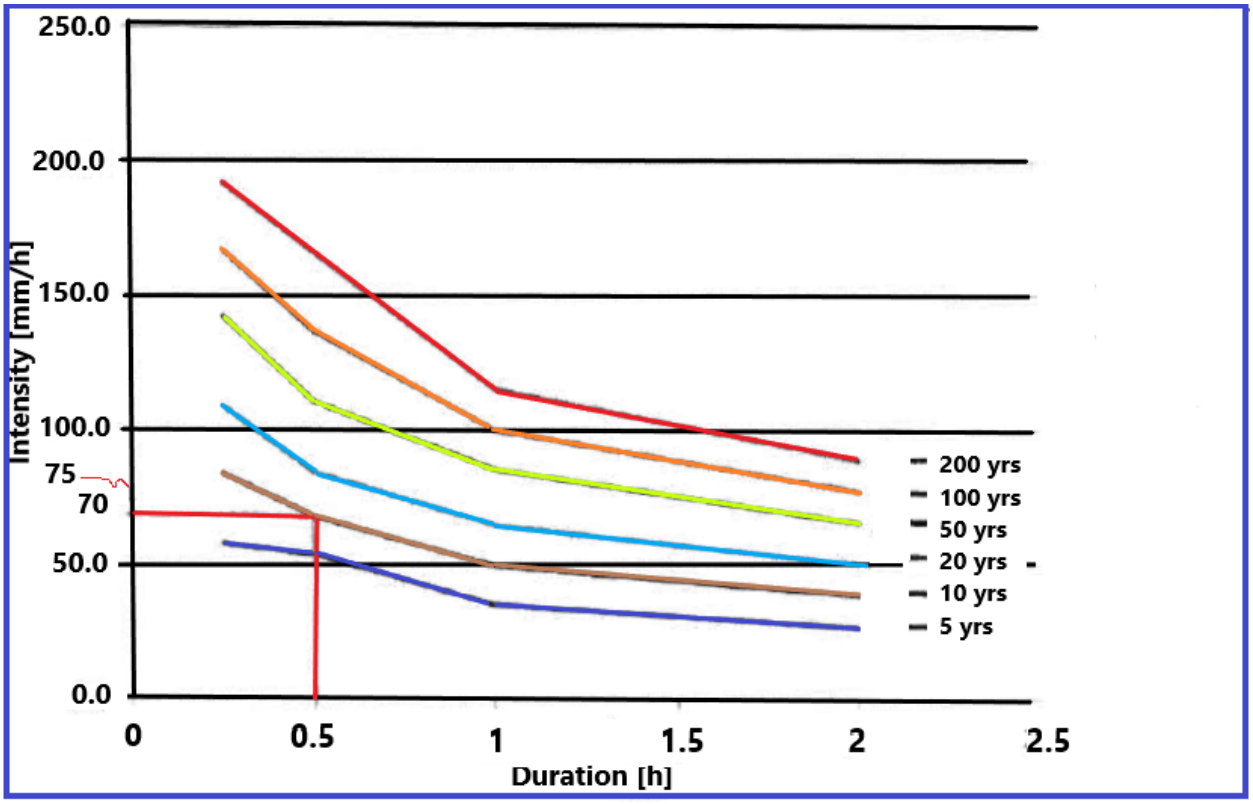


Figure 2.29: Intensity, Duration, Frequency Curves for rainfall at the Philip Goldson Airport. (Source: Drainage Report, CDB, 2013).

2.2.3.2 Return Period

The return period for several rainfall intensities were calculated from daily rainfall for the Philip Goldson Airport (Drainage Report, CDB 2013), and summarized in **Table 2.12**

Table 2.13: Rainfall return period and intensity for PGIA.

Return Period (yrs)	5	10	25	50	100	200
mm/day	15.1	27.4	42.9	54.4	65.8	77.2

2.3 Water Quality

2.3.1 Sampling sites and sea water quality parameters

Two sets of sea water samples were collected offshore the proposed Port of Belize Cruise Tourism Village area and delivered to the Public Health Water Quality Laboratory in Belize City, for biochemical analysis following prescribed operating procedures. The water samples were collected on April 11th and June 8th, 2019. The locations of these points are shown on the Google map (**Figure 2.30**). **Table 2.14** lists these water sampling sites, the water depth in meters, and the maximum observable current flow for the water column.

In situ water quality tests were also conducted at each of these sites using the Professional Plus YSI water quality kit. The results of the in situ YSI measurements and the National Water Quality Laboratory analysis, and a split sample for site AC4-2 are included in the **Tables 2.15, 2.16 and 2.17**. The laboratory analysis results are also contained in **Annex IX**. Also, in situ measured water quality parameters in the vicinity of the Belize Cruise Terminal development as compiled by JDN Report of 2018 (JDNR) during their Site Investigation study can be viewed in **Table 2.18 and Table 2.19**.

Laboratory Analysis results are summarized in **Table 2.20**. Sediment analysis in the project zone for heavy metals, mineral oils and polycyclic aromatic hydrocarbons (PAH) were also conducted during the project site investigation field study in 2018. The results are presented in **Table 2.21** for reference (See **Annex IX** for more information). This marine environmental data is recent and can be considered as additional baseline information on the water quality and sediment characteristic for the marine environment off the Port Loyola site, complimenting the April 11, 2019 and June 8, 2019 measurements conducted by the BET team.

The parameters tested at the National Drinking Water Quality Laboratory (Public Health Bureau) included: Nitrate-nitrogen, Sulfate, Orthophosphate, Turbidity, pH, Fecal Coliform, and Escherichia Coli. A split sample for site AC4-2 was also collected and sent to the Bowen & Bowen Laboratory mostly as a control.

In situ water analysis conducted with the Professional Plus YSI at the surface and near the bottom of the water column included the following parameters: temperature (°C), actual pressure (mmHg), Dissolved Oxygen (% and mg/L), Specific Conductivity (mS/cm), Conductivity (µS/cm), Total, Dissolved Solids (TDS), Salinity, pH (standard scale and mV), Nitrate (NH_4-N) and Oxidizing Reducing Potential of sea water sample (ORP, mV). A secchi disk was used to help ascertain the level of turbidity in the vertical water column. The detail water quality results are listed in separate tables in the **Annex VII** both for the in-situ measurements with the Professional YSI kit and laboratory water quality analysis results. For the equipment and methodology used in the JDN report please see **Annex VII**.



Figure 2.30: Water quality sampling points near the Port of Belize.



Figure 2.31: Marine sampling points of JDN 2018.

Table 2.14: Marine water quality sampling points near project site.

Date: April 11 2019				
Sample Sites	**Eastings**	**Northings**	**Water Depth (m)**	**Max Vel (m/s)**
T2	372190	1930232	10.0	0.15
AC1	372623	1930324	9.20	0.22
AC2	372472	1928487	9.81	0.24
AC3-1	373150	1926008	12.34	0.16
AC3-2	372778	1925540	12.47	0.18
AC4-2	372577	1923974	12.10	0.25
SA1	371946	1922247	10.21	0.24
SA2	373922	1921070	9.14	0.32
EXDA	368245	1930413	5.18	0.25
RL	374828	1930169	8.69	0.22
DA1	372818	1932388	5.57	0.35
SL-1	369626	1933188	5.20	0.21
Date: June 8, 2019				
Sample Sites	**Eastings**	**Northings**	**Water Depth (m)**	**Max Vel (m/s)**
T2	372190	1930232	10.0	0.18
AC1	372623	1930324	9.20	0.25
AC2	372472	1928487	9.81	0.21
AC3-1	373150	1926008	12.34	0.24
AC3-2	372778	192540	12.47	0.28
AC4-2	372577	1923974	12.10	0.18
SA1	371946	1922247	10.21	0.25
SA2	373922	1921070	9.14	0.30
EXDA	368245	1930413	5.18	0.28
RL	374828	1930169	8.69	0.24
DA1	372818	1932388	5.57	0.30
SL-1	369626	1933188	5.20	0.20

Table 2.15: In situ and National Water Quality Laboratory analysis results for April 11, 2019.

Results of Water Analysis																								
11-Apr-19			1		2		3		4		5		6		7		8		9		10		11		12	
			Sample T2		Sample AC1		Sample AC2		Sample AC3-1		Sample AC3-2		Sample AC4-2		Sample SA1		Sample SA2		Sample EXDA		Sample RL		Sample DA1		Sample SL-1	
			±0.3 km West of the Deep Water Deck		2 km South of the Deep Water Deck (Canal)		3.8 km South of the Deep Water Deck (Canal)		6.35 km South of the Deep Water Deck (Canal)		0.38 km Sample Point AC3-1 (Canal)		8.34 km South of the Deep Water Deck (Canal)		10 km South of the Deep Water Dock (Canal- Near Robinson Point)		11.33 km South of the Deep Water Dock (Canal - Near Robinson Point)		West of AC1 1.5 km from Shore		± 2.2 km East of AC1		±0.3 km East of Deep Water Dock			
In Situ Water Quality Analysis Using the YSI Professional Series Water Probe Mar 1 2019																								
	Time		9:30 AM	9:35 AM	10:06 AM	10:16 AM	10:50 AM	10:57 AM	11:24 AM	11:36 AM	11:57 AM	12:09 PM	12:55 PM	12:59 PM	1:18 PM	1:25 PM	2:00 PM	2:06 PM	3:10 PM	3:14 PM	3:32 PM	3:37 PM	3:45 PM	3:51 PM	3:45 PM	3:51 AM
	Depth	meters	10.00		9.20		9.81		12.34		12.47		12.1		10.21		9.14		5.18		8.69		4.57			
	Sample Dept		0.50	5.00	0.50	4.50	0.50	5.00	0.50	6.00	0.50	6.00	0.50	6.00	0.50	5.00	0.50	5.00	0.50	2.50	0.50	4.00	0.50	2.00	0.50	2.00
Parameters																								
1	Temperatu	C°	28.2	27.9	28.3	28.2	28.4	28.2	28.6	28.3	28.6	28.2	28.5	28.5	28.6	28.2	28.6	28.3	28.7	28.6	28.7	28.2	28.9	28.9		
2	Pressure	mmHg	757.9	759.9	757.8	757.7	757.6	757.6	757.1	757.1	756.9	756.9	756.3	756.3	756.9	756	755.7	757.8	755.1	755.1	755.2	755.1	755.6	755		
3	DO (SAT)	% /L	85.8	81.7	87.7	89.1	94.3	97.7	101.1	100.7	93.6	108.4	95.3	102	91.1	129.6	96.4	125	97.3	118.2	100.4	135	96.1	109.5		
4	DO	mg/L or ppn	5.50	5.29	5.62	5.64	6.03	6.09	6.45	6.45	5.96	6.94	6.4	6.5	6.8	7.81	6.12	7.91	6.21	7.46	6.29	8.56	6.43	6.96		
5	SPC[ond]	mS/cm	53163	53287	53103	52129	53093	53135	53371	53314	53280	53203	53572	53623	53509	53462	53642	53620	52703	52713	53144	531.23	53212	52207		
6	C[ond]	µS/cm	56.40	56.20	56.4	55.10	56.60	56.40	57.00	56.70	56.90	56.40	57.5	57.3	57.1	56.7	57.4	57	56.4	56.3	56.9	56.4	57.2	57.2		
7	TDS	g/l	34580	34645	34575	33995	34515	34515	34710	34645	34645	34580	34840	34840	34775	34775	34840	34840	34255	34255	34515	34515	34580	34580		
8	Salinity	ppt	34.98	35.03	37.93	34.77	34.92	34.94	35.12	35.09	35.09	35.06	35.27	35.32	35.23	35.21	35.29	35.31	34.62	34.63	34.963	34.95	35.03	34.99		
9	ORP	mV	12.8	19.4	12.3	13.7	8.2	11.0	0.1	-1.9	0.3	13.3	-5.9	-42	-10.2	0.7	-3.4	4.6	0.6	8.1	4.9	12.8	-12.4	-9.9		
National Drinking Water Quality Monitoring Program -Public Health Bureau - Sample Taken Mr 1 2019: Analyzed:																								
10	Nitrate-N	mg/l		0.9		0.9		0.9		0.8		0.8								0.8		0.9		0.8		
11	Sulfate	mg/l		2,800		3,300		2,900		2,800		2,700								2,800		3,100		2,900		
12	Phosphate	mg/l		0.03		0.05		0.02		0.02		0.03								0.03		0.03		0.02		
13	Turbidity	NTU		7		3.29		2.75		1.93		2.4								3.08		1.89		3.52		
14	pH			8.29		8.07		8.28		8.29		8.31								8.3		8.31		8.31		
Bacteriological																								
15	Fecal Colif	per/100 ml		0		0		0		0		0								0		0		0		
16	E. Coli	per/100 ml		0		0		0		0		0								0		0		0		
Way Point																								
UTM Coordinates 16Q WGS 84 Datum		mE	372190		372623		372472		373150		372778		372577		371946		373922		368245		374828		372818			
		mN	193232		1930324		1928487		1926008		192540		1923974		1922247		1921070		1930413		1930169		1932388			
			Degrees Miniutes Seconds																							
		Lat	17 28 26.3		17 27 19.1		17 26 19.3		17 24 58.8		17 24 56.5		17 23 52.5		17 22 56.2		17 22 18.32		17 27 21.1		17 27 14.5		17 28 26.3			
		Long	88 11 39.5		88 11 58.3		88 12 03.0		88 11 39.5		88 11 23.2		88 11 12.3		88 12 19.5		88 11 12.3		88 14 26.7		88 10 43.5		88 11 52.1			

Table 2.16: In situ and National Water Quality Laboratory analysis results for June 8th, 2019.

Results of Water Analysis																								
8-Jun-19			1		2		3		4		5		6			7		8		9		10		11		12	
			Sample T2		Sample AC1		Sample AC2		Sample AC3-1		Sample AC3-2		Sample AC4-2		Sample AC4-2	Sample SA1		Sample SA2		Sample EXDA		Sample RL		Sample DA1		Sample SL-1	
			±0.3 km West of the Deep Water Deck		2 km South of the Deep Water Deck (Canal)		3.8 km South of the Deep Water Deck (Canal)		6.35 km South of the Deep Water Deck (Canal)		0.38 km Sample Point AC3-1 (Canal)		8.34 km South of the Deep Water Deck (Canal)		Control Sample sent to another Laboratory	10 km South of the Deep Water Dock (Canal- Near Robinson Point)		11.33 km South of the Deep Water Dock (Canal - Near Robinson Point)		West of AC1 1.5 km from Shore		± 2.2 km East of AC1		±0.3 km East of Deep Water Dock		Shoreline -offshore ± 500 m from BWS discharge canals	
In Situ Water Quality Analysis Using the YSI Professional Series Water Probe June 8, 2019																										
	Time		9:54 AM	9:58 AM	10:38 AM	10:45 AM	10:49 AM	10:55 AM			11:00 AM	11:06 AM	11:14 AM	11:20 AM	11:20 AM	11:30 AM	11:35 AM	11:40 AM	11:45 AM	9:32 AM	9:36 AM	10:25 AM	10:32 AM	10:11 AM	10:11 AM	9:12 AM	9:16 AM
	Depth	meters	10.00		11.00		9.81		12.34		10.00		12.1			10.21		9.14		5.18		10		4.57			
	Sample Depth		0.50	5.00	0.50	4.50	0.50	5.00	0.50	6.00	0.50	6.00	0.50	6.00		0.50	5.00	0.50	5.00	0.50	2.50	0.50	4.00	0.50	2.00	0.50	2.00
Parameters																										
1	Temperature	C°	31.0	30.6	30.7	30.5	30.5	30.2			30.5	30.2	30.6	30.1		30.7	30.3	30.8	30.1	30.4	30.4	30.5	30.6	30.9	30.9	30.6	30.5
2	Pressure	mmHg	757.7	757.7	757.6	757.7	757.5	757.5			757.7	757.5	757.5	757.5		757.4	757.4	757.3	757.4	757.8	757.8	757.6	757.5	757.7	757.7	757.7	757.7
3	DO (SAT)	%/L	85.8	81.7	87.7	89.1	94.3	97.7			93.6	108.4	95.3	102		91.1	129	96.4	125	97.3	118.2	100.4	135	96.1	109.5	91.1	129.6
4	DO	mg/L or ppm	4.40	5.10	5.2	5.10	5.10	5.30			5.10	5.20	5.1	5.1		5.3	5.2	5	5.2	5	5.2	5	5.3	5.2	5.5	4.8	4.9
5	SPC[ond]	mS/cm	56037	57036	56405	56433	56415	56500			56408	56348	56384	56367		56478	56457	56408	56357	56472	56475	56338	56387	57015	57292	56492	56510
6	C[ond]	µS/cm	56.40	56.20	56.4	55.10	56.60	56.40			56.90	56.40	57.5	57.3		57.1	56.7	57.4	57	56.4	56.3	56.9	56.4	57.2	57.2	57.1	56.7
7	TDS	g/l	36400	37245	36660	36725	36660	36660			36660	36660	36660	36660	36,500	36725	36725	36660	36660	36725	36725	36595	36595	37050	37245	36725	34775
8	Salinity	ppt	37.08	37.86	37.33	37.34	37.31	37.37			37.31	37.29	37.29	37.31	33.3	37.37	37.37	37.31	37.29	37.38	37.38	37.28	37.26	37.73	38.03	37.37	37.1
	pH	pH Units	8.09	8.22	8.17	8.17	8.18	8.18			8.18	8.18	8.17	8.17		8.18	8.18	8.17	8.18	8.17	8.17	8.16	8.18	8.23	8.24	8.16	8.15
	Nitrate	NH4-N	48.22	49.01	49.09	48.65	48.35	48.02			48.35	47.80	48.14	47.24		49.37	49.37	48.05	47.37	59.32	49.34	49.06	48.74	49.94	50.33	54.13	55.47
9	ORP	mV	12.8	19.4	12.3	13.7	8.2	11.0			0.3	13.3	-5.9	-42		-10	0.7	-3.4	4.6	0.6	8.1	4.9	12.8	-12.4	-9.9	-10.2	0.7
National Drinking Water Quality Monitoring Program -Public Health Bureau - Sample Taken 8 June 2019: Analyzed:																										
10	Nitrate-N	mg/l	1.20		0.60		0.70						1.10		3.30	0.60				0.90		0.60		0.70		0.80	
11	Sulfate	mg/l	2,300		2,500		2,200						1,800		3,154	2,400				1,800		2,800		2,600		2,200	
12	Phosphate	mg/l	0.06		0.02		0.02						0.03		0.02	0.01				0.01		0.13		0.02		0.02	
1	Turbidit	NTU	12.90		1.96		2.18						1.81			1.14				2.68		1.37		2.12		5.88	

3	y																										
14	pH		8.13		8.19		8.21						8.20			8.21				8.21		8.13		8.25		8.21	

Bacteriological 8 June 2019																											
15	Fecal Coliform	per/100 ml	10		0		0						0		106	0						0		0		0	
16	E. Coli	per/100 ml	0		0		0						0		>1	0						0		0		0	
Secchi Disk			2 ft		11 ft 2 inch		11 ft 2 inch				7 ft 2 inch		7 ft 2 inch			13 ft 4 inch		12 ft 9 inch		5 ft 8 inch		11 ft 8 inch		6 ft 8 inch		–

UTM Coordinates 16 Q WGS84 Datum	mE	372190	372623	372472	373150	372778	372577		371946	373922	368245	374828	372818		
	mN	1932325	1930324	1928487	1926008	192540	1923974		1922247	1921070	1930413	1930169	1932388		
		Degrees Minutes Seconds													
	Lat	17 28 26.3	17 27 19.1	17 26 19.3	17 24 58.8	17 24 56.5	17 23 52.5	17 23 52.5	17 22 56.2	17 22 18.32	17 27 21.1	17 27 14.5	17 28 26.3		
	Long	88 11 39.5	88 11 58.3	88 12 03.0	88 11 39.5	88 11 23.2	88 11 12.3	88 11 12.3	88 12 19.5	88 11 12.3	88 14 26.7	88 10 43.5	88 11 52.1		

(Source: BET team. The summary water quality readings are the average values evaluated the water column for each sampling site)

Table 2.17: Water Quality Laboratory analysis results for Site AC4-2 for June 8th, 2019 (Control Sample).

Parameter	*LOQ*	*URL*	*Unit of Meas.*	*Result AC4-2*	*Method*	*Analysis Date*
PHYSICAL						
Total Dissolved Solids	0	50,000	mg/l	**36,500**	Conductivity Probe	2019/06/10
INORGANIC COMPOUNDS						
Phosphate (PO4)	0.02/0.23	2.50/30	mg/l	**0.02**	HACH Method 8048/8178	2019/06/10
Nitrate (NO3)	0.1/0.3	10.0/30	mg/l	**3.3**	HACH Method 8171/8039	2019/06/10
Sulfate (SO4)	2/150	70/900	mg/l	****3,154**	HACH Method 8051	2019/06/10
Salinity	0	100	ppt	**33.3**	HACH Method 10073	2019/06/10
ORGANIC CHEMISTRY						
Oxygen Demand, Chemical (COD)	0.7**30	15,000	mg/l	**<30**	HACH Method 8000	2019/06/10
MICROBIOLOGICAL ANALYSIS						
Fecal (Thermotolerant) Coliform	20	200	CFU/100ml	**106**	HACH Method 8074	2019/06/10
Escherichia Coli	20	200	CFU/100ml	**<1**	HACH Method 8367	2019/06/10

Table 2.18: Overview of in situ water quality parameters (JDN).

	Sample Locations																	
	AC1			AC2			AC3			AC4			T1			T2		
	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom
Turbidity (NTU) 05/03/2018	1.43	1.97	0.93	0.91	0.54	4.25	0.54	0.82	3.28	0.44	0.45	2.08						
Turbidity (NTU) 06/03/2018	0.65	0.67	1.7	0.43	0.46	1.31	0.63	0.52	0.63	0.50	0.57	0.72	4.57	4.01	3.38	1.37	0.91	1.76
Turbidity 14/03/2018	2.55	1.68	4.36	1.52	1.24	10.38	1.29	0.81	0.86	1.53	0.94	1.30	3.28	3.07	2.86	2.64	1.86	2.29
Turbidity 20-22/03/2018	1.23	0.71	0.81	1.85	1.85	2.71	0.26	0.23	1.32	0.23	0.22	1.71				2.53	0.64	2.95
Conductivity (µS/cm) 05/03/2018	51397	52534	55362	50586	54421	56305	53422	54867	56787	54621	54631	56531						
Conductivity (µS/cm) 06/03/2018	53932	53941	55184	54108	54419	55538	54990	54939	55430	55078	55063	55243	51814	51837	53136	53015	56196	53431
Conductivity 14/03/2018	51043	53623	55789	52446	54725	56699	52843	55178	56222	52570	54435	56538	52709	54308	56152	52094	55394	55908
Conductivity 20-22/03/2018	52188	53845	56481	51648	52798	54037	53814	53778	55415	54148	51502	55144				53603	54354	56653
Salinity (ppt) 05/03/2018	31.87	32.74	34.86	31.39	34.34	35.67	33.53	34.80	36.07	34.62	34.64	35.85						
Salinity (ppt) 06/03/2018	34.02	34.02	34.68	34.13	34.27	34.88	34.81	34.85	35.08	34.89	34.90	35.02	32.63	32.66	33.54	33.34	33.72	33.86
Salinity 14/03/2018	31.27	33.28	35.05	32.39	34.23	35.75	33.21	34.62	35.47	32.72	34.10	35.72	32.26	33.40	34.83	31.92	34.47	35.04
Salinity 20-22/03/2018	32.06	33.26	34.92	31.80	32.45	33.23	33.36	33.48	36.66	33.77	33.77	36.47				32.75	33.58	34.68
DO (mg/l) 05/03/2018	7.12	7.18	6.82	6.99	6.84	6.72	6.82	6.74	6.55	6.77	6.74	6.66						
DO (mg/l) 06/03/2018	6.94	6.93	7	6.88	6.9	7	6.83	6.8	6.81	6.78	6.75	6.77	6.79	6.82	6.88	6.98	6.96	7.14
DO 14/03/2018	6.66	6.62	6.33	6.70	6.53	6.10	6.67	6.58	6.48	6.68	6.57	6.46	6.59	6.61	6.63	6.58	6.48	6.68
DO 20-22/03/2018	6.71	6.70	6.76	6.53	6.40	6.04	6.62	6.60	6.66	6.61	6.56	6.53				6.54	6.83	7.08
Chlorophyll a (µg/l) 05/03/2018	0.58	0.76	0.42	0.26	0.35	0.97	0.28	0.32	0.58	0.28	0.33	0.36						
Chlorophyll a (µg/l) 06/03/2018	0.29	0.33	0.47	0.31	0.35	0.51	0.29	0.25	0.42	0.21	0.29	0.35	0.42	0.65	0.55	0.27	0.38	0.43
Chlorophyll a 14/03/2018	0.34	0.57	0.74	0.31	0.46	1.07	0.30	0.34	0.38	0.28	0.35	0.42	0.34	0.65	1.06	0.36	0.72	1.05
Chlorophyll a 20-22/03/2018	0.33	0.39	0.52	0.54	0.83	1.04	0.24	0.28	0.46	0.23	0.25	0.64				0.74	0.40	0.68
Temperature (C°) 05/03/2018	27.68	27.56	27.37	27.58	27.17	27.19	27.32	26.98	27.12	26.99	26.98	27.17						
Temperature (C°) 06/03/2018	27.144	27.145	27.442	27.158	27.276	27.484	27.081	26.987	27.112	27.06	27.03	27.05	26.98	26.97	27.02	27.18	26.84	26.87
Temperature 14/03/2018	28.20	27.87	27.52	27.96	27.62	27.45	27.72	27.52	27.37	27.62	27.52	27.34	28.43	28.37	28.16	28.30	27.94	27.64
Temperature 20-22/03/2018	28.19	28.11	28.35	28.02	28.24	28.35	27.94	27.74	28.04	27.70	27.68	27.90				28.61	28.16	28.85

(Source JDN Report, 2018)

Table 2.19: Overview of in situ water quality parameters (JDN).

	Sample Locations																				
	DA1			DA2			SA1			SA2			ExDa			RL			AWAC		
	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom	top	middle	bottom
Turbidity (NTU) 05/03/2018																0.55	0.46	10.57	1.47	0.95	1.32
Turbidity (NTU) 06/03/2018	1.07	1.09	1.06	10.25	7.57	15.22							0.86	1.09	1.19	0.41	0.39	0.33	0.70	0.71	0.79
Turbidity 14/03/2018	2.04	2.37	5.34	3.70	4.81								1.58	1.72	2.84	1.76	0.98	6.74	2.05	1.59	9.44
Turbidity 20-22/03/2018	1.04	1.07	4.95				0.23	0.25	2.50	0.26	0.28	1.57	1.73	2.12	4.16	1.18	1.06	1.40			
Conductivity (µS/cm) 05/03/2018																53713	54980	56247	48415	53195	55400
Conductivity (µS/cm) 06/03/2018	47921	47983	48634	47397	47418	47405							46788	47891	50530	*55163*	*55148*	*55054*	53096	53086	53415
Conductivity 14/03/2018	54297	54895	56100	54314	54492								52705	52793	53489	49997	55303	56263	50519	54729	56399
Conductivity 20-22/03/2018	51122	55784	58557				54873	54989	58224	55171	55496	57473	51808	52958	53475	53905	54922	58322			
Salinity (ppt) 05/03/2018																33.54	34.66	35.61	29.73	33.10	34.84
Salinity (ppt) 06/03/2018	29.95	29.98	30.36	29.50	29.51	29.51							29.25	29.99	31.83	34.72	34.75	34.79	33.32	33.34	33.63
Salinity 14/03/2018	33.61	34.11	35.09	33.58	33.77								32.58	32.65	33.18	30.74	34.69	35.40	31.19	34.18	35.53
Salinity 20-22/03/2018	31.45	34.36	36.58				34.27	34.34	36.51	34.31	34.55	35.93	31.52	32.55	32.93	33.08	34.06	36.46			
DO (mg/l) 05/03/2018																6.86	6.78	6.52	7.10	6.93	7.09
DO (mg/l) 06/03/2018	7.03	7.03	7.09	6.85	6.88	6.86							6.99	7.01	7.06	6.84	6.81	6.77	6.92	6.92	6.92
DO 14/03/2018	6.71	6.66	6.82	7.43	7.64								6.63	6.60	6.51	6.68	6.57	5.97	6.76	6.51	5.97
DO 20-22/03/2018	6.84	7.06	6.22				6.60	6.57	6.35	6.52	6.51	6.25	6.56	6.54	6.47	6.66	6.60	6.82			
Chlorophyll a (µg/l) 05/03/2018																0.42	0.35	0.62	0.42	0.43	0.66
Chlorophyll a (µg/l) 06/03/2018	0.33	0.32	0.38	0.52	0.55	0.66							0.33	0.45	0.46	0.20	0.26	0.26	0.26	0.33	0.36
Chlorophyll a 14/03/2018	0.44	0.75	2.12	0.70	1.40								0.41	0.56	1.03	0.39	0.50	1.03	0.38	0.76	1.39
Chlorophyll a 20-22/03/2018	0.29	0.62	1.24				0.25	0.23	0.42	0.18	0.22	0.28	0.29	0.51	0.70	0.36	0.50	0.49			
Temperature (C°) 05/03/2018																27.58	27.28	27.21	27.79	27.70	27.44
Temperature (C°) 06/03/2018	26.90	26.92	27.04	27.03	27.04	27.03							26.76	26.81	26.83	27.38	27.32	27.17	27.29	27.26	27.15
Temperature 14/03/2018	28.06	27.95	27.76	28.13	28.02								27.95	27.94	27.87	27.95	27.54	27.50	27.77	27.69	27.46
Temperature 20-22/03/2018	28.00	28.45	28.08				27.70	27.72	27.87	27.93	27.93	27.93	28.61	28.25	28.21	28.45	28.05	28.02			

(Source JDN Report, 2018)

Table 2.20: Laboratory analysis results (JDN).

Parameter	Measurement Unit	DA1	DA2	AC1	AC2	AC3	AC4	T1	T2	RL	AWAC	ExDA
PHYSICAL												
Total Suspended solids	mg/l	<4	ND	ND	<4	ND	ND	<4	<4	<4	<4	ND
Total Dissolved Solids	mg/l	28 100	26 300	31 300	30 200	31 500	31 700	31 200	31 400	31 400	31 500	26 700
NON-METALS												
Total Phosphate	mg/l	0.06	0.05	ND	0.05	0.06	0.12	0.11	0.13	ND	0.02	0.18
INORGANIC OMPOUND												
Total hardness (as CaCO3)	mg/l	**5 850	**5 150	**6 100	**6 300	**6 500	**6 650	**6 650	**6 000	**5 150	**6 250	**4 900
Sulfide	µg/l	ND	ND	ND	<5	ND	ND	ND	<5	<5	<5	ND
Nitrate (NO3)	mg/l	3.50	2.70	4.30	5.50	4.30	4.90	5.30	5.90	4.80	4.00	4.00
ORGANIC CHEMISTRY												
Biochemical Oxygen Demand (BOD)	mg/l	1.70	2.90	2.90	3.30	2.00	<1	<1	<1	<1	<1	<1
MICROBIOLOGICAL ANALYSIS												
Fecal Coliform	CFU/100ml	**195	156	86	137	141	88	**1350	134	52	62	105
Escherichia Coli	CFU/100ml	**470	31	7	53	20	22	90	10	43	29	88

(Source JDN report – 2018)

Table 2.21: Sediment analysis for heavy metals, mineral oils and polycyclic aromatic hydrocarbons (PAH).

		Locations											
Parameter	Unit	AC1	AC2	AC3	AC4	T1	T2	DA1	DA2	RL	ExDA	SA1	SA2
Soil analysis													
Dry matter	% (m/m)	45.7	43.4	44.4	47	28.8	32.2	35.9	41.8	42.4	60	57.1	64.4
Metals													
Arsenic (As)	mg/kg dm	19	13	15	13	14	15	17	19	12	<10	19	<10
Cadmium (Cd)	mg/kg dm	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Chromium (Cr)	mg/kg dm	38	34	41	39	45	44	42	47	35	23	15	14
Cupper (Cu)	mg/kg dm	8.3	5.2	<5.0	6.6	13	11	13	11	5.7	<5.0	<5.0	<5.0
Mercury (Hg)	mg/kg dm	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	<0.10
Nickel (Ni)	mg/kg dm	16	13	16	16	23	18	19	18	15	9.7	5.5	5.8
Lead (Pb)	mg/kg dm	12	<10	12	12	19	15	16	16	10	12	<10	<10
Zinc (Zn)	mg/kg dm	39	32	36	41	51	48	57	49	34	38	13	14
Mineral oil													
Mineral oil (C10-C40)	mg/kg dm	67	83	74	54	96	120	100	130	61	<50	28	<50
Polycyclic Aromatic Hydrocarbon PAH													
PAH (total OVAM (10)K	mg/kg dm	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PAH (total EPA 16)	mg/kg dm	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16

(Source JDN report – 2018)

2.3.2 Results of Water Quality Analysis

Table 2.22 lists the BWS, WHO and DOE acceptable limits for surface water parameters, while the recommended standards for key marine water quality parameters is summarized in **Table 2.23**. **Table 2.24** is a summary of typical concentration of major ions (in mg/l) in sea water, brackish water and fresh water (Boyed, 1998).

Table 2.22: Acceptable Limits for BWS, WHO and DOE Guidelines.

Parameter	*Acceptable Limits (BWS)*	*Guideline Values (WHO) / DOE*	*Remarks on water quality parameters*
Temperature	25 °C	None / ≤ 33 °C	
pH	6.5 – 7.5	6.5 – 8.5 / 6 - 9	Value of 7 indicates neutral condition
Colour		15 TCU	Less than 10 units is unnoticed, water with 100 units resemble black tea
Turbidity	5 units	5 NTU	Pure distilled water turbidity is 0 NTU
TDS	500 mg/L	1,000 mg/L	TDS of 0-1000 is considered fresh and non-saline
Conductivity	N/A	none	Range 50–1000 µS/cm found in natural fresh water
Hardness (total)		none	Water with hardness less than 120 mg/L is deemed desirable, in excess of 500 mg/L undesirable for domestic and industrial use
Alkalinity	250 mg/L	N/A	Generally acceptable water range for alkalinity is 30 – 500 mg/L
Biological Oxygen Demand (BOD)		/ 50 mg/L	DOE effluent standards
Chemical Oxygen Demand (COD)		100 mg/L	DOE effluent standards
Chlorine (free)	N/A	0.5 mg/L	
Coliform (total)	0/100 ml	0/100 ml	
E-coli	0/100 ml	0/100 ml	
Nitrate - N	10 mg/L	10 mg/L#	#Or 50 mg/L as Nitrate
Chloride	250 mg/L	250 mg/L	250 mg/L is the acceptable value for drinking water
Fluoride	0.5 – 1.5 mg/L	1.5 mg/L	
Phosphate	N/A	None / 5 mg/L	

Sulphate (SO_4)	250 mg/L	250 mg/L	Concentrations up to 500 mg/L acceptable
Magnesium (Mg^+)	N/A	none	
Aluminium (Al^{3+})	N/A	0.2 mg/L	
Calcium (Ca^{2+})	N/A	none	
Iron (Fe)	0.3 mg/L	0.3 mg/L	
Lead (Pb)	N/A	0.01 mg/L	
Sodium	N/A	200 mg/L	

(Source: Environmental Water Quality Monitoring Program (NARMAP) Final Report, June 1995, DOE/USAID; DOE Effluent imitation (Amendment) Regulations 2009).

Table 2.23: Marine Water quality parameters and acceptable limits.

Parameter	Natural Value / Concentration	Remarks
Coastal water Temperature: °C **Tropics surface** **Tropics sub surface**	Varies with season & depth 27 – 29 °C < 26 °C	
pH	6 – 9	Adequate for marine organisms
Salinity: ppt **Brackish / Estuary** **Black Sea** **Ocean Range** **Ocean Average**	 0.5 – 17 16 32 – 37 35	
Chloride	19, 000 mg/l	(Boyd, 1989)
Conductivity	55.0 µS/cm	Sea water (www.fondriest.com)

(Source: Claude E. Boyd, Auburn University, Feb. 1989)

Table 2.24: Typical concentration of major ions (mg/l) in Seawater, Brackish-water, and Freshwater.

Ion (mg/l)	Seawater	Brackish water	Freshwater
Chloride	19,000	12,090	6
Sodium	10,500	7,745	8
Sulphate	2,700	995	16
Magnesium	1,350	125	11
Calcium	400	308	42
Potassium	380	75	2
Bicarbonate	142	156	174
Other	86	35	4
Total	34,558	21,529	263

(Source: Claude E. Boyd, Auburn University, Feb. 1989)

(i) Sea Water Temperature (°C)

Sea water temperature varies with depth, latitude and sea currents. Sea surface temperature in the western Caribbean in the summer months can vary from 28 °C to around 30 °C. High water temperature indicates solar heating and thermal pollution, and influences most physical, chemical, and biological processes. Many water quality parameters vary with temperature, for example Dissolved Oxygen (DO), Density and Salinity. In situ observations using the YSI Professional Plus water kit was conducted to gauge these parameters in the vicinity of the project site at the Port of Belize.

As can be observed from **Figure 2.32**, the mean water column temperature for readings taken on April 11 and later on June 10, 2019 showed values ranging between 28 °C and 29 °C in April and 30 ° to 32 °C in early June. The water column temperature in the project zone was higher by almost 2 °C in June. Intense insolation was the main factor contributing to this change, primarily linked to the long, hot 2019 dry season. NOAA also reported that June 2019 was the second warmest on record globally after June 2016. The water column temperature at these locations varied from 28 °C to 30 C at that time. Not too different from the water temperature near the Port of Belize as observed in July 2019.

The JDN report states that Salinity, Temperature and Conductivity indicate that in the nearshore locations a colder, less saline water layer can be found coming from an outflow from land at certain times.

(ii) Pressure (mmHg)

The YSI Professional Plus Water probe measures 'true' (uncorrected) values of air pressure of the water column in mmHg. True BP = [corrected BP] – [2.5 * (local altitude in feet above sea level/100)]. Weather service readings are usually not "true", i.e., they are corrected to sea level, and therefore cannot be used until they are "uncorrected". At mean sea level the average pressure is 1013.5 hPa or 760 mmHg. Many water properties vary with increasing water pressure such as temperature and salinity.

The in-situ water pressure observed at the twelve sampling points in the project site ranged from 755 mmHg to 759 mmHg. The water column pressure was steadier at most locations on June 8 compared to the April 11 records. This may have been the result of tidal effects on April 11, 2019 (**see Figure 2.33**).

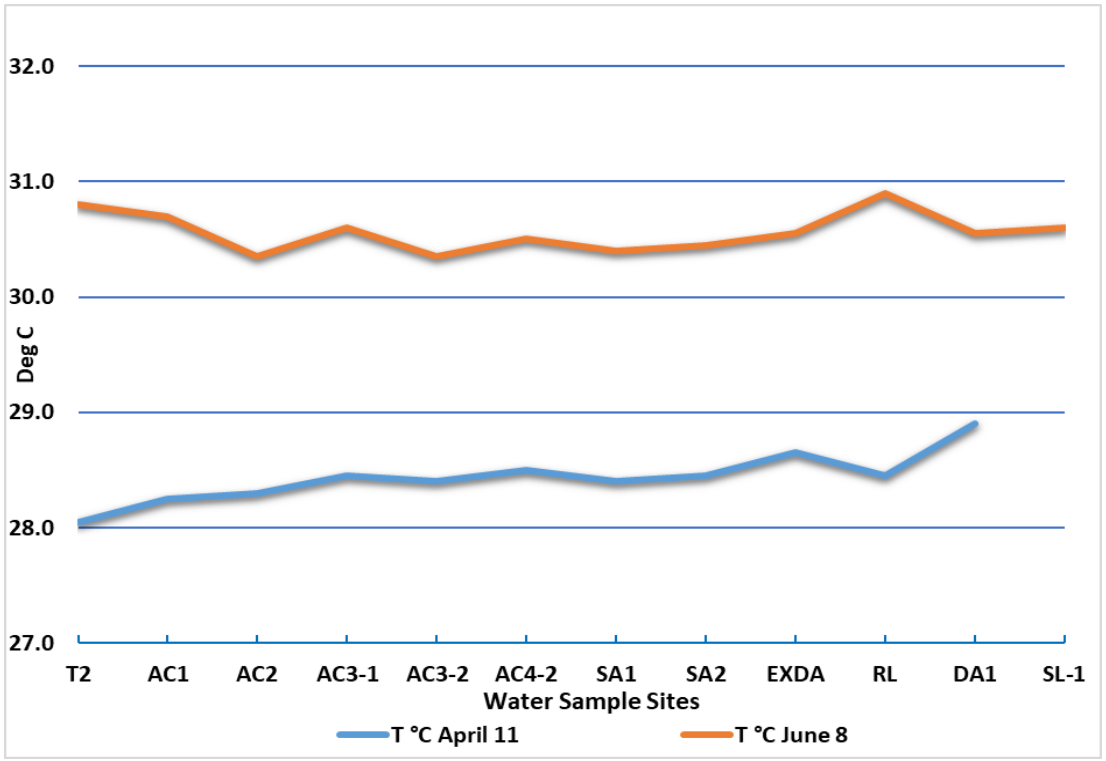


Figure 2.32: Sea water temperature at twelve sites near project area taken April and June 2019.

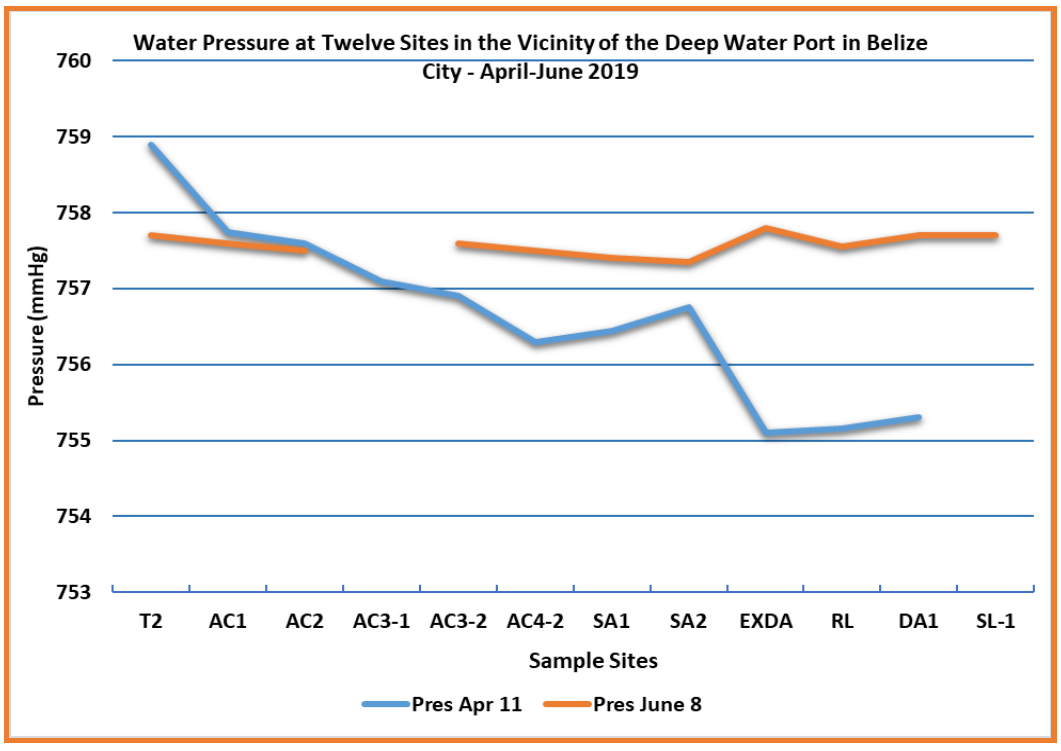


Figure 2.33: Water pressure measured at twelve sites in the project area.

(iii) Hydrogen Ion Concentration, pH (Standard Units)

The pH in water is related to soil makeup and inorganic content. Depending upon the relative hydrogen ion concentration water can be either basic or acidic. The pH of surface waters is important to aquatic life because pH affects the ability of fish and other aquatic organisms to regulate basic life-sustaining processes, primarily the exchanges of respiratory gases and salts with the water in which they live.

Failure to adequately regulate these processes can result in numerous sub-lethal effects (e.g., diminished growth rates) and even mortality in cases when ambient pH exceeds the range physiologically tolerated by aquatic organisms. The normal pH range that is considered satisfactory for fish and other marine aquatic organisms is 6.0 - 9.0 (**See Table 2.23**). PH values detected in the sea water in the vicinity of the project site ranged from near 7.1 to 8.3, well within the acceptable limits for the marine environment. **See Figure 2.34**.

According to the JDN, pH is a critical factor in many chemical processes. Dramatic shifts in pH can be extremely harmful to many organisms. High nutrient loadings from untreated effluent could exacerbate the levels of primary productivity and respiration and photosynthesis that could lead to detrimental short-term shifts in pH. Most marine organisms prefer conditions with pH values ranging from 6.5-8.5. pH measured during the current campaign was relatively high (8.36 - 8.51) but remained stable over the whole area and the whole period of measurement.

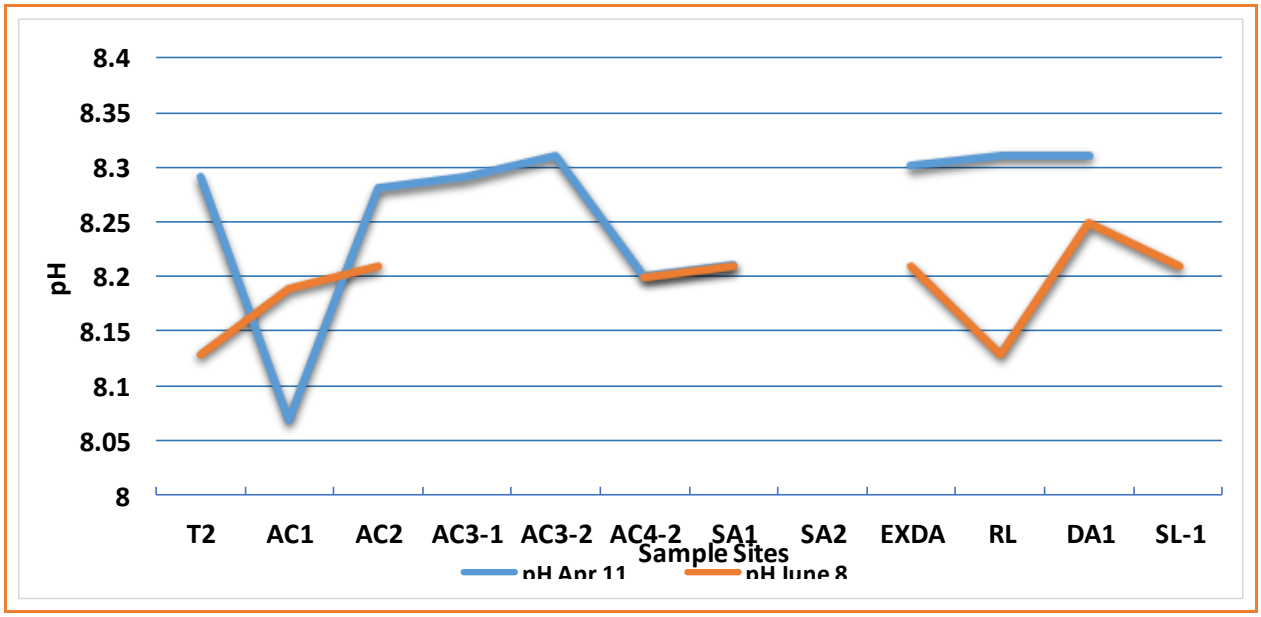


Figure 2.34: pH values at twelve sites in the vicinity of the project area.

(iv) Conductivity (µS/cm)

Electrical Conductivity is the ability of a solution to transfer (conduct) electric current. It is the reciprocal of electrical resistivity (ohms). Therefore, conductivity is used to measure the concentration of dissolved solids which have been ionized in a polar solution such as water.

While freshwater sources have a low conductivity and seawater has a high conductivity, there is no set standard for the conductivity of water. Instead, some organizations and regions have set limits on total dissolved solids for bodies of water.

Sea water conductivity is about 55000 mS/cm (www.fondriest.com). Specific Conductivity observed in the sea water near the proposed Cruise Ship Terminal at the Port of Belize site varied from near 52,000 to 56,500 mS/cm (**Figure 2.35**). **Figure 2.36** plots conductance in units of µS/cm as measured with the Professional Plus YSI probe. Here, the values varied from a low of near 55.7 µS/cm at site AC-1(2 km South of the Deep-Water Deck (Canal) to a high of near 57.4 at site AC4-2 (8.34 km South of the Deep-Water Deck (Canal). Generally, the conductivity along the coast near the project area was in the acceptable limit.

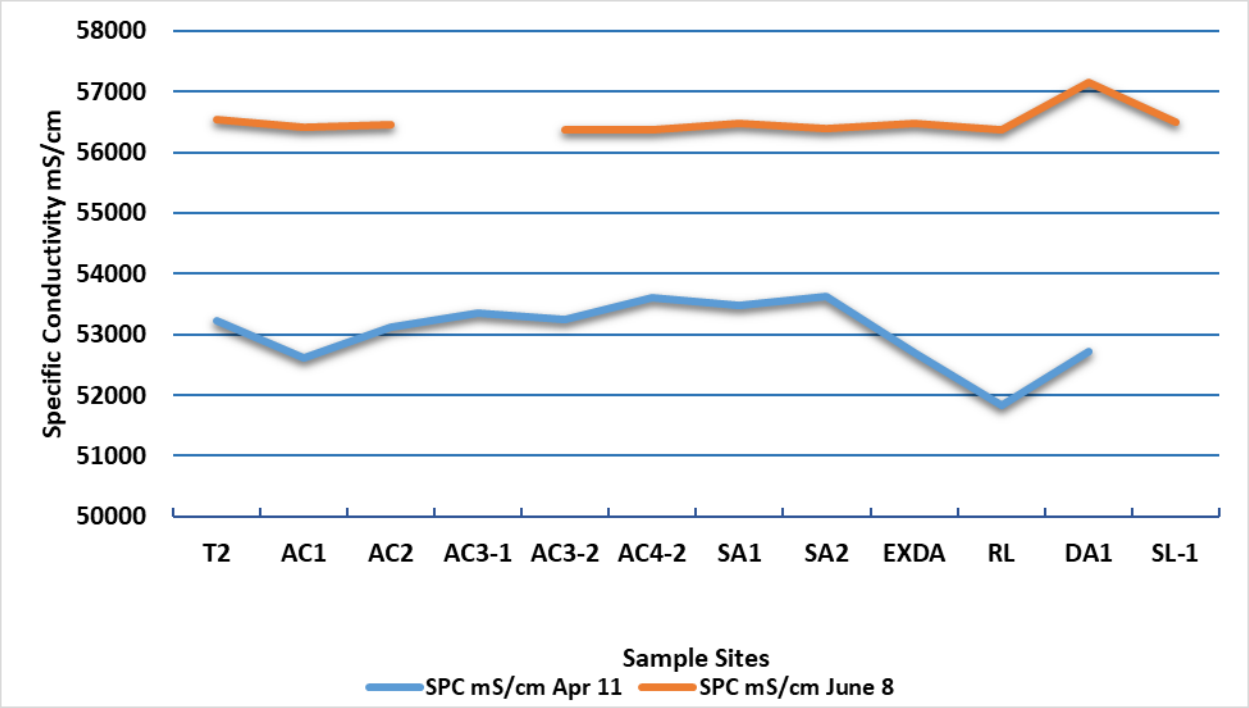


Figure 2.35: Specific Conductivity (SPC) at Twelve Sites.

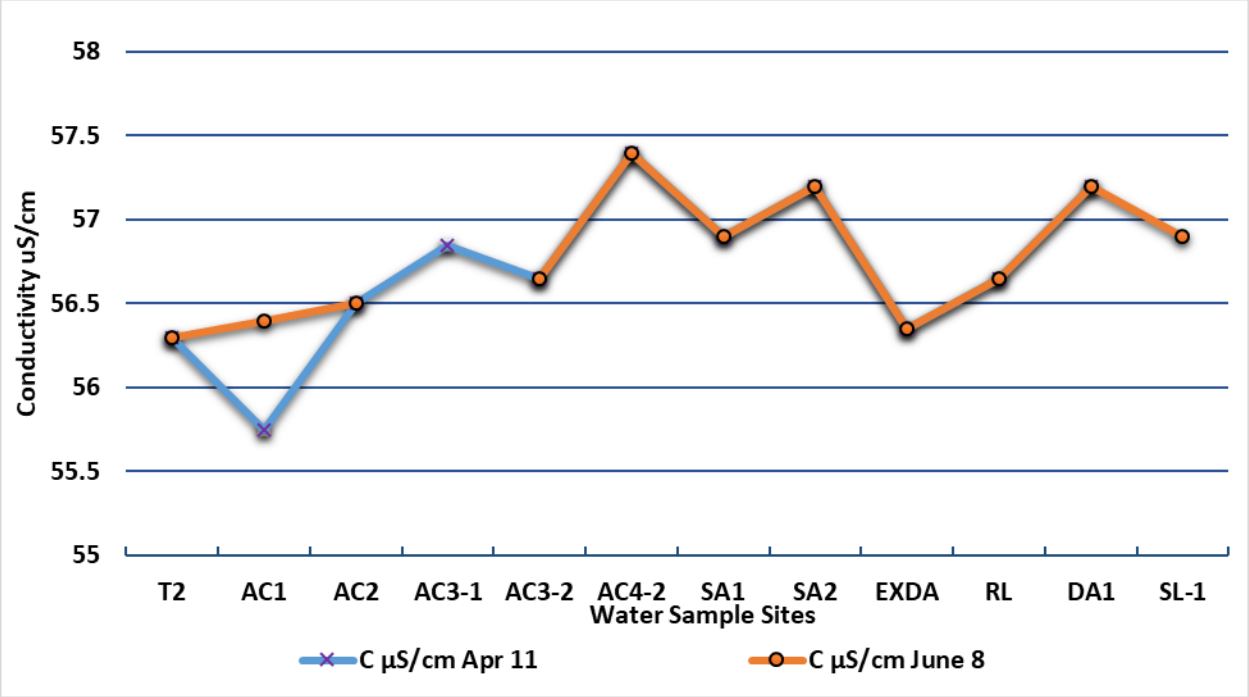


Figure 2.36: Conductivity (C µS/cm) values at Twelve sites.

(v) Total Dissolved Solids (TDS, m/L) and Hardness

TDS is an index of the amount of dissolved substances in water. The presence of such solutes alters the physical and chemical properties of water. As can be observed from **Figure 2.37**, Total Dissolved Solids in the project site were in the range of 34,300 mg/L to 34,800 mg/L from analysed samples taken on April 11, 2019, and from 35,700 mg/L to 37,100 mg/L on June 8, 2019. TDS levels increased by almost 2000 mg/L from April to June 2019. Sediment discharge from the Belize River, Belize City and activity in the marine environment could all be contributing to the TDS levels in the project site.

Based on the 2018 JDN report, TDS is not generally considered a primary pollutant associated with health effects but is an indicator of aesthetic characteristic for drinking water and an aggregate indicator of the presence of a broad array of chemical contaminants.

TDS was fairly consistent in concentration having a narrow range of 26300 to 31700 mg/L (**See Table 2.23**). The variations across the sites are closely linked to the salinity values. Hardness on the other hand, refers to the amount of dissolved calcium and magnesium in the water for which water is a great solvent. Hardness is caused by compounds of calcium and magnesium, and by a variety of other metals. Total hardness varied between 499 mg/l at ExDA to 6650 mg/l at AC4 and T1. These are within the normal range for seawater (**See Table 2.23**).

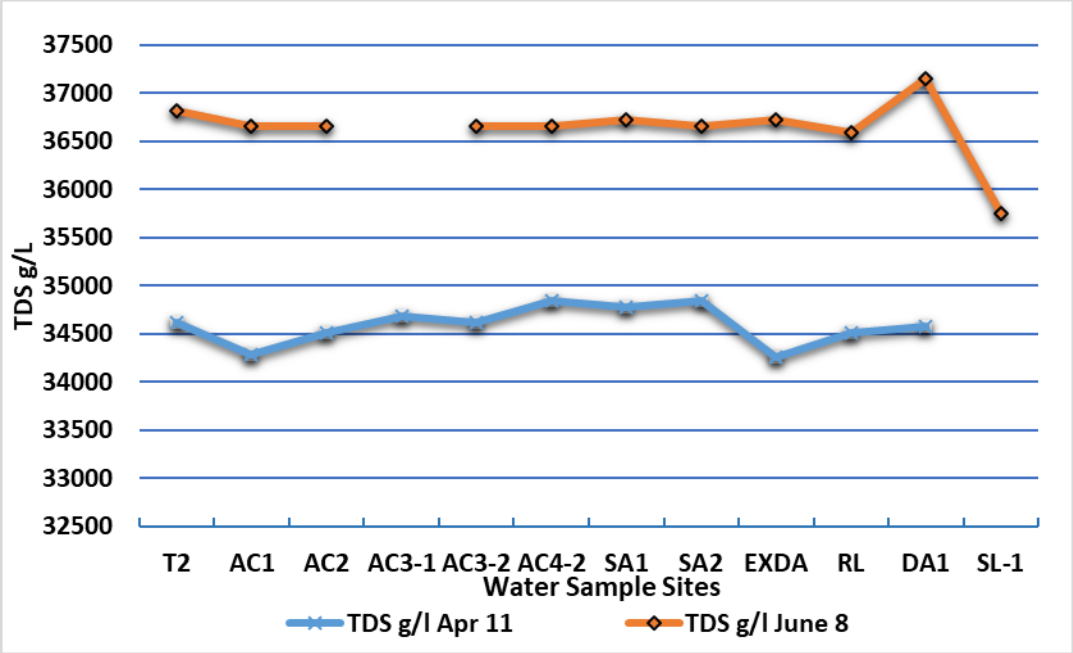


Figure 2.37: Values for Total Dissolved Solids at Twelve Sites.

(vi) Dissolved Oxygen DO, (mg/L)

Oxygen is measured in its dissolved form as dissolved oxygen (DO). If more oxygen is consumed than is produced, dissolved oxygen levels decline and some sensitive animals and marine plants may move away, weaken, or die. In the marine environment energetic wave action and photosynthesis of marine plants dissolve oxygen through the water column. DO decreases as temperature in the water column increases.

Mean Dissolved Oxygen levels in the sea water at the project site varied from around 5.6 to 7.2 mg/L as noted from the April 11, 2019 measurements, and between 4.8 to 5.3 mg/L in the June 8, 2019 observations as depicted in **Figure 2.38**, for twelve sampling points in the project zone.

JDN states that the solubility of oxygen is dependent on water temperature and salinity. Excessive plant growth and rapid decomposition of organic matter by aerobic organisms can utilize more oxygen than it produces, resulting in low dissolved oxygen readings in the water. DO is essential to most aquatic organisms, especially fish. It is one of the best measures of the health of any given body of water since low oxygen concentrations can have a detrimental outcome for wildlife.

Most animals and plants thrive when DO levels exceed 5 mg/L. Below this level such as in the range of 3-5 mg/L living organisms may become stressed. The results of the study showed that DO levels for the marine waters were generally slightly higher at the surface and nearer to shore compared to deeper measurements and locations and ranged between 5.97 and 7.64 mg/L.

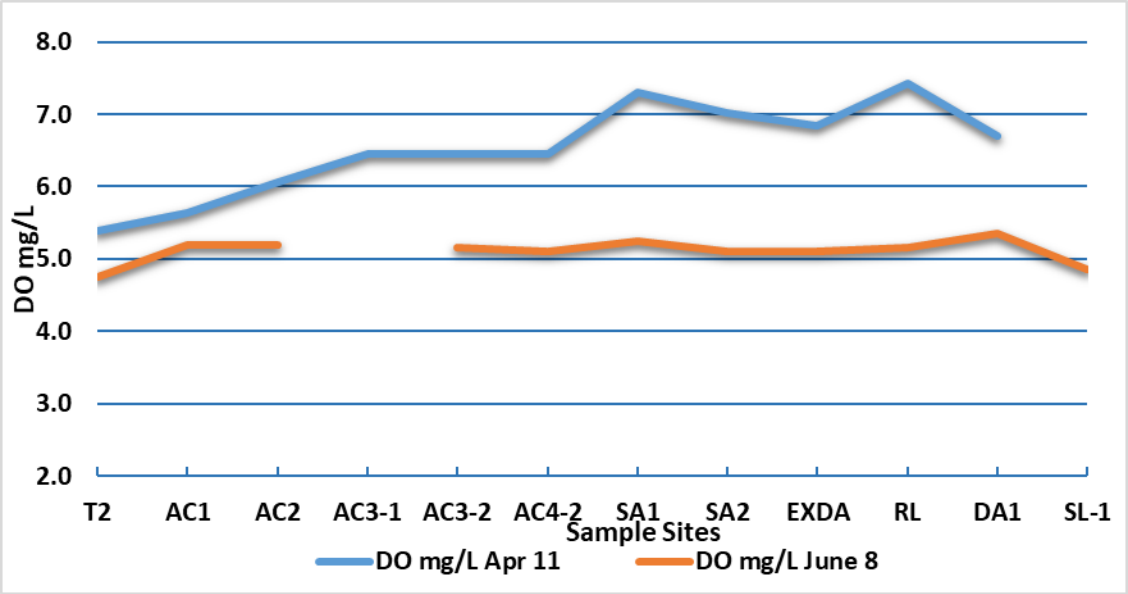


Figure 2.38: Dissolved Oxygen (DO) measured at twelve sites in the vicinity of the project area in April and June 2019.

Levels of dissolved Oxygen decreased from the April 11 to the June 8, 2019 measurements, primarily because of increased sea water temperature during the interim period, as indicated earlier.

(vii) Salinity

Salinity varies across the Belizean continental shelf both in a north to south direction, as well as in the east to west direction. Salinity is generally higher away from the mainland, which is function of the riverine freshwater inputs. Generally, the salinity for open sea water is about 35 ppt (**Table 2.25**).

Table 2.25: Approximate salinity for various water bodies in the environment (Source: www.fondriest.com).

FRESHWATER	< 0.5
BRACKISH / ESTUARY	0.5 - 17
BLACK SEA	16
OCEAN RANGE	32 - 37
OCEAN AVERAGE	35

The proposed project site is located in coastal water near the Deep-Water Port, and strongly influence by the freshwater discharge from the Belize and Sibun Rivers. The mean salinity levels in the project site observed using the YSI kit at twelve locations, varied from near 34.8 ppt to 36.3 ppt on March 1, 2019, and 37.5 ppt to near 37.9 ppt on June 8, 2019 (**See Figure 2.39**). Salinity levels appeared unusually high for brackish water along the coast near to the Deep-Water Port. Additionally, salinity levels increased slightly from the April 2019 measurement to the early June 2019 results.

For the control point, AC4-2, salinity was 33.3 ppt's (**See Table 2.23**), which is 4 points lower than the YSI, and noting that salt water has an average of 35 ppt's, and the water was not that salty, there is a possibility that the Salinity probe was either not functioning properly or was not properly calibrated.

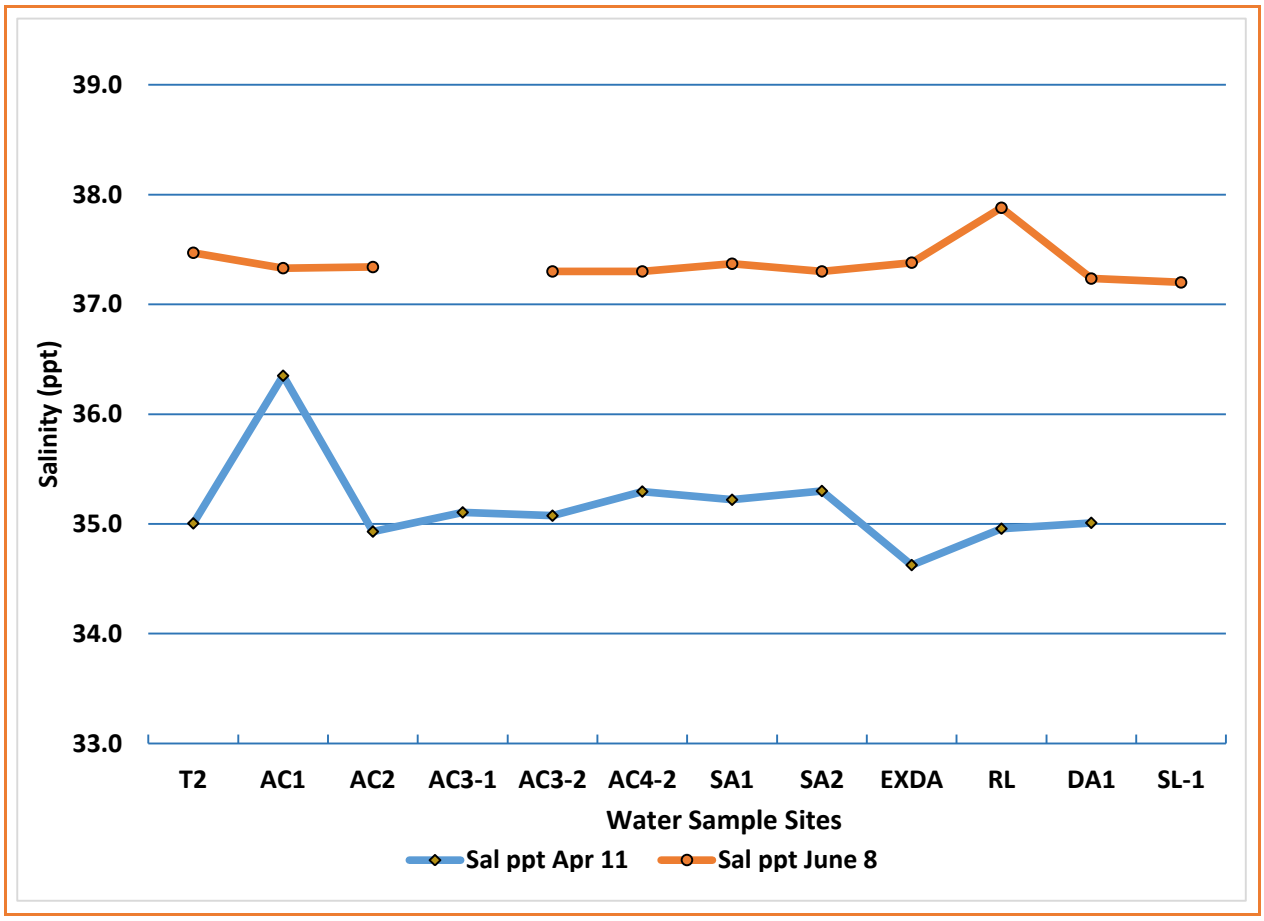


Figure 2.39: Salinity concentration measured at twelve locations in April and June 2019.

(viii) Turbidity (NTU)

Turbidity is a measure of the suspended particles such as silt, clay, organic matter, plankton and microscopic organisms, which are usually held in suspension by turbulent Brownian flow. It is impractical to assign a range of values to turbidity; however, non-detectable turbidity may be approximated by pure distilled water or "0" (zero) NTU.

Suspended solids measurements taken at the proposed Cruise Terminal project site for twelve sampling point averaged from around 1.0 NTU to 7.0 NTU on April 11, and 1.0 NTU to 13 NTU on June 8, 2019 (**See Figure 2.40**). The location with the highest mean turbidity was T2 (± 0.3 km West of the Deep-Water Deck). This location is in a busy zone for small sea vessel traffic and canal discharge from the City.

The JDN study states that Turbidity is a measure of how much sediment is present in a water sample. The sediment is usually composed of silt and soil particles that enter the system through storm water runoff, wave and current energy, propeller wash, dredging or other activities that release or disturb bottom sediments. High levels of Turbidity make the water cloudy, impacting organisms such as fish that depend on light to find food, shelter and mates. Cloudy water also prevents light from reaching benthic flora and fauna.

Figure 2.40 gives an overview of the turbidity at the different sample locations at different depths. Three levels were considered, the top layer of the water column (0-1 m below the surface), mid depth and a layer just above the bottom (1 m above the seafloor). The values show that in almost all cases the bottom layer results in the highest values. This is a quite common observation for a silty seabed. The areas, of the turning basin and in or near the access channel, give comparable values of turbidity. The values range from below 1 NTU to peak values of 10-14 NTU. The more remote sampling points SA1 and SA2 have clearer water with values below 0.5 NTU in the top and the mid depth layer. It should be noted that currently turbidity levels in the near shore waters of the project area can reach extreme levels during normal conditions. Two of the report author's transect dives for biological surveying showed near zero visibility due to ambient turbidity.

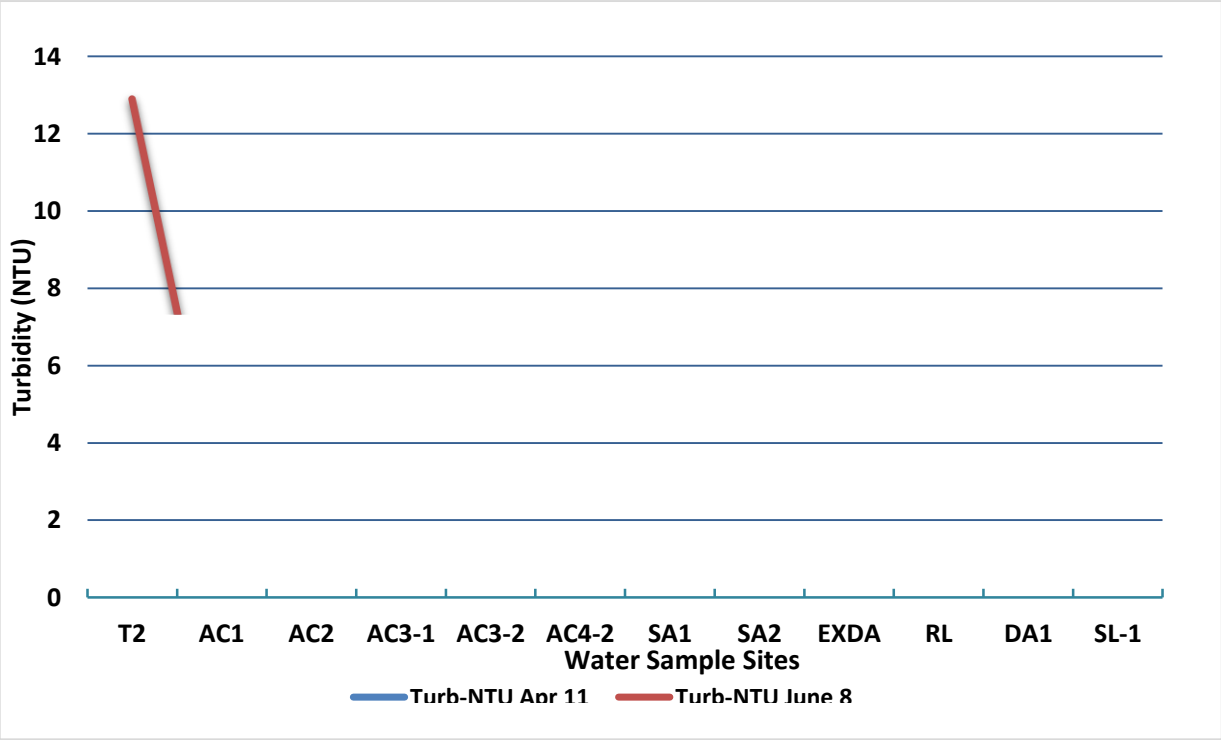


Figure 2:40: Turbidity at twelve sample points near the Cruise Terminal project sites for April 11 and June 8, 2019.

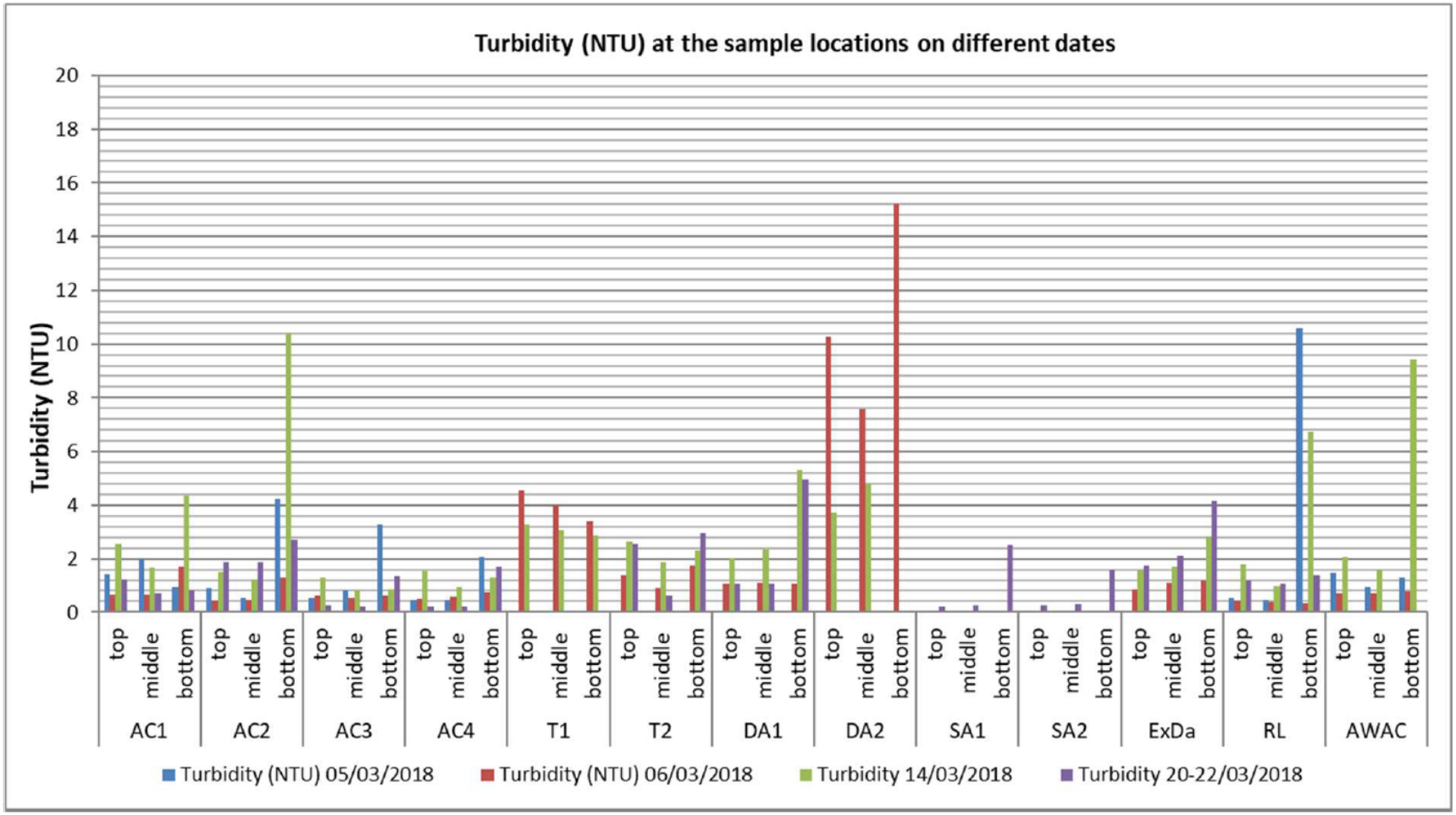


Figure 2.41: Overview of the turbidity at the different sample locations at different depths. (Source JDN 2018.)

(ix) Oxidizing and Reducing Potentials, ORP, (mV)

Oxidizing and Reducing Potential (ORP) of water sample is a measure of the presence of oxygen in the water column. Excess chlorine in wastewater effluent will result in a large positive ORP value and the presence of hydrogen sulfide will result in large negative value of ORP. Negative value of ORP was measured at site AC4-2, while large values of ORP were recorded at sites T2 and RL, respectively. At the other sites, ORP values range from -5 mV to 12 mV (**Figure 2.42).**

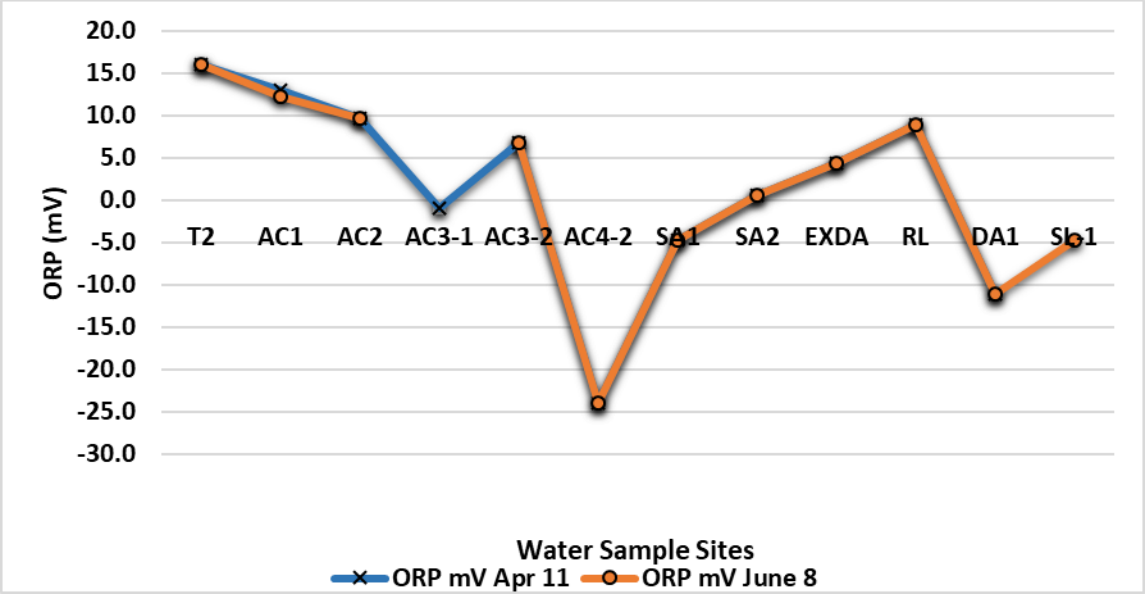


Figure 2.42: Results of Oxidizing and Reducing Potential in water column at twelve sites in Apil and June, 2019.

(x) Phosphate (mg/l) Orthophosphates Nitrate – Nitrogen

Phosphorus is one of the key elements necessary for plant and animal growth. Phosphates (PO_4) are formed from this element. Too much phosphate present in the water column results in rapid growth of algae and weeds, which may choke waterways, and use up large amounts of precious oxygen (in the absence of photosynthesis) as the algae and plants die and are consumed by aerobic bacteria.

The standard for Phosphate concentration in surface water is 5 mg/L, for Nitrate (Nitrogen), 10 mg/L and for Fluoride it is 1.5 mg/L. Nitrogen finds its way into the earth through several media: through nitrogen fixation by certain leguminous plants, decomposition of plants and animal carcasses and debris, through nitrate fertilizers, from sewage discharges on land or from sewage lagoons. Laboratory results for water sample analysis from twelve sites near the Port of Belize showed that Nitrate concentration ranged from 0.8 to 1.1 mg/L for the April 11, 2019 samples and 0.8 to 1.2 mg/L for the June 8 samples. These results were well below the limit of 10 mg/L (**Figure 2.43**).

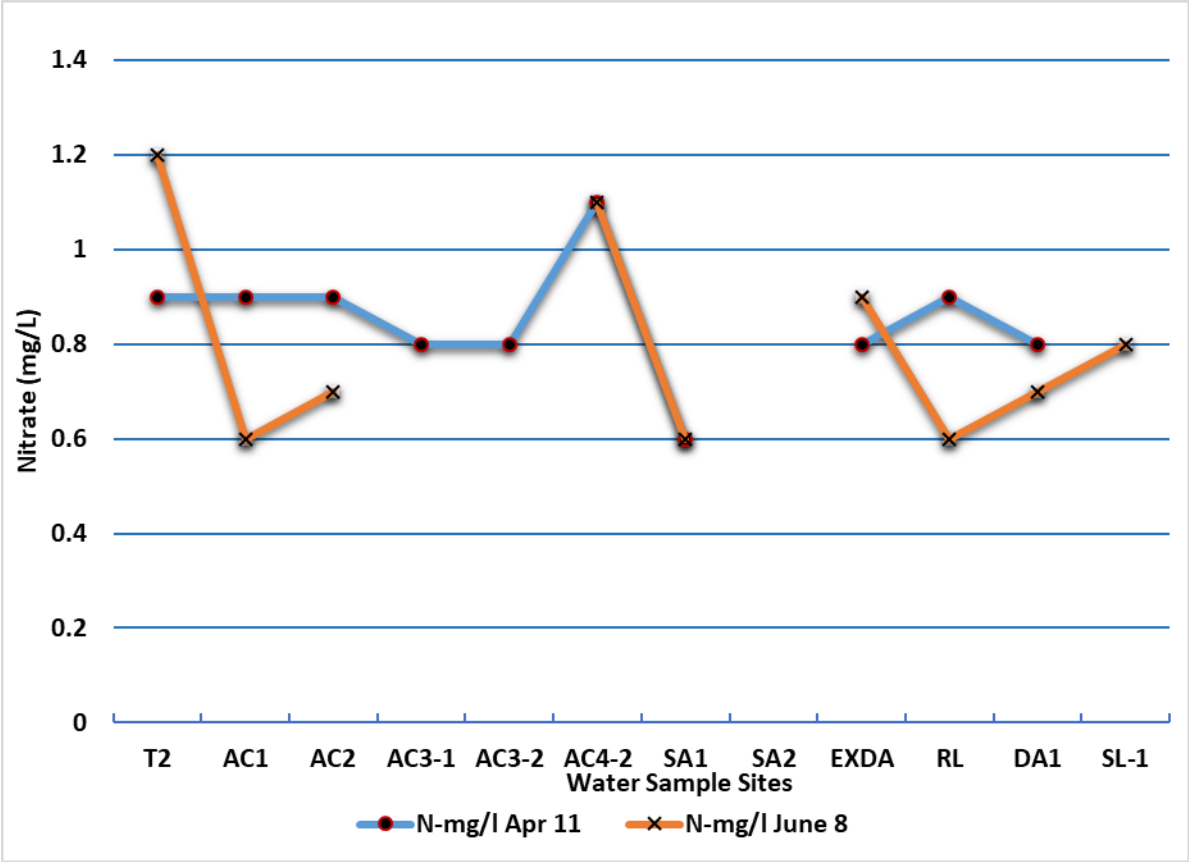


Figure 2.43: Laboratory results for Nitrate concentration at twelve sites near project site.

Laboratory analysis results for Phosphate concentration from all twelve marine sites, showed values well below the limit of 5 mg/L. **See Figure 2.44 and Tables 2.22 and 2.23** for more detailed results.

The control point readings were 3.3 mg/l for nitrate and 0.02 mg/l for Phosphates, which is within the normal range (**See Table 2.23)**.

JDN denotes that Phosphorus is the least abundant macronutrient required by biota and is, therefore, the first element to limit biological productivity. In most cases it originates from agricultural runoff and wastewaters containing detergents. Total phosphate is the measure of all forms of phosphorous in the system, includes phosphorous already taken up by plants. Although phosphorus occurs in natural waters in smaller amounts than nitrogen, it is an essential plant nutrient. During the study, total phosphate ranged from 0.02 to 0.18 mg/l. These values are normal low concentrations.

Nitrate is a natural fertilizer which promotes plant growth, including algae and aquatic weeds. Nitrate levels below 10 ppm have little or no effect on fish life in natural waterbodies. Nitrate levels recorded during the survey ranged from 2.7 mg/l to 5.9 mg/l, with the highest values in the turning basin and the channel).

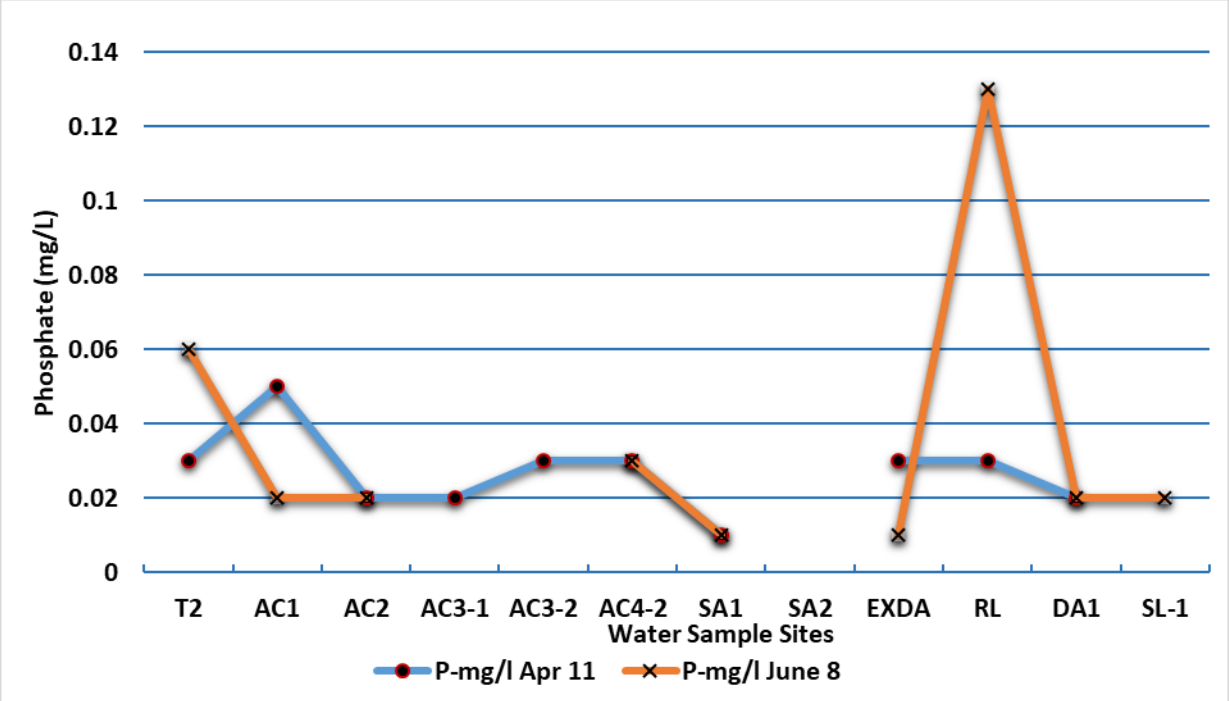


Figure 2.44: Laboratory results for Phosphate concentration at Twelve Sites.

(xi) Sulfate (mg/L)

Sulfate is the concentration of the oxidized form of aqueous sulfur in water. Sources include acid mine drainage (oxidation of sulfide minerals) and acid precipitation. Typical concentration of Sulfate ions in seawater is 2,700 mg/L (**See Table 2.22 and 2.23)**.

Sulfate concentration for the twelve water sampling sites ranged from lows of 1800 mg/L at AC-2 (3.8 km South of the Deep Water Dock (Canal) and EXDA (west of AC1, 1.5 km from Shore), to an elevated value of about 3,400 mg/L at AC-1 (2 km South of the Deep Water Dock (Canal) (**See Figure 2.45**). In general, most samples had sulfate concentration near the limit of 2,700 for sea water. However, the control point at AC4-2 had concentration at 3,154 mg/l, which is almost double that of the YSI. The JDN investigation found that for most of the sites, Sulfide was not detected or with very minimal readings of 0.06 – 0.18 mg/l.

(xii) Biological Oxygen Demand & Chemical Oxygen Demand

Biological Oxygen Demand (BOD) is a measure of the amount of oxygen consumed by bacteria and other microorganisms which decompose organic matter under aerobic conditions. Concentrations found in the study area were low and ranged from below detection limit to 3.3 in the access channel. For the control point AC4-2, the Chemical Oxygen Demand (COD) result was <30 and is expected of normal marine water quality (**See Tables 2.22**).

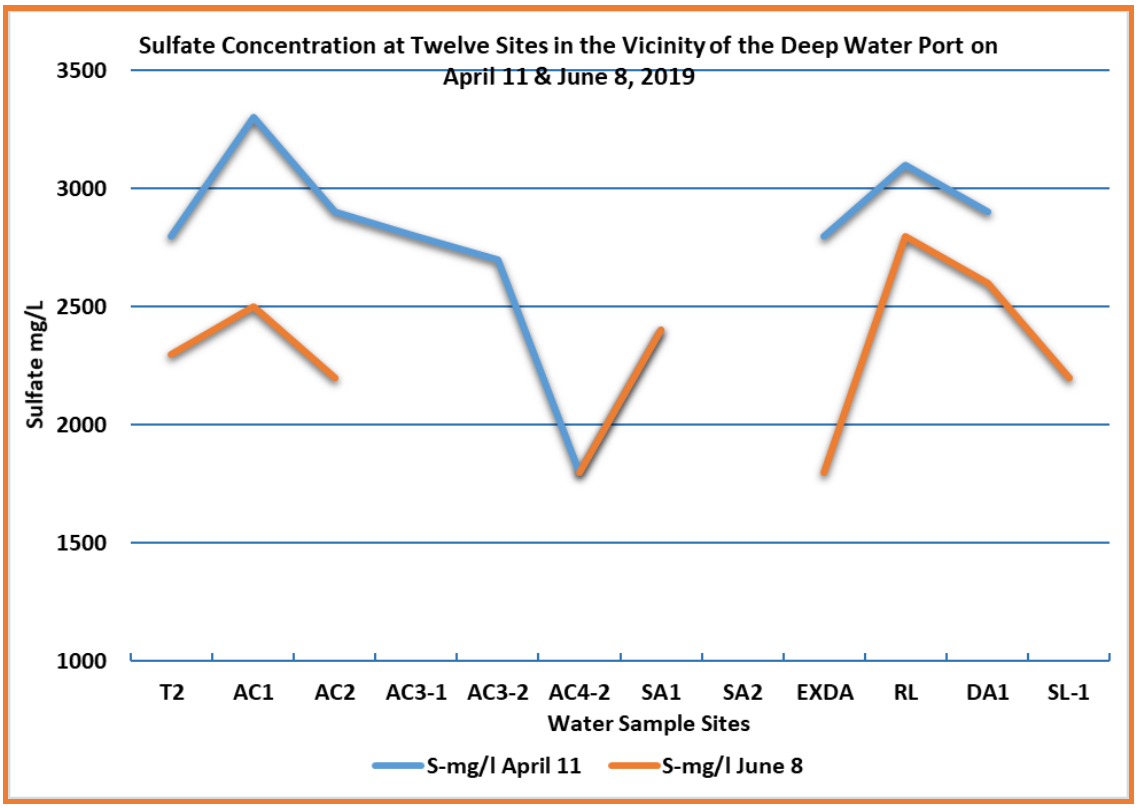


Figure 2.45: Laboratory results for Sulfate concentration at Twelve sites.

(xiii) Chlorophyll a

"Chlorophyll a" is the principal photosynthetic pigment in algae and vascular plants. Chlorophyll a is a good indicator of algae concentrations and over-enrichment of nutrients. Levels higher than 10 µg/l often are indicative of eutrophic conditions. An abundance of algae can lead to anoxic (low oxygen) concentrations and harm fish and other aquatic fauna. The results of the samples conducted by Jan JDN in 2018 showed that concentrations varied between 0.18 µg/l and 2.12 µg/l indicating low chlorophyll a concentration.

(xiv) Fecal Coliform and *Escherichia Coli* (E coli counts /100 ml)

The EPA Guidelines for marine recreational waters list standards for four types of marine environment and highlights the limits for key parameters that affect human health. Top importance among these are Fecal Coliform and Escherichia Coli. In Belize, the WHO and DOE standards for these parameters in surface waters are both 0/100 ml. The laboratory test results for Fecal Coliform and *Escherichia Coli* in the sea water near the project site 0 counts per 100 ml for nearly all sampling sites for both sets of water samples collected. Only one sample, T2 of June 8th, 2019 had a count of 10 Fecal Coliform. This can be observed from **Tables 2.22**. Public Health Department in 2007 conducted a series of sampling in the area, and the results were very minimal ranging from >2 to 4 per 100 ml.

The control point also showed positive results for AC4-2, where Fecal Coliform was at 106 and E. coli was at <1. The E. coli matches the BET study results, however the JDN study showed positive results across the board **(See Table 2.22**). The data results matched those of the control point.

The results obtained are two-fold viz:

The BET sampling results, went against expectations considering that the coastal zone near the proposed project site is exposed to spills from the BWS sewage treatment pond, urban effluents from Belize City and discharge from the Belize and Sibun Rivers. Nevertheless the results seemed to be supported by prior Ministry of Health monitoring in the area conducted in 2007 and subsequent years. One reason for the better than expected results of bacterial pollution in the marine environment near the proposed project site is that the effects of discharges from BWS and runoff are carried along the coastal waters by more longshore currents hugging the coast.

Total Coliform was high at the control point, but the most important parameter, which is E. coli, (denotes presence of warm bloodied animal feces), is minimal, and well within acceptable limits. The most reasonable explanation for the disparity between the JDN and the BET results is the possibility that on the day JDN conducted their sampling, a ship in port may have discharged its waste into the harbour. As can be seen at T1 & DA1, the reading was the highest.

2.3.3 Sediment Analysis

Results from the laboratory (Eurofins) can be found in **Annex VII** - 1815-BZE-Port Loyola - Lab results sediment quality to the JDN March 2018 report.

Heavy Metals – Heavy metals in marine sediments may have either a natural or an anthropogenic origin. Concentrations found in the samples were in general higher closer to shore and in the access channel. Arsenic, Chromium and Nickel showed higher values, but concentrations stayed below NOAA's PEL level (Canada) as well as Cefas's AL2 levels (UK).

Mineral oil - The level of mineral oils turned out to be slightly elevated in the turning basin (T1, T2) and near the coast (DA1, DA2). The values vary between 90 mg/kg and 130 mg/kg dry matter (dm). These results are however clearly below the intervention levels for reuse applicable in for example the Netherlands (5,000 mg/kg dm) and Belgium/Flanders (1,500 mg/kg dm).

PAH - The PAH's were in most cases under the detection limit and in case detected concentrations were very low.

Table 2.26: Summary of sediment analysis in the project zone (JDN).

		Locations											
Parameter	Unit	AC1	AC2	AC3	AC4	T1	T2	DA1	DA2	RL	ExDA	SA1	SA2
Soil analysis													
Dry matter	% (m/m)	45.7	43.4	44.4	47	28.8	32.2	35.9	41.8	42.4	60	57.1	64.4
Metals													
Arsenic (As)	mg/kg dm	19	13	15	13	14	15	17	19	12	<10	19	<10
Cadmium (Cd)	mg/kg dm	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Chromium (Cr)	mg/kg dm	38	34	41	39	45	44	42	47	35	23	15	14
Cupper (Cu)	mg/kg dm	8.3	5.2	<5.0	6.6	13	11	13	11	5.7	<5.0	<5.0	<5.0
Mercury (Hg)	mg/kg dm	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	<0.10
Nickel (Ni)	mg/kg dm	16	13	16	16	23	18	19	18	15	9.7	5.5	5.8
Lead (Pb)	mg/kg dm	12	<10	12	12	19	15	16	16	10	12	<10	<10
Zinc (Zn)	mg/kg dm	39	32	36	41	51	48	57	49	34	38	13	14
Mineral oil													
Mineral oil (C10-C40)	mg/kg dm	67	83	74	54	96	120	100	130	61	<50	28	<50
Polycyclic Aromatic Hydrocarbon PAH													
PAH (total OVAM (10)K	mg/kg dm	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PAH (total EPA 16)	mg/kg dm	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16

(Source: JDN Report – 2018)

2.4 Land Use

The general land use setting in the area is mixed urban residential and commercial. On the residential setting, there are residences all along the northern side of Jane Usher Boulevard known as the Port Loyola. The commercial businesses are Esso Fuel Depot, Lopez Construction, The Port Authority, the Excise and Customs House and BWSL. The Cruise Terminal Development is in an area considered one of the most poverty-stricken in Belize City.

The land in the immediate vicinity of the project belongs to the Port of Belize or Belize Logistics Terminal, who are jointly the developers of this Project. As can be noted from the land tenure documents (See **Annex III**), there will be no need for the acquisition of land or the displacement of families.

The land in question is low-lying areas and was once covered in Mangrove before being cleared and encircled with a berm in 2002 and considered as the disposal site for dredge spoil in 2005 Port ESIA. The proposed action for the disposal of spoil on land and the construction of the Cruise Terminal will not conflict with any other land use slated for the area.

2.5 Geology

2.5.1 Regional Geology

Belize can be divided into three major geological provinces (Purdy, Gischler and Lomando, 2003); (1) the Corozal Basin in the north, representing an eastern continuation of the northern Guatemala Peten Basin; (2) the central Maya Mountain Block, comprised primarily of igneous and metamorphic rocks; and (3) the Belize Basin to the south, which borders the Maya Mountain block offshore to the east and onshore and offshore to the south, it is a continuation of the southern part of the Peten Basin (Prasada and Ramananthan, 1988).

The Corozal Basin is an extension of the north Peten Basin which is an extended continental shelf deposit comprising undifferentiated limestones and dolomites of Cretaceous age (Barton Creek, Yalbac and Hillbank Formations); bedded or massive limestones and marls that exhibit some karstification; limestones of Early Tertiary age (El Cayo Group and Doubloon Bank Formations) which are primarily lagoonal limestones with some dolomites and minor marls.

Marls and limestones of Late Tertiary/ Miocene-Pliocene age (Orange Walk Group), deposits exhibit fossils of oysters, gastropods and coral fragments; clays of Late Tertiary/ Miocene-Pliocene age (Red Bank Group), red to grey mottled clays with inclusions of chert a few fossilerferous beds and some sands; alluvial deposits of Quaternary age, quartz sands derived from erosion of the Maya Mountains, river terraces, silts and clays with some conglomerate clasts (Cornec, 2010) (**Figures 2.46a and 2.46b**). An extensive part of the deposition in the Corozal Basin was done in a restricted shallow lagoon environment with depositional episodes being done in a passive environment.

Over the northern half of Belize, the pattern of sedimentation suggests alluvial deposition in the form of a delta. The main rivers originally flowed northward but gradually deflected in an easterly direction as the northern part of Belize was subject to gentle uplifting. Presently there are only three river systems that still flow north, Rio Hondo, New River and Fresh Water Creek.

The Belize River, running off the highlands to the west and south, runs northeast across the lowlands, forming a delta where it empties into the Caribbean Sea. Belize City is situated on this delta at the mouth of the Belize River.

Deltas are depositional landforms found at the mouth of a river where the river meets a body of water with a lower velocity than the river (e.g. a lake or the sea). For a delta to develop, the body of water needs to be relatively quiet with a low tidal range so that deposited sediment is not washed away and has time to accumulate.

When a river meets a stationary body of water, its velocity falls causing any material being transported by the river to be deposited. Deltas are made up of three sediment beds that have been sorted by the size of the sediment. The bottom most bed, the *bottomset* bed, is composed primarily of clay and some other fine-grained sediments.

Clay is the main constituent because when clay meets saltwater a process called flocculation takes place where clay & salt particles clump together (flocculate) due to an electrostatic charge developing between the particles. This makes the clay particles sink due to their increased weight producing the bottomset bed. The bottomset bed stretches a fair distance from the mouth of the river as the fine sediments can be transported a reasonable distance from the river's mouth.

2.5.2 Geology of the Project Area

The study area lies in the lower plain of the Corozal Basin which is the sections dominated by the shallow lagoon sands and clays. There are some occurrences of marls and limestones (see **Figure 2.46a and 2.46b**). The surface geology within the study area is covered predominately by Quaternary terrigenous derived sediments eroded and deposited primarily from the Maya Mountains; silts and clays are interspersed with some shallow lagoon calcareous derivatives, marls and thinly bedded limestones, the marls typically tend to have limestone boulders and the clays tend to have chert inclusions which may be viewed as a residual deposit or soil. Conglomeratic nodules of manganese and ferruginous pebbles and cobbles are often present.

The subsurface geology is late to early Tertiary composed of either the Red Bank or El Cayo group (Cornec, 2010) of benthonic red variegated mottled clays and sandy clays which is believed to overly Mesozoic carbonate rocks (Cornec, 2010. Dixon, 1975. Flores, 1952). The limestone bedrock onshore has been described from borehole data and seismic reflection (JDN, 2018) at depths ranging from 26 ft (highly weathered marls) to 39 ft (more competent karstic limestone) which speaks to the undulating nature of the limestone bedrock.

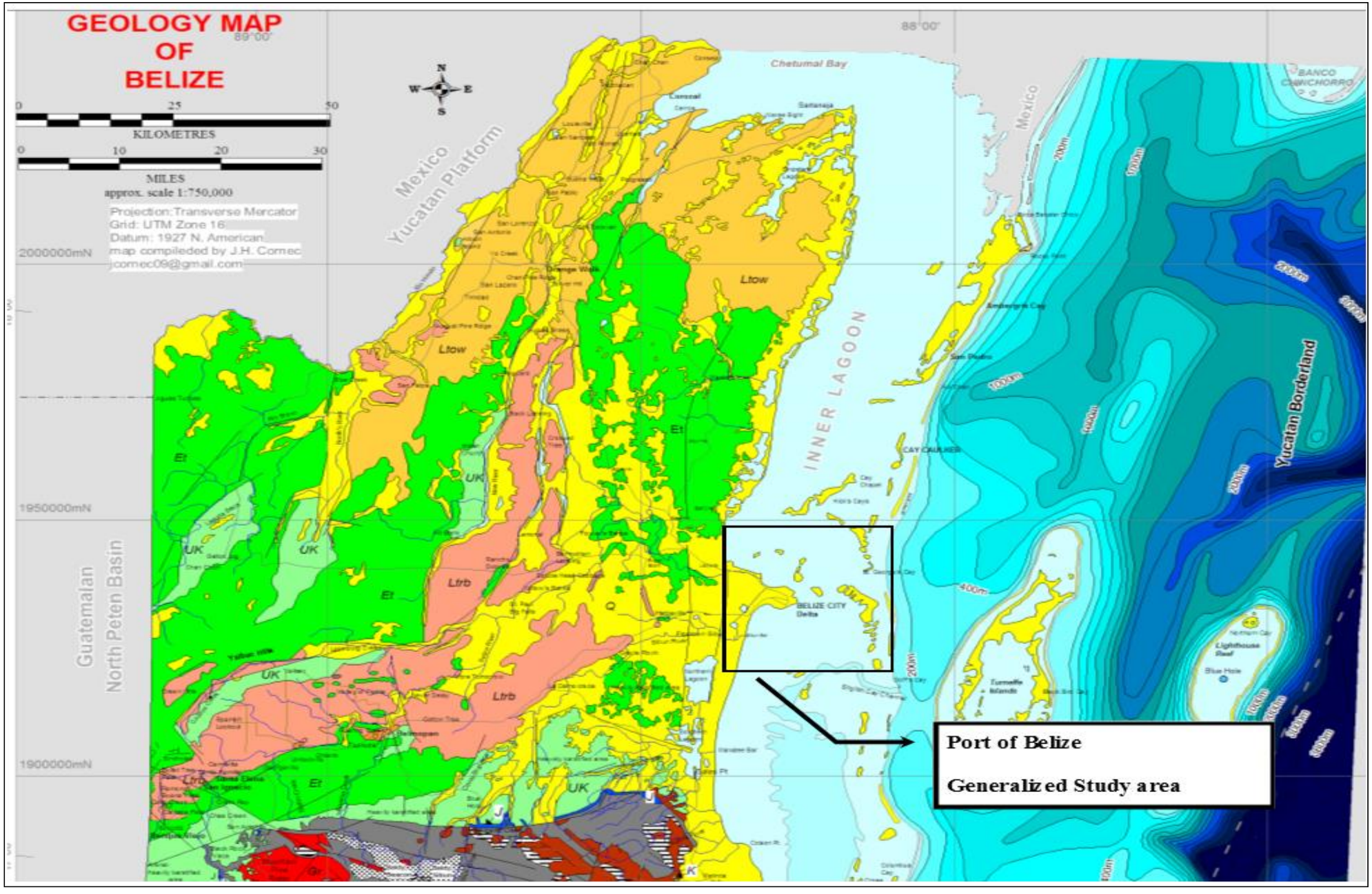


Figure 2.46a: Northern Section of the Geology of Belize with the Project Area (highlighted).

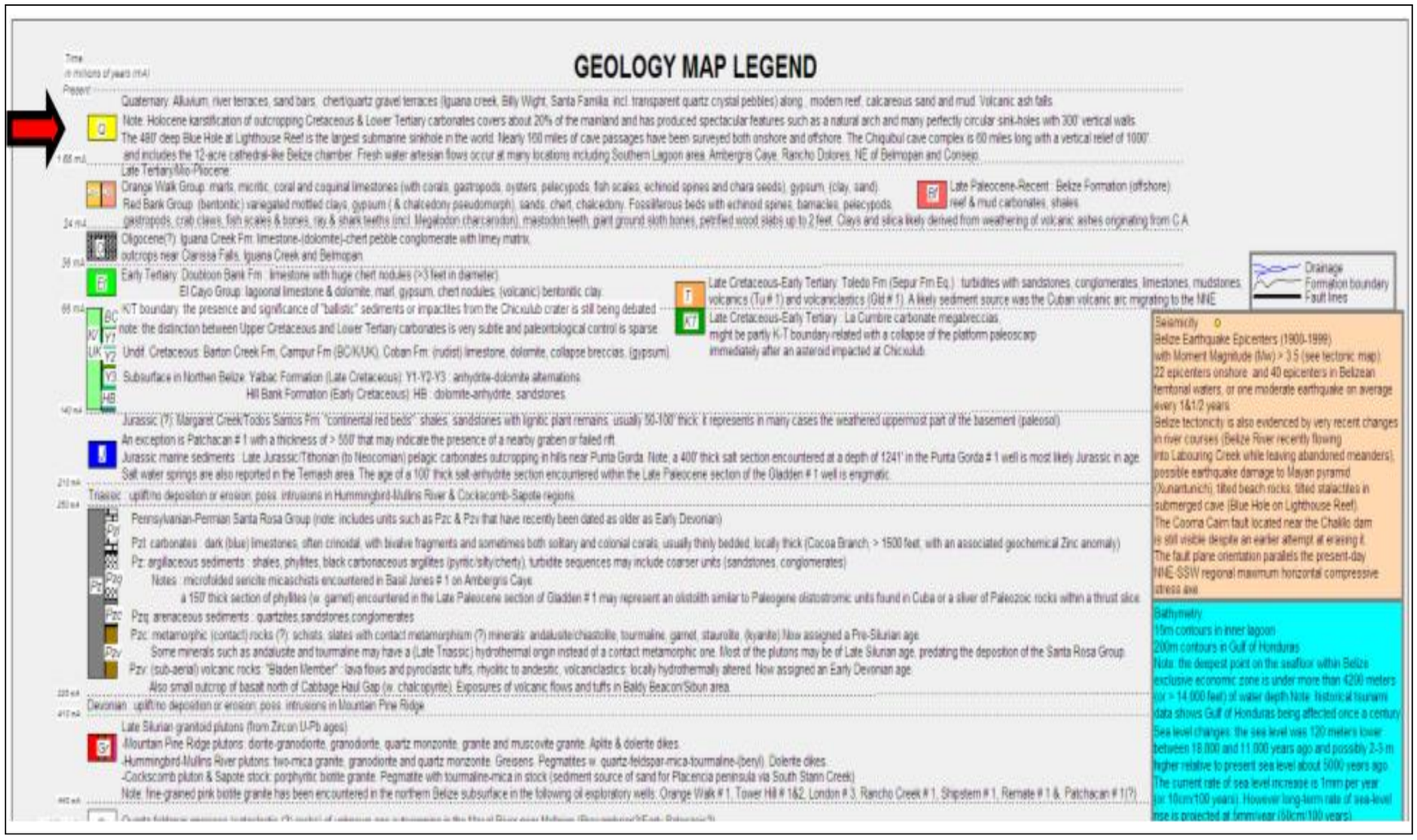


Figure 2.46b: Legend -Geology of the Project Area.

2.5.3 Geotechnical and Geological Investigations 2004

Geotechnical investigations were carried out at the Port of Belize as part of the 2005 Environmental Impact Assessment (ESIA). Toney Drilling Supplies, Inc. carried out the geotechnical investigations from the 15th to the 26th of September 2004. The details of the more recent 2018 Geotechnical site investigation conducted by JDN can be found in Chapter 5 of this ESIA.

Ten deep borings and five shallow borings were drilled in the then proposed terminal access channel and turning basin. The locations of the borings are indicated on the boring location plan (**Figure 2.47)**. The borings were performed with a CME-45B drill rig mounted on an ocean-going barge with six hydraulically operated jack-up legs.

The results of the 2004 geotechnical soils investigations are summarized as follows;

Stratum 1. Soft clay and silt

The sea floor sediments are composed of very soft grey marine clay and silt. SPT-N values of the marine layer is on the order of 0 to 2 blows per foot (BPF). At the bottom of this stratum, a thin layer of organic silt and clay was encountered in some borings.

Stratum 2. Peat

Locales of peat often mixed with organic silt and clay occur below Stratum 1. The peat is typically, dark red-brown and fibrous. The peat layer is very soft to soft, with recorded SPT-N values ranging from 0 to 3 BPF. Thickness of the peat layer typically ranged from 0 to about 6 feet. The top of this stratum was generally detected at elevations 22 to 30 feet.

Stratum 3. Clayey and silty marl

Underlying the peat layer are strata of completely decomposed or extremely weathered limestone, which have been physically and chemically altered to mixtures of residual soil and relict limestone grains described as marl. The original limestone is variably weathered to clay, silt, sand, gravel, cobble, and boulder size particles.

Stratum 4. Gravel and cobble marl

Below the clayey and silty marl is a layer of gravel and cobble marl, composed of fine to coarse gravel and cobbles interlayered with fine-grained clay and silt marl. Some of the gravel recovered in SPT split spoon soil sampler are inferred to be cobbles broken during the sampling process. SPT-N values of the hard gravel and cobble marl ranged from 30 to 95 BPF, with most N-values greater than 50 BPF. Cobbles and a few boulders were cored during the field exploration program.

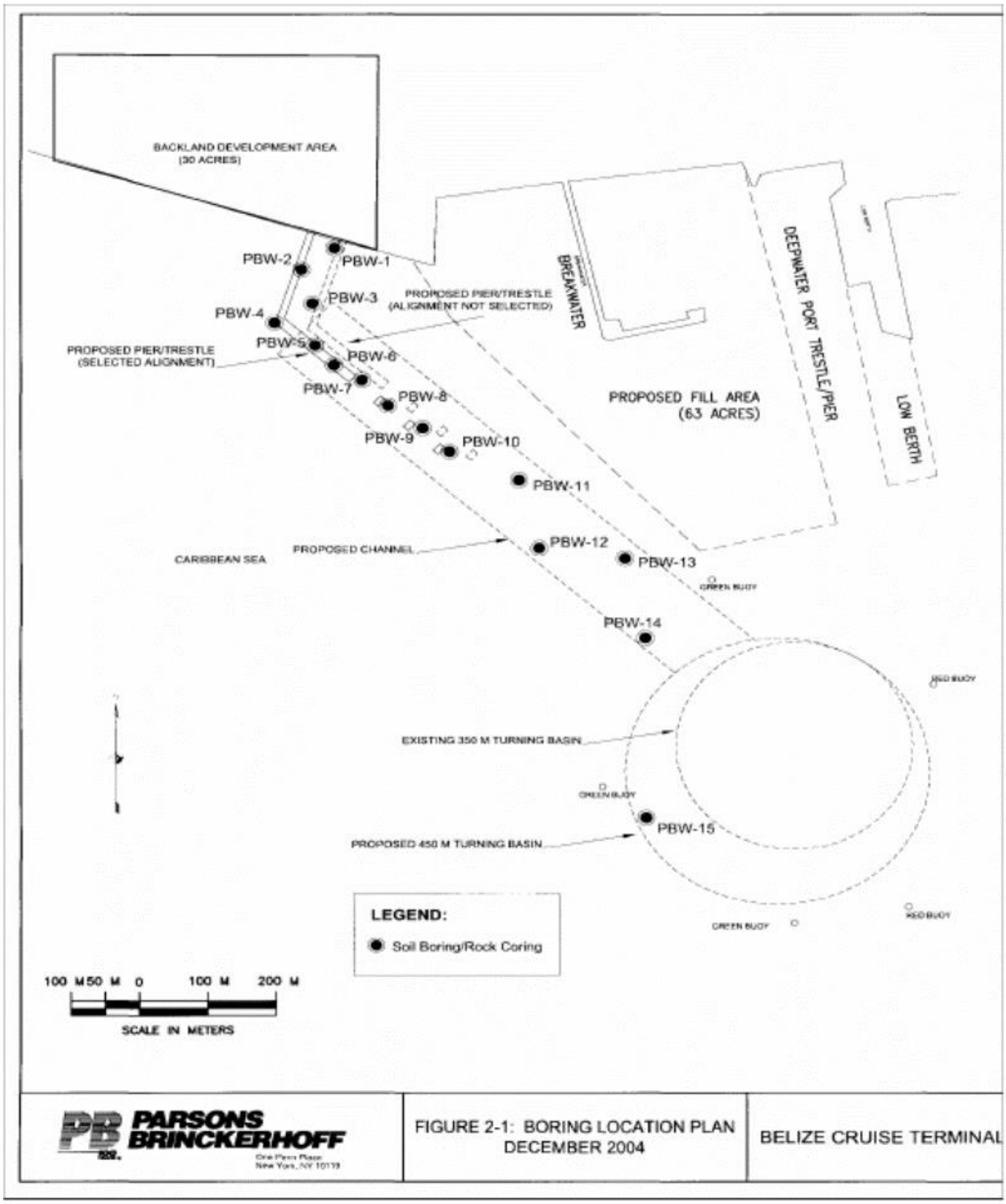


Figure 2.47. Boring location plan – 2004.

Stratum 5. Weathered to Extremely Weathered Limestone

Typically, the limestone core encountered at depths of about 12 meters during the project field exploration was not intact. Some core runs recovered possible loose cobbles and boulders. Fracture spacing ranged from extremely close to closely spaced and occasionally moderately spaced. Fracturing was ubiquitous along very thin to thinly spaced horizontal to low angle bedding planes. In addition, moderately high angle to vertical fracturing was common. Some open fractures were coated with trace to ¼-inch thick hard, cemented clay. Recovery of the rock core samples ranged between 0 percent and 100 percent with an average of 45 percent.

2.6 Siltation Rate of The Dredged Basin and Access Channel

Estimates for the siltation rates within the project site can be achieved through a comparison of dredge depths done in the 2001 dredge campaign for the deepening of the deep-water port and the current recorded bathymetry in the dredge areas. Another method of estimation is the use of analogues data from areas around Belize City deepened for navigational channels (**Table 2.27**).

Table 2.27: Sediment siltation rate (approximation).

Year	Water Depth (ft)	Sediment Type	Change in water depth (ft)	Approx. Siltation Rate (ft/year)
2001	29.5	Stiff clays/marls		
2018	27.2 to 27.9	Silt and mud	2.2 ft to 1.6 ft	0.13 ft/yr to 0.09 ft/yr

The 2001 dredge campaign was undertaken to deepen the access channel to a water depth of approximately 9 m or approximately 30 ft. Investigations in 2018 indicate a current water depth in the same areas of approximately 8.5 m (**Figure 2.48**) seismic cross section with water depths and sediment profile).

The estimated sedimentation or siltation rate within the project site specifically within the excavated access channel is in the order of 0.13 ft to 0.09 ft per year, sediments composed primarily of fines and super fines. This provides an extrapolated accretion of approx. 1.3 ft per 10-year period as a maximum siltation rate.

Analogous data obtained from the Fort Street Tourism Village, Belize City (personal communique) indicates that the access channel near the entrance of Haulover Creek experiences an average siltation of muds and silts of 0.25 ft/year.

The low siltation rates in the project area and Fort Street Tourism Village area, Belize City could be due to a number of factors;

- The net supplier of sand and sediment is the Belize River which is located on the northern side of Belize City and is distal to the project area and may be seen as located in a separate littoral sediment cell from the southern side of Belize City due to current

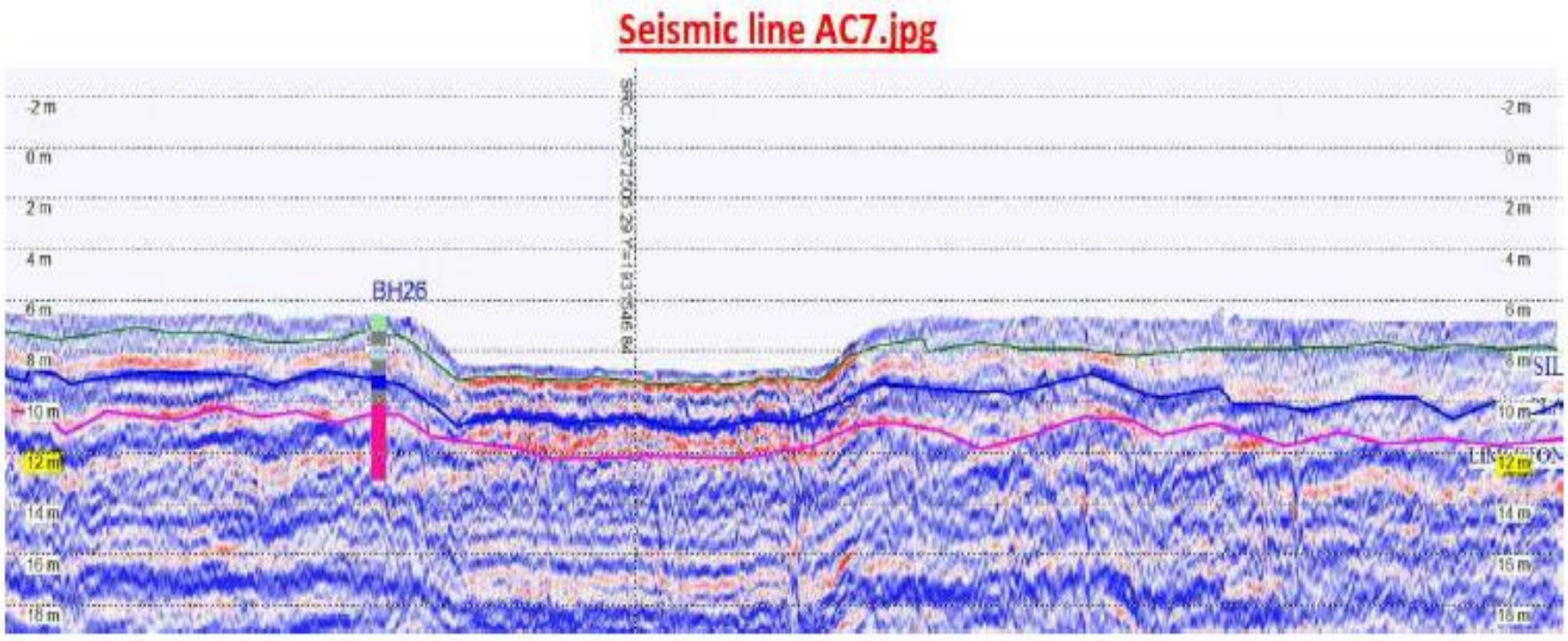


Figure 2.48: Seismic line AC7 across access channel showing the water depth, sediment distribution and indicative layers of fines at upper surface.

directions and longshore drift, thus negating any sediment gain in the project area from the Belize River sediment supply.

- Within and surrounding the project area, the sediments within the upper sections of the seafloor (which would be the most susceptible to movement) is composed of fines of silt and mud fractions. These fractions are highly mobile and are redistributed or re-suspended in the water column through wave action, current movement and vessels passing. This high mobility results in a reduction in the ability to settle and accumulate in any one location but rather these sediments tend to spread out in a more blanketing effect, which has little vertical relief in accumulations.
- The access channel is located and oriented in a somewhat perpendicular direction to the primary current direction, this in effect limits the sink effect created by deeper areas as the highly mobile fines are scoured or flushed in a southerly down drift direction, limiting the accumulation or siltation rates within the project area.

2.7 SOCIAL SETTING

2.7.1 Population and Demographics

Belize City is the largest population centre in the country, containing an official population estimate of approximately 62,582 in a country of 387,879 inhabitants (Statistical Institute of Belize, 2017). The country of Belize boasts one of the lowest population densities in the region with approximately 43.7 inhabitants per square mile and the Belize District with 70. These general population densities, however, can misrepresent the actual density in Belize City, which hovers around 4,544.8 persons per square mile using an unofficial Belize City size of 13.77 square miles and the population estimates of 2017.

Belize City, like most other urban centres, bustles with commercial activities and experiences traffic congestions during rush hours, in the morning between 7:30 and 8:30 am, at noon and again around 5:00 pm. The city experiences an influx of perhaps several thousand workers on a daily weekday basis along with many more persons coming to do business and visiting tourists. All this human activity fuels the livelihood and economy of resident city dwellers (**Figure 2.49**).

Belize City is composed of the following ethnicities, Creole, Garifuna, Mestizo, East Indian, Mayan, and Chinese among many others that live mainly in harmony with each other. It has been said in the past, that Belize is a cultural melting pot and Belize City reflects a microcosm of the country's rich ethnic diversity.



Figure 2.49: Central American Boulevard, parked traffic on a slow summer day.

2.7.2 Topography and its Social Effects

Given the low-lying landscape and poor drainage, Belize City is prone to seasonal flooding. Much of the new developments, including those near the Port of Belize project, is reclaimed land from swampy marshes in the coastal area (**Figures 2.50 and 2.51**). This seasonal flooding results in the widespread loss productivity in, business, school closures, illness due to water contamination and pest increase to name a few. Flooding can take crisis proportions when associated with tropical storms and hurricanes, which are expected to increase with the onset of climate change.



Figure 2.50: Swampland reclamation near the Port Loyola Area.



Figure 2.51: Reclaimed swamp land in the Port Loyola area.

2.7.3 Social Issues

2.7.3.1 Poverty

Poverty has been a long-standing social ill in Belize City, which was further exacerbated by the United States financial crisis in 2007. There is a paucity of official and new statistics regarding poverty (earliest being 2002) levels in Belize. The 2002 poverty study established that 33.5 percent of the population were living under poverty (Belize, 2013). It is an established fact that poverty levels have gradually increased since 2002. Poverty levels in recent years have ranged between 30 to 40 percent varying widely depending on the source.

It is the consensus view among social workers and many policy makers that the current level of poverty remains a serious threat to the development of the country. The south side of Belize, the epicentre of the Port of Belize project, has been officially recognized as one of the poorest areas in the country along with the Toledo and Corozal Districts. These areas have all benefitted from a wide range of social welfare responses over several years to mitigate the impact of poverty.

2.7.3.2 Crime and Violence

Crime in Belize City, is a scourge that poses, perhaps, the greatest threat to the city's safety, security and economic development. The World Homicide Report (2019), placed the Caribbean region, with a homicide rate of 31 per 100,000, as the third most violent region globally, while Central America placed first, with homicide rates of 44.7 per hundred thousand residents.

Belize and specifically Belize City remained one of the most violent places in the world with 145 murders reported in 2012—the highest ever reported (News 5, 2013). OSAC (n. d.) reported that of Belize's 145 murders in 2012, ninety occurred in the District of Belize with the vast majority

of murders confined to Belize City. The rate stays stable with 143 in 2018 which is one more than 2017. While there have been some minor fluctuations in the number of homicides that have occurred in Belize City over the last decade and a half, the general view is that crime and violence continues to be a significant threat to national development and cost of doing business in needing bolstered security.

2.7.3.3 Land Tenure in Project Area

Historical land tenure in the immediate area varies from land previously owned by the Belize Port Authority, to a small number of lots sold by the Belize Port Authority, to lands now held under grant to the Port of Belize Limited. Privately held lands within the northerly subdivision sold by the Belize Port Authority include lots sold but not limited to: Wilhelm Lopez, Customs Department, Caribbean Shipping Agency and Mrs. Turton.

The area of land immediately west of the proposed facility includes lands held by Belize Water Services Limited (BWSL), which was reverted back to Government of Belize control in early October 2005. The area north and north west of the proposed development include Port of Belize Lands and other privately owned and leased lands with varying levels of commercial and semi-industrial development activities. PUMA Energy Belize Limited (formally ESSO) is privately held land located just northeast of the Port of Belize land and facilities.

2.7.3.4 Traditional Uses of Project Area

Marine areas - The 2005 EIA indicated that "the area is used in a very limited way by a few sports fishers. These sports fishers are mainly tourists who fish at the Deep-Water Port Pier Head, as well as around the piles supporting the apron-way."

This assessment shows that fishing in the area entails commercial, subsistence and recreational or sports fishing with subsistence and commercial fishers generally coming from the local area. Most of the fishing activities by commercial fishers takes place offshore, away from the nearshore areas and immediate land and infrastructure of the Port of Belize. However, these commercial fishers adjust their destinations seasonally during the cooler months of the year and target marine shrimps (Penaeus spp.) in the shallower areas nearer to shore.

The commercial fishers are generally 'day trippers' who will not go beyond the sight of mainland Belize and primarily target fin-fishes including snappers (Lutjanidae), Grunts (Haemulidae), Jacks (Carangidae) and mackerel (Scombridae). Subsistence fishers are more confined to the nearshore areas, as well as the infrastructure of the Port, including the pylons of the pier and the reclaimed pond west of the pier head. Fish will normally congregate around columns and pilings on piers and provide opportunity for ambush predators such as tarpons.

Some fishing activity is seasonal and coincides with the peak of the dry season when the jacks (*Caranx sp*.) are 'running', as well as in the cooler months when the snooks (*Centropomus sp*.) are spawning and present around the area. At the time of the study, this was not observed.

However, a few individuals were observed throwing cast nets for shrimps. The traditional use by mariners in the area is dealt with in the chapter dealing with transportation.

As an international port the waters immediately offshore the Port of Belize property is a legally restricted under ISPS code and the Port of Belize has the legal authority and jurisdiction to enforce restriction of movement within this area but has never enforced this.

Terrestrial areas – People from the area immediately adjacent to the port frequently cross the property to access the marine areas for subsistence fishing. Local people also enter the property to collect resources from the mangrove forest on the property including clothesline sticks. Once construction begins this, area will need to be restricted for the safety of the residents.

2.8 GENERAL ECOLOGY OF PROJECT AREA

The habitats within the project area both marine and terrestrial are severely disturbed from recent development activity but in particular the dredging and habitat alterations which took place in 2001. As a result, only a small area of mangrove to the far west of the property has anything remotely approaching an intact forest ecosystem, however this area will not be affected by the development.

2.8.1 Study Methodology

In February 2020 Nextera undertook additional terrestrial surveys to supplement and confirm the recent studies of BET. The surveys concentrated on those species that are considered most sensitive to habitat disturbance and can be used by relevant authorities as indicator (diagnostic) species during the project and post project phase. This included plants, mammals, birds, reptiles and amphibians with special attention to the presence of valued ecosystem components (VECs) which can be species, habitats, or other attributes likely to be receptors of project impacts.

2.8.1.1 Terrestrial Surveys

Nextera conducted a phase 1 habitat survey of the property to identify species and habitats of national or international conservation significance. The approach is as follows:

i) <u>Forest Ecosystems</u>

In view of the heavily disturbed nature of the site it was decided that the most appropriate course of action would be to conduct a walkover survey of the property using transects (**Figure 2.52**) and study plots marked off as quadrants (**Annex XIX**). During the walkover all species observed were recorded. Herbs and grasses were not considered in the study as they are considered invasive species from the recent disturbance. The results of the vegetation survey are given in **Annex XX**.

ii) Fauna

Most of the field effort went into understanding the characteristics of the faunal population within the project site with the view to identify species that are threatened or rare in Belize or regionally or that are listed by the IUCN as threatened.

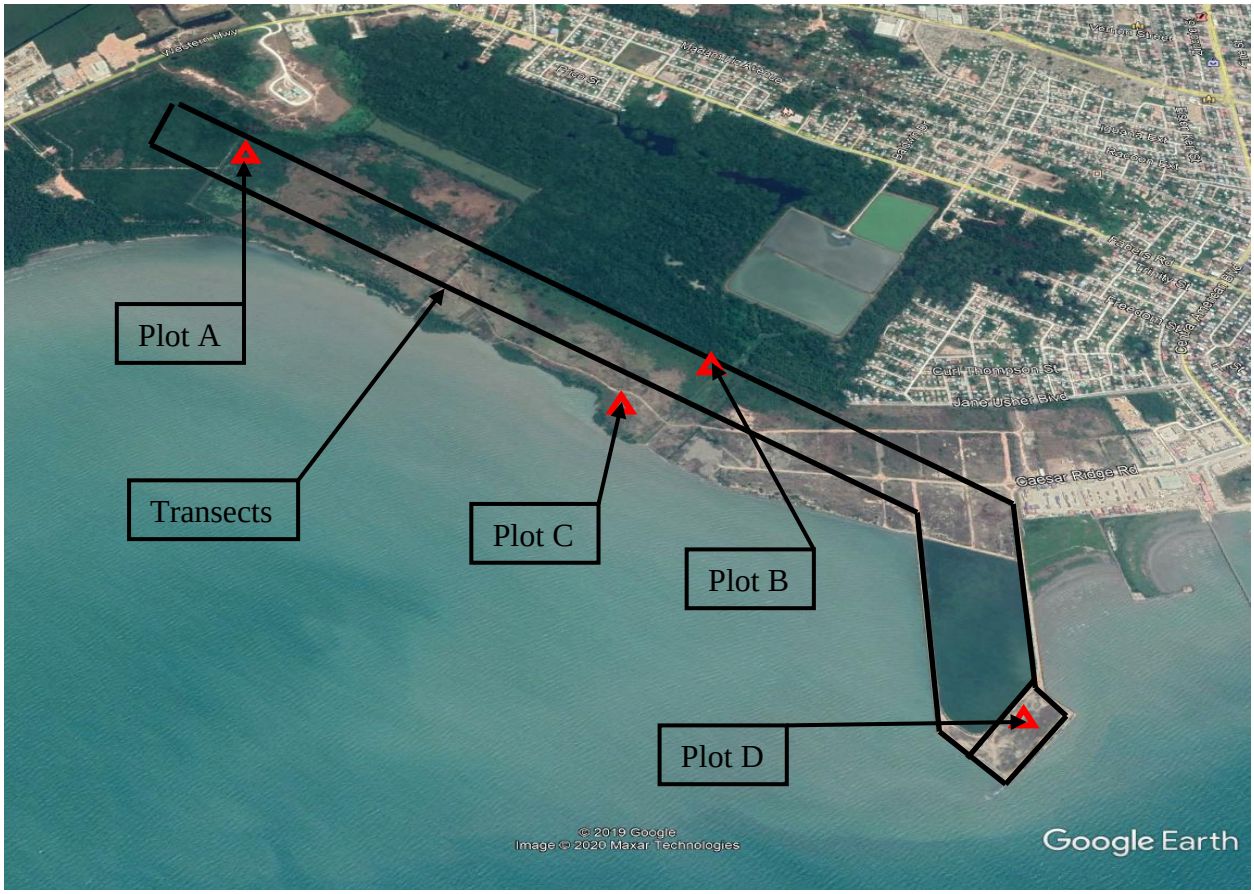


Figure 2.52: Terrestrial transects and study plots used in survey.

a) Birds – The field team recorded birdlife opportunistically while moving through the area making extra efforts to conduct observations in all main ecosystems in the area such as along the shoreline, swamps, drains and different forest habitats etc. Birds were identified by vocalization as well as by sightings among others with special attention paid to the presence of endangered species.

b) Amphibians - The team used the transect and patch sampling method to study reptiles as it is the least intrusive of the options available. This method is particularly good for relating amphibian abundance to habitat variables such as vegetation, pollution and climate factors. It is especially relevant for sampling under forest conditions.

In this method we established a transect and walk over it at regular intervals systematically searching for amphibians and checking under all covered objects within 2m of the line. An

estimate of species richness and relative abundance was determined by the number of animals detected divided by the number of person hours. Call surveys was used to augment the results obtained however the utility of using this method was limited as no night time survey was carried out.

c) Mammals – All wild mammal sightings were recorded on a form with the primary objective to conduct a vigorous investigation of all endangered species of animals in the area. Anecdotal evidence was also collected from the local population about sightings, species hunted and any threats they observe to these populations.

Phase 11 Habitat Surveys – Since no intact primary forest habitat was encountered and no species of conservation significance was detected we did not undertake a Phase II habitat survey which would have been more intensive and focused on the target species.

2.8.1.2 Marine Surveys

Marine surveys of the project site was carried out by JDN in 2018. The marine surveys were originally planned for ten 50m long transects, along with stationary fish surveys at the 25m and 50m points. However, due to the poor visibility and the bareness of the seafloor, it was decided to perform 25m point intercept transects instead of 50m point intercept transects. The survey team used a white rope that sinks and at every 0.5m interval a coloured cable tie was placed to denote the point intercept. Only what was beneath the point was documented.

If the team encountered any clumps of seagrass or algae near the transect areas then it was noted and a quadrant survey conducted. The sites were then chosen based on the area of possible development, proposed work area, reference locations and nearby sensitive areas (See Figure 3.51).

The dives were executed on the 20th, 21st and 22nd of March 2018. The sites that were chosen, when in the field, were slightly changed. The official dive sites and GPS positions are as per **Figure 2.53** and **Table 2.28**.

Subsequently BET conducted a marine benthic assessment to validate and refine data already collected through JDN, Central America Ltd in 2018 (**Annex VII**). All ten sites assessed under this survey were re-visited and validated plus five additional sites were surveyed in order to refine the biological benthic assessment of the area. The benthic survey of the project site presented much challenges because of the prevailing high turbidity in the surrounding waters making it almost impossible to see anything on several occasions the area was visited. The information obtained is a compilation of several diving attempts.

The method used was by roving diver to sites and video record using a GoPro 4 under water video camera. Sites were located using a handheld Garmin GPS and two divers were sent down to conduct the visual assessment.

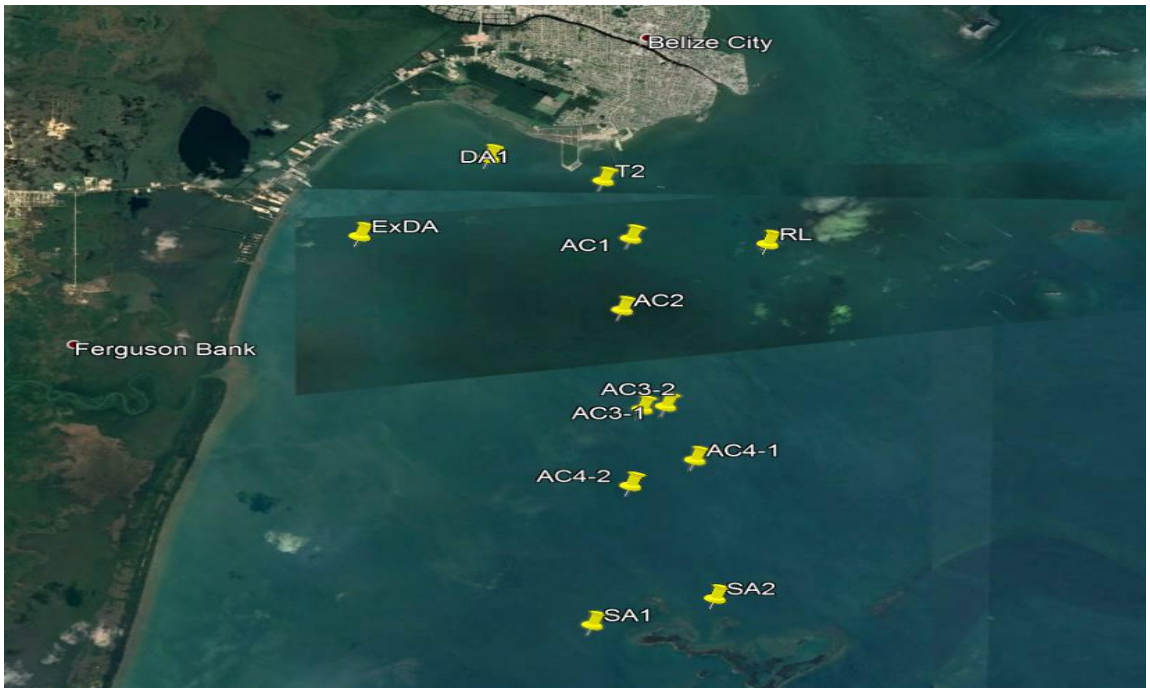


Figure 2.53: Proposed Dive Sites.

Table 2.28: Dive Sites Locations (*All Projections are WGS-84)*

Point	Latitude	Longitude	Recorded Depth
AC4-1	17°24'14.0" N	88°11'23.2" W	12m
AC4-2	17°23'52.5" N	88°11'58.5" W	7m
AC3-1	17°24'58.8" N	88°11'39.3" W	10m
AC3-2	17°24'56.5" N	88°11'52.1" W	10m
RL	17°27'14.5" N	88°10'43.5" W	10m
DA1	17°28'26.3" N	88°13'16.0" W	5m
T2	17°28'07.3" N	88°12'13.4" W	8m
AC1	17°27'19.1" N	88°11'58.3" W	11m
AC2	17°26'19.3" N	88°12'03.0" W	10m
ExDA	17°27'21.1" N	88°14'26.7" W	5m
SA1	17°22'56.2" N	88°12'19.5" W	10m
SA2	17°22'18.3" N	88°11'12.3" W	6m

Day 1 **(20/03/2018) - There were five dives done the first day, namely, RL AC3-1, AC3-2, AC4-1 and AC4-2 (See** Figure 3.51 **&** Table 3.28**).**

Day 2 **(21/03/2018) - On day 2, five dives were conducted, namely AC1, AC2, DA1, T2 and ExDA (See** Figure 3.51 **&** Table 3.28**).**

Day 3 **(22/03/2018) - On day 3, the final two dives were conducted at sites SA1 & SA2 (See** Figure 3.51 **&** Table 3.28**).**

On the second phase of this study four sites were selected to conduct a more detailed assessment in order to properly validate the first study. Benthic surveys were conducted using a twenty meter transect with point intercept at every 25 cm along the length of the transect. A black cable tie was used to mark every 25 cm intersect.

Two divers conducted the survey. Diver 1 laid the transect line in an east to west direction. Since visibility was extremely low and most of the sea floor was dominated by fine sediments, Diver 2 would wait for approximately 5 minutes after the line was laid to swim over the transect and video the entire length. Diver 2 swam at a slow pace keeping the camera firm at approximately 2 feet above the transect line. The GoPro Camera used is a wide-angle lens and at this distance it ensures good benthic coverage in the video frames. Video records were analysed on a desktop computer and on each transect a total of 100 points of data was recorded.

2.8.2 Vegetation

2.8.2.1 Recent Vegetation History

The original, natural, vegetation cover of the project area was a mosaic of coastal fringing mangrove, tropical coastal vegetation on recent sediments, mixed mangrove scrub, marine salt marsh, and basin mangrove. Whether dwarf red mangrove scrub also occurred there cannot be verified.

2.8.2.2 Drivers of Change

Land reclamation, earthworks, and the construction of near-shore groynes in and after 2001 has had a significant impact on the natural vegetation of the project area, with significant areas now in early successional regeneration. Some of this regeneration is towards the pre-existing plant communities that had been cleared and others towards new communities as a result of altered drainage/water regime, imported fill material (with a different soil chemistry), and/or subsequent fire impacts.

Land reclamation took place over an area of approximately 120 hectares immediately north of the current container storage area and westward to the George Price Highway, but no further development took place on these areas.

Reclamation work included the construction of extensive berms (up to 4-5 m in height) to facilitate the draining of dredged materials, the construction of access roadways, drainage channels and culverts, removal of vegetation and extensive backfilling (**Figure 2.54**). These works reportedly took place in 2001 (Tunich-Nah, 2005), prior to the cessation of works.

An area of approximately 19.5 hectares of basin mangrove forest was left bermed but otherwise intact in the western portion of the property, along with a previously contiguous 7.75 hectares of mixed mangrove scrub south of the Solid Waste Transfer Station. By 2005, extensive vegetative regrowth was reported on the reclaimed land, with much of the original mixed mangrove scrub – including all three mangrove species – regenerating over the majority of the cleared area.



Figure 2.54: Reclamation of works in 2001.

Today the vegetation over most of the reclaimed land area is very different from that described in the 2005 ESIA (Tunich-Nah, 2005). An ecological shift has occurred over the intervening years with succession shifting from the regeneration of the previous mixed mangrove scrub and associated wetland systems towards a weedier species mix more typical of heavily disturbed soils.

Extensive mangrove regeneration was reported in the four years following clearance but has subsequently been largely replaced by other vegetation assemblages. Much of this ecological shift can be attributed to the longer-term impacts of altered drainage, altered soil chemistry (including lower salinity as a result of raised elevation and freshwater entrapment), and to fire. Fire damage is evident and is considered likely to be a significant driver of the shift from mangrove regeneration to the observed assemblages of grasses and "weedy" herbaceous and shrubby species.

2.8.2.3 Current Vegetation

Little natural vegetation cover remains – largely restricted to a mix of mixed mangrove scrub and basin mangrove in the western portion of the property. Much of the remainder of the property is now a heavily impacted scrubland with isolated pockets of regenerating buttonwood and black mangrove on the coastal strip reaching back in isolated clumps interspersed with grass and shrubs to the northern property boundary.

Within the study plots the dominant species is Black Mangrove (*Avicenia Germinans*) most within the range of 15cm dbh. Other plots documented mostly herbaceous secondary growth general of low conservation importance but used by butterflies and other insects. Most plots contained many invasive species, e.g., mimosa specie and sand burr in the genus cenchrus and sporubulos. Other important plant species for butterflies and hummingbirds are *lantana camara* and *wild hibiscus*. Endemic species recorded include the *passiflora urbaniana*.

Plot D that is located to the coastal area is dominated by a graminoid specie of grass in the genus sporobolus and buttonwood (in the family of Conoraceae). The study site in question is more or less stabilized because it has been consolidated with boulders.

1. Tropical coastal vegetation on recent sediments

Extensive stands of saltwort (*Batis maritima*) (**Figure 2.55**) have become established on an area of approximately 5 hectares of recently accreted silts immediately south of the container storage area, in what was previously near-shore waters. The accretion has evidently taken place as a result of reduced lateral water flow along the coast, caused by the construction of solid groynes in the near-shore waters. As an early colonizer of recent coastal sediments, saltwort stabilizes the substrate – trapping further sediment over-wash during high tides thereby extending the coastline out into what was previously shallow waters and allowing secondary colonizer species to become established as the silts gradually become terra firma.



Figure 2.55: Extensive stands of saltwort (*Batis maritima*).

2. Disturbed scrubland

Much of the reclaimed land is now covered with disturbed scrubland that bears little resemblance to the original vegetation. Species distribution is at least partly determined by small variations in elevation and drainage, as well as fire impacts. Areas that have been frequently burnt are largely grass-dominated, with species including *Andropogon glomerathua, Cenchrus incertus,* and a limited diversity of herbaceous annuals (**Figure 2.56**).

In wetter areas that have been less frequently impacted by fire, *Avicennia germinans* and *Concarpus erecta* have become dominant. On better-drained areas, including on the berms

themselves, *Cecropia peltata*, *Helicteres sp*., *Hibiscus pernambucensis*, and *Pithocellobium sp*. (possibly *P. keyense*) are well established. The berms are also scattered with specimens of craboo (*Byrsonima crassifolia*) – that have almost certainly grown from seeds discarded by visitors to the site. Small patches of tasiste palm (*Accoelorraphe wrightii*) and red mangrove (*Rhizophora mangle*) are also scattered amongst these other species.

Regrowth includes *Conocarpus erecta*, *Distichilis spictata*, *Sedges*, *Passiflora foetida*, *Stachytarpheta jamaicensis*, cough bush (*Pluchea carolinensis*), *Eleocharis sp*., sea purslane (*Portulaca oleracea*), and wild cow pea (*Vigna luteola*). Continued disposal of dredged sediments over the herbaceous and shrubby regrowth has both elevated the ground level and reset the successional pathway to bare soil.



Figure 2.56: Reclaimed land is now covered with disturbed scrubland.

3. Mixed mangrove scrub

Mixed mangrove scrub is presumed to have originally covered much of the project area; elements of regrowth are becoming re-established in areas that have largely escaped fire. *Avicennia germinans*, *Conocarpus erecta*, and associated grasses are the most evident. Red mangrove (*Rhizophora mangle*) and white mangrove (*Laguncularia racemosa*) are uncommon in these areas possibly due to their very limited fire tolerance (**Figure 2.57**). The most intact example of this ecosystem occurs south of the Solid Waste Transfer Station.

4. Basin mangrove

Basin mangrove is perhaps the best categorization of the existing vegetation assemblage covering approximately 19.5 hectares in the western-most bermed area adjacent to the George Price Highway. At this location freshwater entrapment is beleived to have caused a shift from an assemblage previously more typical of mixed mangrove scrub. Buttonwood (*Conocarpus erecta*) and black mangrove (*Avicennia germinans*) are dominant, growing to 15m+ in height. Other species on and adjacent to the raised berm embankments include trumpet tree (*Cecropia peltata*), blackberry (*Syzygium cumini*), subin (*Acacia collinsii),* fig *(Ficus sp.),* mangrove vine (*Rhabdadenia bifora),* almond (*Terminalia catappa*) and craboo *(Byrsonima crassifolia).*



Figure 2.57: Mixed mangrove community.

5. Tall herbaceous swamp

In this context (of small scale), this ecosystem can perhaps be best considered as a component of the disturbed scrubland, having become established in shallow basins that are seasonally inundated with rainwater and which support freshwater-associated herbaceous plants such as *Typha domingensis* and *Eleocharis sp.* **(Figure 2.58).**



Figure 2.58: Tall herbaceous swamp.

Table 2.29 provides a listing of the Plant species recorded in the project area in the current survey.

Table 2.29: Plant species recorded in the project area in the current survey.

Scientific name	Common name
Acacia collinsii	subin
Accoelorraphe wrightii	tasiste palm
Acrostichum aureum	mangrove fern
Ageratum littorale	white weed
Andropogon glomerathua	broom grass
Avicennia germinans	black mangrove
Batis maritima	saltwort
Byrsonima crassifolia	craboo
Cecropia peltata	trumpet tree
Cenchrus incertus	burr grass
Chamaesyce mesembrianthemifolia	spurge
Conocarpus erecta	buttonwood
Distichilis spictata	salt grass
Eleocharis sp.	spike rush
Ficus sp.	fig

Scientific name	Common name
Fimbristylis sp.	sedge
Helicteres sp.	shrub
Hibiscus pernambucensis	moho
Laguncularia racemosa	white mangrove
Malvaviscus arboreus	Turk's cap hibiscus
Metopium brownei	black poisonwood
Mimosa tarda	sensitive weed
Passiflora foetida var.	passionflower
Pithecellobium sp. (cf. *P. keyense*)	prickly bush
Pluchea carolinensis	cough bush
Portulaca oleracea	sea purslane
Rhabdadenia bifora	mangrove vine
Rhizophora mangle	red mangrove
Stachytarpheta jamaicensis	verbena
Syzygium cumini	blackberry
Turnera ulmifolia	yellow alder
Typha domingensis	cat-tail rush
Vigna luteola	wild cow pea
Introduced (non-native) species	
Casuarina equisetifolia	Australian pine
Cocus nucifera	coconut
Terminalia catappa	Indian almond tree
Ziziphus mauritians	governor's plum

2.8.3 Terrestrial Fauna

2.8.3.1 Herpetofauna

The reclaimed land area of the property is an inhospitable environment for most species of amphibians and reptiles. Whilst the regenerating vegetation provides habitats that could be colonized by a number of species, intermittent fires would have devastating impacts on new colonizers. These areas can therefore be considered as largely devoid of significant populations of herpetofauna.

The largely intact mangrove ecosystems in the western portion of the property still provide suitable, largely undisturbed, habitat for several herpetofauna species, though not enough to sustain viable populations in the long-term. With adjacent habitat clearance and increasing habitat fragmentation, the diversity and abundance of herpetofauna occupying these remnant habitats can be expected to be in a state of continuing decline.

In their current condition, these habitats can be expected to harbour up to 7 amphibian and 23 reptile species, including occasional occupants moving through the area. The American crocodile has been reported in the near-shore waters in front of the property (ESIA report, 2005), though it is questionable whether it still frequents this area given the scale of anthropogenic presence and disturbance.

Given the limited extent and poor condition of much of the potential herpetofauna habitat on the property, coupled with the medium-to-long-term trend of land development in the surrounding area, the conservation importance of the remnant herpetofauna populations within the property is very limited. None of the amphibian or reptile species likely to occur here are assessed (IUCN) as being Vulnerable, Endangered or Critically Endangered.

1. **Amphibians**

Scientific name	Common name
Leptodactylus fragilis	White-lipped frog
Leptodactylus melanonutus	Black-backed frog
Rhinella marina	Marine toad
Incilius valliceps	Gulf coast toad
Trachycephalus typhonius	Veined tree frog
Scinax staufferi	Stauffer's tree frog
Smilisca baudinii	Mexican tree frog

2. **Reptiles**

Scientific name	Common name
Crocodylus acutus	American crocodile
Crocodylus moreletii	Morelet's crocodile
Kinostertnon leucostomum	White-lipped mud turtle
Kinosternon scorpiodes	Red-cheeked mud turtle
Rhinoclemmys areolata	Furrowed wood turtle
Sphaerodactylus glaucus	Dwarf gecko

Scientific name	Common name
Phylodactylus tuberculosus	Mangrove gecko
Hemidactylus frenatus	Asiatic house gecko
Basiliscus vittatus	Banded basilisk
Ctenosaura similis	Spiny-tailed iguana
Anolis lemurinus	
Anolis rodriguezii	
Anolis sagrei	Brown anole
Anolis sericeus	Silky anole
Holcosus undulata	Rainbow ameiva
Boa constrictor	Boa
Coniophanes imperialis	Black-striped snake
Drymobius margaritiferus	Speckled racer
Leptodeira frenata	Cat-eyed snake
Oxybelis aeneus	Grey vine snake
Oxybelis fulgidus	Green vine snake
Thamnophis proximus	C. American ribbon snake
Micrurus diastema	Coral snake
Norops Uniformis	lesser scaly anole
Drymarchon Corais	Black Tailed Indigo

2.8.3.2 Birds

A total of 119 bird species have been recorded across the landscape surrounding the property (e-Bird, 2019) within the last 8 years, the majority in the last 2 years. These include a mix of coastal and freshwater wetlands, coastal strand, savannah / reclaimed land (grassland / scrub / forest) species, and migratory species:

- Coastal waders (black necked stilts, sandpipers, plovers),
- Saltmarsh species (Clapper rail),
- Freshwater species (herons, egrets and kingfishers),
- Marine species observed overhead (magnificent frigate birds, brown pelicans, gulls, terns),
- Generalists (great tailed grackles, melodious blackbirds, great kiskadees, vultures),
- Grassland disturbed vegetation species (Morelet's seedeater, blue-black grass quit),

- Migratory species (warblers, swallows).

These include 4 species identified within the top 25 avian species most at risk in Belize (National Bird Working Group, 2016, as part of larger regional assessment):

- Reddish Egret (*Egretta rufescens*) – high level species of national concern. Area is not considered critical habitat for this species. Known nesting areas are in northern Belize,
- Yucatan vireo (*Vireo magister*) – Yucatan endemic. Area is not considered critical habitat for this species,
- White crowned Pigeon (*Patagioenas leucocephala*) – Coastal / caye resident. Area is not considered critical habitat for this species,
- Clapper Rail (*Rallus crepitans*) - Area is not considered critical habitat for this species.

Whilst the property is not considered critical to any of these species, the long-term trend of land development in the surrounding landscape – and associated habitat loss – has cumulative impacts on many species and can but result in decreasing species diversity and avian abundance in the immediate area. **Table 2.30** provides a list of birds known to frequent the area and zone of influence.

Noted at the study site are migrant shore bird species which use the area as steppingstones. A noteworthy specie is the Palm Warblers that have specialized feeding habitat. Another specialized species is Mangrove Warblers which is restricted to mangrove habitat. The Osprey is another specie of ecological importance that is dependent on marine organisms.

Table 2.30: List of birds known to frequent the area and zone of influence.

Species		Sewage Treatment Facility (0.7 km)	Solid Waste Management Site (1 km)	Cucumber Beach (3.8 km)	Belizean Beach (1.7 km)
Brown Pelican	*Pelecanus occidentalis*	x		x	x
Double-crested Cormorant	*Phalacrocorax auritus*				x
Anhinga	*Anhinga anhinga*	x			
Magnificent Frigate bird	*Fregata magnificens*	x		x	x
Great Blue Heron	*Ardea herodias*	x			x
Great Egret	*Ardea alba*	x		x	x
Snowy Egret	*Egretta thula*	x		x	x
Little Blue Heron	*Egretta caerulea*	x		x	x
Tricolored Heron	*Egretta tricolor*			x	x
Reddish Egret	*Egretta rufescens*				x
Cattle Egret	*Bubulcus ibis*			x	x
Green Heron	*Butorides virescens*	x			x
Yellow-crowned Night-Heron	*Nyctanassa violacea*	x			x
Roseate Spoonbill	*Platalea ajaja*				x
White Ibis	*Eudocimus albus*	x		x	x
Blue-winged Teal	*Anas discors*	x			
Limpkin	*Aramus guarauna*	x			
Lesser Swallow-tailed Swift	*Panyptila cayennensis*	x			
Osprey	*Pandion haliaetus*			x	
Black Vulture	*Coragyps atratus*	x	x	x	x
Turkey Vulture	*Cathartes aura*	x	x	x	x
Lesser Yellow-headed Vulture	*Cathartes burrovianus*	x			x
White-tailed Kite	*Elanus leucurus*		x		
Snail Kite	*Rostrhamus sociabilis*			x	x
Common Black Hawk	*Buteogallus anthracinus*	x	x	x	x
Roadside Hawk	*Rupornis magnirostris*	x	x		
Grey Hawk	*Buteo plagiatus*	x			
White-tailed Hawk	*Geranoaetus albicaudatus*				x

Species		Sewage Treatment Facility (0.7 km)	Solid Waste Management Site (1 km)	Cucumber Beach (3.8 km)	Belizean Beach (1.7 km)
Peregrine Falcon	*Falco peregrinus*			x	
Collared Forest-Falcon	*Micrastur semitorquatus*	x			
Rock Pigeon	*Columba livia*			x	
Red-billed Pigeon	*Patagioenas flavirostris*			x	
Pale-vented Pigeon	*Patagioenas cayennensis*	x			
White-crowned Pigeon	*Patagioenas leucocephala*	x			
Eurasian Collared Dove	*Streptopelia decaocto*	x			
Ruddy Ground-Dove	*Columbina talpacoti*	x			
White-winged Dove	*Zenaida asiatica*	x			
Black-necked Stilt	*Himantopus mexicanus*	x			x
Black-bellied Plover	*Pluvialis squatarola*			x	x
Semipalmated Plover	*Charadrius semipalmatus*	x		x	x
Whimbrel	*Charadrius semipalmatus*			x	x
Killdeer	*Charadrius vociferus*	x			
Stilt Sandpiper	*Calidris himantopus*				x
Sanderling	*Calidris alba*				x
Least Sandpiper	*Calidris minutilla*	x		x	x
Western Sandpiper	*Calidris mauri*			x	
Short-billed Dowitcher	*Limnodromus griseus*			x	x
Long-billed Dowitcher	*Limnodromus scolopaceus*				x
Spotted Sandpiper	*Actitis macularius*	x		x	
Semipalmated Sandpiper	*Calidris pusilla*	x			
Western Sandpiper	*Calidris mauri*				
Willet	*Tringa semipalmata*			x	x
Greater Yellowlegs	*Tringa melanoleuca*			x	
Lesser Yellowlegs	*Tringa flavipes*	x		x	x
Clapper Rail	*Rallus longirostris*	x			
Russet-napped Wood-Rail	*Aramides albiventris*	x			
American Coot	*Fulica americana*	x			

Species		Sewage Treatment Facility (0.7 km)	Solid Waste Management Site (1 km)	Cucumber Beach (3.8 km)	Belizean Beach (1.7 km)
Ruddy Turnstone	*Arenaria interpres*				x
Laughing Gill	*Leucophaeus atricilla*	x		x	x
Royal Tern	*Sterna maxima*			x	x
Roseate Tern	*Sterna dougalii*				x
Least Tern	*Sternula antillarum*				x
Gull-billed Tern	*Gelochelidon nilotica*	x			
Black Tern	*Chlidonias niger*	x			
Wood Stork	*Mycteria americana*				x
Belted Kingfisher	*Megaceryle alcyon*	x			x
Green Kingfisher	*Chloroceryle americana*	x			
Yellow-bellied Sapsucker	*Sphyrapicus varius*				
Golden-fronted Woodpecker	*Melanerpes aurifrons*				x
Lineated Woodpecker	*Dryocopus lineatus*				
Green-breasted Mango	*Anthracothorax prevostii*	x			
Rufous-tailed Hummingbird	*Amazilia tzacatl*	x			
Cinnamon Hummingbird	*Amazilia rutila*	x			
Olive-throated Parakeet	*Eupsittula nana*				
White-fronted Parrot	*Amazona albifrons*				
Black-headed Trogon	*Trogon melanocephalus*	x			
Dusky-capped Flycatcher	*Myiarchus tuberculifer*	x			
Great Kiskadee	*Pitangus sulphuratus*	x	x		
Social Flycatcher	*Myiozetetes similis*		x	x	
Tropical Kingbird	*Tyrannus melancholicus*	x	x	x	
Scissor-tailed Flycatcher	*Tyrannus forficatus*	x	x		
Common Tody-flycatcher	*Todirostrum cinereum*	x			
Eastern Wood-Pewee	*Contopus virens*				
Rufous-browed Peppershrike	*Cyclarhis gujanensis*	x			
Mangrove Vireo	*Vireo pallens*	x			
White-eyed Vireo	*Vireo griseus*	x			

Species		Sewage Treatment Facility (0.7 km)	Solid Waste Management Site (1 km)	Cucumber Beach (3.8 km)	Belizean Beach (1.7 km)
Red-eyed Vireo	*Vireo olivaceus*	x			
Yellow-green Vireo	*Vireo flavoviridis*	x			
Yucatan Vireo (YE)	*Vireo magister*	x			
Brown Jay	*Psilorhinus morio*	x			
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	x			
Purple Martin	*Progne subis*	x			
Grey-breasted Martin	*Progne chalybea*	x			
Mangrove Swallow	*Tachycineta albilinea*	x	x	x	
Bank Swallow	*Riparia riparia*		x		
Barn Swallow	*Hirundo rustica*	x		x	
Cliff Swallow	*Petrochelidon pyrrhonota*	x			
Tropical Mockingbird	*Mimus gilvus*	x	x		
Yellow-breasted Chat	*Icteria virens*	x			
Mangrove Warbler	*Setophaga petechia*				x
Magnolia Warbler	*Dendroica petechia*	x			x
Yellow-romped Warbler	*Setophaga coronata*	x			
American Redstart	*Setophaga ruticilla*	x			x
Northern Parula	*Setophaga americana*	x			
Northern Waterthrush	*Parkesia noveboracensis*	x			x
Black-and-white Warbler	*Mniotilta varia*	x			
Prothonotary Warbler	*Protonotaria citrea*	x			
Common Yellowthroat	*Geothlypis trichas*	x			x
Yellow-bellied sapsucker	*Sphyrapicus varius*	x			
Scarlet Tanager	*Piranga olivacea*	x			
Indigo Bunting	*Passerina cyanea*	x			
Blue-black Grassquit	*Volatinia jacarina*	x			
Morelet's Seedeater	*Sporophila morelleti*	x			
Orchard Oriole	*Icterus spurius*	x			

Species		Sewage Treatment Facility (0.7 km)	Solid Waste Management Site (1 km)	Cucumber Beach (3.8 km)	Belizean Beach (1.7 km)
Hooded Oriole	*Icterus cucullatus*	x			
Baltimore Oriole	*Icterus galbula*	x			
Bronzed Cowbird	*Molothrus aeneus*				x
Melodious Blackbird	*Dives dives*	x		x	
Great-tailed Grackle	*Quiscalus mexicanus*	x		x	x

Birds of the Port landscape based on e-bird reports in adjacent areas of similar habitats (coastal and freshwater wetlands, coastal strand, reclaimed land (grassland / scrub / forest). Distance from the site is noted in km.
(NOTE: e-Bird has a stringent review process by an in-country panel of experts before records are integrated into the e-bird database).

2.8.3.3 Terrestrial Mammals

The reclaimed land of the property is a relatively inhospitable environment for most species of mammal, especially with the occasional intermittent fires that burn through the area. The largely intact mangrove ecosystems in the western portion of the property still provide suitable, largely undisturbed, habitat for several mammal species, though not enough to sustain viable populations in the long-term. Excluding bat and small rodent species, 7 terrestrial mammal species can be expected to frequent portions of the property:

Scientific name	Common name
Agouti paca	Paca
Didelphis virginiana	Virginia opossum
Conepatus semistriatus	Striped hog-nosed skunk
Nasua narica	White-nosed coati
Procyon lotor	Northern raccoon
Sciurus yucatanensis	Yucatan squirrel
Urocyon cinereoargenteus	Grey fox

The lack of mammal tracks on the seashore and reclaimed land areas during the survey was significant – and is most likely indicative of fire impacts: deterring regular use of the area even by opportunists such as the raccoon. The largely intact mangrove habitats in the westernmost portion of the property are likely to still harbour most of the mammals that could occur there. Hunters' trails enter this mangrove forest habitat from the Western Highway, with hunters most likely targeting paca at night – the evident regular use of these tracks suggests enough animals remain for the area to be attractive to hunters.

2.8.4 Marine Fauna

The two marine mammals known to frequent the nearshore waters in front of the property on a regular basis are the Antillean Manatee (*Trichechus manatus manatus*) – an Endangered subspecies of the vulnerable West Indian Manatee - and the bottlenose dolphin (*Tursiops truncatus*).

Scientific name	Common name
Trichechus manatus manatus	Antillean manatee
Tursiops truncatus	Bottlenose dolphin

Belize's manatee population is considered to be the largest in the region estimated at between 700 – 1,000 individuals (National Manatee Working Group, in prep.), The very significant recent

increase in annual mortalities recorded between 2012 and 2019 in Belize's waters represents a significant threat to the long-term conservation of this endangered subspecies.

In 2018 there were 49 recorded deaths (Ecomar, 2018), mostly in or near the mouth of the Belize River, the sub-population that uses the river to access freshwater is being impacted by unsustainable levels of mortalities with numbers likely to crash over the next 2-5 years and with fecundity apparently already negatively impacted (Walker, P., pers. obs.). The location of the proposed project will help to divert traffic away from the congestion of the Belize River.

Whilst the near-shore waters immediately in front of the project area are not known to be important as a habitat for manatees, it is thought that manatees living south of that section of coastline travel northwards to the mouth of the Belize River every 8-10 days to access freshwater, and then return to their regular feeding grounds.

Multiple manatee deaths have been recorded along the coastline 3 - 4 km eastwards and north of the project site in 2019 alone. Injured and stranded manatee calves and adolescents have been observed / rescued on at least three occasions within 3 km of the property on the SW shoreline in recent years. Increased boat traffic through these near-shore waters may exacerbate the already serious situation faced by the subpopulation of manatees living in, or traversing, them.

Multiple national agencies are pushing for enforcement of existing no-wake zones and the broad-scale adoption of best practices by tour boat operators and water taxis in these hotspots. The establishment of strictly enforced no-wake zones for any new boat activity within 2.5 km of the shoreline or cayes in this area is considered important to reduce threats to the local sub-population of this endangered subspecies (Walker, P. pers. obs.). The Port of Belize Development will commission a Wildlife Management Plan which will focus on Manatee conservation. The plan will detail the stringent measures which will be put in place to safeguard the Manatee population of the area.

The much faster-moving bottlenose dolphin is far better equipped to avoid boat collisions, with no known boat-strike mortalities in Belize. Negative impacts on the dolphin population from increased boat activity associated with the development, are therefore assessed as likely to be far lower than on the manatee sub-population.

Corrections:
Two species identifications have been corrected from previous assessments of the area (Tunich-Nah Consultants & Engineering, 2005)
The palmetto palm previously identified as *Schippia concolor* (a Belize endemic palm largely confined to the Maya Mountains and some pine savannas), is actually *Accoelorraphe wrightii*, a palm commonly found in and around seasonally flooded (freshwater) areas.
The furrowed wood turtle identified as *Rhinoclemmys scripta* is in fact *Rhinoclemmys areolata*.

2.9 Marine Ecosystem

The zone of influence including areas adjacent to the channel to be excavated, as well as the shore-based infrastructure is a part of the larger southern shelf lagoon. This comprises the areas leeward of the first line of cayes adjacent the main barrier reef crest and back reef areas in the east stretching west to mainland Belize up to the vicinity of the Sibun River mouth and Manatee Bar area.

The sub-tidal areas are generally a mix of benthic or seafloor habitat, including: seagrass and macro-algal dominated seafloor, bare substratum of mud and silt, bare sand and mud bottom, bedrock rubble with dense gorgonians, bedrock and rubble with sparse gorgonians, sand and sparse algae bottom, and rubble and sparse algae.'

The salinity in the nearshore waters along Belize City's Coastline and in particular the project area is greatly influenced by freshwater outfalls from the Belize River, Haulover Creek and the Sibun River. The degree of freshwater influence varies with the time of the year with the greatest dilution influences being realized during the rainy season. The nearshore water quality of the 'Cruise Terminal Bay' and the 'Low Berth Area' are oceanic and near-oceanic during the peak of the dry season, with salinities in the area being equivalent to or approaching 35 ppt.

2.9.1 Benthic Survey

2.9.1.2 Results of Benthic Survey

All ten sites surveyed had fine sediment and minimal movement would cause re-suspension of sediment and further affect visibility to the extreme of zero visibility. On most dives the fine sediment layer was so thick that the diver's leg would sink in the soft sediments and when swimming forward huge amounts of sediment would be re-suspended and dives would have to be aborted due to low visibility.

All ten sites surveyed by Tunich Nah Consulting were revisited and confirmed that most had soft sediment bottoms with a top layer of carpet algae and cyanobacteria. The area near the pier, turning basin and channel were composed of fine sediments with top layer of carpet algae. The water column was almost saturated with sediments and visibility was almost zero in some area. This made diving difficult and sometimes dangerous since poor visibility can disorient and confuse a diver (**Figure 2.59**)

At sites SA1 and SA2 visibility was better but there were substantial quantities of re-suspended particles in the water column. The team was able to identify a not well-developed ***gorgonian reef*** with several species of macro algae and sponges. Sedimentation on benthic organisms was heavy and may be the reason why this reef has very low biodiversity and is not well developed. In addition, surveys were conducted on this site since it was the area with highest biodiversity and may be affected by dredging of the nearby channel.

Four sites near Robinson Point and the main navigational channel were assessed to determine the current status. This area has been identified as having the greatest biodiversity in and near the project site's marine environment.

After analysis of the video transects, the team recorded that over 40% of the benthos is composed of fine sediment sparsely populated by *Thalassia testudinum* at 26% and macro algae at 22%. Soft coral (gorgonian) recorded 10%, while sponges and corals had coverage of 1%. Most of the benthic coverage was fouled with fine sediment (**Figures 2.59, 2.60 and 2.61**). **Table 2.31** list the Benthic organisms recorded by TNCE in 2018 and **Table 2.32** list the Flora and Fauna observed during BET dives in project area.

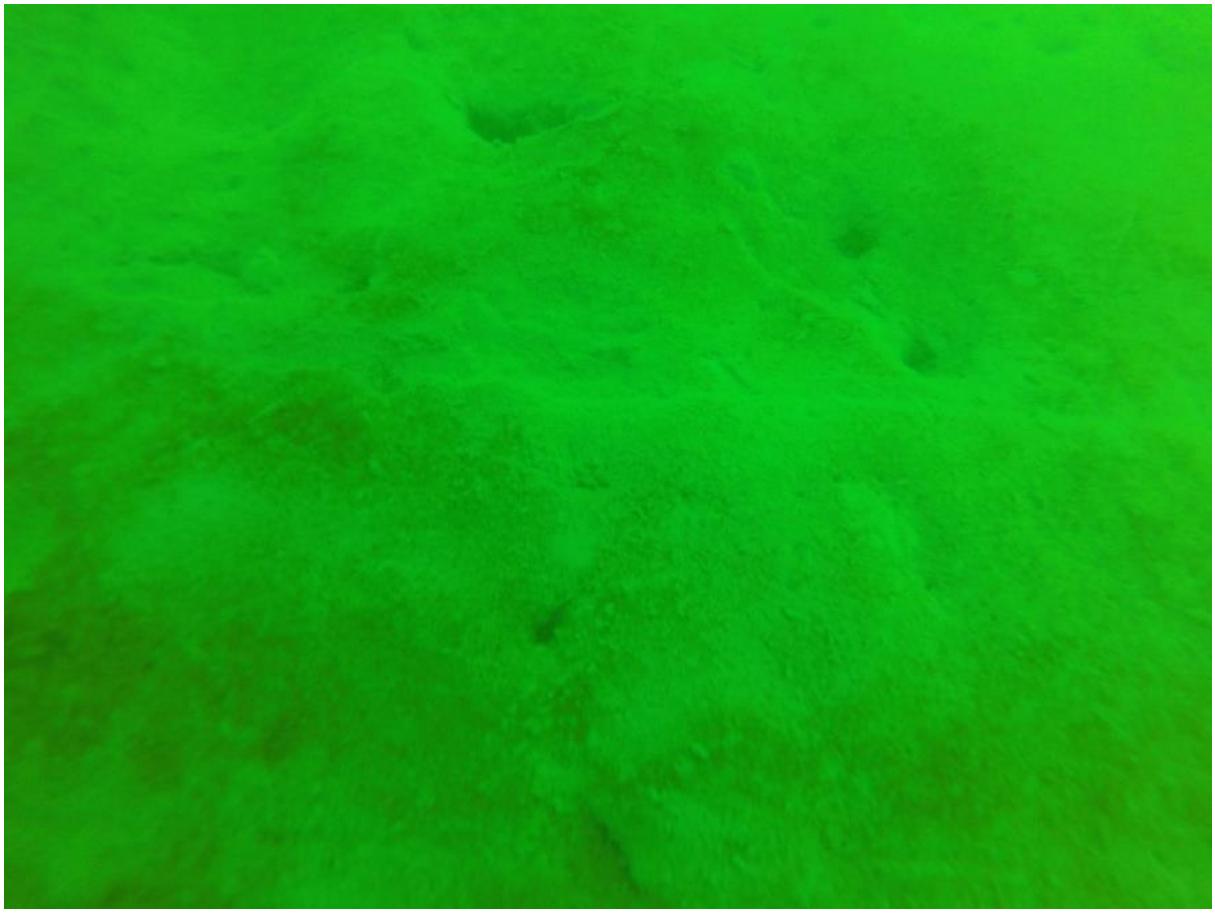


Figure 2.59: Unprocessed image of benthic composition at site AC2.

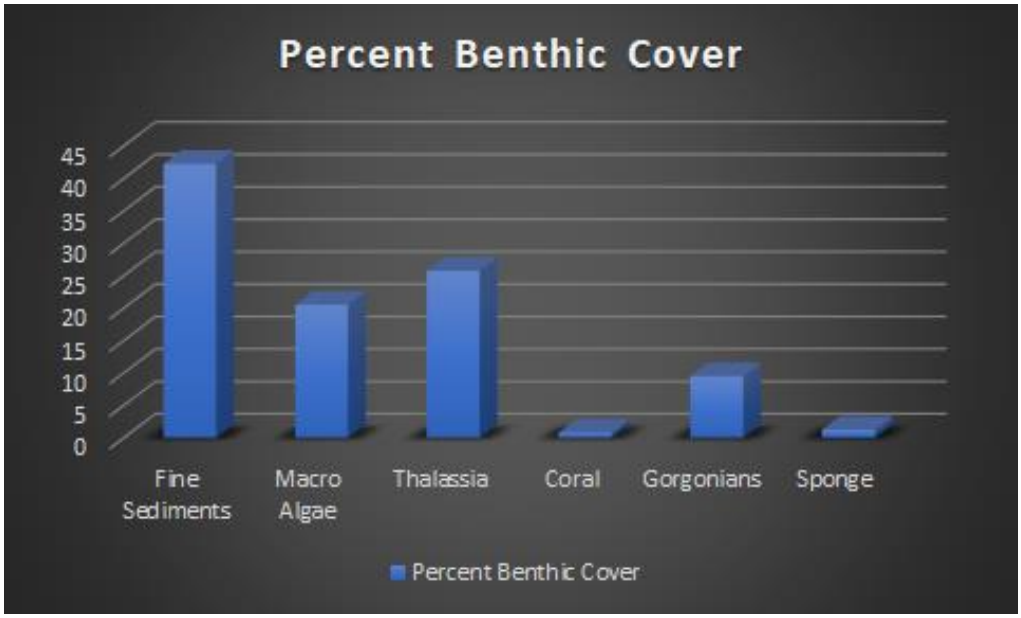


Figure 2.60: Percent Benthic Cover.



Figure 2.61: Benthic Transects.

Table 2.31: Benthic organisms observed during dives within project area.

DIVE SITE	Common Name	Scientific Name	Abundance
AC4-2	Sea Whip	*Alcyonacea*	Common
	Y Branched Brown Algae	*Dictyota sp.*	Abundant
	Mermaids Fan	*Udotea sp.*	Sparse
	Green Feather Algae	*Caulerpa sertulariodes*	Common
	Green Algae	*Caulerpa flexilis*	Common
	Orange Tree Sponge	*Ptilocaulis sp.*	Common
	Branching Tube Sponge	*Aiolochroia crassa*	Common
	Shaving Brush Algae	*Penicillus dumtosus*	Sparse
	Green Hair Algae		Sparse
SA1	Branching Tube Sponge	*Aiolochroia crassa*	Common
	Sea Whip	*Alcyonacea*	Common
	Green Algae	*Caulerpa flexilis*	Common
	Y Branched Brown Algae	*Dictyota sp.*	Abundant
	Green Hair Algae		Sparse
	Halimeda	*Halimeda tuna*	Sparse
SA2	Branching Tube Sponge	*Aiolochroia crassa*	Common
	Sea Whip	*Alcyonacea*	Common
	Green Algae	*Caulerpa flexilis*	Common
	Y Branched Brown Algae	*Dictyota sp.*	Abundant
	Halimeda	*Halimeda tuna*	Sparse
All Sites	Red Slime	*Cyanobacteria*	Very Abundant
	Green Film Algae		Sparse
AC3-2/AC1	Juvenile Horse Eye Jack	*Caranx latus*	

Table 2.32: Flora and Fauna observed during dives within project area.

Common Name	Scientific Name	Abundance
Gorgonians		
Sea Plume	*Pseudopterogorgia sp.*	Moderate
Sea Rods	*Eunicea sp.*	Moderate
Angular Sea Whip	*Pterogorgia anceps*	Low
Swollen Knobby Candelabrum	*Eunicea mammosa*	Low
Porous Sea Rods	*Pseudoplexaura sp*	
Corals		

Massive Starlet Coral	*Siderastrea siderea*	Low
Finger Coral	*Porites porites*	Low
Muster Hill Coral	*Porites astreoides*	Low
Knobby Star Coral	*Solenastrea Haydes*	Low
Fire Coral	*Milipora alicornis*	Low
Marine Seagrasses		
Turtle Grass	*Thalassia testudinum*	Abundant
Manatee Grass	*Syringodium filiformes0*	Moderate
Clover Grass	*Halophila Baillonis*	Low
Macro Algae		
	Caulerpa Ashmeadii	Low
	Caulerpa sertulariodes	Low
	Avrainvillea sp.	Low
	Halimeda Sp.	Moderate
	Laurencia sp.	Moderate
	Penicillus sp.	Low
	Rhipocephalus sp.	Low
	Amphiroa sp.	Low
	Dictyota sp.	Moderate
Sponges		
	Callyspongia sp.	Low
	Amphimedon compressa	Low
	Aplysina fistularis	Low
Echinoderm		
	Isostichopus badionatus	Low

2.9.1.3 Fish Surveys

It was almost impossible to conduct a fish visual census due to poor visibility at surveyed sites, especially those close to the pier, turning channel and navigation channel. However, a few fish species were recorded during roving dives at sites D1 to D3 (**Table 2.33**).

Table 2.33: Fish species observed at project site.

Common Name	Scientific Name	Abundance
Bar Jack	*Caranx rubber*	Low
French Grunt	*Haemulon flavolineatum*	Low
Blue Stripped Grunt	*Haemulon sciurus*	Low
Princess Parrot Fish	*Scarus Taeniopterus*	Low
Stripped Parrot Fish	*Scarus Iseri*	Low

In the 2005 ESIA Tunich Nah conducted a survey of fish in the project area and reported that the "fin-fish or ichtyofauna observed were in large measure euryhaline and secondary freshwater species. This was consistent with the relatively high rainfall and consequently high riverine inputs into the area at the time. Some of these species included: the 'Snook' or Common Snook (*Centropomus undecimalis*), the Drum or 'Drummer' (*Stellifer colonensis*), the White Mullet or 'Mullet' (*Mugil curema*), the Checkerd Puffer or Mutruse (*Sphoeroides testudineus*) and the Tarpon (*Megalop atlanticus*)." The report went on to state that "the more stenohaline or oceanic groups of fishes were found in the more distal offshore areas of the site generally referred to as the 'Wider Marine Environment'. These included the Silk Snapper (*Lutjanus vivanus*), the Yellowtail Snapper (*Ocyurus chrysurus*), the Spanish Mackerel (*Scomberomorus maculates*), the Barracuda (Sphyraena barracuda) and the Porgy (*Calamus bajonado*).

2.9.1.4 Mega Fauna

It is well known that a relatively large number of manatees are found at the Swallow Caye and the Belize River Estuary. According the Belize Manatee Recovery plan (1998) a 25 kilometers radius from Belize City is an area of high use by manatees. Of concern is the potential impacts the project may have to the species habitat and feeding areas. During our visits to the area, no manatees were observed.

Sightings of different species of dolphins have been reported in the project area. Several studies have been conducted on the dolphin population at the nearby Drowned Cayes. Garcia et.al. (2017) reported 192 dolphin sightings in this area of which 39 individuals were identified photographically. The Drowned Caye are approximately 13 kilometers north of the project site.

Three species of marine turtles have been documented to nest in Belize and are also known to forage, mate and use Belizean waters as migratory routes. No nesting sites exist at the project site and only transient individuals have been reported in the area.

2.10 Protected Areas

Two protected areas i.e. the Burdon Canal Nature Reserve and the Swallow Caye Wildlife Sanctuary (SCWS) lies within the projects area of influence (**Figure 2.62**).

2.10.1 Burdon Canal Nature Reserve

Burdon Canal Nature Reserve lies a short distance to the west of the project site and occupies an important terrestrial wetland area which protects regional important mangrove communities and birdlife. The nature reserve is bounded to the east by the Burdon Canal which is an important waterway draining Belize City and adjacent environs. The Nature Reserve is currently being stressed by developmental pressure for land and for the harvesting of mangrove poles for the construction trade. The Nature Reserve falls under the purview of the Forest department but lacks on site management presence which is contributing to its management challenges. (**Figure 2.62**).

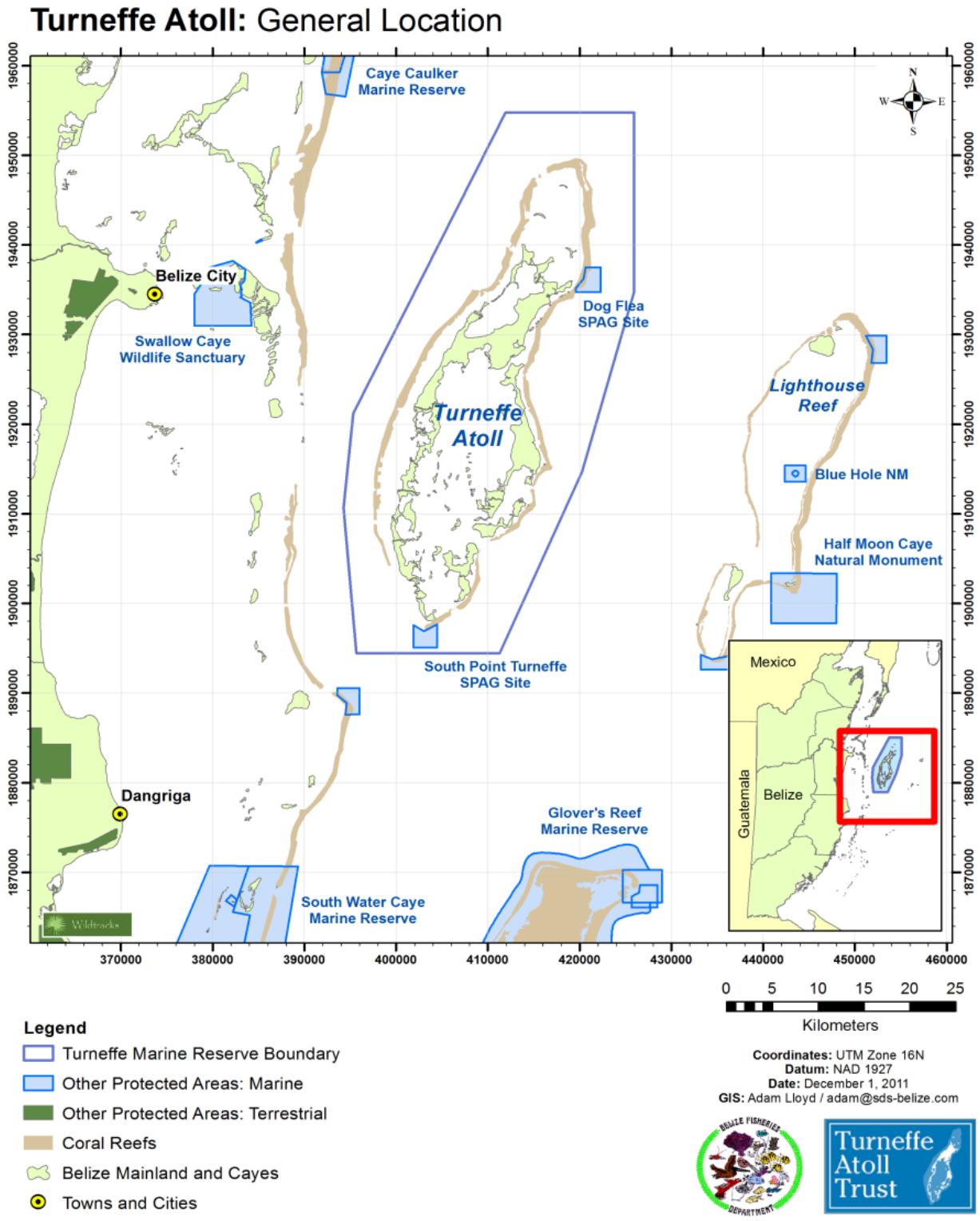


Figure 2.62: Burdon Canal Nature Reserve and Swallow Caye Wildlife Sanctuary.

2.10.2 Swallow Caye Wildlife Sanctuary

Swallow Caye Wildlife Sanctuary was established for the protection of the West Indian Manatee, Trichechus *manatus manatus* in September 7, 2002 and its importance to international and regional natural heritage and biodiversity as per various treaties and conventions including CITES, IUCN, RAMSAR and more.

Swallow Caye Wildlife Sanctuary is readily accessible by boat. Its neighbouring communities are Mapp's Caye, St. Georges Caye and Moho Caye. It is one of Belize's very handy tourism natural heritage attractions and is popular with international visitors via San Pedro Ambergris Caye and Caye Caulker in the north, Belize City west, St. George's Caye on the east and from Placencia in the south. SCWS is also on the route for tourist sailors of bareboat charters.

Primary stakeholder groups are boat captains, fishers, tour guides, tour operators, researchers and tourists. Swallow Caye Wildlife Sanctuary is immediately of interest to Belize's largest population center and to its shipping and priority export service industry, tourism. The Sanctuary's community co-management group is headquartered in Caye Caulker, Belize District and the public sector counterpart, the Forest Department, is in Belmopan City, Cayo District.

CHAPTER 3: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Introduction

This section is aimed at reviewing relevant environmental resource and planning legislation and policies to ensure that the proposed project and its related activities meet national policy and legislative requirements, and that these relevant requirements are built into project design and implementation.

3.2 Policy

Belize's national environmental policies are based on an integrated environmental management approach towards sustainable development. The Government of Belize (GOB) is committed to the long-term development of the country through the sustainable and rational use of our natural resources. New investment projects as well as the expansion of existing development projects are actively encouraged by the Government. However, the need for development of the country must be balanced against the need to preserve and enhance our natural resources.

The GOB, through its Department of Environment, evaluates these projects to make an initial assessment of the environmental risk associated with them. Depending on factors such as project size, project type, and location, these projects may or may not be required to carry out an Environmental Impact Assessment (EIA) or a Limited Level Environmental Study (LLES).

The Government has promulgated laws, regulations, guidelines and standards that govern the sustainable use and exploitation of its natural resources and help guide the implementation of proposed developments and activities. These laws and regulations are implemented by Government Departments with the support of funding agencies, Non-Governmental Organizations (NGOs) and local communities through co-management agreements or their active participation in the EIA evaluation process and monitoring of project implementation to ensure compliance with environmental conditions. Several GOB departments have formal and informal agreements with NGOs for the co-management of Belize's protected areas.

This legal and regulatory framework includes national legislations and regulations that address issues of environmental management including pollution control and prevention, natural resource management, biodiversity conservation, protected areas management, preservation of historic and cultural resources, chemicals management and integrated water resources management which are also influenced by the various Multilateral Environmental Agreements (MEAs) Belize is a party to.

The Department of Environment, the Department of Fisheries, Forest Department, Coastal Zone Management Authority and Institute, Lands and Survey Department, Petroleum and Geology Department, the Port Authority and the other government institutions are the major regulatory bodies of the various legal instruments affecting the proposed development.

In implementing its proposed project, the Port of Belize will need to ensure adherence to Belize's environmental laws and permitting requirements. This Chapter presents a brief overview of Belize's environmental legal and regulatory framework, while highlighting those legislations, regulations and institutions which govern the activities associated with the proposed development.

3.3 The Environmental Protection Act, Chapter 328 as Amended in 2009

The Environmental Protection Act of 1992 legally established the Department of the Environment (Section 3). Under section 3 (3), the Department has the responsibility to monitor the implementation of the Act and Regulations, and to take necessary actions to enforce the provisions of the Act and its Regulations. This enabling legislation provides the Government and the Department with the comprehensive environmental protection authority it needs in order to address modern environmental management issues.

The ACT also grants the Department of Environment broad regulatory and enforcement authority for the prevention and control of environmental pollution, conservation and management of natural resources, and regulating Environmental Impact Assessments (EIAs).

The Environmental Protection Act entrusted the Department of the Environment with a broad range of functions related, but not limited to, the assessment of water pollution, the coordination of activities relating to the discharge of wastes, the licensing of activities that may cause water pollution, the registration of sources of pollution and the carrying out of research and investigations as to the causes, nature and extent of water pollution, and the necessary prevention and control measures (Section 4). Although there are no specific regulations on Environmental Audits (EAs), the Department is empowered to require an EA as a tool as it goes about with the monitoring of the implementation of the Act and Regulations.

The Environmental Protection Act Revised Edition 2003 also charges the Department of the Environment with the responsibility for formulating environmental codes of practices, specifying procedures, practices or release limits for pollution control relating to works, undertakings and activities during any phase of their development and operation, including the location, design, construction, start-up, closure, dismantling and clean-up phases and any subsequent monitoring activities.

Under the Act, no person, installation, factory or plant shall, unless specifically permitted by the Department, emit, deposit or discharge or cause emission of any pollutant or contaminant into the atmosphere or environment in contravention of the permitted levels. Every person, installation, factory or plant emitting air pollutants is required to maintain and submit to the

Department records of the type, composition and quantity of pollutants emitted. Part V - 20 (4) of the Environmental Protection Act states that every project, programme or activity shall be assessed with a view of the need to protect and improve human health and living conditions and the need to preserve the reproductive capacity of ecosystems as well as the diversity of species.

Furthermore, the EPA requires that any person or undertaking exploiting the land, water resources, seas or other natural resources shall ensure the protection of the environment against unnecessary damage or from pollution by harmful substances; and no person shall emit, import, discharge, deposit, dispose of or dump any waste that might directly or indirectly pollute water resources or damage or destroy marine life.

PARTS IV pertaining to the "Prohibition on Dumping" and PART V addressing "Environmental Impact and Social Assessments(ESIA)" are two other important and relevant sections of the EPA since the proposed project has triggered the requirement for an ESIA .

PARTS IV the "Prohibition on Dumping

PART IV 17(1) state that "An application for a permit shall be submitted to the Minister in the prescribed form and shall contain all information as may be prescribed and shall be accompanied by the prescribed fee."

Subsection (3) states that "In determining whether to grant a permit, the Minister shall take into account the factors specified in Part II of the Schedule and any other factors which the Minister may consider necessary," and subsection (4) goes on to say that "The Minister may, after consultation with the Department, grant a permit containing terms and conditions as he considers necessary in the interest of human life, marine life, or any legitimate uses of the sea, and, without limiting the generality of the foregoing, the permit may contain terms and conditions relating to any of the following as are applicable-

a) the nature of the substance that may be dumped or disposed of and the quantity of the substance;

b) the method and frequency of the dumping or disposal authorised including, if necessary, the date or dates on which dumping or disposal is authorized;

c) the manner of loading and stowing the substance authorised to be dumped or disposed of;

d) the site at which dumping or disposal may take place;

e) the route to be followed by the ship or aircraft transporting the substance to the site of the dumping or disposal; and

f) any special precautions to be taken respecting the loading, transporting, dumping or disposal of the substance.

Subsection (5) states no permit may be granted in respect of a substance specified on the list of hazardous substances in the Schedule unless, in the opinion of the Minister:

a) the substance is rapidly rendered harmless by physical, chemical or biological process of the sea and does not render normally edible marine organisms inedible or unpalatable or endanger human health or the health of animals;

b) the substance is specified in any of items 1 to 5 of the list of hazardous substances in the Schedule and is contained in another substance in a quantity or concentration that does not exceed the prescribed quantity or concentration;

c) the dumping or disposal of a certain quantity of the substance is necessary to avert an emergency that poses an unacceptable risk relating to human health and admits of no other feasible solution;

Subsection (6) states that "A permit shall specify that it is valid for-

a) a particular date or dates; or

b) a particular period that shall not exceed one year.

Subsection (7) states that "The Minister may suspend or revoke a permit or vary its terms and conditions where the Minister considers it advisable to do so."

Regulation 18. States that "Any person who contravenes any term or condition of a permit granted under section 17 shall be treated for all purposes as having committed the prohibited act without a permit and shall be punished accordingly."

Regulation 19-(1) allow for proper monitoring of dumping activities and states that "For the purpose of determining whether any provision of this Part has been or is being contravened, a designated officer may, at any reasonable time:-

a) enter any place in which he reasonably believes a substance intended for dumping or disposal is being loaded;

b) go on board any ship, platform or other man-made structure anywhere in Belize or within any area on the sea of Belize or any aircraft if the designated officer reasonably believes that the ship, aircraft, platform or man-made structure has on board a substance intended for dumping;

c) examine any substance found in any place entered, or on any ship, aircraft, platform or other man-made structure boarded, and open any container found therein that the designated officer has reason to believe contains any substance intended for dumping or disposal and take samples of the substance;

d) require any person in any place entered, or on any ship, aircraft, platform or other man-made structure boarded, to produce for inspection or for the purpose of obtaining copies thereof or extracts from any books or other documents or papers containing any matter relevant to the administration of this Part;

e) travel on any ship, aircraft, platform or other man-made structure that is loaded with a substance intended for dumping; or

f) detain any ship, aircraft, platform or other man-made structure

Subsection (2) states that "A designated officer who travels on a ship, aircraft, platform or other man-made structure under subsection (1) (e) shall be carried free of charge to and from the dumping site and the person in command of the ship or aircraft or in charge of the platform or man-made structure shall provide the designated officer with suitable accommodation and food.

PART 11 of Schedule pertains to the Characteristics of Dumping Site and Method of Deposit and requires that the following issues be considered.

1. Location (e.g., coordinates of the dumping site, depth and distance from the coast) and location in relation to other areas (e.g., amenity areas, spawning, nursery and fishing areas and exploitable resources).
2. Rate of disposal per specific period (e.g., quantity per day, per week, per month).
3. Methods of packaging and containment, if any.
4. Initial dilution achieved by proposed method of release.
5. Dispersal characteristics (e.g., effects of currents, tides and winds on horizontal transport and vertical mixing).
6. Water characteristics.
7. Bottom characteristics (e.g., topography, geochemical and geological characteristics and biological productivity).
8. Existence and effects of other disposals that have been made in disposal site (e.g., heavy metal background reading and organic carbon content.)
9. Whether an adequate scientific basis exists for assessing the consequence of dumping, as outlined in this List, taking into account seasonal variations.

General Considerations and Conditions

1. Possible effects on amenities (e.g., presence of floating or stranded material, turbidity, objectionable odour, discoloration and foaming).
2. Possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, seaweed harvesting and culture.
3. Possible effects on other uses of the sea (e.g., impairment of water quality for industrial use, underwater corrosion of structures, interference with ship operations from floating substances, interference with fishing or navigation through deposit of waste or solid objects on the sea floor and protection of areas as of special importance for scientific or conservation purposes).
4. The practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the substance less harmful for dumping at sea.

3.4 The Environmental Protection Act Regulations

3.4.1 The Environmental Impact Assessment Regulations (S. I. No. 107 of 1995) and Amendments of 2007

Screening of projects, programmes or activities that could have significant negative impact on the environment, such as this proposed "Port of Belize Dredging and the Construction of a Cruise Terminal and other Supporting Related Activities", is done through the Environmental Impact Assessment Process, as required by the EIA Regulations. The Environmental Impact Assessment regulations describe in detail the processes involved in the preparation and evaluation of environmental impact assessments.

The regulations divide projects or activities into two main categories. The first category consists of those projects that automatically require an environmental assessment based on the scope of the project, the sensitivity of the surroundings or the nature of the undertaking. The second category comprises those projects that are discretionary and which may require that either an ESIA or an LLES be carried out, but with some modifications based on the location and size of a project.

The regulations allow the Department to charge an application and processing fee for projects, programmes or activities requiring environmental clearance, and allow for active public participation. In addition, it also allows for a monitoring fee to be charged to ensure follow up during project implementation and operation.

The ESIA is normally prepared by the proponent and submitted for review by the

National Environmental Appraisal Committee (NEAC), whose function it is to ensure that the proposed undertaking takes fully addresses the approved Terms of Reference (TOR) and considers all of the legal requirements for protection of the environment, natural resources and socio-economic condition.

Following review by NEAC, if the project is allowed to proceed, an Environmental Compliance Plan (ECP) for the proposed implementation and operation of the proposed works or activities is agreed upon between the proponent and DOE. Essentially, the Compliance Plan constitutes an approval to proceed with the project which is followed by an Environmental Clearance Letter issued by the DOE to the project proponent. Environmental Clearance means approval of the undertaking, programme, policy or activity granted by the DOE, in the form of a letter.

The Environmental Compliance Plan (ECP) contains the agreed mitigation, monitoring and other conditions which the project is later monitored to ensure full compliance. Operators that do not comply with the terms of the Compliance Plan may be subject to a Stop Order issued by DOE.

3.4.2 The Environmental Protection (Effluent Limitation) Regulations, (S. I. No. 94 of 1995 and Amendments of 2005)

These regulations were established to control and monitor discharges of effluent into any inland waters or the marine environment of Belize; prohibit the discharges of effluent from new and altered sources; implement a licensing system for the discharge of effluents; and establish and implement the requirements for the treatment of effluents. In 2009 this regulation was amended to allow for greater consistency with the Cartagena Convention and the Aruba Protocol on land-based sources of marine pollution.

Under the Effluent Limit Regulations, DOE may require the owner or operator of a facility which produces liquid and solid waste to report on the performance of the facility, the effluent discharged, the area affected by the discharge, and the control measures being undertaken for the discharge. Storm water runoff is not considered an effluent in this respect.

3.4.3 The Pollution Regulations (S. I. No. 56 of 1996 and Amendments of 2009)

These Regulations address issues of air, water and soil pollution, including noise pollution. Part III – 6 (1) deals generally with the emission of contaminants into the air where the proposed Project shall cause, allow or permit contaminants to be emitted or discharged either directly or indirectly into the air from any source. Other prohibitions are:

- Regulation 31 provides that the proposed project shall not pollute the land so that the condition of the land is so changed as to be capable of making the land noxious or harmful to animals;
- Regulation 32 provides that the proposed project shall not cause any seepage or leaching contamination of the adjacent soil, groundwater or surface water;
- Regulation 33 empowers the DOE to issue directions to persons operating a site for the elimination of waste or a solid waste treatment plant and disposal system; and
- Regulation 35 prohibits the depositing of waste in a place other than a site approved by DOE for the storage or elimination of waste or operation of a waste treatment plant or waste management system.

Amendments were made in 2007 to provide for the establishment of a licensing regime for the importation of certain substances, which were identified in the Montreal Protocol as “substances of concern.”

3.4.4 The Hazardous Waste Management Regulations (S. I. No. 100 of 2009)

These regulations establish rules for the proposed project with respect to the transport, storage, and disposal of hazardous waste. The regulations do not address hazardous waste contained in domestic waste or waste generated from the use of agrochemicals since these are addressed in other legislations. Any hazardous waste such as waste oil (from motors and machinery),medical waste, spent batteries, containers of antifouling agents and expired antibiotics and their

containers will need to be properly stored in accordance with these requirements and taken to the mainland for final disposal in the mile 22 sanitary landfill site's specially designated cell for disposal of hazardous waste.

3.5 Other Relevant Legislations

There are other legislations, some with an environmental content, which may also govern some of the construction and operation activities of the proposed Project. It should be noted, however, that in the case of an infraction by the proposed Project against any of the provisions of the Environmental Protection Act and its Regulations, where this same infraction is contained in any other legislation the proposed Project may be additionally liable for that infraction under that other legislation as well. Other such relevant legislations include:

(i) Mines and Minerals Act Chap. 226 Revised Edition 2000

The extraction of all non-renewable resources except petroleum is regulated by the Mines and Minerals Act (1988). The Government owns all minerals under public and private lands, and, minerals are reserved from all future grants of state lands. The Mines and Minerals (General) Regulations provide a general framework for the implementation of the Mines and Minerals Act. These Regulations cover a range of topics such as application, duties, terms and conditions and failure to comply with the conditions of a mining license. Under the Act "land" includes land beneath water.

The Act also addresses dredging and sand mining, which is essential in avoiding destruction to coastal habitats such as seagrass beds and the coral reef. Under Section 36, it requires that any application of a mining (includes dredging) license should be accompanied by a proposal for the prevention of pollution, the treatment of wastes, the safeguarding of natural resources and the minimization of the effects of mining on surface and underground water.

The act provides for licenses and royalties for the taking of minerals, and prohibits the pollution of any river, stream, or watercourse. A quarry permit allows for the extraction of volumes up to 16,000 cubic yards. A mining license will be required by the development since the volume to be extracted is much greater than 16,000 cubic yards.

(ii) Land Utilization Act (Chapter 188 of Revised Edition 2000)

The Land Utilization Act provides the primary authority for land-use planning in Belize. The Act requires that government approval be obtained before any parcel of land can be subdivided and provides general authority to regulate land use in order to protect watersheds, prevent soil erosion, control clearing of forest, and regulate the type of development permitted in designated areas. This is accomplished through the Land Subdivision and Utilization Authority (LUA) established under the Act, which is required to approve the subdivision of any property for development purposes.

(iii) The National Lands Act Chap 191, Revised Edition 2003

According to the act, national lands mean "all lands and sea bed, other than reserved forest within the meaning of the Forests Act, including cayes and parts thereof not already located or granted, and includes any land which has been, or may hereafter become, escheated to or otherwise acquired by the Government of Belize."

Hence, any person desirous of building or constructing a pier, berthing facility or any over the water structure is required to obtain a permit from the Lands and Survey Department for the lease and construction of such erections over any water body (national lands).

In addition, according to section (1) of the National Lands Act, the Minister may exempt from sale and reserve to the Government of Belize, the right of disposing of in a manner as for the public interests, "such lands as may be required as reserves, or as the sites of public quays, wharves or landing places on the sea coast or shores of streams."

According to Section 3 of the National Lands Act there is the requirement of sixty-six feet reserve measured from high water mark along all water frontages, which shall be reserved for Government or public purposes. Furthermore, Section 4 states "Access shall be provided from all surveyed lands to any public road, navigable river, creek, lake, or seashore contiguous thereto."

In Section 28 the National Lands Act states that in any "grant, lease or other document where the sea, or any sound, bay, or creek or any part thereof, affected by the ebb or flow of the tide, is described as forming the whole or part of the boundary of the land to be disposed of, such boundary or part thereof shall be deemed and taken to be the line of high water mark at ordinary tides."

These sections of the National Lands Act are important to consider when planning and obtaining permit for the development and construction of any pier and overwater facilities or land creation or reclamation activities.

The digging of sand rules an S.I. under the National Lands Act Section 37 and 39(2) requires that anyone digging sand on national lands apply to the commissioner of Lands and Survey for permission to do so. Although this subsidiary law exists, it is hardly ever exercised since the Mines and Mineral Act seems to prevail with activities pertaining of extraction of minerals inclusive of sand and gravel.

(iv) Private Works Constructions Act, Chapter 337, Revised Edition 2003

Presently construction of any "wharf, bridge, pier, bathing or other kraal or other erection whatever upon, and to enclose, stake in or fill up any land on the shore of the sea or bank of any river in any part of Belize other than Belize City", are subject to the granting of a license as required by Section 2 of the Private Works Constructions Act, Chapter 337, Revised Edition 2003.

(v) Belize City Council Act Chap. 85 Revised Edition 2000

The Belize City Council Act provides for the regulation and assessment of building plans. This is in addition to the powers to lay out and manage streets and public open spaces. Under the act, all public canals constructed within the City of Belize are hereby vested in the council.

Under Section 25, without prejudice to any other powers conferred on the Council by the Act or any other law, the Council have the power and responsibility of coordinating activities and operations of all utility agencies and property developer within the Belize city with respect to the excavation and restoration of streets, canals, creeks and other public right of way, with the object of preventing damage to the city infrastructure and minimizing the disruption of utility services to Belize City

(vi) Housing and Town Planning Act Chapter 182, Revised Edition 2000

Under the Housing and Town Planning Act Chapter 182, the Housing and Planning Department has legal authority to execute planning schemes within Belize. While this process is not being fully implemented at the present time, it is important that the Housing and Planning Department and the Land Utilization Authority be involved at an early stage with the approval process for any sites involved.

(vii) The Belize Building Act No. 131 of 2003

This Act and its 2005 Revision repeals the Belize City Building Act (CAP. 131 Revised Edition 2000). The "Act has as its main purpose "to control building operations in the interest of public health and safety and to enable the introduction of regulations prescribing standards relating to the use of material and methods of construction…" The provisions of the Act apply to the construction of any building or structure in Belize.

The Act establishes the Central Building Authority (the "Authority") to administer the provisions of the Act. The Act states that the Authority shall appoint a professional engineer or architect to be the Director of Building Control (the "Director"). The Director shall sign and issue all building permits, enforcement notices and other related documents. The Authority may appoint Building Inspectors to review plans and other documentation submitted in support of an application for a building permit, and to inspect construction to determine compliance with the terms of the building permit.

The Central Building Authority has delegated the responsibilities to review and approve building plans and issue building and occupancy permits, in their respective jurisdictions, to the Local Building Authorities in Belize City, the City of Belmopan, and in each of the Towns constituted under the Town Councils Act. Depending on the nature of the building project other governmental agencies may also be involved in the overall permitting process. As mandated by the Act, every application shall be accompanied by such drawings, descriptions, calculations and specifications as the Authority or the Director may require.

(viii) The Public Health Act, Chaps. 40 and 40S, R. E. 2000 and 2003

The Act addresses liquid and solid waste disposal and issues relating to general public health. The Ministry of Health is given a mandate for addressing public health issues and related complaints, monitoring of sewage and solid waste, and prosecution of public health offenders. In addition, all persons handling food for public consumption are required to have a food handler's certificate. The act also grants the Ministry of health responsibility for general public health issues which have incidence on the control, and prevention of pollution, including those pertaining to "Drains and Water Supply, Infectious Diseases, Mosquito Destruction, Offensive Trades and Sanitation and Prevention of Nuisances from Factories and Miscellaneous Trades;

(ix) The Dangerous Goods Act, Chap. 134, R. E. 2003

This law regulates the import, production, transportation, storage and distribution of dangerous goods (explosives and petroleum products) including the transportation and safe keeping of explosives and other dangerous goods, liquefied petroleum gases and gunpowder, dynamite, nitroglycerine, gun cotton, blasting powders, fulminate of mercury or of other metals, coloured fires and every other similar substance.

(x) The Customs and Excise Duties Act, Chap, R.E. 2000

This Act regulates the importation or exportation of any goods which for the time being is subject to any number of conditions or restrictions and applies to the importation of all groups of metals;

(xi) The Belize Port Authority Act, Chaps. 233 and 233 S, 234 R. E. 2000 and 2003

Under Sec 23 (1) the Minister may, after consultation with the Authority, grant in writing a license to any person, corporation or other body to construct and operate a private port subject to such terms, conditions and restrictions and on the payment of such fees as the Minister may consider appropriate (Private ports 15 of 1989).

Under part III 19-(3) and in particular and without prejudice to the generality of the provisions of subsections (1) and (2), it is the duty of the Authority – (a) to operate the ports as appears to it best calculated to serve the public interest; (b) to regulate and control navigation within the limits of ports and their approaches; (c) to maintain, improve and regulate the use of such ports and services and facilities therein as it considers necessary or desirable; (d) to provide for such ports and the approaches thereto such pilotage services, beacon, buoys and other navigational services and aids as it considers necessary or desirable; (e) to exercise the duties and functions relating to shipping and navigation excisable under the provisions of any other law.

Under PART VII (pilotage) 53 – (1) The territorial waters of Belize shall be compulsory pilotage waters and all ships other than those excepted under subsection (2), navigating within the waters under the pilotage of a licensed pilot.

Under section 55(1), the Minister may make regulations on the hauling up or launching of boats from any pier, bridge, or wharf, or at or from any point or place on the shore of the sea or on the bank of any river or canal or regulate the manner in which vessels, boats and rafts may be fastened to or brought or kept alongside of any pier, bridge, wharf, wall, staking, shore, or bank.

Part VIII Special Provisions in Relations to Ports 70 – (1) deal with accidents occurring in the port related to loss of human life or serious injuries to person or properties and collision between ships. Section (76) of the Act deals with persons endangering safety of operations while section (90) deals with restrictions on execution against property of the Authority.

Under 2003 (1) Belize City Port – Limits of the Port are declared starting at the Belize City Swing Bridge on the north bank of the Haulover Creek thence downstream to Fort George Light thence northwards along the coast to the Belize River Mouth, thence easterly to Mapp's Caye thence along the western coast of the Drowned Cayes to the southern point of Water Caye thence south-westerly to the northern point of Long Caye, thence due west to the coast thence northerly along the coast back to the Belize City Swing Bridge.

The Port Authority Regulations Section 74 (2003) make regulations relating to anchorage or obstruction of turning basis and channels, unauthorized movements of ships and lights and mooring or manoeuvring in the territorial waters of Belize.

(xii) Belize Port Authority Free Zone (Designation) Order SI 140/2004

The schedule includes ALL THAT PIECE OR PARCEL OF LAND situate at Port Loyola in Belize City, containing 377 acres and being bounded on the North and West by lands now or formerly the property of the Government of Belize; and on the South and East by the Caribbean Sea.

(xiii) Belize Port Authority (Tariff) Amendment Regulations Si 143/2004

Whereby the principal Regulations amended include "Port Security (ISPS) Fee" means a fee levied against commercial ships calling into port or port facility anywhere in Belize and payable to the Belize Port Authority. The amended regulation also details those fees, charges and port dues.

(xiv) The Belize Harbours and Merchant Shipping Act Si 234/2000

Part II 6 (1) states "the Minister shall have the general superintendence, management and control of the harbour of Belize City and the other harbours of Belize and can make regulations for a - (ii) the control, improvement, preservation and maintenance of all or any of the ports, harbours, roadsteads, rivers or public wharves of Belize, and for the maintenance of good order therein; (iii) requiring the exhibition of such lights and signals as may be considered necessary and regulating the steps to be taken for avoiding collisions by ships navigating the waters of any harbour, port, roadstead, river or other inland waters. Other regulations which can be made by the Minister under this Act also apply."

(xv) Belize Registration of Merchant Ships Act Si # 236/2003

Under 3 (1) the Act established an "International Marine Registry of Belize" (hereinafter called "IMMARBE") for the registration under the flag of Belize of vessels of any type, class, size or weight engaged in any kind of trade, service or international maritime activity, including pleasure vessels. Under 17 (1) every vessel registered in IMMARBE shall have at all times a shipping agent in Belize appointed by the ship owner.

Maritime Security Guidelines for Ships Registered at the International Merchant Marine Registry of Belize (IMMARBE)

On 30th April 2004, the Minister responsible for the International Merchant Marine Registry of Belize (IMMARBE) passed Regulations giving legal effect in Belize to the ISPS Code insofar as these relate to ship security. The SI identified IMMARBE as the Administration and outlines responsibilities in relation to ship security measures for all Belize registered vessels to which the ISPS Code applies.

IMMARBE has issued the Maritime Security Guidelines contained herein in order to assist all concerned in the better understanding of the way in which the security measures are being administered and enforced in Belize. These Guidelines are by no means comprehensive and should be read in conjunction with SOLAS Chapter XI-2, the ISPS Code as well as the Registration of Merchant Ships (Ship Security) Regulations 2004.

Owners of Belize registered vessels engaged on regular, short international voyages e.g. ferry operators, who seek to introduce alternative security measures should apply to IMMARBE as well as to the governments of the ports which they serve.

The management of each port facility is responsible to carry out a security assessment of its premises. This assessment is reviewed by the Belize Ports Authority to ensure adherence to the ISPS Code. Such assessments have been completed for the primary port facilities of Belize.

(xvi) Fisheries Act Chap. 210 Revised Edition 2000

In accordance with Section 14 of the Fisheries Act Chap. 210 Rev. Ed. 2000, the Minister may declare any area within the fishing limits of Belize and as appropriate any adjacent surrounding land, to be a marine reserve. An area declared a marine reserve prohibits any person from damaging, destroying, removing any species of flora or fauna and from disturbing the natural beauty of such area or do any other act which may be prohibited by the specific Statutory Instrument declaring a marina reserve. A license for these activities must be obtained from the Fisheries Administrator**.**

(xvii) The Wildlife Protection Act, Chap. 220, R. E. 2000

This Act seeks to control hunting, research, and trade in wildlife, protecting species from hunting, killing, and harassment, including two species of crocodiles, the manatee, all birds with

the exception of six species, whales, dolphins, and the Caribbean monk seal; and prohibits the hunting of endangered species such as cetaceans, freshwater turtles and crocodiles;

(xviii) Export Processing Zone Act Si 280/2000 & 2003

Powers and responsibilities of Export Processing Zone (EPZ) Developers are detailed in 2000 6 (a – i); 7 (1) also details Export Processing Zone businesses in relation to the establishment of its own committee within the zone provided that it has applied for and obtained a Certificate of Compliance. The Certificate of Compliance for an EPZ business (8-(1)) shall state what lines of business the EPZ business may conduct within the Zone, and the EPZ business shall be limited to those business lines. 9.-(1) also states that no import license shall be required for any imports of an EPZ business into an EPZ. The Act also details additional restrictions and conditions necessary under an EPZ license.

The Trade Licensing Act does not apply to an EPZ business, however, the EPZ business is subject to all payroll taxes and other taxes, as set out in the Labour Act. Provisions relating to the development and utilization of the resources of the Coastal Zone are also included. The 2003 SI states that "the EPZ Developer shall administrate the operations and provide infrastructure and public services within an EPZ. The Developer will also set up security units to guarantee the safety of goods and persons within the EPZ and ensure that rules regarding the entry, permanence, and departure of persons, vehicles and goods into and out of the EPZ are observed."

Under the first schedule (Regulation) General information for processing of EPZ designation are subjected but not limited to the following: physical master plan showing overall layout; proposed construction schedule; copies of the company's Memorandum and Articles of Association and Certificate of Incorporation.

(xix) The Labour Act, Chap. 297 and 297S, R. E. 2000

This Act regulates the relationship between employees and employers as to contract of service (written and oral), recruiting, employment service, protection of wages, hours of work, overtime, holiday, safety, health, housing, employment of women and children, maternity protection, domestic servants, severance pay, fair labour practices, etc.;

(xx) The Mines and Minerals Act, Chap. 226, R. E. 2000

This Act addresses the extraction of all non-renewable resources except petroleum. The Government owns all minerals under public and private lands, and minerals are reserved from all future grants of state lands. The Mines and Minerals (General) Regulations provide a general framework for the implementation of the Mines and Minerals Act. These Regulations cover a range of topics such as application, duties, terms and conditions and failure to comply with the conditions of a mining license.

Under the Act "land" includes land beneath water. dredging and sand mining, which is essential in avoiding destruction to coastal habitats such as seagrass beds and the coral reef and requires

that any application of a mining license (includes dredging) should be accompanied by a proposal for the prevention of pollution, the treatment of wastes, the safeguarding of natural resources and the minimization of the effects of mining on surface and underground water.

The Act provides for licenses and royalties for the taking of minerals, and prohibits the pollution of any river, stream, or watercourse. A quarry permit allows for the extraction of volumes up to 16,000 cubic yards. A mining license will be required by the development since the volume to be extracted is greater than 16,000 cubic yards.

(xxi) 2.5.21 The Forest Act, Chap. 213, R. E. 2000 and the Forests (Mangrove Protection) Regs., SI No. 52 of 1989

These legislations provide for the protection and conservation of all mangrove forests on both private and national lands, any alterations to which require evaluation and a permit by the Forestry Department; the protection of all mangroves fall under this Act via the Forest (Protection of Mangrove) Regulations. The Forests (Protection of Mangrove) Regulations, 1989, prohibit any "alteration" (which includes cutting and defoliating, but does not include "selective trimming") of mangroves on any land except with a permit (reg. 4).

Alterations which involve dredging or filling can be authorized only in "exceptional circumstances." Factors considered for issuing or denying permits include the proximity of the proposed project to coastal and reef areas known to be of outstandingly high ecological value (reg. 5(2) (i)), and the existing or proposed plans such as the barrier reef regional management and development plan. The Mangrove Regulations were amended in 1992 to increase the level of fines and sanctions. In most cases a permit to clear mangroves is issued after a multi-agency assessment is conducted.

This Act also includes for the establishment of Forest Reserves which may include mangroves, littoral forests and water bodies. However, no specific regulations exist under this Act that address littoral forests. The Forest Act is currently being revised.

(xxii) Belize Tourist Board Act Chap. 275 of 2000

The Belize Tourist Board Act establishes the Belize Tourist Board (BTB) with wide responsibilities for the promotion of tourism in Belize. Apart from being charged with the development of the tourist industry, the BTB also has responsibility to foster understanding within Belize of the importance of environmental protection and pollution control, and the conservation of the natural resources (11(k)). The 2003 revised edition contains specific regulations relating to requirements and licenses, etc., of tour guides, tour operators, and local water passenger and water sport vessels**.**

(xxiii) The National Integrated Water Resources Act of 2011

This Act established the National Integrated Water Resources Authority with responsibility for the preparation and implementation of a National Water Resources Master Plan, licensing of

water abstraction, and responsibility for dealing with issues related to easements required by licensees, control and protection of groundwater and well drilling, and the protection of gathering grounds;

(xxiv) The Solid Waste Management Authority Act, Chap. 224, R. E. 2000

This Act requires that contractors remove and dispose of all construction waste material resulting from new construction or other works on or at any premises; and where a contractor fails to remove construction waste material when required to do so by the Authority, the Authority may remove such materials and recover the cost of such removal from the contractor.

(xxv) The Coastal Zone Management Act (Chapter 329 of revised edition 2000)

This Act established the Coastal Zone Management (CZM) Authority and Institute which conducts scientific research used to provide technical advice, recommendation of zoning schemes and the provision of guidelines for coastal development within Belize. This agency, while not regulatory in nature, is important in its monitoring activities of the marine waters.

The CZM Act mandates the Coastal Zone Management Authority and Institute (CZMAI) as the entity responsible to design a National Integrated Coastal Zone Management (ICZM) Plan. The goal of the ICZM Plan is to recommend actions that will ensure sustainable coastal resources use by balancing conservation ideals with the economic and social needs of the country

Although national in scope, the Plan builds upon efforts at the local level to develop sustainable regional guidelines. These efforts are coordinated with Coastal Advisory Committees (CACs) for nine coastal planning regions along the coast and offshore cayes. As an important complement to written guidelines, the Plan includes a zoning scheme, which spatially designates permissible activities and uses. It was created in collaboration with the Natural Capital Project through the use of the Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) modeling tool. The tool was used to examine the effects of human activities on the benefits people receive from coastal and marine ecosystems called ‘ecosystems services’.

(xxvi) National Institute of Culture and History (Amendment) Act (#20 of 2003)

This Act empowers the Institute of Archaeology to carry out research, interpretation and the protection of the Archaeological Heritage of Belize. The ownership of all ancient monuments and antiquities shall rest in the Institute of Archaeology, Government of Belize.

(xxvii) Multilateral Environmental Agreements (MEAs)

Belize has signed on to various Multilateral Environmental Agreements (MEAs) with other nations in a concerted effort to conserve and sustainably use earth’s natural environment. In fulfilling their requirements, some MEAs have directly influenced the development of national environmental legislations and institutions; while others find some expression in existing

national environmentally related legislations and institutions. Some MEAs Belize has signed on to which it influences the implementation and operational activities related to the proposed Port of Belize Project are included in **Table 3.1**.

Table 3.1: Multilateral Environmental Agreements and their objectives.		
1	Convention on Biological Diversity. Rio de Janeiro 1992. Ratified 1993	To conserve biological diversity, to promote the sustainable use of its components, and encourage equitable sharing of benefits arising from the utilization of natural resources.
2	International Plant Protection Convention (Rome, 1951)	To secure common and effective action to prevent the introduction and spread of pests and diseases of plants and plant products and to promote measures for their control. The Convention makes particular reference to pests and diseases of importance to international trade.
3	Convention for the Conservation of Biodiversity and Protection of Priority Areas of Central America, 1992	To conserve biological diversity and the biological resources of the Central American region by means of sustainable development.
4	Inter-American Convention for the Protection and Conservation of Sea Turtles (December 21st 1997)	To promote the protection, conservation and recovery of sea turtle populations and of the habitats on which they depend.
5	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region and its three Protocols: Protocol on the Cooperation to fight oil spills in the wider Caribbean; Protocol on Areas and Wildlife; and Protocol on Pollution from Land-based sources and Terrestrial activities in the Wider Caribbean Region. (Cartagena de Indias, Colombia, 1983)	To protect the marine environment of the wider Caribbean region for the benefit and enjoyment of present and future generations.
6	Convention for Nature Protection and Wildlife Preservation in the Western Hemisphere (1940)	To establish in parties' territories national parks, national reserves, nature monuments, and strict wilderness reserves.
7	UN Convention on the Law of the Sea and ISPS Code	To legally regulate law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources.
8	1992 Protocol to the International Convention on Civil Liability for Oil Pollution Damage (1972) and 1992 Protocol to the Convention Establishing the Fund for Compensation for Oil Pollution (July 1, 1991)	To ensure that adequate compensation is available to persons who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships.
9	International Convention for the Prevention of	To prevent pollution of the marine

	Pollution from Ships and the 1978 Protocol MARPOL (August 25, 1995) and its six annexes	environment by ships from operational or accidental causes.
10	Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (BASEL) (April 21, 1997)	To reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs).
11	London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	To control pollution of the sea by dumping and to encourage regional agreements supplementary to the Convention.

3.6 Permits/Licenses

The dredging of the turning basin and the channel along with the disposal of dredge material will require the granting of permits or licenses before those activities could commence; and some activities during the operation phase may need certain permits/licenses as well (**Table 3.2)**.

Table 3.2: Permits/Licenses/Instructions required by Port of Belize.

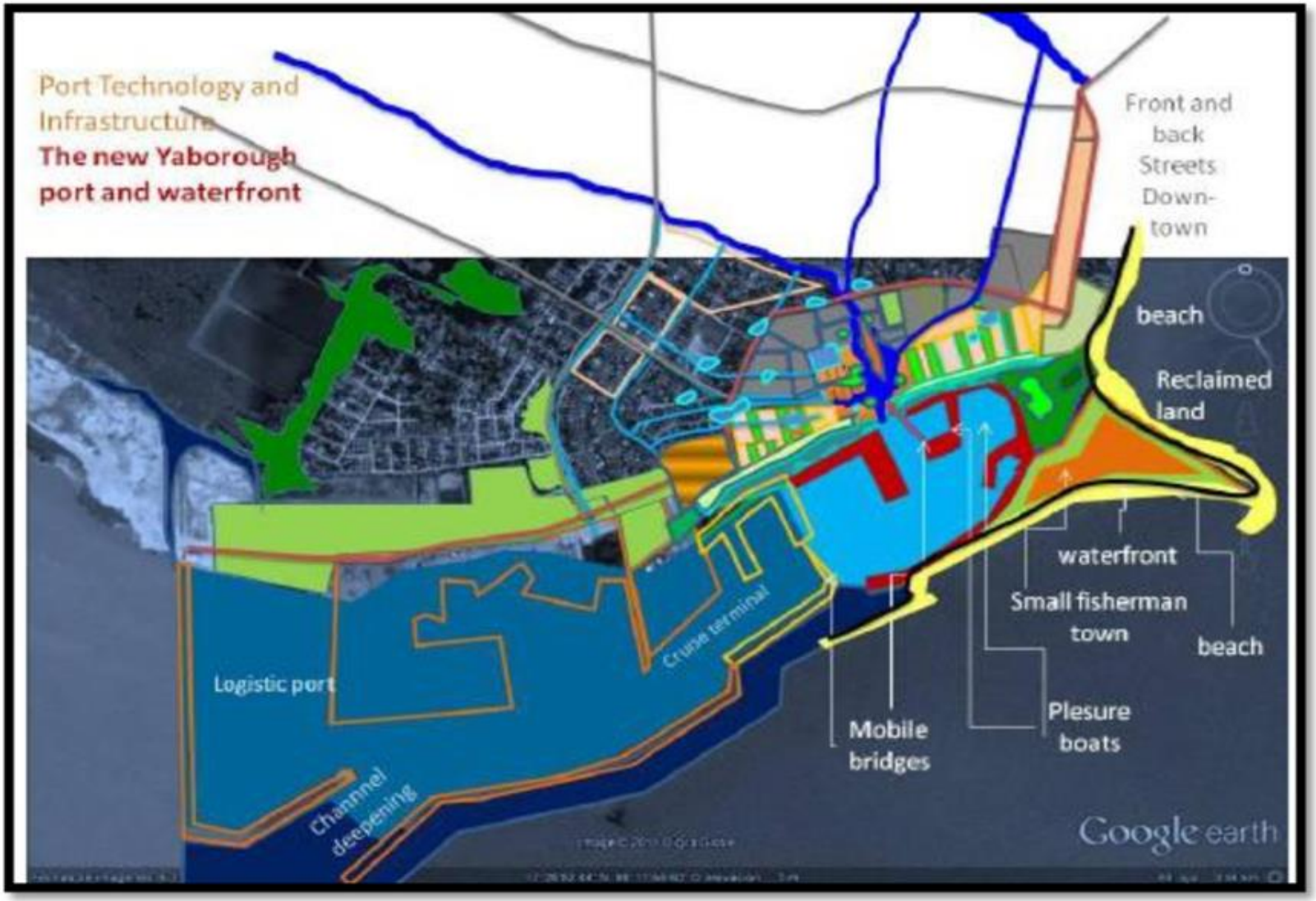
Activity	**License/Permit/Instructions Required**	**Permitting Agency**
PRE-CONSTRUCTION		
Commence Development	Environmental Clearance.	Dept. of the Environment
Dredging/Excavation, and Land Filling	Mining License	Geology & Petroleum Units.
Mangrove alteration	Mangrove Alteration Permit	Forestry Dept.
Dredging Operations	Permit to address navigational issues	Port Authority
Boat transportation	Boat License/Captain's License	Port Authority
Construction of Buildings and Infrastructure works	Building License	Central Building Authority
Importation of building/household material, furniture, etc.	Import Permit	Ministry of Finance - Customs and Excise Dept.
Hiring foreign workers	Work Permit	Labour Dept.
POST-CONSTRUCTION		
Businesses	Trade License	Belize City Council
Operation of Port	Licence to operate a Cruise Terminal Port	Port Authority
Immigration/Customs Services	Permit to manage a Port of Entry	Immigration and Customs

Hiring foreign workers. (For services for which Belizean do not have the necessary skills.)	Work Permit	Labour Dept.
Effluent Discharge	Effluent Discharge for gray water and effluent from waste treatment plant	Department of the Environment

3.7 Consistency with Metropolitan Development Planning

This Port of Belize Master Plan is consistent with the Belize City Master Plan (BCMP) prepared by PADECO/iE in 2012 and funded by the IDB. It is important to point out that the BCMP report recognizes that "To this day, the harbour of Belize City is not able to receive today's large cruise ships. Security, quality of service, and the attraction of Belize City (existing and potential) mean that nearly all the cruisers navigating the Caribbean can use Belize City as either a stopover or a turnaround cruise port."

It goes on to state "The Port of Belize, located in Belize City is the country's main port, where much of Belize's main imports and exports are processed. However, over recent years, the port area has become isolated from much of the city's social and development processes, despite playing a significant role in the local economy. The report recommends that as part of the development strategy, the port should be promoted as a vibrant destination for business and recreation (**Figure 3.1**). It surmised that the Port should become a tourist attraction in its own right, with a waterfront connecting to the city….". The BCMP goes on to state that "as part of the Port development plan, the cruise terminal will be upgraded, through infrastructural improvements.



Source: PADECO/iE, 2011

Figure 3.1: BCMP Long Term Plan for the Port and Yarborough Area.

and added facilities and services. The new terminal will have modern aesthetics and serve as an innovative symbol for the city.", The present proposed improvements while not as ambitious as what is proposed in the BCMP is a significant step in achieving the long- term goals of the BCMP

CHAPTER 4: ASSESSMENT OF ALTERNATIVES

4.1 Introduction

This section of the EIA presents the assessment of alternatives considered related to the Proposed Dredging of The Port of Belize and the construction of Cruise and Cargo Terminals and other Supporting facilities. The assessment is based on a rapid assessment of the potential environmental and social impacts associated with the proposed activities. The assessment of alternatives focuses on the most critical issues relevant to the proposed project and its related activities paying special emphasis to the proposed dredging and the disposal of the dredged material, as well as the alternatives for the containment of dredged materials disposed of in the nearshore placement area.

4.2 Assessment of Alternatives

As part of the EIA requirement, there is the need to assess alternatives to a proposed development and its associated activities inclusive of the siting of the proposed development. In considering the implementation of a conceptual plan, a project proponent would have to consider a number of alternatives prior to a decision to move forward with the implementation of the activities outlined in the development plan.

There are usually two or more important alternatives for each major developmental activity proposed. In the case of the Port of Belize Limited (PoBL) facilities there is no alternative to siting since this is an existing facility with an already established access channel and turning basin. This limits to a great extent the assessment of options normally considered during the establishment of a new port facility.

The evaluation of alternatives may encompass the consideration of a wide range of economic, social, and environmental issues associated with the various available options. This section focuses on the evaluation of the major alternatives to the Proposed Dredging of The Port of Belize and the construction of a Cruise and Cargo Terminals and Other Supporting Related Activities, inclusive of the 'No Action Alternative'. The discussions focus on the options that are most practical.

Preliminary baseline information indicates that the major issues or constraints associated with the present Port of Belize Facility includes:

1. Shallow Access and Turning Channel Basin (9-10 m depth) making it inaccessible to larger cargo and cruise vessels. Presently most of the Average size Cruise Vessels (5,000 passengers or Oasis-class) have an average design draft requirement of 11-11.5 meters.

The present channel has a sharp bend at the point where it intersects with the Grennels Channel. In 2019, a series of navigation simulation were undertaken at the STAR Center. These

simulations examined the manoeuvring of large cruise ships, such as Royal Caribbean Cruise Line's (RCL) Oasis of the Seas and Mediterranean Shipping Company's (MSC) Seaside and Divina class ships, through the planned access route, including the sea entrance at Buzzard Shoals, English Cay Channel, South Grennel's Channel, and One-Man Cay Channel, as well as all the project's planned navigational features (access channel, turning basin, and berthing pockets). The Oasis-class reflects the cruise industry's largest vessel type currently used or on order, while the MSC vessels reflects large, conventionally propelled and thus more maneuver restricted vessels. The STAR simulation confirmed that the entire planned route is safely navigable per the current design under all modelled conditions and vessel types. The full simulation runs can be seen (as a Dropbox link) in **Annex X**.

2. As a result of the existing baseline situation, cruise vessels are forced to remain in deeper waters offshore and passengers ferried to mainland by tenders elevating the risk posed to passengers which has remained a major issue of concern expressed by the cruise industry. This transit also consumes 60 to 90 minutes of tourist time that could be spent onshore purchasing goods and services which would benefit the Belizean economy. Future plans could even include overnight docking which opens up a whole new revenue base for the city and adjacent community.
3. Cargo size vessels are currently limited in size to those with lower draft requirements with most being container type vessels with very few bulk cargo shipments occurring at the PoBL facility.
4. The cargo port capacity is limited due to the size of the vessels it can service. Presently only one vessel is serviced at a time due to limitations with the pier head while the trestles remains a single lane trestle with a passing bay allowing the passage of only one tow head truck to transit its length at a time. The limited size of vessel and the capacity of the PoBL has hindered Belize's ability to trade competitively due to higher shipping costs as compared to other areas in the region.

This means that the Port of Belize is completely dependent on the proposed dredging to deepen and slightly widen the channel and turning basin as a requirement for larger vessels to safely dock on shore and offload their goods or passengers. The country of Belize will greatly benefit from these improvements since this would lower shipping cost and secure Belize as a premier Cruise Industry Destination with a modern and competitive offering.

Baseline information was specifically obtained to assist in the selection of alternatives being considered to address some of the most critical issues identified earlier, while planning for projected climate change impacts and disaster risk management. This informed the assessment of alternatives discussed below and the final selection of the recommended options. The assessment of impacts also focuses on the discussion of those related to the proposed recommended options.

4.3 Port Design Alternatives Considerations

This section provides a discussion of the implications of options in terms of their impacts to the environment and ecosystem of the area, and the need to improve access by larger vessel and safety issues with respect to onshore docking and offloading of goods and passengers. It also provides recommendations on best options taking into account environmental, social, technical, and economic factors. In the analysis of the various alternatives, the option with the highest cost benefit, the most technically feasible and with the least residual environmental and social impacts is usually identified as the preferred option.

The narrative below includes the examination of a minimum of three main alternatives, vis a vis the "no action' alternative and two other potential technical options for the following critical issues identified from the study:

a) Docking Facility Considerations,

b) Disposal Options for Dredged Material,

c) Coastal or Shoreline Protection Measures **(**Discussed in **Chapter 5)**,

d) Need For improved Road Egress and Ingress to project site (Discussed in **Chapter 11)**.

e) Need for improved access at point of intersection with the GPH.

4.3.1 The Need to Consider the 'No Action Alternative'

The ToR requires consideration of the **'No Action Alternative'** however such an alternative mainly applies to projects that are not always the least impacting and in the best interest of the general public, or proponent, from an economic and social viewpoint.

The no action alternative only becomes a viable option where it is determined that a project's environmental and social impacts would far outweigh any net economic and social benefits. In these instances, both the proponent and GOB's regulatory agencies need to consider the economic and social opportunities a project of this nature provides in addressing outstanding issues and the future development of Belize's Port Capacity and its importance to the country's economic development in particular its tourism, agricultural, manufacturing, industrial and trade industries.

4.3.2 Assessment of Docking Facility Alternatives

The assessment of Docking Facility Alternatives focuses on the evaluation of the following three alternatives.

(i) Option 1: Construction of Cruise Terminal in Accordance with 2005 Plan

This option looks at the construction of a Cruise terminal at the location of the present jetty for which significant investment has been made which formed part of the original concept approved in the 2005 EIA with limited expansion of the cargo terminal (coloured in orange in **Figure 4.1**).

This option was still viable in 2004 when the Cruise industry in Belize was in its infancy and mostly smaller vessels were expected to call at the Port of Belize. Since then, most of the cruise lines operating in the region have upgraded to the larger 5,000 passenger cruise vessels with an average design draft requirement of 11-11.5 meters. Very little attention was paid to improving the current cargo terminal's capacity except for the expansion of the terminal compound. This option is no longer viable now, since it would not address the current reality of the shipping industry.

The environmental impacts from dredging and the disposal of dredged material could have been dealt with within PoBL's land with only minor impacts since the channel and turning basin had already been previously dredged. The greatest challenge would have been the construction of berms capable of withholding and withstanding the pumping rates typical of dredging operations. In addition, it would have required that the dewatering site be properly designed to allow stormwater to flow freely out to sea, thereby preventing flooding of low-lying areas in its vicinity.

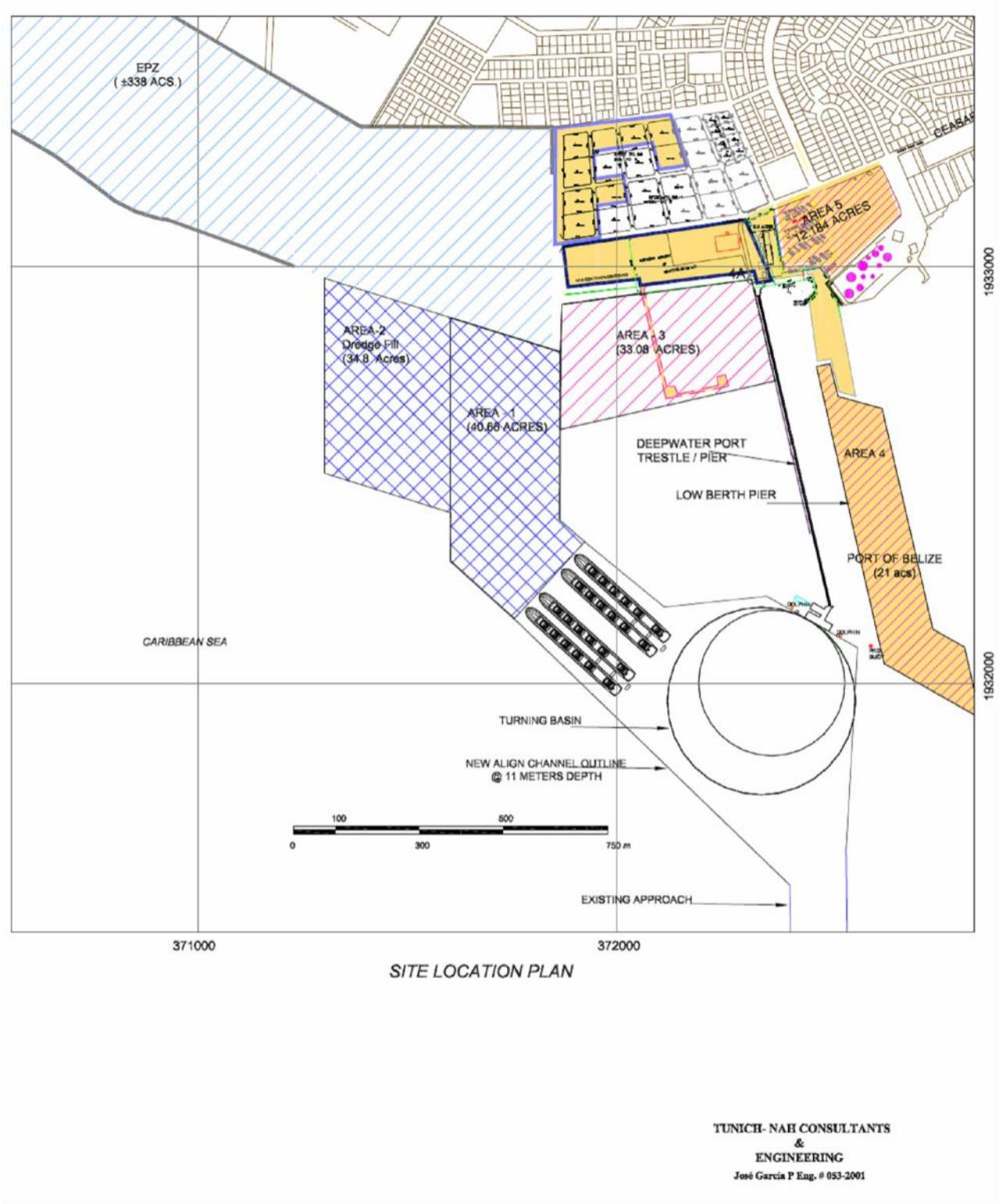


Figure 4.1: Design Concept of Cruise Terminal in 2005 EIA.

(ii) Option 2: Construction of New Cruise and Cargo terminals in accordance with the New Plan

This option looks at the construction of the Cruise Terminal at the point of the present jetty and the construction of a new Cargo Port Jetty or Terminal (B) where multiple cargo vessels will be able to dock on shore simultaneously. The issues associated with this option are similar to those of Option 1 except that a larger volume of dredge materials would accumulate because of the need for 12 meters depth to accommodate current cruise vessel requirements and support future bulk, container, and any potential LNG vessels.

The intended footprint and environmental impacts remain essentially similar in scope. The most significant issue becomes the disposal of the large amount of dredged material of which over 65% percent is classified as unsuitable for reuse. The volumes exceed the ability of PoBL's land to contain.

The large amount of dredged material has provided the opportunity to improve the current situation with the cargo terminal. In accordance with the new plan shown in **Figure 4.2 (Section B)** this area will be enclosed with sheet piling and filled with the solid components of the dredged spoils. The volume and nature of dredged materials to be disposed has made it essential to include a combination of onshore and nearshore disposal options. These are discussed in more detail in **Chapter 5**.

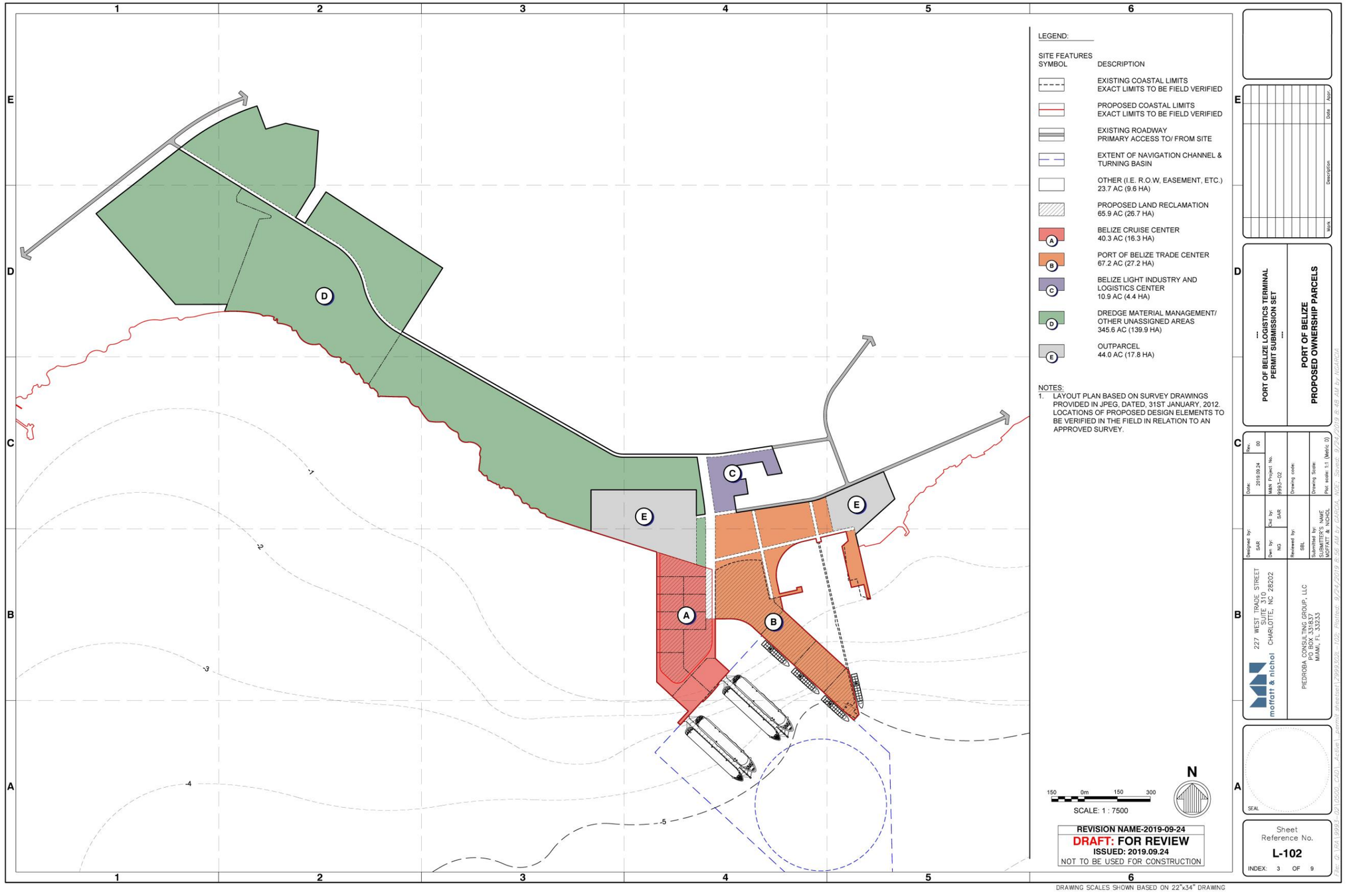


Figure 4.2: Proposed Cruise and Cargo Terminal 2018 EIA.

(iii) Option 3: The No Action Alternative

The "No Action Alternative" considers the situation where everything remains the same (**Figure 4.3**). This option would have direct environmental impacts since it would mean that the link road to the George Price Highway would not be built and vehicles to and from the Port of Belize compound would continue to pass through Belize City adding to inner city congestion and creating noise and air quality impacts. In the same vein the berthing of the cruise ships directly at the port through an enlarged and deepened access channel and turning basin will eliminate the need for tenders which currently present a significant risk to marine fauna forcing frequent dredging exercises in front of the FSTV.

While the 1978 designed cargo port remains fit-for-present purpose stagnation comes at an environmental cost. What is experienced on a global scale is that the largest capacity container ships of 1978 were around 2,500 TEU and are now broaching the 24,000 TEU mark. These behemoths are deployed on the primary east-west shipping lanes (Asia-Europe and Trans-Pacific), yet as a result of their introduction there has been a cascading of larger ships onto secondary and tertiary trade-lanes. Although the maximum size of container ship has probably already been achieved, as global trade grows there exists a need to accommodate larger ships in most secondary and tertiary ports.

The present TEU capacity maximum capability of Port of Belize is around the 1,100 TEU mark, but in time to come this will naturally increase in line with global developments. The proposed expansion of the cargo facility would facilitate the handling of container ships of up to 3,500 TEU which would then be fit-for-purpose for the next one to two decades. Larger ships and greater volumes result in economies of scale which will ensure that Belizean importers and exporters experience reducing costs on a per ton or per TEU basis as we reach the middle of the present decade. If these cannot be accommodated in Port of Belize, alternative ports will need to be further developed, which are not necessarily less environmentally damaging than the Port of Belize proposal, and which might well come with additional downsides of longer intermodal road drays resulting in road deterioration, road safety issues and not least additional CO2 pollution as well as higher costs of inland logistics

The "No Action Alternative" would have the highest opportunity cost from a socio-economic perspective since the many benefits associated with job creation, education and training and myriad opportunities for local businesses and entrepreneurs would fail to materialize. This would mean that a golden opportunity to promote development and uplift the circumstances on the economically depressed south-side of the city would be lost. It would mean that the value of land which could be improved within this community would also be lost. It would also mean that the opportunity to remedy what has been one of the biggest limitation to the growth of cruise tourism and maritime trade and commerce would be lost as certain classes of ships would still not be able to dock in the city. This would continue to impact shipping and foreign trade including the cruise tourism sector, agriculture, and trade industries.



Figure 4.3: Existing Cargo Terminal

Based on the above considerations the preferred option is Option 2 as presented in the current masterplan for the Port of Belize Improvement program.

4.3.3 Assessment of Dredged Material Disposal Option

The alternatives for the disposal of dredged material considered three main options as well as the "No Action Alternative". These are further discussed in **Chapter 5**:

1) on PoBL and adjacent lands at the port,
2) near shore in adjacent waters,
3) in open sea far offshore,
4) No Action Alternative

4.3.3.1 Option I: On Land Disposal of Dredged Material Within Property Boundaries

This would require the creation of an earthen wall (berm) to contain the dredge spoils. Port of Belize lands would require the construction of bunds with imported materials from another section of the property and the trucking and spreading of material within this zone. The EPZ area (existing 1.5-2 m earthen bunds are breached in many locations and incomplete for the entire EPZ perimeter zone) may require the creation and re-enforcing the earthen bunds with imported materials.

The environmental impacts from these activities are expected to be minimal since the area had already been cleared in 2002 and would require minimal clearance of secondary mangrove and other vegetation growth. The greatest issue of concern is ensuring that the berms are properly constructed to withstand JDN's pumping rates to avoid flooding of adjacent properties. Mitigation of this includes the creation of outflows prepared beforehand to also ensure the free flow of stormwater from adjacent lands into the sea and not affect the local community.

Over time, the dredged material will dry out and be transported by trucks to the expansion areas, which are now below the waterline. This area will be filled to the height stipulated in the engineering plans. Some of the dredged materials can be made available to residents of nearby areas at no or minimal cost for the materials through a program to be developed with local authorities.

4.3.3.2 Option 2: Marshland On Land Disposal of Dredged Material

Two marshlands were investigated as potential sites for the disposal of dredged spoils; however, the accessibility of these sites for the creation of containment structures would make these areas challenging to manage with potential to negatively impacts adjacent waterbodies and lands.

The pumping operations to these sites would cause significant inconvenience to boat traffic using the Old Belize Marina, Coast Guard Facility and Stake Bank Onshore Staging Area located within the zone of influence. In addition, the use of these sites would significantly increase the cost of the project making it financially less viable if not altogether unbuildable from a cost perspective.

The marshlands to the west of the project site and south of Faber Lagoon lies at a distance of approximately 10 km from dredger, requiring the running of extensive (and costly) lengths of pipelines to this location. In addition, the surrounding areas are not easily accessible; therefore, the pipes will have to be installed on the side of the road and will interface with users of the road. The reclamation area itself requires special swamp equipment and no guarantees can be made in regards to the containment bunds and the control of outflow discharge water. In consideration of these important limitations, this option has been eliminated.

4.3.3.3 Option 3: Nearshore Disposal Areas

A nearshore area located south of the future expansion area has been examined as a potential site to receive dredge spoils. The water in the bay is shallow and not used for navigation. The top sediment layer consists of very fine material, consequently any disturbance (including wave and current motion and propeller action from vessels) brings these fines into suspension resulting in highly turbid waters. Because of these limitations, the area is not an attractive area for marine flora and fauna.

The area is characterised by a very low biological diversity and abundance with almost no benthic flora and fauna. This is in stark contrast to the rich coral reefs that border the bay of Belize City on the east. Because it is already populated by fine sediments the area is considered as a suitable site to capture the return waters from the EPZ area and reclamation disposal areas. The risks of material suspension and the diffusion of turbid waters in the immediate area can be fully mitigated by enclosing the return water area with floating turbidity curtains.

Other nearshore options being considered are those related to land reclamation activities proposed in the new master plan which call for the reclamation of the Cargo Terminal jetty area.

A bund wall utilizing rip rap or sea wall using sheet piling will be used to enclose the cargo terminal or new expansion areas of the cargo port.

The cruise ship terminal is presently surrounded by a rip-rap wall that will be fitted with geotextile material to reduce the impact of sedimentation. The small alignment of the coastline as shown in **Figure 4.4** will be enclosed with sheet piling or earthen bund. These enclosed areas will then be backfilled with dredged materials. The reclaimed material may offer bulking potential depending on the soil type.

Post settlement and compaction, either hard or soft engineering approaches may be used for beach or shoreline stabilization. Soft engineering approaches such as the planting of a mangrove vegetated buffer along the water's edge is being considered as the preferred choice for the long-term stabilization of the coastline and as a means of coastline restoration.

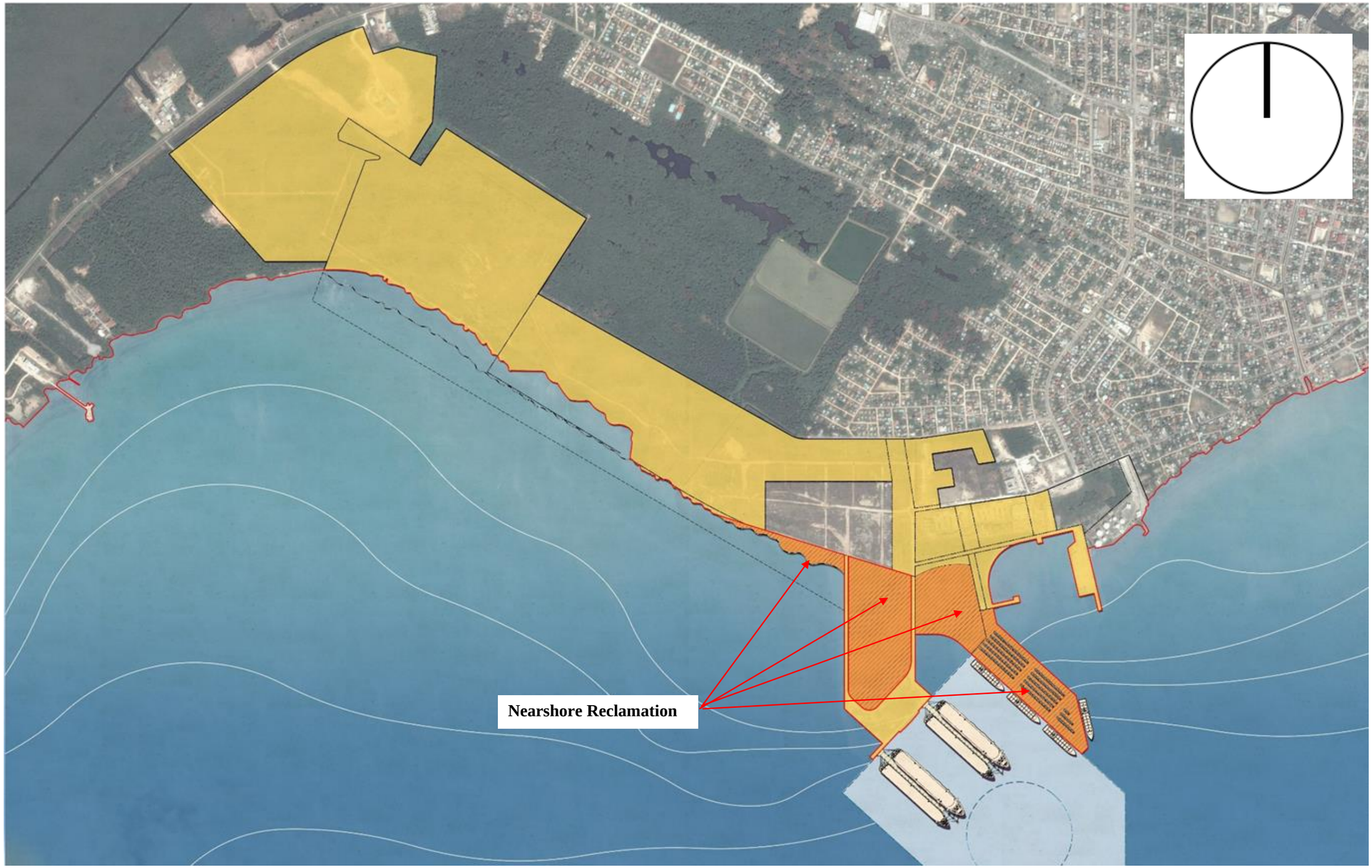


Figure 4.4: Nearshore Reclamation options being considered using the dredged materials.

Preparatory works are required for all reclamation areas. The use of sheet piling or earthworks should be used to limit the effluent runoff from the dredged materials and manage the use of near shore areas for disposal. Natural dewatering and compaction will occur with the geotextiles maintained until a more permanent containment structure is put in place.

4.3.3.4 Option 4: The No Action Alternative

The "No Action Alternative" while having no environmental impacts, could become the costliest from a socio-economic point of view because of the loss opportunity to improve the facilities and offer the opportunities needed by the southside community and the country on a whole as it tries to rebound economically from challenges such as the deadly COVID19

Preferred Option - The volume of the material to be dredged will require that a combination of Options 1, and 3 be used for the disposal to achieve the most efficient and desirable outcome. Option 2, and its potential for considerable negative environmental impacts combined with the significant cost impact render this option undesirable.

4.4 Assessment of Nearshore Disposal Options of Fine Sediment

Moffatt & Nichol Inc., an infrastructure advisor, specializing in the planning and design of ports and harbours, has been contracted to prepare the masterplan for PoBL. The planners utilized a complete site investigation study conducted by JDN in 2018. The plan calls for the dredging of the access channel and turning basin to allow the current cruise vessels visiting Belize to be able to safely dock onshore and safely offload passengers. The plan also includes provision to solve the current constraints being experience with the PoBL's Cargo terminal.

The scope of the dredging will make it the largest dredging campaign ever conducted in Belize and as a result will generate a very large amount of dredged material. With the offshore disposal option withdrawn by the developer, the quantity and quality of the dredged materials has necessitated the consideration of nearshore disposal to place of the lower quality component of the dredged spoils. The plan is to dispose a total dredged volume of 4.25 million m^3 nearshore.

4.4.1 Expanded Nearshore Disposal Alternatives

The project's contractor/engineer (Jan de Nul Group, JDN) was contracted to undertake the project's detailed engineering. This scope commenced in June of 2020 and has been ongoing. As a function of the detailed engineering exercise, it has become clear that an alternative to the initially considered offshore placement site exists, one that permits the completion of the project utilizing only the onshore and nearshore options as discussed herein.

A number of factors contributed to the development of the alternative but the most notable are:

1. A deeper understanding of the sediment characteristics; and
2. The long-term detailed hydrographic modeling of the project, the proposed marine works, and local conditions.

The originally proposed material management plan considered the onshore and nearshore areas to have a maximum storage capacity of 4.5 million m^3, leaving a 3 million m^3 shortfall with the offshore option withdrawn. The proposed plan distributes the 3 million m^3 shortfall across both the onshore and nearshore placement sites, with the majority directed to the nearshore area. This material management alternative will have no adverse environmental or social impact and all construction and operational activities remain unchanged and within the boundaries of the project area studied and presented.

Alternative 1 (PREFERRED):

The containment of dredge spoils will occur through the application of underwater geotextile curtains, connected to semi-submersed floats at the top, and anchor lines at the bottom. Anchor blocks will be placed to the shoreside of the containment curtain, which in combination with shore-linked wires will keep the curtains and floats in place. As the placement area is filled with dredge spoils the anchor lines and anchor blocks will become buried and immovable, effectively cemented in place.

These geotextile curtains will remain in place following the completion of the dredging works. Spreading of any suspended fines outside the Project area during the hydraulic discharging of dredged materials will be prevented entirely by the installation and monitoring of floating silt screens. These screens will be placed on the shoreside of the submerged geotextile curtains and will also be kept in place with wires and anchor blocks. The silt screens will be removed once the dredging works are completed and ambient water quality returns to pre-construction condition.

In the weeks/months after installation, the fine-grained sediment deposit of reclaimed dredged materials will consolidate. This primary consolidation will yield settlement and progressive shear-strength, hence improve erosion-resistance.

Figure 4.5 presents the concept during the filling process, indicating the presence of suspended materials and floating silt screens (top image) and the final condition following completion of the works (bottom image).

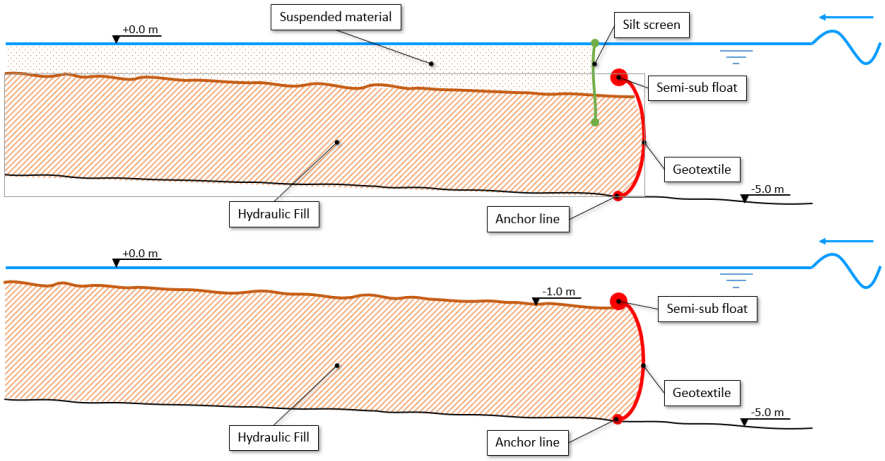


Figure 4.5: Geofabric containment concept - Alternative 1

The detailed specifications of the geotextile curtains and silt screens will be optimized during the Detailed Design Phase to ensure environmental compliance once a detailed dredge placement methodology has been established and following consultations with suppliers.

Alternative 2:

Alternative 2 offers a variation to Alternative 1 with the distinction that the underwater geotextile curtains will be held in place by driven piles instead of anchor lines and floats. Similarly, the siltation curtains will be installed during the hydraulic filling process. These silt curtains can be separate floating curtains as indicated in **Figure 4.6** or serve as the upper part of the geotextile screens that are suspended between piles as shown in **Figure 4.6** (top image). The top part of the curtains will be removed to avoid any obstruction to local navigation following the completion of all the marine works.

The final specifications (lengths, diameter, material and spacing of the piles, etc.) of the geotextile curtains will be defined during the Detailed Design Phase and once suppliers are consulted.

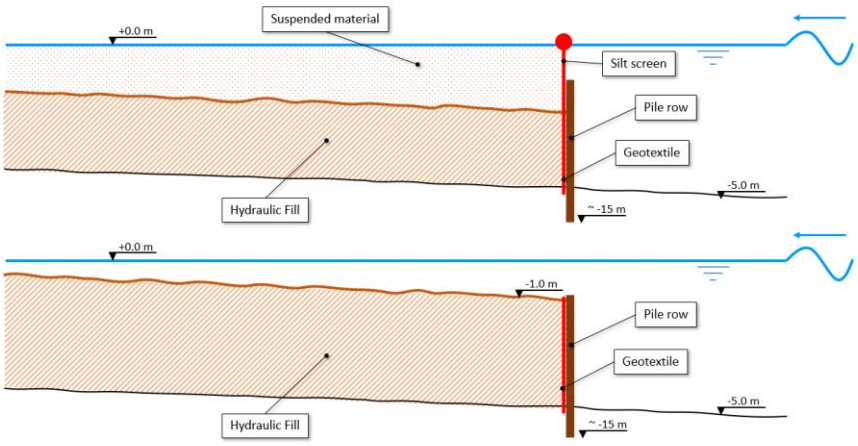


Figure 4.6: Geofabric with piles containment concept – Alternative 2

Alternative 3:

The final of the three Alternatives contemplates constructing containment bunds around the nearshore placement area. The bunds will be built with dredged materials (stiff clays) or imported quarry-run material.

To guide the flow of excess process water towards the south, the east and west side containment bunds will be built first. Stiff clays will be dredged from both the access channel and turning basin with a backhoe dredger and loaded into split hopper barges. The hopper barges will then sail to the designated edge of the nearshore placement area and create the bunds through deliberate dredge-material placement events. By using a mechanical dredging method (in lieu of hydraulic dredging), disintegration of excavated clays will be kept to a minimum.

Additional protection of the placement area with geotextile curtains and silt screens will be identical to Alternatives 1 and 2. With this alternative, the geotextile curtains will be kept in place by burying the bottom under the containment bund, as indicated in **Figure 4.7** below. The curtains can be secured with anchor blocks and lines. The final layout and installation methodology will depend on the type and specifications of geotextile curtains to be deployed, which will be defined after consultation with suppliers comparably as with the other alternatives.

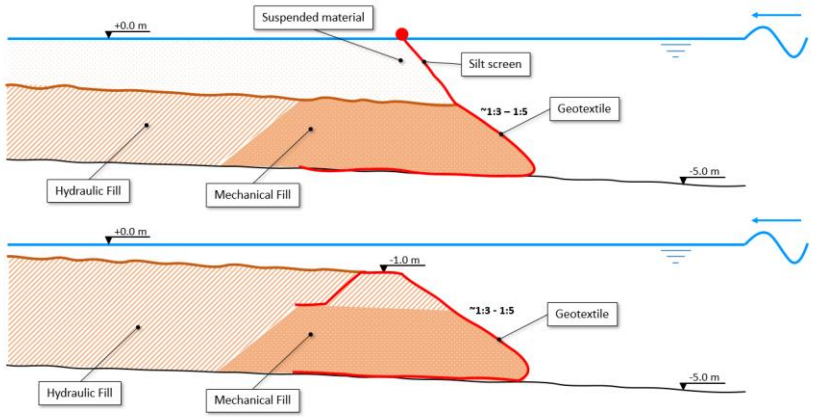


Figure 4.7: Geofabric with underwater berm containment concept – Alternative 3

The overall size of the nearshore placement area will remain in the same range for all three alternatives; approx. 1200 acres, with an outer boundary of approx. 6km. **Annex XIII** presents the location of the nearshore placement area, and two visualisations: one offering the containment option using underwater berms, and one through geotextile curtains between piles.

All three alternatives presented warrant no dredge spoils will escape the nearshore placement area and ensure environmental compliance via an effective and proven dredge placement

compliance methodology, and until the Detailed Design is finished all options, or a combination of one of three options remain a possibility.

Alternative 1 is currently considered the preferred alternative as it offers a flexible and thorough solution while complying with the requirement of having no visible surface impact on the Sibun Bay waters. Once the dredged materials have finalized consolidating the disposal is fail-safe, and the geotextile structure will have no function anymore. The deposited material will form a new seabed, similar in nature to the existing seabed

4.4.2 Expanded Nearshore Dredged Material Management Plan

Having withdrawn the offshore option will have a minor impact on the already considered nearshore placement site's footprint. The onshore placement site and general methodology applied to both onshore and nearshore sites will remain completely unaffected by the expanded nearshore placement option.

The onshore site's capacity will be between 2,500,000 and 3,000,000 m^3. The remaining material is to be captured at the nearshore site.



Figure 4.8: Nearshore placement site

The above **Figure 4.8** shows the approximate location of the proposed nearshore placement site. As there is no change to the onshore site or method, this discussion will center exclusively on the nearshore area. The project's nearshore is a shallow-draft bight with low hydrodynamic activity, highly turbid bottom, and virtually no marine life. The shallow draft and proximity to the Port of Belize's security exclusion zone make the area unsuitable as a navigational route and the high ambient turbidity and low biological life render it of no ecological value.

The nearshore area would be completely encircled with floating turbidity curtains rated for coastal deployment. In order to ensure no impact to ambient or down-current water quality it can

be chosen either to double the curtain row at the outer perimeter, or else divide the inner area in smaller cells formed by geotextile curtains.

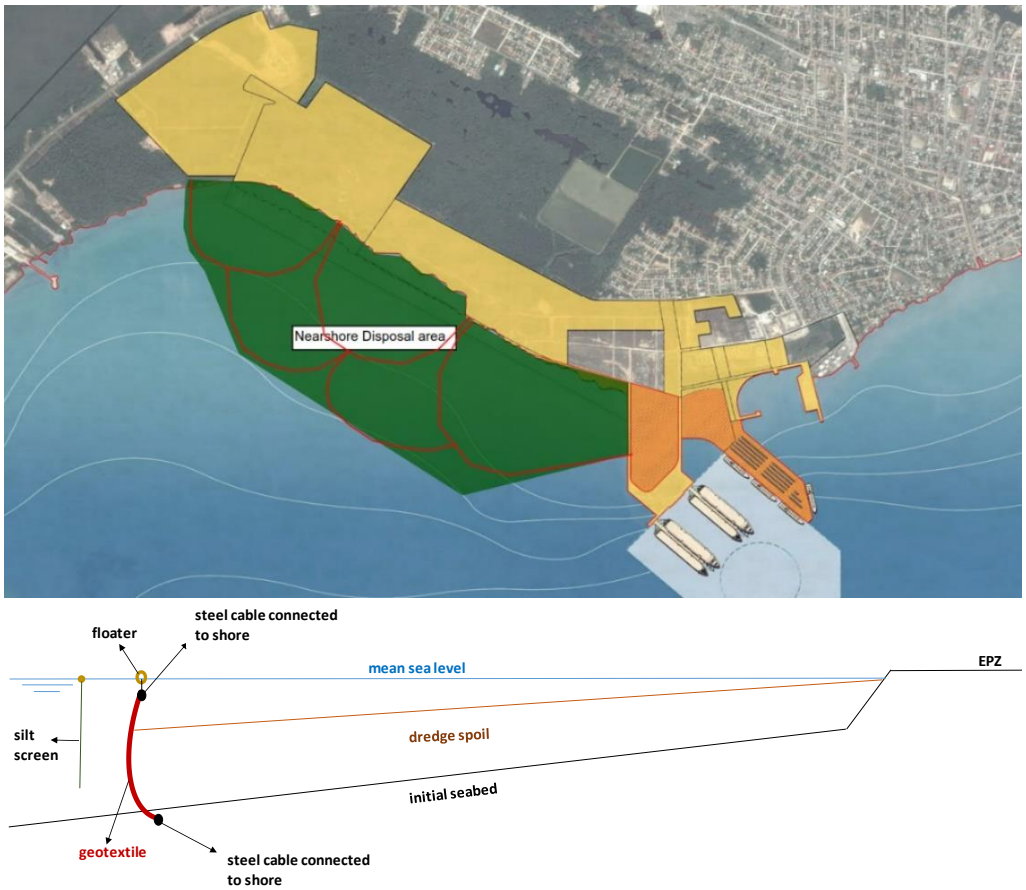


Figure 4.9 Nearshore Disposal Containment

The perimeter and interior cells of the nearshore site would be encircled by a geotextile, connected to shore via clearly marked steel cables and suspended by floating boom (**see Figure 4.9**). Dredged material will be conveyed to the nearshore placement area via pipeline or through placement by shallow draft, split-hull barges. The nearshore placement site is to remain a marine environment. The top elevation of the containment cells will at all times remain at a minimum of 1m below mean low water. The above methodology will remain unchanged with the proposed alternative.

The nearshore area requires a footprint of approximately 750 acres. This footprint, at initial calculations, allowed for the placement of up to 2 million m^3 of material. Because this site will now contain more material, the footprint must expand to approximately 1200 acres.

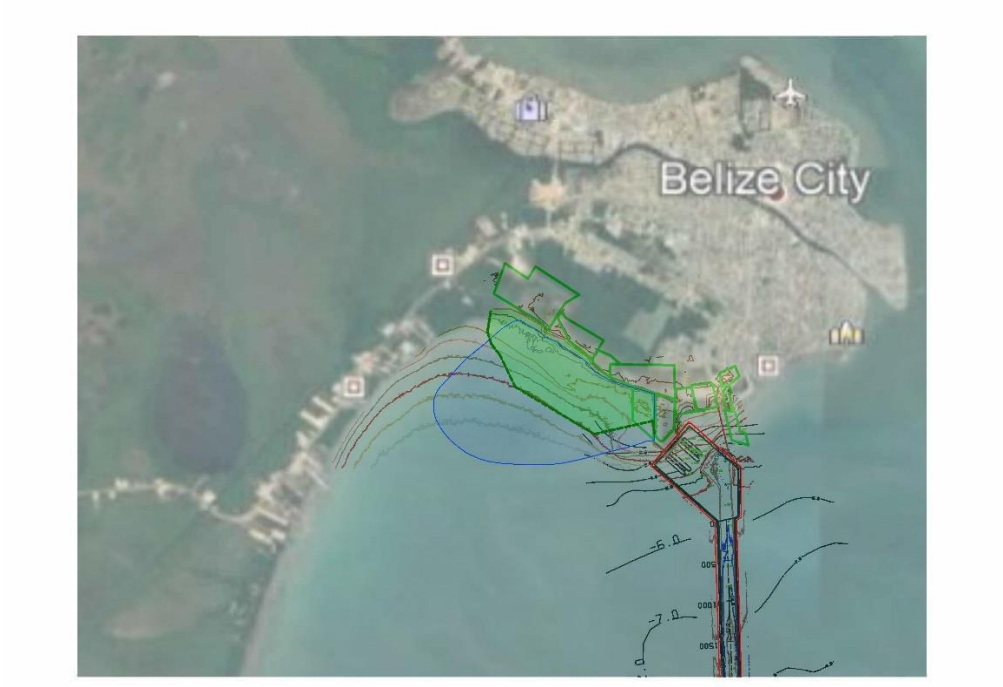


Figure 4.10: Original nearshore site (green) and expanded nearshore site (blue).

The proposed footprint of the expanded nearshore has been optimized to ensure no down current hydrological impact (see **Figure 4.10**). The method for containment and placement will be described in Chapter 5.

4.4.3 Social and Environmental Impacts and Mitigations

The nearshore area, both within and beyond the footprint of the placement site, is characterized by shallow draft, low hydrodynamic activity, and high ambient turbidity. As discussed previously, the area is benthically barren and of limited navigational use due to the shallow draft and proximity to the Port's exclusion zone.

The nearshore area remains completely within the documented area. The methodology remains completely unchanged, beyond a proportionate increase in scope. Chapter 15 of this ESIA presents a detailed mitigation plan. Water quality and marine species monitoring will remain critical components of the project's ongoing quality control and mitigation planning.

4.4.4 Hydrodynamic Impact

The project's engineering team has undertaken an extensive and state-of-the-art hydraulic modeling scope. The purpose of this scope was to assess the potential impact the project may have on regional and local hydrology and assist in the optimization of the project's marine features to ensure long-term stability.

The modeling relied on a combination of statistical, measured, and hydrodynamic factors to accurately predict how the project's coastal structures (multi-purpose cargo terminal, 2 cruise piers, navigational features, and nearshore placement area) would impact hydrology. The foundation of the hydrodynamic model was the Delft3D-FLOW model, calibrated with hydrometeorological measurements and a regional bathymetry produced by JDN during the 2018 site investigation.

Conditions were placed on the project's engineering team with regard to the coastal structures, specifically requiring that all designs ensure no interference with the local hydrology, no impact on any coastal properties or their functionality, and no interference with the proposed facilities navigational features.

After substantial modeling and design efforts, the engineering team and the hydrodynamic study concluded that the project's coastal structures (piers and terminal) and the expanded nearshore placement site will have a negligible impact on either the regional or local hydrology. The noted impacts, occurring only at the extremes of measured weather (July, during maximal ebb/flood conditions), were limited to a slight increase in residual velocity at the southern edge of the nearshore placement site of 0.06 m/s and a slight reduction of residual velocity along the nearshore placement site's western edge of 0.05 m/s. No changes whatsoever are noted within the project's navigation features or south of the nearshore placement site. The changes in residual velocity discussed above are extremely mild and below a threshold that would have a measurable impact.

The complete Hydrodynamics Conditions Report is included with this Addendum as **Annex XII**

4.4.5 Bathymetry

A third single-beam survey of the nearshore disposal area was performed in April of 2022. Belize Coastal Science Alliance (BCSA) surveyed the area of interest over a three-day period from April 21st to April 23rd, 2022. The objective of the study was to determine the bed levels and provide the data and maps, allowing for the communication of accurate and recent bathymetric data and informed decisions regarding the disposal of dredge spoils during the development of the cruise port. The area surveyed covered the entire projected nearshore disposal area and its immediate surrounding area.

The data presented in the BCSA report, attached in **Annex XIII,** shows the summary of the nearshore data collected and the profiles of sound velocity and salinity of the water column. Individual casts are represented by different colours that are consistent in both figures. The data collected at Sibun Bight show that the sound velocity of the area is slightly lower that the accepted sound velocity of saltwater (~1560 m/s). The lower measurements are likely a result the areas proximity to the freshwater outflow of the Belize River, Haulover Creek, and Sibun River. There was also some rain in the area during the time of the surveys.

After the tidal and sound speed corrections where made, the point data where then interpolated in QGIS using TIN Interpolation tool. The interpolation resulted in the bathymetric map below with

a 20-metre pixel size. The results show that the bathymetry of the area gradually decreases in a southward direction from the shoreline.

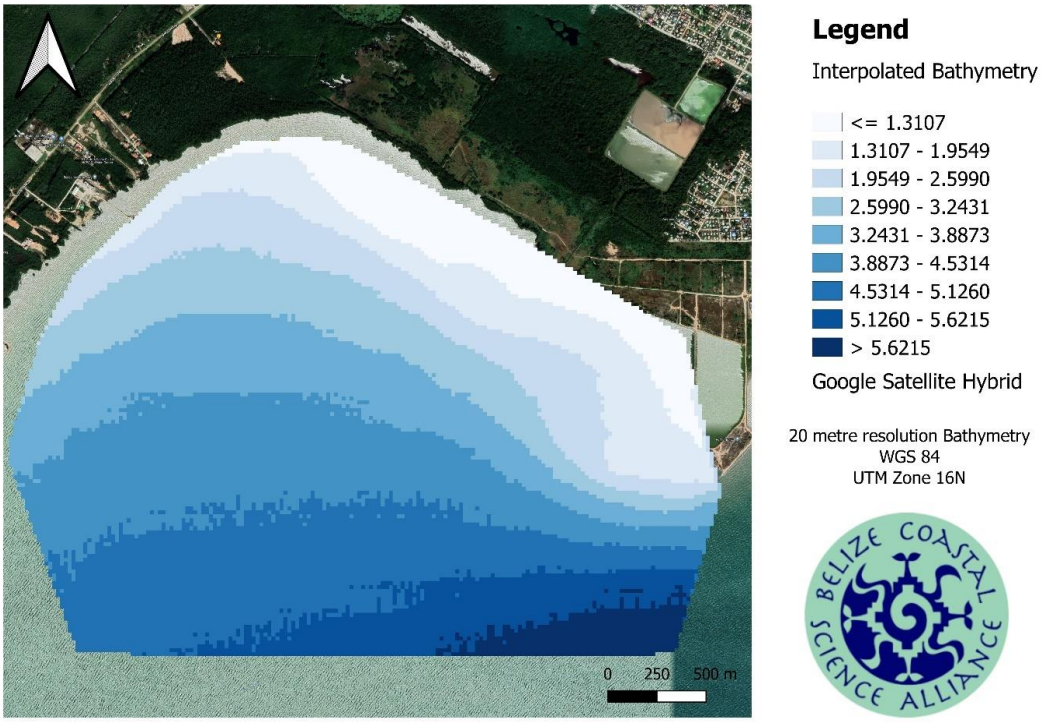


Figure 4.11: Interpolated bathymetry of the nearshore area and its immediate surroundings superimposed on a Google Satellite Hybrid basemap.

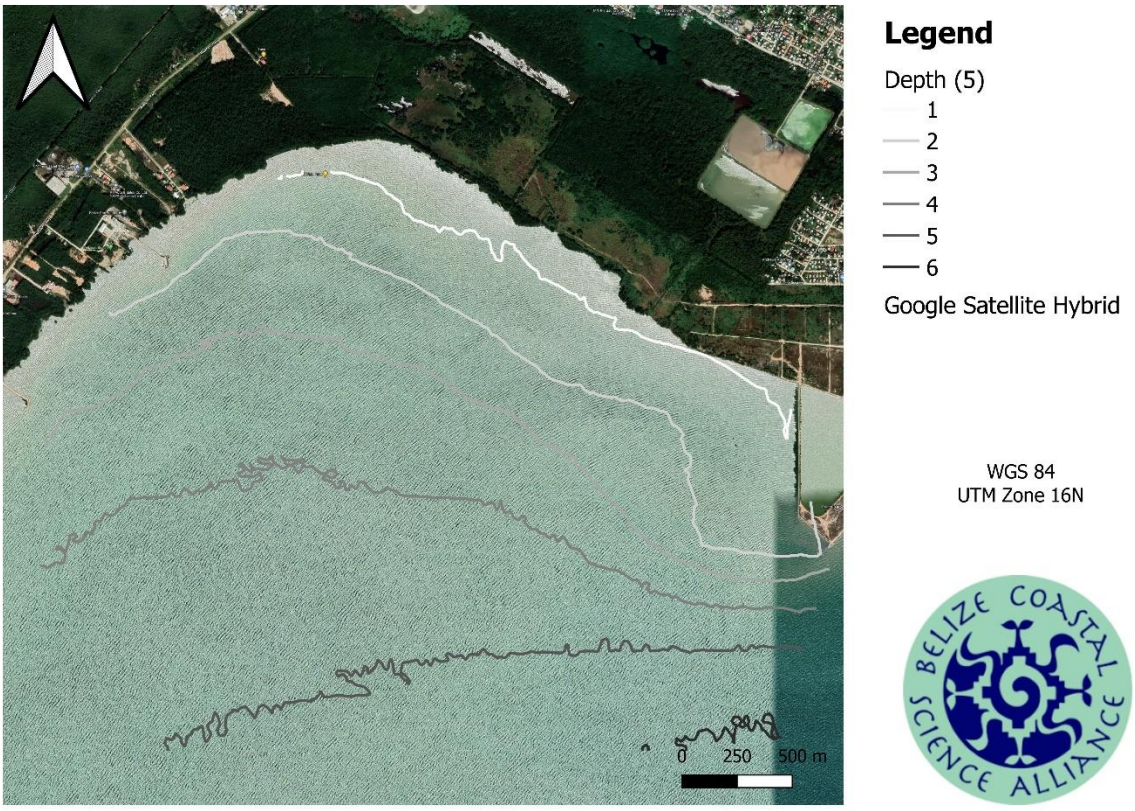


Figure 4.12: Contours derived from the interpolated bathymetry.

Figure 4.12 indicates the shallowness of the nearshore placement area, and the way the depth gradually increases towards the south. No considerable irregularities like trenches or outcrops are present. The resolution and data presented in BCSA's report conclusively indicate a nearly flat and regular area, providing sufficiently accurate and up to date data points to complete a hydrodynamic modelling study. The same bathymetric data is ample for any additional detailed modelling of the nearshore placement area and surroundings, like the assessment of any extreme weather event impacts.

4.5 Alternative for Point of Intersection of New Boulevard with GPH

The construction of a paved four lane boulevard linking the project site to the Jane Usher Boulevard and George Price Highway, is an important component of the project aimed at addressing the efficient access and egress of buses, taxis and cargo to the project site. This is expected to alleviate traffic congestion of Fabers Road, Central American Boulevard and Caesar Ridge Road and the Port Loyola/ Yarborough Area as a whole.

The point of intersection with the George Price Highway will need special consideration to allow for safe access and egress to the highway to avoid this point from becoming a potential bottleneck and/or high-risk site for accidents. The option is for a roundabout or a channelized T-

junction at the location in addition to the no action alternative and is summarized in **Table 4.2** and **Figures 4.13 and 4.14.**

Table 4.2: Junction of New Boulevard with GPH.

Alternatives	Parameters to be Considered		
	Environmental	**Social**	**Economic**
Alternative I: Roundabout Fig. 4.13	Negligible: most vegetation on either side will have been cleared. Will need to ensure proper drainage design and perhaps land filling to elevate some low-lying areas where the footprint of the roundabout will lie	Social impact is assessed as positive. There is not expected to be any need for land acquisition since the roundabout will occur within the existing road right of way. Allows for improvement to social amenities lighting and bus stop; Improved Road Safety and Reduced Risk to motorist and pedestrians.	The capital cost of a roundabout is significantly higher than the other options but has a very low operational cost. Justifiable as a long-term investment cost
Alternative II: construction of a channelized T- junction Fig. 4.14	Negligible Impacts	Similar to those associated with roundabout only that access and egress would need to be regulated by a traffic light or officer. Risk to motorists and pedestrians is also reduced;	Operational expenses are much higher than a roundabout.
Alternative III: No action alternative.	Least environmental impacts.	This point could become a bottleneck point and high-risk area if nothing is done to ensure proper access.	Very high long-term economic cost due to possible loss of opportunity costs and human lives due to accidents.

Based on the above considerations, Alternative 1 is the recommended option.

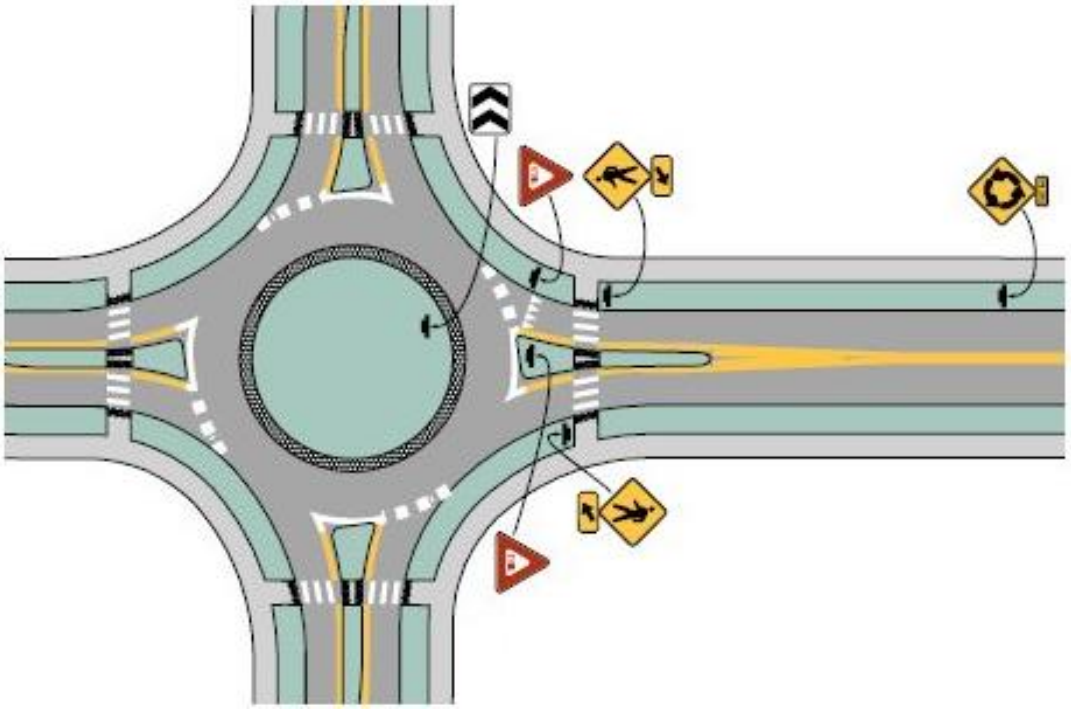


Figure 4.13: Alternative 1: A roundabout.

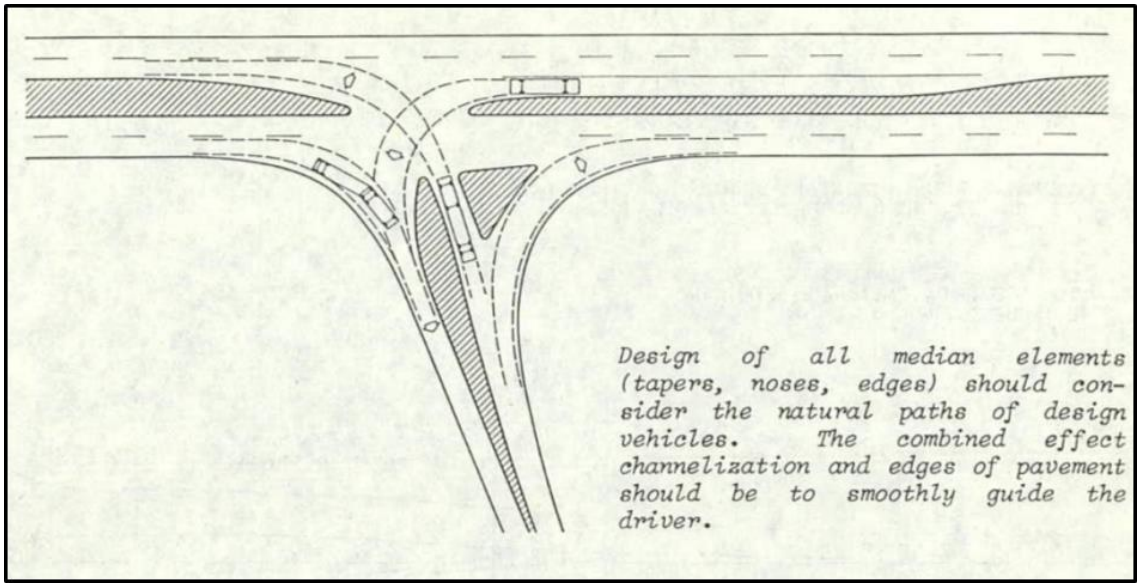


Figure 4.14: Alternative 2: A channelized T- junction.

CHAPTER 5: GEOTECHNICAL STUDIES AND DREDGING ACTIVITIES

5.1 Geotechnical and Geological Investigations

The project area was investigated in-depth by JDN in 2018 through a series of detailed geological and geotechnical studies which included: Topographic Surveys, Boreholes, Side Scan Sonar Survey, Seismic Survey, Sediment sampling among others as shown in **Table 5.1.** The detailed studies can be found in **Annexes VII**, and **IX**.

Geophysical, geotechnical and geological investigations are undertaken in order to ascertain the geological layering, which is verified using borehole data. The geophysical survey including seismic reflection (sub-bottom profiling), multi-beam echo-sounding (swath), single-beam echo-sounding (shallow areas) and side scan sonar survey were executed to map the seafloor and sub-seafloor. Geotechnical investigations included core-drilling or Standard Penetration Tests (SPTs) with representative samples taken and tested.

The different investigations conducted, and their purpose is as follows:

1. Geologic and geotechnical investigations in conjunction with the results from the boreholes to determine;
    a. Volumetric proportion of suitable and unsuitable materials based on the different dredged material placement options,
    b. Slope stability of the channel and berth-pocket,
    c. Geotechnical stability of the jetties.
2. Geotechnical characteristics of the already reclaimed areas (EPZ, Port of Belize) and the subsoil of the areas to be reclaimed, which provided essential information to verify vertical and static stability of the project areas from previous loading of emplaced dredge materials.
3. Bathymetric surveys to confirm and complement the existing bathymetry, especially in the channel (outer channel).
4. Side scan sonar survey which allowed for the identification of obstacles (wrecks, cables) and seabed features (such as outcrops) present on the seabed of the access channel and berth pocket.
5. Hydro-meteorological data collection for statistical wave analysis and extreme event analysis to define the design conditions.
6. Environmental baseline survey to determine the status and vulnerability of the marine ecosystems.

These studies are summarized in **Table 5.1**.

Table 5.1: Site Investigation Works conducted.

Activity	Location	Purpose
Topographic Survey	onshore/very shallow marine	Volume Quantification Reclamation Area
Single beam Survey	shallow marine	Volume Quantification Dredging and Reclamation Area
Multibeam Survey	Marine	Volume Quantification Dredging and Reclamation Area
Side Scan Sonar Survey	marine	Identification Obstacles
Seismic Reflection Survey	marine	Volume Quantification Dredging Area & Geotechnical Characterization Construction Areas
Tide Measurements	marine	Volume Quantification Dredging and Reclamation Area
Current and Wave Measurements	marine	Environmental Baseline Survey & Design Conditions
Water Sampling for water quality analysis	marine	Environmental Baseline Survey
Sediment Sampling for contamination analysis	marine	Environmental Baseline Survey
Hydrophone Measurements	marine	Environmental Baseline Survey
Multiparameter Probe Measurements (Turbidity, Salinity, Temperature, Conductivity, pH, Dissolved Oxygen, Chlorophyll a)	marine	Environmental Baseline Survey
Benthic Survey & Fish Count	marine	Environmental Baseline Survey
Marine Mammal Sightings	marine	Environmental Baseline Survey
Geotechnical Survey - Onshore - soil and rock sampling	onshore	Geotechnical Characterization
Geotechnical Survey - Offshore - soil and rock sampling	offshore	Geotechnical Characterization & Volumetric Proportion Suitables/ Unsuitables

5.2 Geotechnical Investigations: Boreholes

Thirty-one (31) boreholes were drilled with 10 boreholes onshore and 21 boreholes offshore (see **Table 5.2 and Figure 5.1**). The boreholes were drilled by means of rotary drilling, onshore with

a drill truck and offshore with a jack up barge, see **Figure 5.2**, three offshore boreholes in the deepest part of the channel (BH32, BH33 and BH34) were drilled by piston sampling, all positioning was verified by a Trimble GPS.

The method of sampling was through the use of SPT-sampling or continuous sampling in select boreholes (borehole BH10, 17, 21 and 28 to 34), whenever possible an undisturbed sample was taken in the form of Shelby tubes, when SPT values reached too high (hard refusal) the method was switched to coring. The captured soil was sampled, photographed, described and tested with a pocket penetrometer and a field vane tester by a JDN geologist on site. The rock cores were put in a core box, described and photographed.

Table 5.2: Borehole Locations.

Borehole	As-built coordinates WGS84 UTM 16 N		Elevation EGM2008 (m)	Start Date	Finish Date
	Easting (m)	Northing (m)			
BH1	370,448.68	1,934,008.01	1.60	10/04/2018	10/04/2018
BH2	370,722.28	1,933,681.00	2.19	13/04/2018	13/04/2018
BH3	371,039.11	1,933,329.02	0.83	14/04/2018	14/04/2018
BH4	371,368.18	1,933,187.42	0.66	16/04/2018	20/04/2018
BH5	371,760.77	1,933,407.22	1.25	09/04/2018	09/04/2018
BH6	371,883.00	1,933,105.00	0.80	20/04/2018	21/04/2018
BH7	371,876.00	1,932,568.00	1.34	07/04/2018	08/04/2018
BH8	371,770.44	1,932,456.41	1.32	11/04/2018	11/04/2018
BH9	372,402.56	1,933,168.91	0.90	12/04/2018	12/04/2018
BH10	372,538.77	1,933,241.97	0.78	05/04/2018	06/04/2018
BH11	371,398.67	1,932,646.60	-1.89	07/04/2018	07/04/2018
BH12	370,720.43	1,933,099.67	-1.88	05/04/2018	05/04/2018
BH13	369,712.85	1,933,022.06	-3.47	08/04/2018	08/04/2018
BH14	369,260.56	1,933,732.06	-2.03	06/04/2018	06/04/2018
BH15	372,262.04	1,932,473.82	-2.35	21/04/2018	23/04/2018
BH16	372,385.78	1,932,673.51	-2.47	02/04/2018	02/04/2018
BH17	372,651.56	1,932,541.80	-3.75	25/03/2018	28/03/2018
BH18	372,742.90	1,932,228.42	-4.24	30/03/2018	01/04/2018
BH19	371,785.26	1,932,313.35	-3.60	23/04/2018	25/04/2018
BH20	371,853.51	1,932,268.70	-3.41	25/04/2018	26/04/2018

BH21	371,926.92	1,932,216.00	-4.21	27/04/2018	28/04/2018
BH22	371,974.64	1,932,160.64	-4.34	10/04/2018	11/04/2018
BH23	371,719.28	1,932,162.30	-4.11	03/04/2018	03/04/2018
BH24	372,132.16	1,931,853.34	-5.94	04/04/2018	04/04/2018
BH25	372,620.73	1,931,885.57	-6.01	09/04/2018	09/04/2018
BH26	372,412.16	1,931,502.36	-7.06	20/04/2018	20/04/2018
BH27	372,645.26	1,930,466.18	-7.82	19/04/2018	19/04/2018
BH28	372,424.99	1,929,937.90	-8.07	18/04/2018	18/04/2018
BH29	372,712.71	1,928,436.39	-8.71	17/04/2018	17/04/2018
BH30	372,532.38	1,927,350.71	-9.81	16/04/2018	16/04/2018
BH31	372,833.01	1,927,095.75	-10.10	12/04/2018	12/04/2018
BH32	372,813.91	1,926,487.82	-10.50	15/04/2018	15/04/2018
BH33	373,228.94	1,925,880.11	-10.98	15/04/2018	15/04/2018
BH34	373,826.40	1,924,910.96	-11.43	15/04/2018	15/04/2018

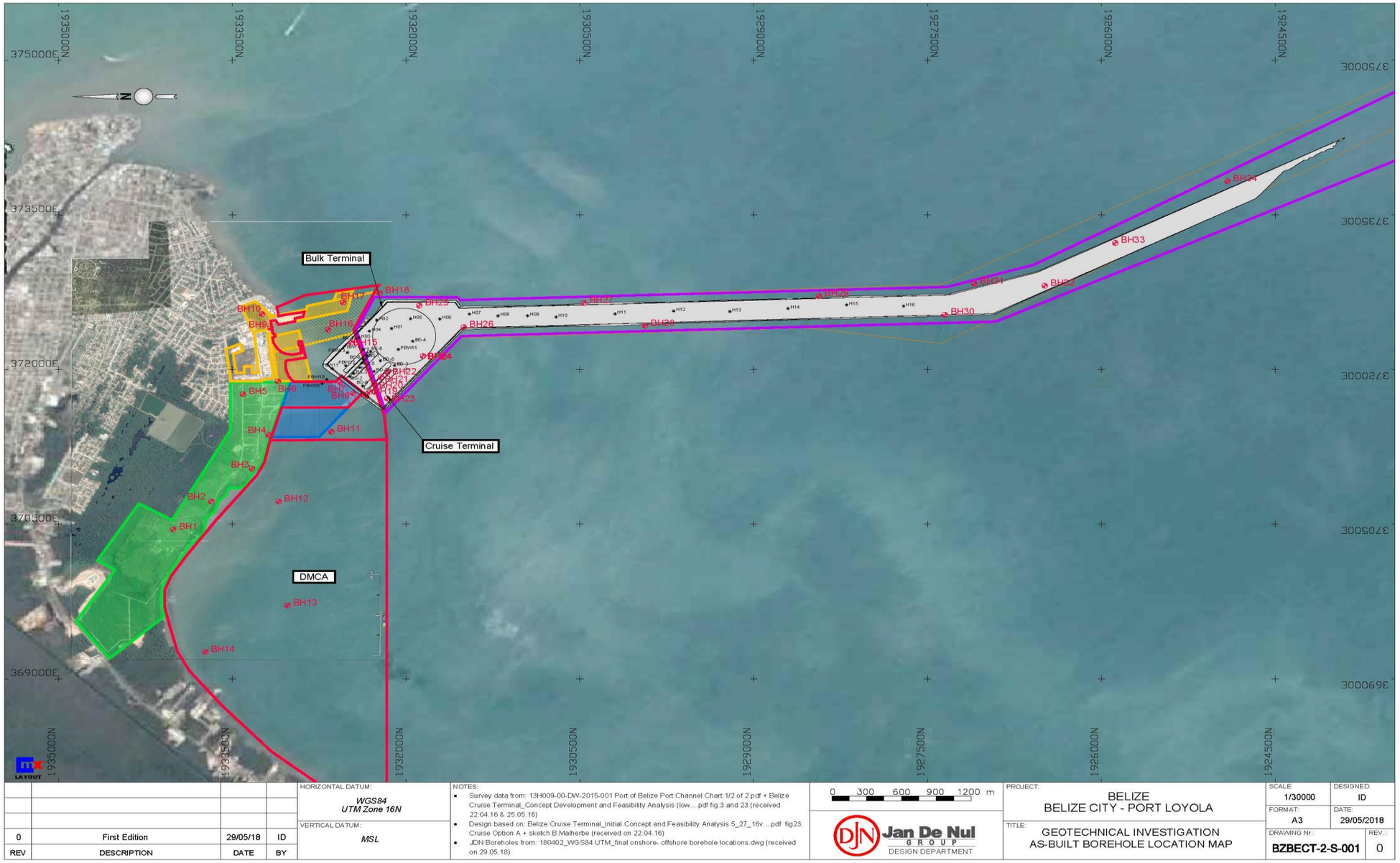


Figure 5.1: Borehole Location Map



Figure 5.2: Borehole Drilling Equipment (Drill truck, Onshore; Jack Up Rig, Offshore).

In general, four major soil types could be distinguished (**see Figures 5.3a & b, 5.4 and 5.5**):

1. The uppermost horizon is a thick layer of very soft to soft, grey silty clays. Clay has frequent inclusions of shells or shell fragments and is often intercalated with layers of PEAT (several decimetres to meters thick). Some horizons contained a sand fraction (<5%). Onshore, this soft layer is covered by a more consolidated clayey/sandy layer with gravel.
2. Below this soft layer lies a firm to hard, mottled grey and beige (variable), silty clay-layer. This harder clayey soil often contains limestone fragments and highly weathered marl. It merges gradually into the layer below, vertically but also occasionally horizontally.
3. The layer below the firm to hard clays consists of marl, gravel and clays, made of highly to extremely highly weathered limestone. The pack mostly presents itself as highly weathered, white marl with beige, clayey intervals and limestone fragments.
4. Underneath this marly layer, the top of limestone bedrock is encountered. The rock consists mostly of limestone and other carbonaceous variants such as calcirudite and calcilutite (cement stone). The limestone is karstic with numerous vugs or dissolution voids (several millimetres to several meters thick), either filled with softer, clayey material or calcite crystals or unfilled.



Figure 5.3a: Photographs of select core and borehole sections showing typical soil and rock profile. Source: JDN, 2018

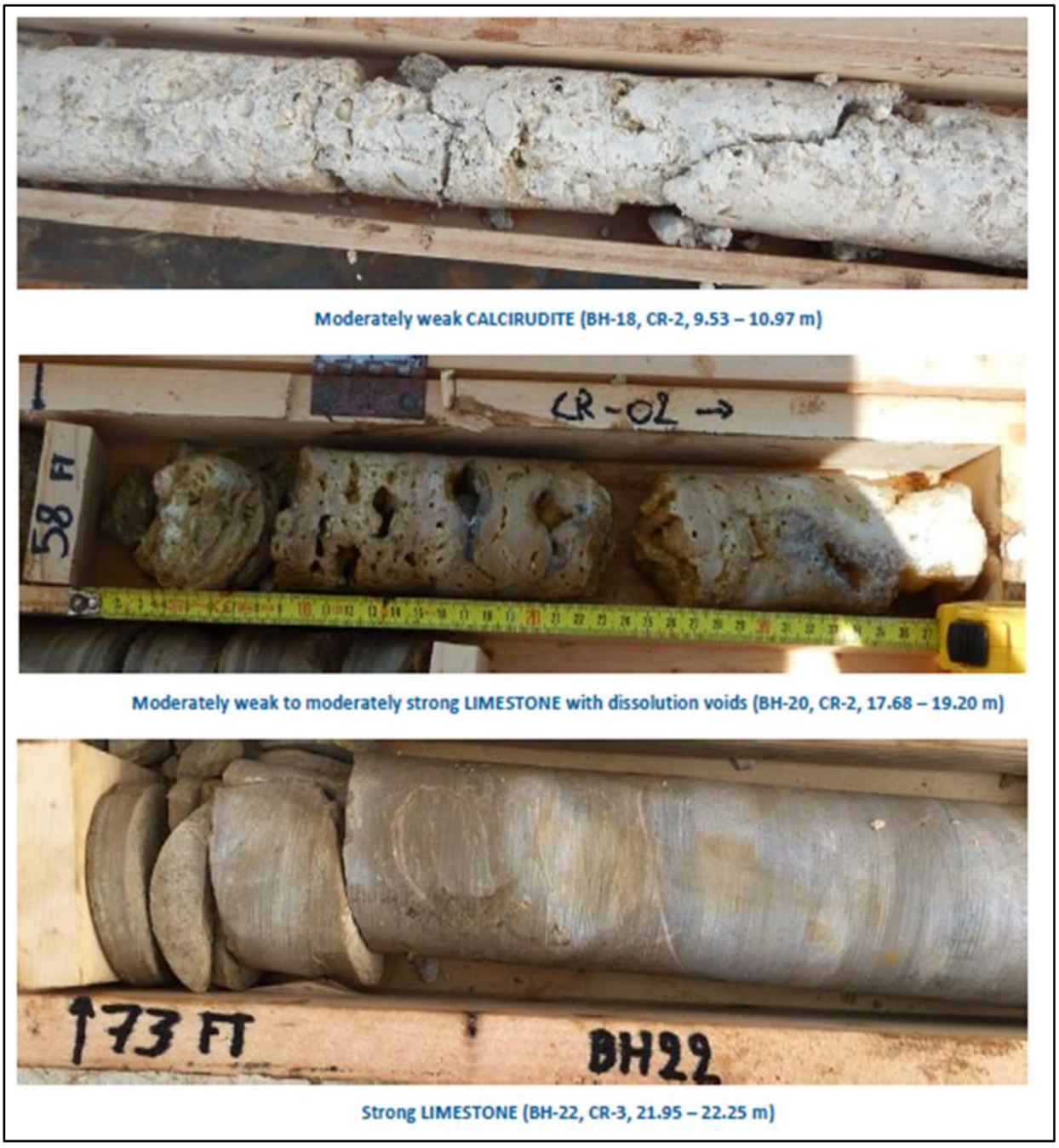


Figure 5.3b: Photographs of select core and borehole sections showing typical soil and rock profile. Source: JDN, 2018.

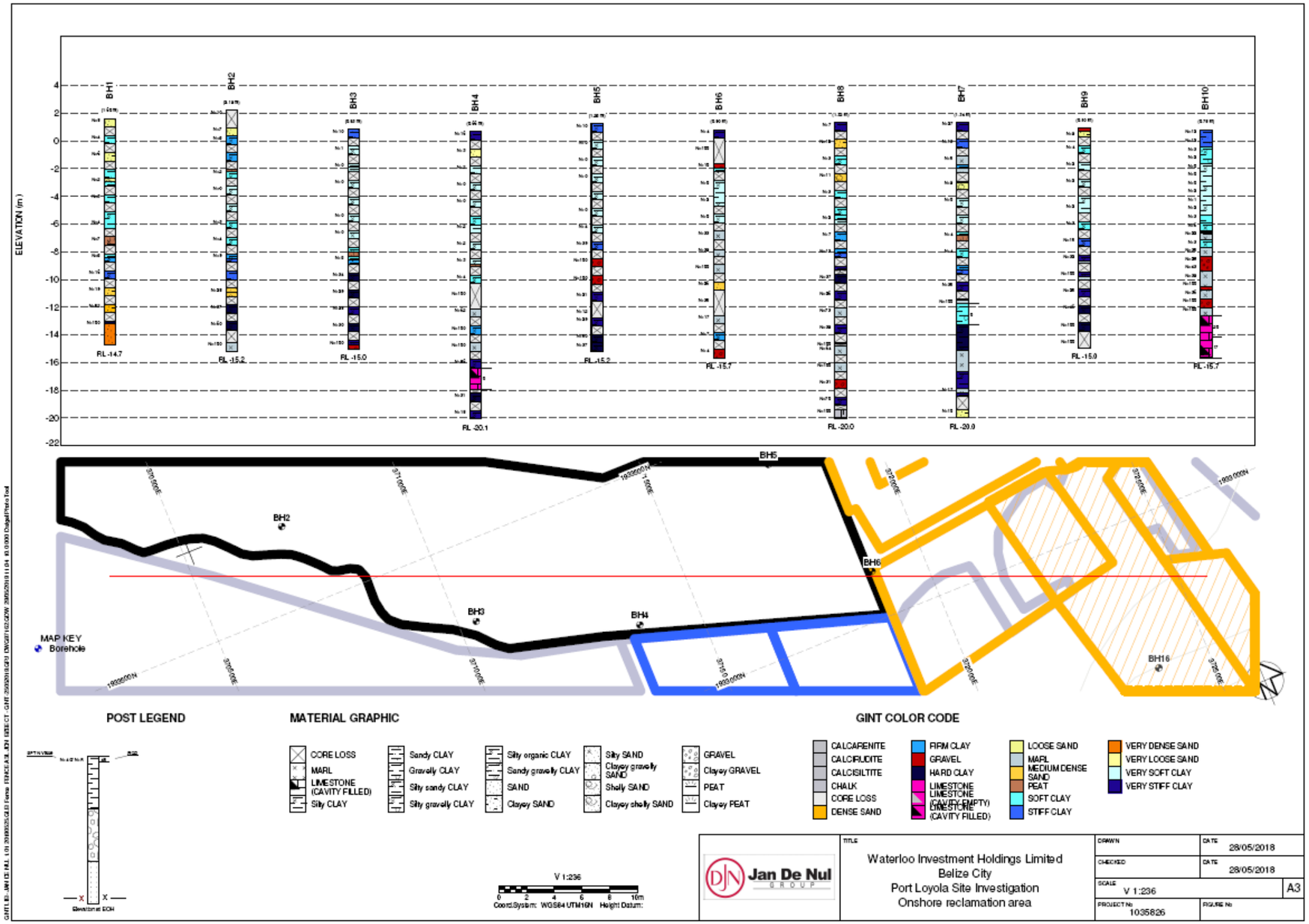


Figure 5.4: Geological panel Diagram of the reclamation area showing distribution and type of subsurface soil and rock types.

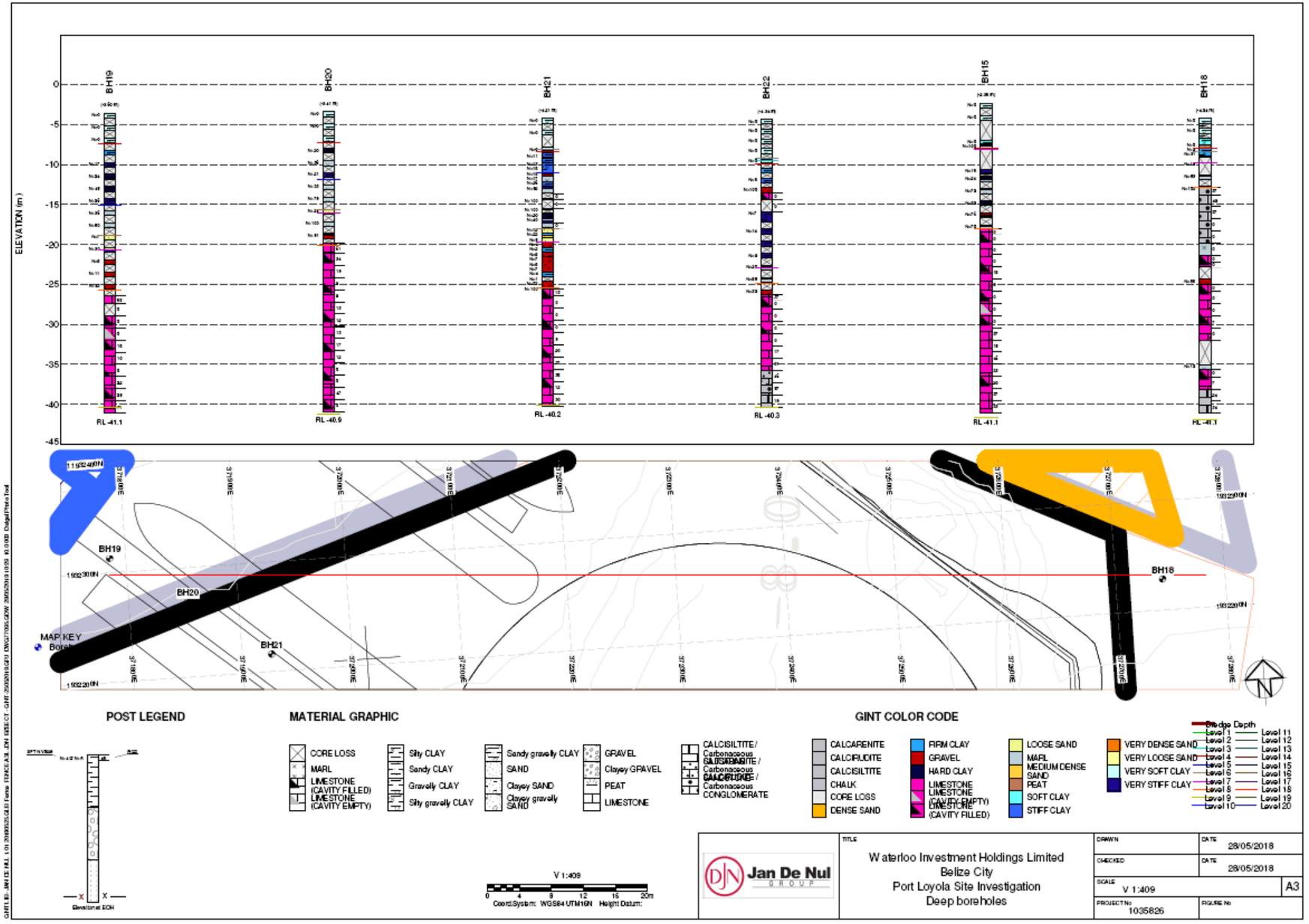


Figure 5.5: Geological panel Diagram of the access channel area showing distribution and type of subsurface soil and rock types.

5.3 Geotechnical Investigations: Seismic Reflection Survey

The seismic reflection survey was carried out in the access channel, turning basin and near shore areas in order to compliment the findings of the geotechnical survey. The main aim of this seismic survey was to 'fill in the gaps' between the different borehole locations and to further fine-tune the proposed layer model by, for example, trying to map the top of the (limestone) rock throughout the project area.

A total of 23 seismic lines were done (**Figure 5.6**), 5 in the shallow near shore areas (Lines 0001 to Lines 0005), 5 in the turning basin area (Lines; TB1, TB2, TB5, TB10, TB19) and 13 throughout the access channel (Lines AC1 to AC13)

The results of the seismic survey are:

1. Near Shore Area: Line 0001 was conducted over BH11 and BH12 and showed that the subsurface profile was small layer of sand overlays soft clay, followed by stiff clay and marl, before reaching limestone, (**Figure 5.7)**.
2. Turning Basin: Line TB1 was conducted over BH19 and BH20 and showed that subsurface profile had a basic sequence of soft clays followed by stiff clay and marl and then limestone at depth 12 m, (**Figure 5.8)**.
3. Access Channel: Line AC7 was conducted over BH26 and indicated that limestone bedrock top would be encountered during the dredge operations as it was a depth above -12m CD, (**Figure 5.9**)

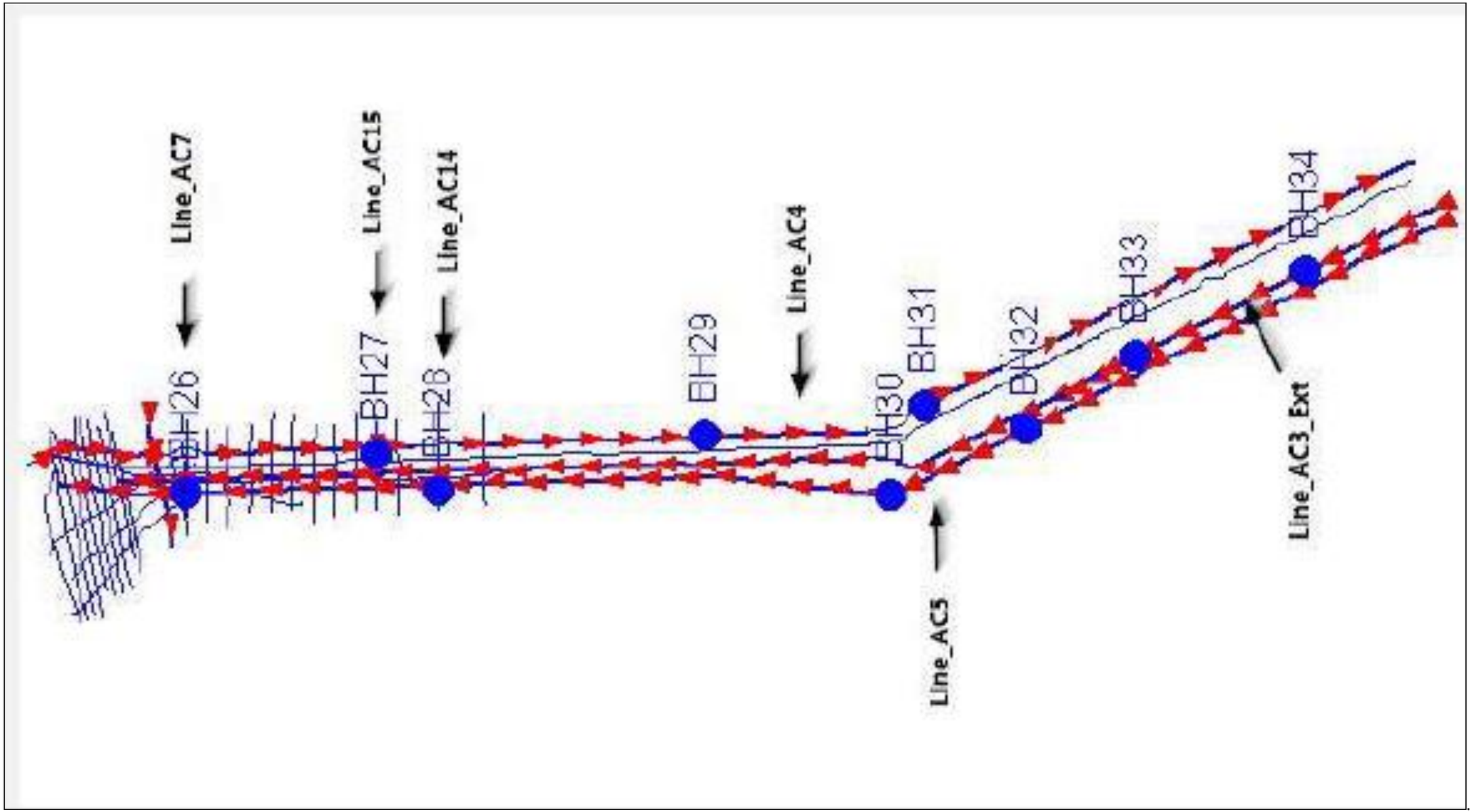


Figure 5.6: Seismic Line Location Map.

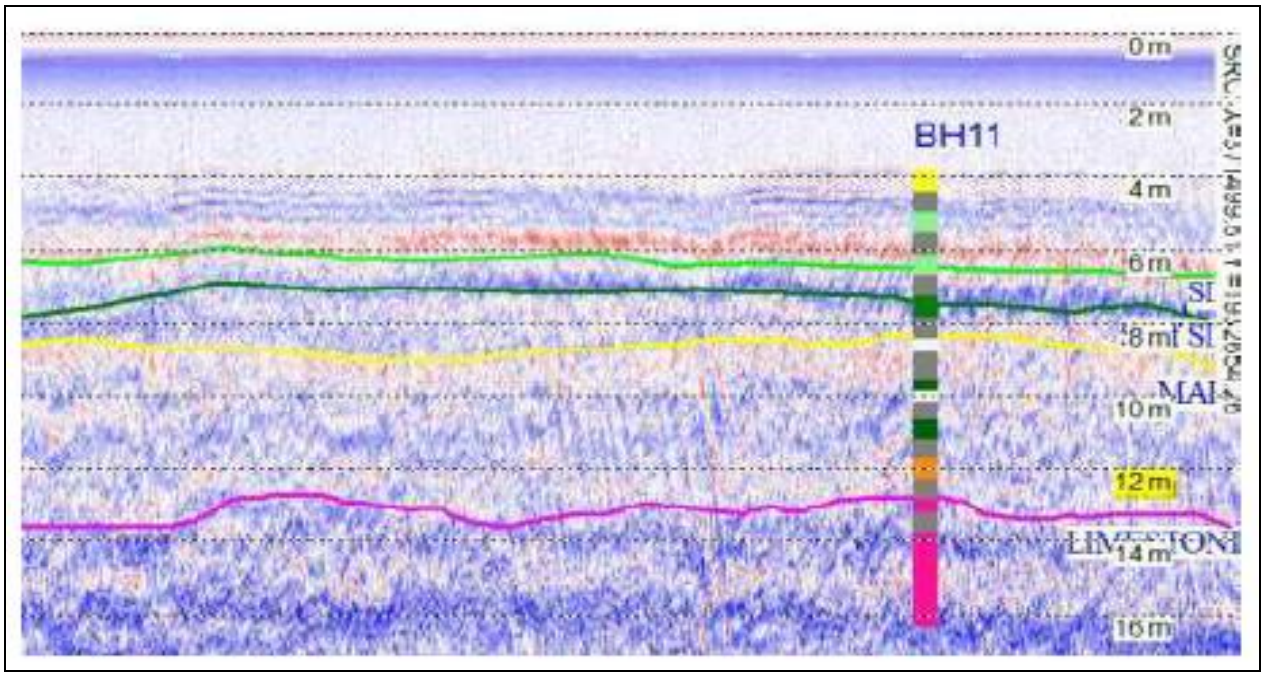


Figure 5.7: Seismic profile of Line-0001, with indication of the depth and the correlated names of the most important reflectors/lithological layers based on the provided borehole data.

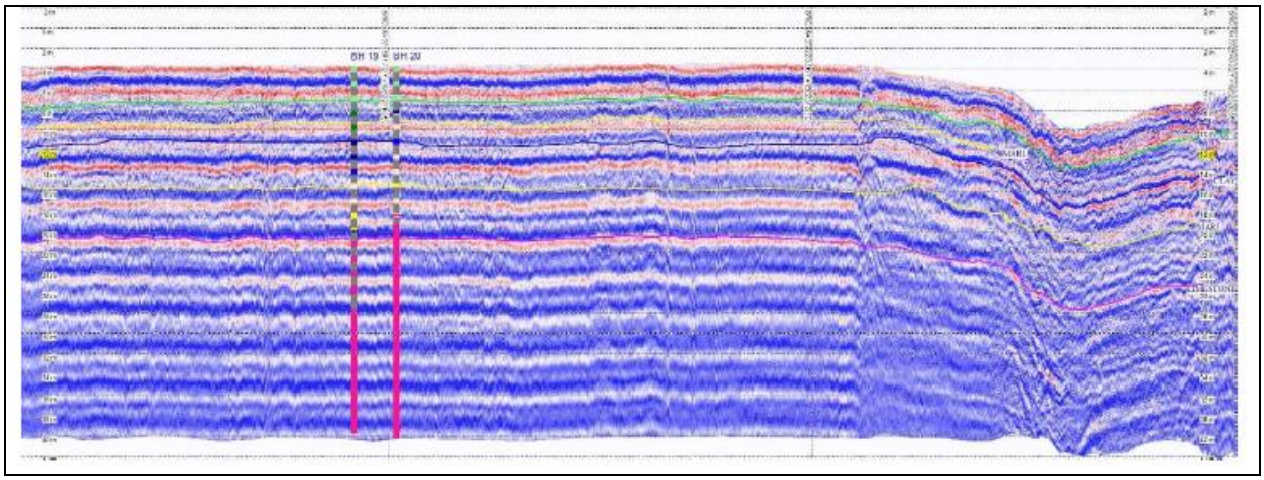


Figure 5.8: Seismic profile TB1, with indication of the depth and the correlated names of the most important reflectors/lithological layers based on the provided borehole data.

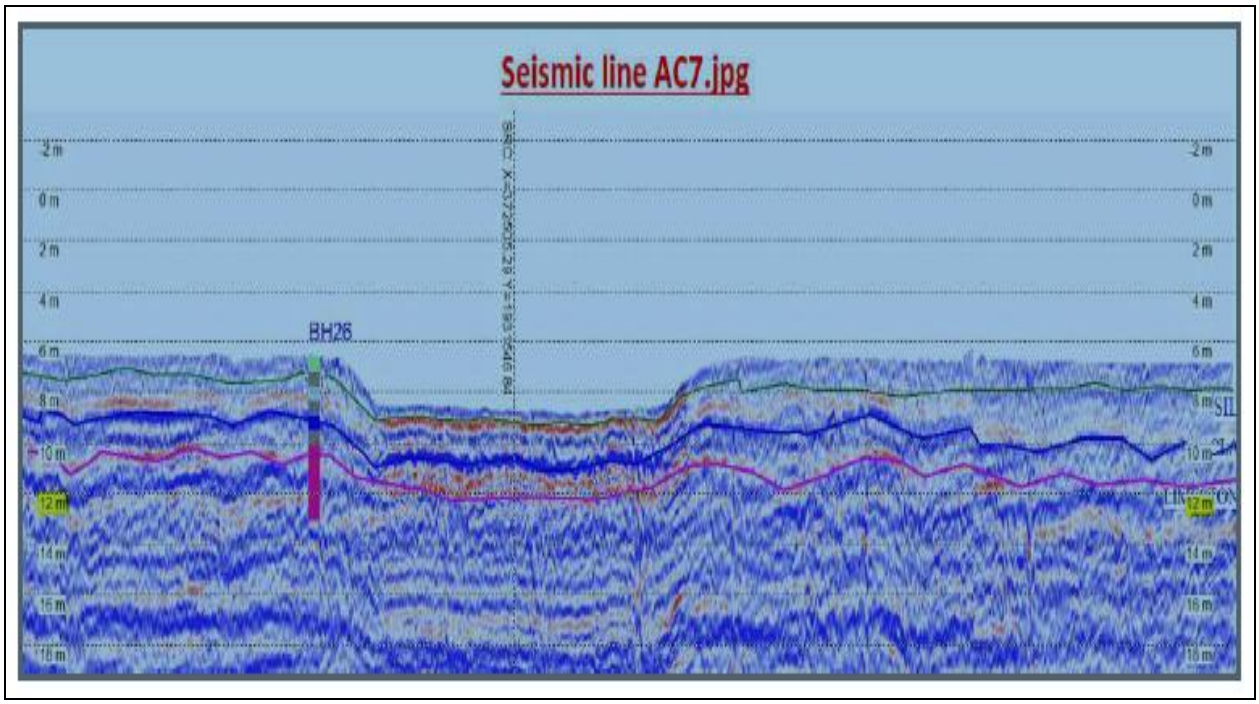


Figure 5.9: Seismic profile AC7, with indication of the depth and the correlated names of the most important reflectors/lithological layers based on the provided borehole data.
Source JDN, 2018

5.4 Geotechnical Investigations: Implications for Dredging Method

The determination of the method of dredging, type of equipment and disposal methods is heavily dependent on the type, depth and quantity of each material type in the dredge area. Of interest is the presence of hard rock or consolidated materials. Within the project area a dredge depth of 12m is required therefore the presence of limestone bedrock or the top of the limestone is a critical input for equipment determinations.

The top of the limestone was determined from two methods (JDN, 2018) analysis of borehole data and interpretation of seismic data. Accordingly, several dredge and disposal methods are needed for handling three types of material combinations:

1. fines and super fines (soft and very soft) inclusive of peat,
2. Clays silts and muds (stiff and consolidated in some areas) and
3. Limestones and marls (consolidated materials).

5.5 Dredging and Earth Moving Methods and Equipment

5.5.1 Scope of Dredging

The Information in this section is derived from the JDN Report, "Report Site Investigation Works – Port Loyola Belize" that can be seen in **Annex VII** and "Dredging and Disposal Methods Work Statement Report" that can be seen in **Annex XI**.

In comparison with the 2008 project, a deeper and wider access channel is required, which increases the dredging and disposal works beyond that described in the 2005 EIA. The total volume will increase from 2.5 million m³ to approximately 7 million m³ to design depth and 7.5 million m³ with allowable overdredging down to 12m depth. The affected area will remain very similar to those described in the original 2005 development proposal (See **Figure 5.10**).

The scope of the dredging works is defined as follows:

1. Dredging of the 7.5 km long access channel with a depth of -12 m CD[3] and 190m wide and side slopes between V1:H1 and V1:H5.
2. Dredging of turning basin with a diameter of 550 m and a depth of -12m CD.
3. Dredging of berth pockets along two piers.

The dredging volumes associated with the scope of works are defined as dredging zones A, B, and C.

1. Zone A is the Main Turning Basin of approximately 550 meters wide by 1,200 meters long requiring an estimated 4.7 million cubic meters to be dredged.
2. Zone B is the Inner Channel of approximately 190 meters wide by 4,500 meters long requiring an estimated 2.2 million cubic meters of material to be dredged.
3. Zone C is the Outer Channel of approximately 190 meters wide by 3,000 meters long requiring an estimated 0.63 million cubic meters of material to be dredged.

Part of this material will be suitable to use for extension of the port facilities, part of the dredged material however is unsuitable and will have to be disposed either onshore or nearshore. The following paragraphs describe the methods that will be used by the dredging contractor to execute the works.

As previously stated, the revised scope of dredging works will accommodate the large Oasis-class ship, which require a deeper and wider channel. The specifications of the design vessel used to determine the basin and channel dimensions are provided in **Table 5.3.**

[3] CD[1]: Chart Datum is the level below which depths are indicated and above which heights of the tides are expressed; usually mean level of low water at a spring tide.

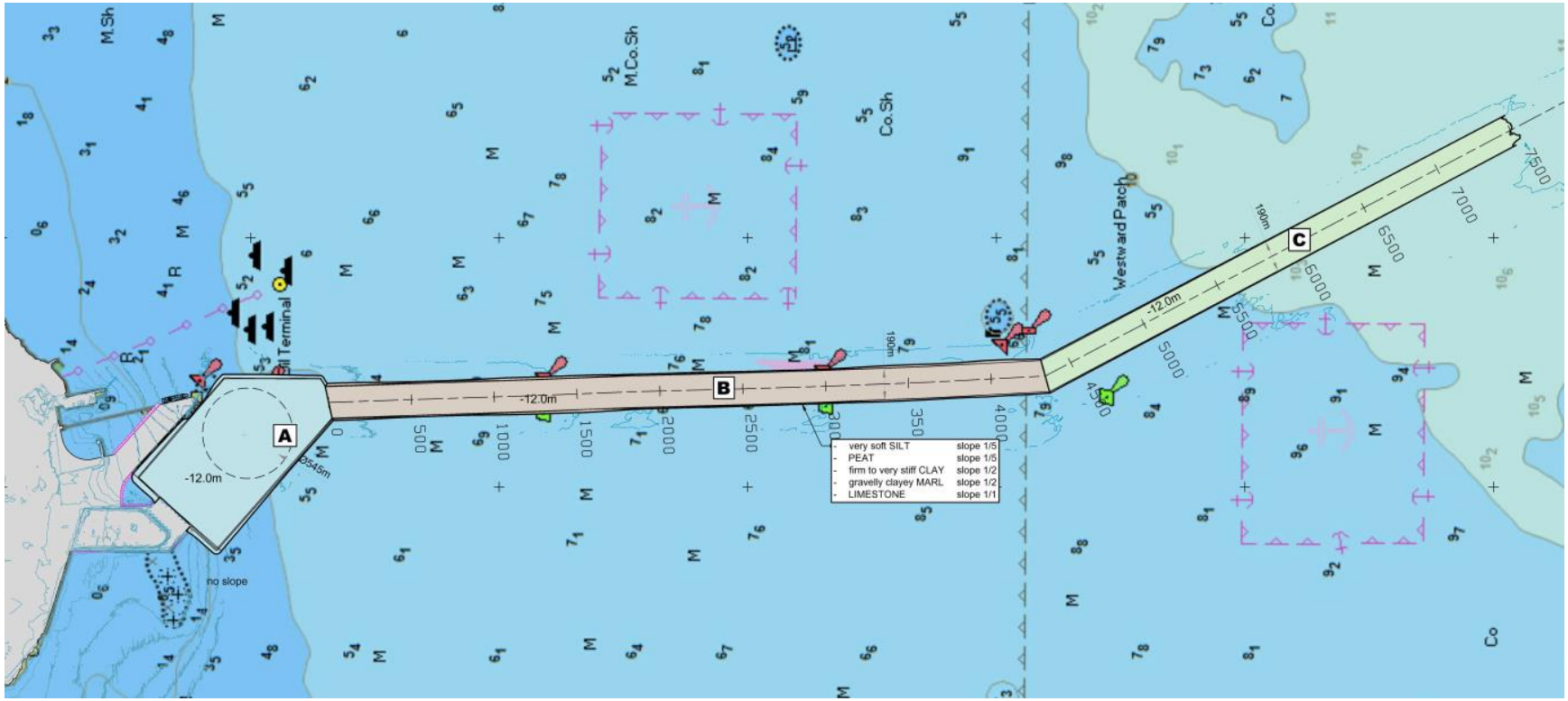


Figure 5.10: Turning Basin (A) and Channel (B & C) Design.

Table 5.3 Oasis-class Cruise Ship Specifications.

Class and type:	Oasis-Class Cruise Ship
Tonnage:	225,282 GT
Length:	361.6 m (1,186.5 ft) overall
Beam:	- 47 m (154 ft) waterline - 60.5 m (198 ft) max beam
Height:	72 m (236 ft) above water line
Draught:	9.322 m (30.6 ft)

The configuration of the improved navigation facilities is a function of the ships' design that will be accommodated at the planned cargo and cruise facilities. In order to meet the navigation and manoeuvring requirements of this vessel design type (Oasis-class) the channel and turning dimensions were determined and are provided in **Table 5.4**.

Table 5.4 Channel Dimensions.

Design Criteria	
Length (LOA)	362 m
Breadth	65 m
Draft	9.15 m
Channel Width	
Manuevering Lane	118 m
Bank Clearance 1	36 m
Bank Clearance 2	36 m
Channel Width	190 m
Turning Basin	
Diameter	545 m
Channel Depth	
Design Vessel Draft	9.15 m
Safe Clearance	0.5 m
Vessel Manuevering	1.0 m
Adv. Maintenance	0.6 m
Contract over Depth	0.6 m
Channel Depth	12 m

The alignment of navigation improvements follows the present channel and turning basin, extending from One Man Caye Channel to the port's current Deep-Water Berth. This alignment utilizes existing, disturbed areas associated with previous dredging programs; and minimizes to the greatest extent possible new impact to submerged resources in the Belize Bay; and aligns the channel to provide safe navigation and ease of access to piers planned at the new cruise and cargo facilities.

In 2019, a series of navigation simulations were undertaken at the STAR Center. These simulations examined the maneuvering of large cruise ships, such as the Oasis of the Seas, through the planned access route, including the sea entrance at Buzzard Shoals, English Cay Channel, south Grennel's Channel, and One Man Cay Channel, as well as the project's planned navigation features (access channel, turning basin, and berthing pockets). For convenience, additional information on these simulation runs is included (as a Drobox link) in **Annex X.**

5.5.2 Dredging Equipment

JDN has taken into consideration the anticipated soil, sea and weather conditions likely to be expected in the working area in its plan to execute the dredging works. For the shallow areas and hard material (**Figure 5.11**) the Company will use a Cutter Suction Dredger (CSD) and a Trailing Suction Hopper Dredger (TSHD) for the dredging in the deeper areas of the navigation channel (**Figure 5.12**). As an alternative, a Backhoe Dredger (BHD) loading barges can be deployed to remove the overburden on top of the hard soil and dump nearshore (**Figure 5.13**). F**igure 5.14** gives the assignment of dredging equipment to dredge areas.

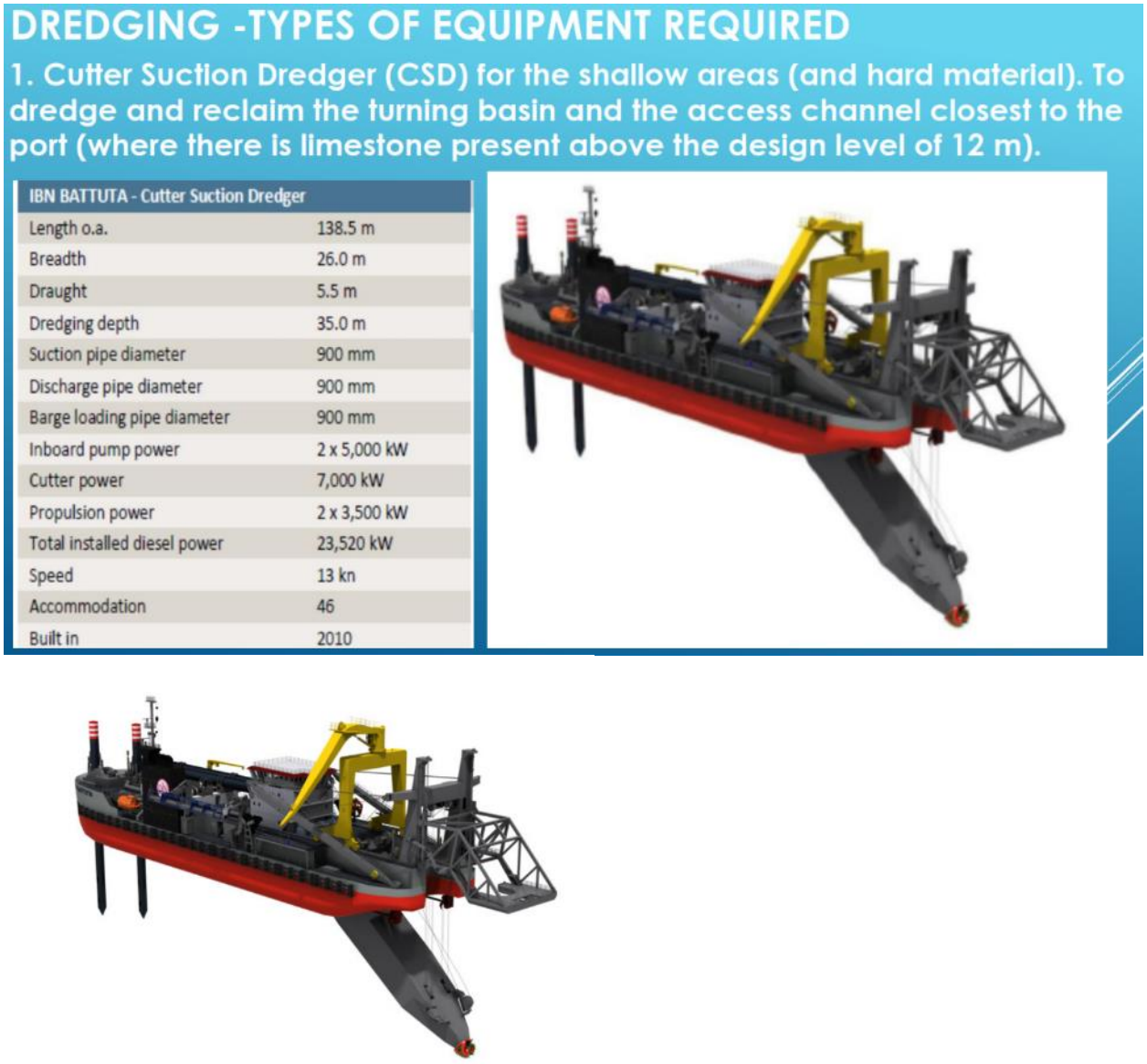


Figure 5.11: Typical Cutter Suction Dredger.

IBN BATTUTA - Cutter Suction Dredger	
Length o.a.	138.5 m
Breadth	26.0 m
Draught	5.5 m
Dredging depth	35.0 m
Suction pipe diameter	900 mm
Discharge pipe diameter	900 mm
Barge loading pipe diameter	900 mm

Inboard pump power	2 x 5,000 kW
Cutter power	7,000 kW
Propulsion power	2 x 3,500 kW
Total installed diesel power	23,520 kW
Speed	13 kn
Accommodation	46
Built in	2010



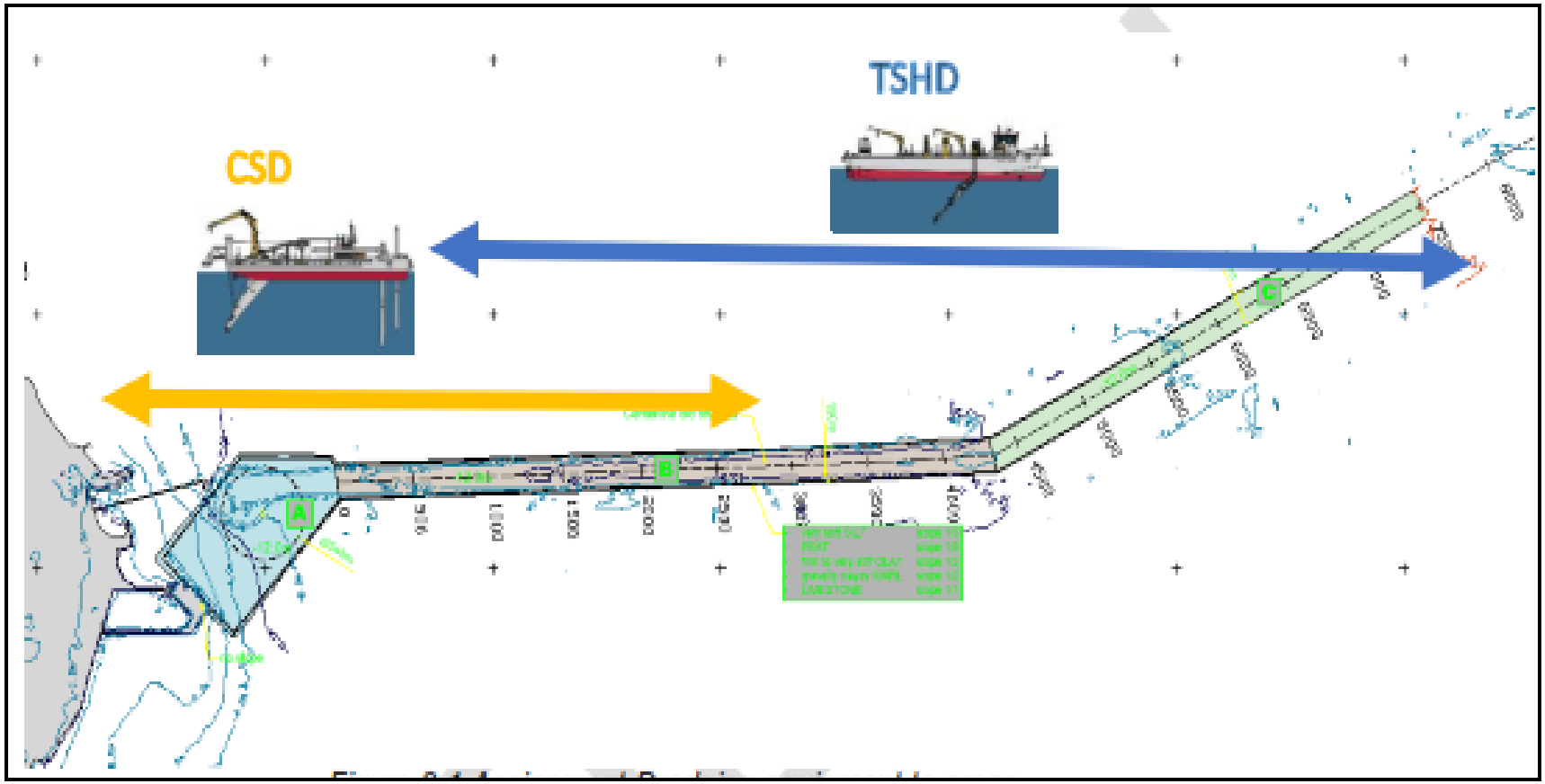
Figure 5.12: Suction Hopper Dredger.

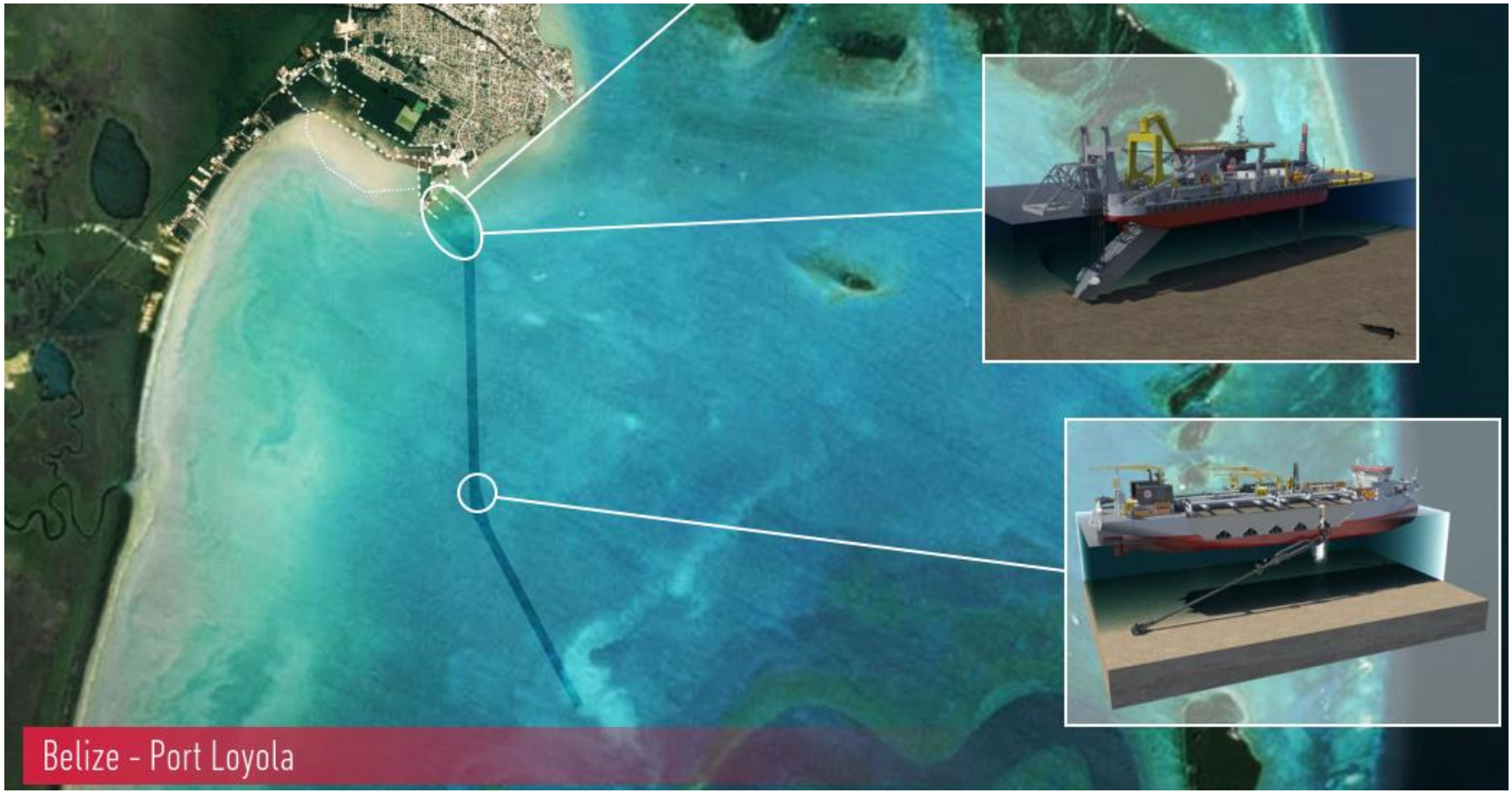


POSTNIK YAKOVLEV - Backhoe Dredger	
Length o.a.	66.9 m
Breadth	21.6 m
Draught	3.35 m
Dredging depth	18 / 26 / 32 m
Excavator type	Backacter 1100
Bucket / Grab capacity	15 / 25 / 40 m³
Total installed diesel power	3,700 kW
Installed power excavator	3,460 kW
Propulsion power	2 x 500 kW
Built in	2009

CONCEPCIÓN - Split Hopper Barge	
Hopper capacity	1,800 m³
Deadweight	3,400 ton
Length o.a.	82.3 m
Breadth	17.2 m
Draught loaded	4.75 m
Propulsion power	2 x 785 kW
Bow thruster power	300 kW
Speed	11.0 kn
Accommodation	10
Built in	2009

Figure 5.13: Backhoe Dredger with Split Hopper Barge.


TSHD
CSD
A
B
C


Belize - Port Loyola

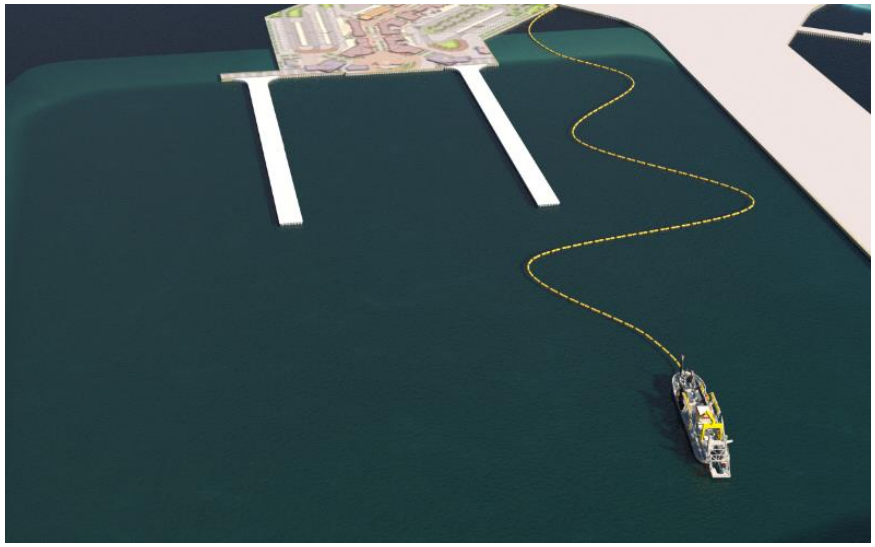


Figure 5.14: Dredge type Assignment Areas/Location.

5.5.3 Mobilization

The mobilization of the dredging plant and equipment will require moving the equipment listed below to the project area. All plant and equipment will be towed or will navigate to the Port of Belize:

- Cutter Suction Dredger (CSD) will sail directly to Belize City,
- Trailing Suction Hopper Dredger (TSHD) will sail to the project site,
- Backhoe Dredger (BHD) will be towed to Belize City,
- The split hopper barges (SHB) are self-propelled will navigate on their own keel to the project.
- The pipelines and auxiliary equipment will be mobilized with cargo vessels.

JDN estimates a 10-week period for mobilization.

5.5.4 Dredging Works

5.5.4.1 Proposed Execution Method

The CSD will remove the overburden of soft material on top of the marl and limestone in the turning basin and the first kilometre of the access channel by pumping the material through a discharge pipeline to the disposal areas.

Once the shallow soft overburden layer is removed the CSD will dredge the marl and limestone, whilst pumping this material to the cruise terminal lagoon and expansion of the container yard and cargo terminal.

Combi walls or similarly designed and effective structures (**Figure 5.15**) will be used to encircle the new cruise and cargo pier, and the overburden will be dredged to a depth of 8 m at this location. Materials of the desired quality from the dredging will be loaded onto trucks which will fill in the berths. The execution of the piling works will be from land without barges.

The TSHD will dredge the mid and lower channel and sail to the Port area and hydraulically offload via onboard pump to a submerged pipeline to shore. The TSHD operation will have no impact on the CSD or BHD operations that will either directly pump to the on/nearshore placement sites or load shallow draft barges, split-hull barges for direct placement.

Once the CSD has completed the dredging of the soft top layer, it will be used to dredge the deeper layers of firm and stiff clay between KP 1+000 and 3+000. Upon completion of the construction works, the fill will be dredged by the CSD up to the new quay wall to the required 12 meters depth.



Figure 5.15: Typical view of Combi walls.

The total volume of materials to dredge is estimated at 7,500,000 m³ (**See Table 5.5**), including additional over dredging tolerances. Part of the dredged materials will be used for construction purposes, with some additional soil improvement, and will be labelled 'suitable'. The peat and soft silt are considered unfit for construction purposes and is referred to as 'unsuitable'

Table 5.5: Material Amount and Make-Up.

Material Type	Volume (m^3)
Silt and Unsuitable (fines)	3,600,000
Clay and Marls	3,220,000
Limestone	180,000
Over Dredging Tolerances (contingency)	500,000
Total	**7,500,000**

5.5.4.2 General working principles of a CSD and TSHD

See **Annex XI** for the general layout and working principles of a CSD and TSHD. Average gross weekly production for the different dredging equipment are:

- TSHD: 250,000 m³/week
- CSD: 300,000 m³/week

5.5.5 Work Schedule

A preliminary dredging schedule is shown in **Figure 5.16** for the dredging of the turning basin and access channel. The schedule is prepared assuming the dredging is done simultaneously with CSD and TSHD. JDN estimates that the total duration of the dredging works would be 45 weeks.

5.6 Mitigation of Turbidity and Containment of Silt and Sediments

The mitigation measures for the control of turbidity and the method of containment used is dependent on material type, volume of material and location of dredging area. The estimated volume and types of material to be dredged within the project area are:

5.6.1 Management of Dredging Activity

- All dredging will occur in the marine environment therefore the management of the excavation site is concerned primarily with navigation aids and turbidity issues.
- The deployment of a floating turbidity curtain to encircle the entire dredge areas is impossible given the extent of the dredging works and the nature of the dredging equipment to be employed (TSHD and large CSD). Control of sediment plume and the propagation of turbid waters outside of the direct zone of dredging impact will be limited by best practices. This will include operation of the dredge plant to minimize suspension of stationary sediments. It should be noted that the hydrographic studies carried out at the site indicate that the background or natural turbidity levels within this area are already very high and therefore the increased impact from turbidity or sediment stir from the propose dredge works will be limited.
- During dredging, the turbidity levels will be monitored, and in the event the suspended sediment load exceeds a tolerable level, the dredge methods will be adjusted, or the activity discontinued until the impact is reduced to a satisfactory level.
- In order to assess the water quality in the project area during the dredging operation, several parameters will be measured with an EXO multi parameter probe (or similar): pH, conductivity, salinity, temperature, turbidity, and total suspended solids. In order to distinguish the impact caused by the dredging and reclamation operations from the natural turbidity, monitoring will be executed before the start of the works to establish the baseline condition. This monitoring will continue throughout the dredging works.
- Turbidity will be monitored in the vicinity of the dredging sites and also at a reference location that is unaffected by the works (to be identified during the baseline campaign). Mobile turbidity monitoring will be carried out near sensitive environmental receptors located closest to the dredging and/or reclamation site.
- In order to assess the general water quality in the project area, several other parameters will be measured with an EXO multi parameter probe (or similar): pH, Conductivity, salinity, temperature and Total Suspended Solids.

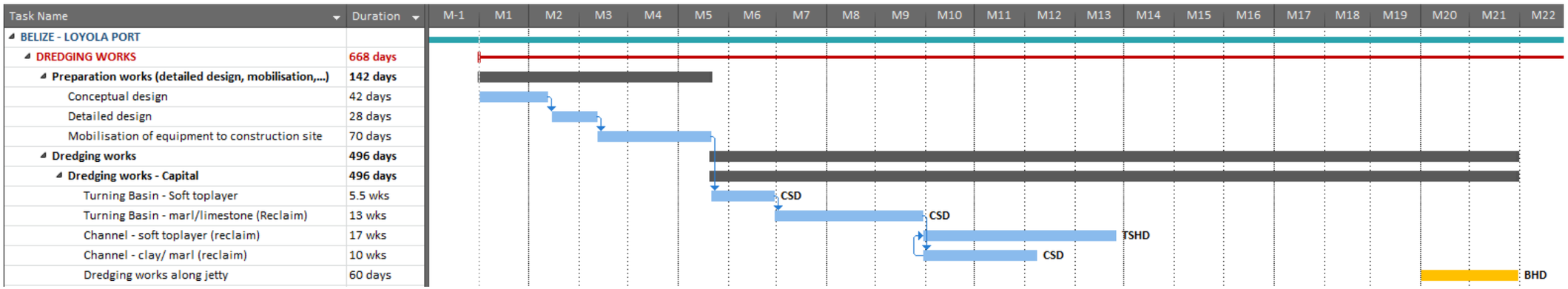


Figure 5.16: Proposed Work Schedule dredging works.

5.6.2 Management and Disposal of Dredge Spoils

Different methods and locations are available for the disposal of the dredged material. Part of the total volume is suitable for construction purposes, however a significant portion is unsuitable for construction or even for use as fill material.

Considering the different material types and the needs of the port, JDN proposes as an experienced contractor the following execution procedure:

- Dredging of overburden and disposal in EPZ zone and nearshore for the turning basin,
- Reclamation of marl, limestone and stiff clay in onshore expansion areas,
- Nearshore disposal of silt and peat.

No dredging projects of a similar size have been executed in Belize, nor has the dredged materials been as unsuitable for commercial and residential use. Previous dredging in locations such as the as the Port of Belize channel, the Big Creek channel and Harvest Caye access channel had smaller dredging volumes.

5.6.2.1 Onshore Disposal Volumes

The EPZ area was used during the last dredging campaign in 2002, when the channel and turning basin were dredged to a depth of -10m MSL **(Figure 5.17).**

Three areas onshore within the boundaries of the Port of Belize were identified for spoils disposal and their estimated capacity to receive dredged materials is as follows:

a. Cruise terminal (blue): capacity of 500,000 m^3

b. Port of Belize (yellow): capacity of 300,000 m^3

c. EPZ (green): capacity of 2,200,000 m^3 over a surface of 750,000 m2

The volumes are estimates not taking into account the final design level of the platform and settlement of the underlying soil layers. With settlement of the subsoil a total capacity of 3,000,000 m^3 is available on shore, consequently a solution must be found for the remaining volume.

The area hatched with black lines in the green area has a surface of 750 Ha and will be used for reclamation **(Figure 5.18).**

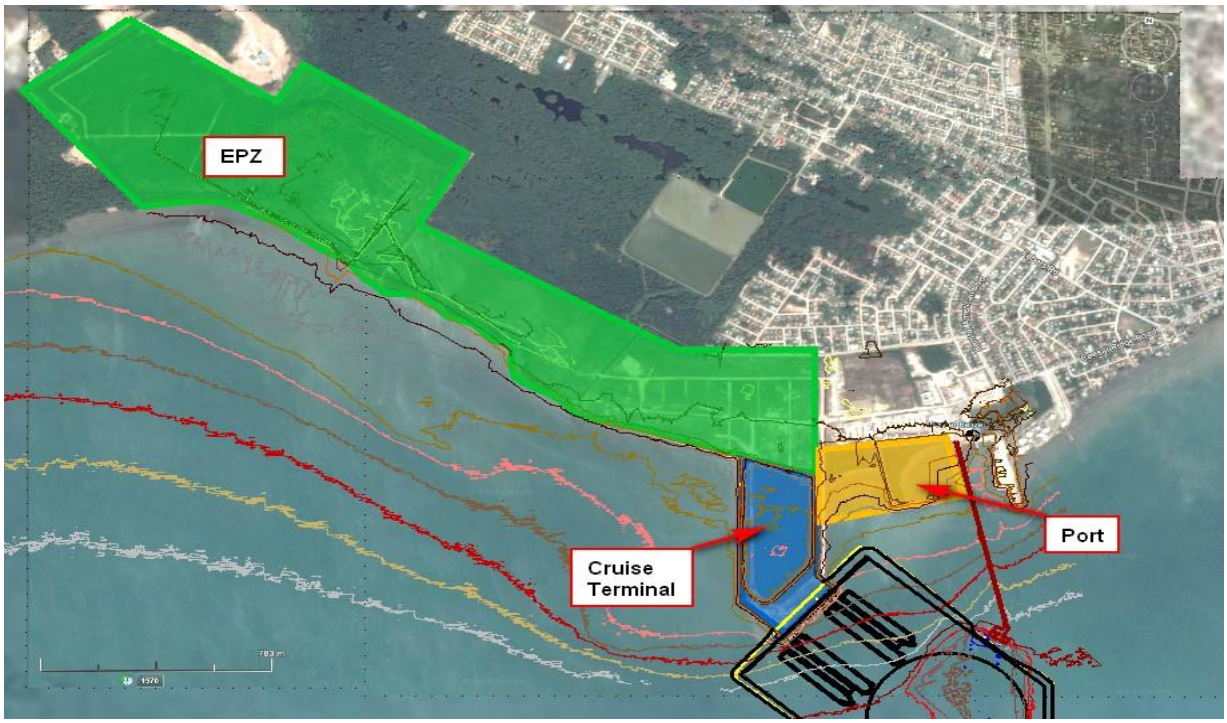


Figure 5.17: Disposal areas onshore (EPZ in green, Cruise Terminal in blue, Port in orange).

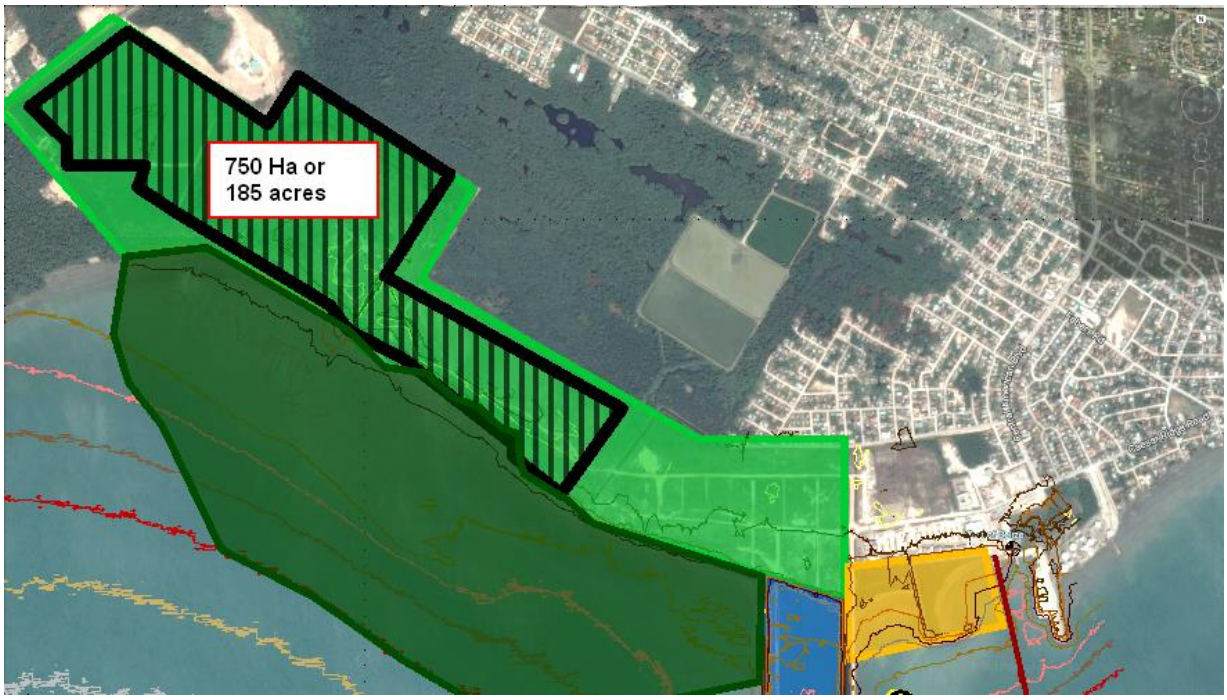


Figure 5.18: Area in green (750Ha) to be used for reclamation

The better fraction of material will be pumped into the blue **(Figure 5.19)** and orange area or into the green area. The bulk of the material will be reclaimed in the East of the EPZ, maintaining a distance from the nearby communities.

If the green area is used for stiff clays, the water quality of the discharge water will be managed to limit turbidity. The clayey material will dry out and transported by trucks to the expansion areas, which are now below the waterline to reach the required volumes of fill material.



Figure 5.19: Cruise Terminal Lagoon (blue area in Figure 5.18).

For 5.4 million m³ of unsuitables and clay @ w= 90,6 % >> ρsat = 1.510,5 kg/m3 or ρd = 790 kgds/m3. The total tonnage of unsuitable dredge materials to be lagooned is hence 4.3 Million tons. This would require an upland lagoon with a surface of 5.7 million square meters or 1400 acres, confined within bunds of 3.5m height.

Based on the calculations, the onshore disposal of all dredged material is not realistic within the boundaries of the port, as the area has a surface of maximum 1.5 million square meters, of which a total area of 1.1 million square meters can be used for reclamation of dredged material.

5.6.2.2 Required Site Preparation to Receive Dredged Volumes

Preparatory works are required for all reclamation areas. The expansion of the port will need to be closed off with a bund. A bund or sea wall already closes off the lagoon of the cruise terminal. The levels in the EPZ limit the capacity, as the height of the bunds that can be attained is limited due to the subsoil conditions. The level considered is +3m or +9ft. (in Belize a minimum height of 5ft is required in case of storm surge). The reclaimed material presents bulking challenges depending on the soil type. The clayey material destined for the green area, is prone to bulk with factor 2-3 immediately after dredging. The material will have to undergo lagooning to remove the water over an extended period.

The reclamation area in the EPZ zone will be surrounded by bunds constructed from in-situ material. Construction of bunds is considered a temporary work and will not be tested or have specific design criteria. As a rule of thumb, the bund should be 0.5m above the top of the reclamation level.

Based on the experience in 2002 achieving bunds more than 2 to 3 metres above ground level is difficult **(see Figure 20**). Design of the bunds must follow the following minimum specifications:

- Minimum width 3 to 5m for accessibility with vehicles or excavator
- Minimum width 8m on the bunds where there is a discharge line to be installed
- As a minimum the bund should be 0.5m above the level of the water and material in the reclamation area.

Construction of the bunds in the swampy area should be scheduled towards the end of the dry season, in order to be able to access the area with heavy equipment.

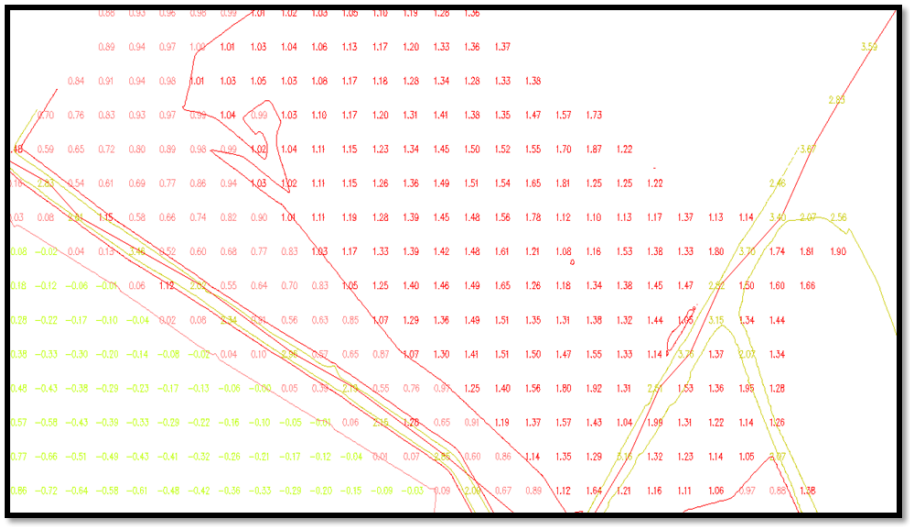


Figure 5.20: Levels of bunds from 2002 range between 2.5 and 3.5m CD.

The bunds will be created with in-situ material taken at that specific location (**Figure 5.21**). Excavators and bulldozers will raise bunds with material from within the reclamation area. The bunds will be integrated in the future platform or removed if the quality does not suffice for the intended purpose. The external perimeter of the bund will have properly sloped drains to ensure that storm water runoff from the area is diverted around the area to avoid flooding of roads and adjacent properties. If the volume balance shows material is deficient to create all bunds or there is insufficient good materials, sand and clay will be obtained from areas reclaimed in 2002.



Figure 5.21: Bund with ditches where the material was excavated for the berm.



Figure 5.22: Installation of weir boxes and sandbags.

5.6.2.3 Erosion Control

The bunds are not covered with geotextile or plastic, on the inside nor the outside. Erosion only occurs when discharging close to the bunds, which is covered on the inside with sand. The reclamation area supervisor will control the flow of slurry at a rate and in a direction that will protect the bund. It is of the utmost importance to have good accessibility all around the reclamation area for inspection and repair by an excavator if damage from erosion should occur. A seepage channel collects water from around the bunds and convey it away from the site.

Around the weir boxes the sides are protected by big bags and regular size sand bags in order to avoid erosion and collapse of the bunds (**Figure 5.22**).

Figure 5.23 illustrates the general layout of a typical reclamation area:

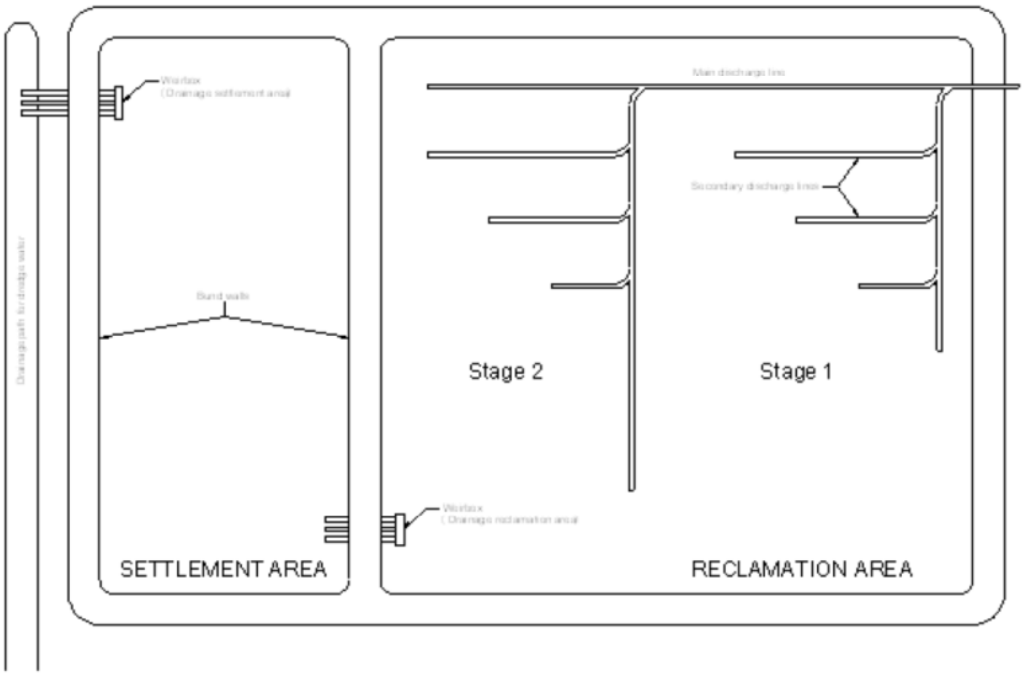


Figure 5.23: Proposed PoBL reclamation area layout.

5.6.2.4 Bund Section

Due to the nature of the reclaimed material, the core reclamation area will not be accessible to vehicles, therefore the bunds, Type 1 – green, should be extra wide to allow for passage of equipment and the installation of branches of the discharge line. The opposite bund, (Type 2 – blue color line), will protect the surrounding lowlands. A height of 2.5m above ground level is foreseen but should be made higher if possible (**Figure 5.24 and Figure 5.25**).

5.6.2.5 The Terminal Area

The topographical and survey chart, shows that the level of the terminal varies between 1 and 1.5m. Initially, a first layer of material will be reclaimed up to +0.5m, from this material new bunds will be constructed to the required height. The height will be determined by the expected settlement of the subsoil in the "pool" and design height (**Figure 5.26** and **Figure 5.27**). Installed across the bund the weir box, as shown below, will control the water and sediment level inside (**Figure 5.28**)



Figure 5.24: Two different sections for the containment bunds (satellite background not to scale): bund type 1 in green and bund type 2 in blue.

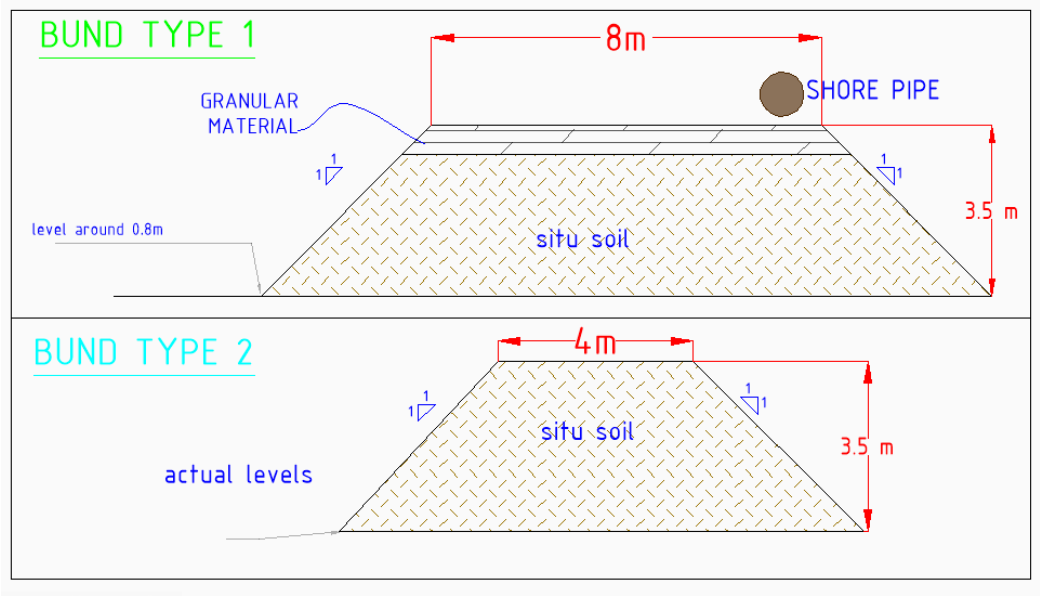


Figure 5.25: Drawing of two different Bund Types for the containment bunds.

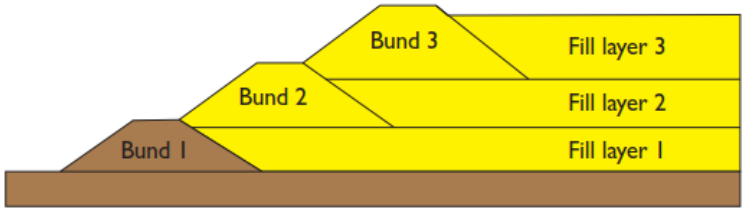


Figure 5.26: raising of bunds in different fill layers

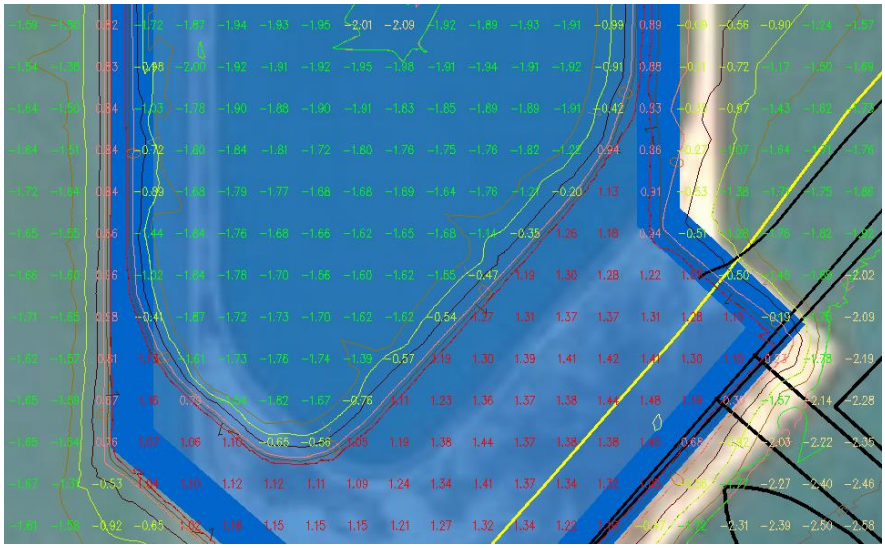


Figure 5.27: Depth Survey Chart of the Terminal Area (in metres).



Figure 5.28: Perforation of the berm for the weir box and outflow pipes.

5.6.2.6 Outflow from the confined settlement ponds

The outflow of process water and unsettled fines will pass through the longest distance into the nearshore disposal area. A weir box is used to control outflow and water levels. Within the reclamation area an additional separation bund will be constructed to close off a settlement area.

Around the nearshore disposal area, two rows of turbidity curtains will contain the fines. **Figure 5.29** shows the typical cross-section of correctly installed turbidity curtain in tidal/moving waters and giving the minimum clearance detail. As the project will take place entirely in a tidal area, a minimum of a 12-inch (30 cm) gap must be maintained between the weighted, lower end and the seabed.

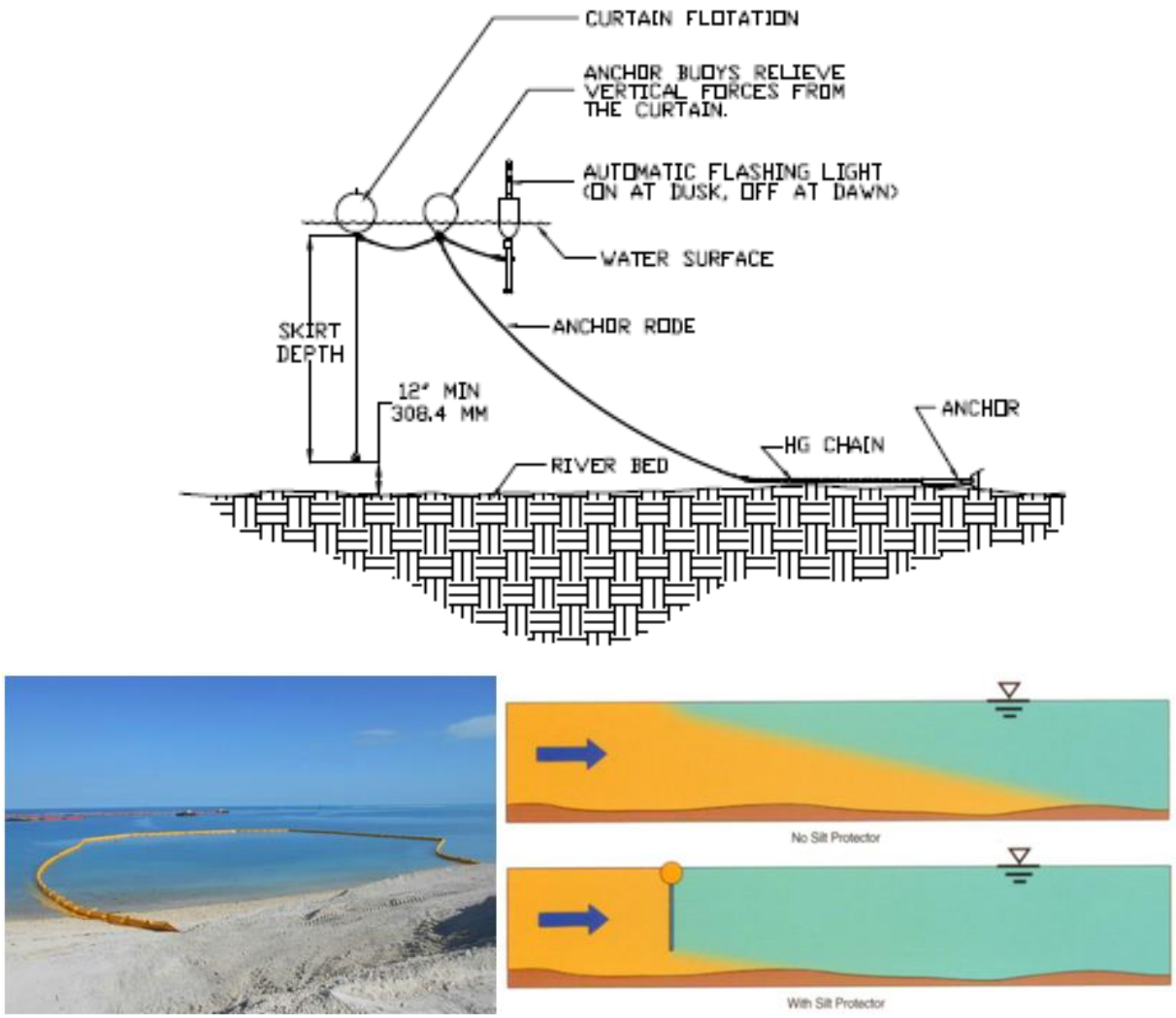


Figure 5.29: Cross-section of correctly installed turbidity curtain in tidal/moving waters, note the minimum clearance detail.

5.6.3 Nearshore Disposal Areas within PoBL Lands

A bund or sea wall using sheet piling will be used to enclose the cargo terminal and new expansion areas of the port. In the EPZ, the height of the bunds due to the subsoil conditions limit the capacity, that can be attained. The level considered is +3 m or +9 ft. (in Belize a minimum height of 5 ft is required in case of storm surge).

The reclaimed material may present bulking challenges depending on soil type. The clayey material destined for the green area, is prone to bulk with factor 2-3 immediately after dredging hence the material will have to undergo lagooning to remove the water over an extended period.

The better-quality materials will be pumped into the blue, orange or green area (see **Figure 5.30**). In case the green area is used for stiff clay, the quality of the discharge water can be easily

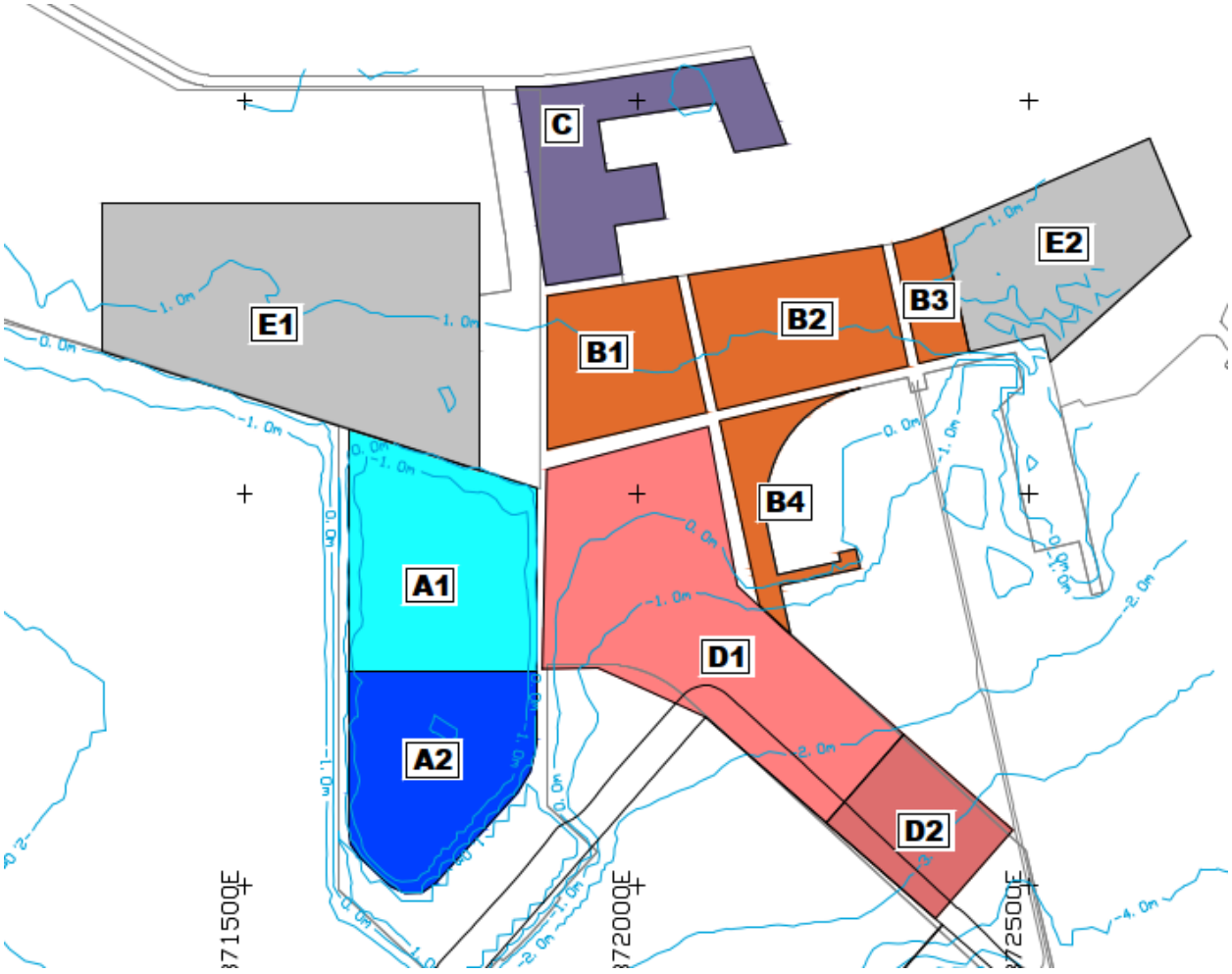


Figure 5.30: Disposal/reclamation areas on shore (Future expansion D1+D2, Cruise Terminal in A1+A2, Port in B4.

managed to limit turbidity. The clayey material will dry out and be transported by trucks to the expansion areas, which are now below the waterline to reach the required volumes of fill

material. Some of this material will be made available to local area residents through a program to be developed with local authorities.

The nearshore area would be completely encircled with floating turbidity curtains rated for coastal deployment. In order to ensure no impact to ambient or down-current water quality it can be chosen either to double the curtain row at the outer perimeter, or divide the inner area in smaller cells formed by geotextile curtains.

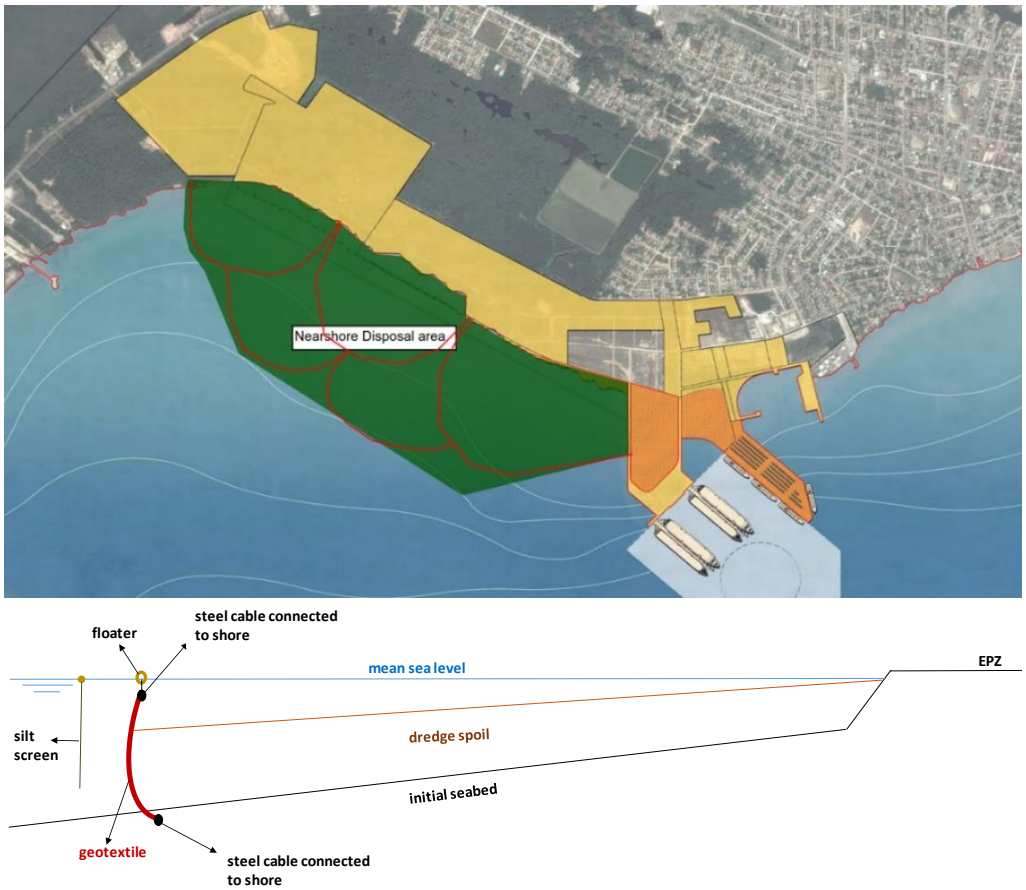


Figure 5.31: Nearshore containment

The perimeter and interior cells of the nearshore site would be encircled by a geotextile, connected to shore via clearly marked steel cables and suspended by floating boom (see **Figure 5.31**). Dredged material will be conveyed to the nearshore placement area via pipeline or through placement by shallow draft, split-hull barges. The nearshore placement site is to remain a marine environment. The top elevation of the containment cells will at all times remain at a minimum of 1m below mean low water. The above methodology will remain unchanged with the proposed alternative.

The nearshore area initially discussed prior to the withdrawal of offshore placement of dredged materials required a footprint of approximately 750 acres. This footprint, at initial calculations, allowed for the placement of up to 2 million m^3 of material. Because this site will now contain more material, the footprint must expand to approximately 1200 acres.

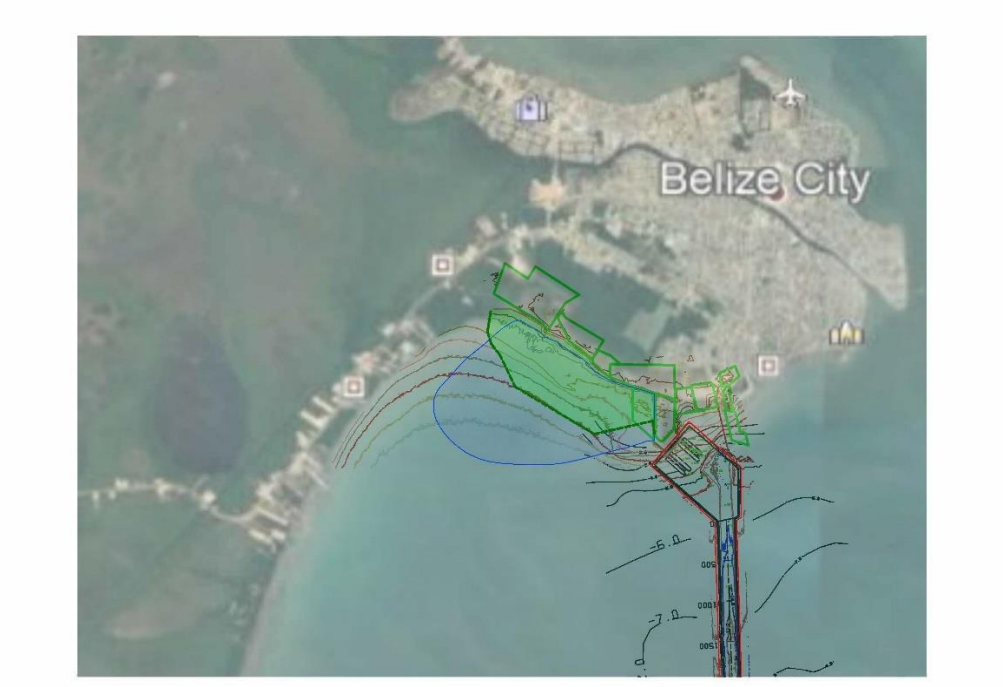


Figure 5.32: Original nearshore site (green) and expanded nearshore site (blue).

The proposed footprint of the expanded nearshore has been optimized to ensure no down current hydrological impact (see **Figure 5.32**). The method for containment and placement remains unchanged.

The existing cargo facility was originally dredged in 2002. The approved 2005 addressed further dredging and reclamation works necessary for the new cruise facility. The area slated for fill in 2002 can be seen in **Figure 5.33**, and **Figure 5.34**.

JDN described the technical aspects of lagooning of unsuitable material in a previous report, however a careful assessment of this option indicates it is very limited. The case for reclaiming all material was analysed and based on the calculations, the onshore disposal of all dredged material was found not to be realistic on the Port of Belize Lands. The use of other wetlands was examined, but the assessment found this to be prohibitively expensive and plagued with many challenges.



Figure 5.33: Area used for disposal of spoil in 2002.

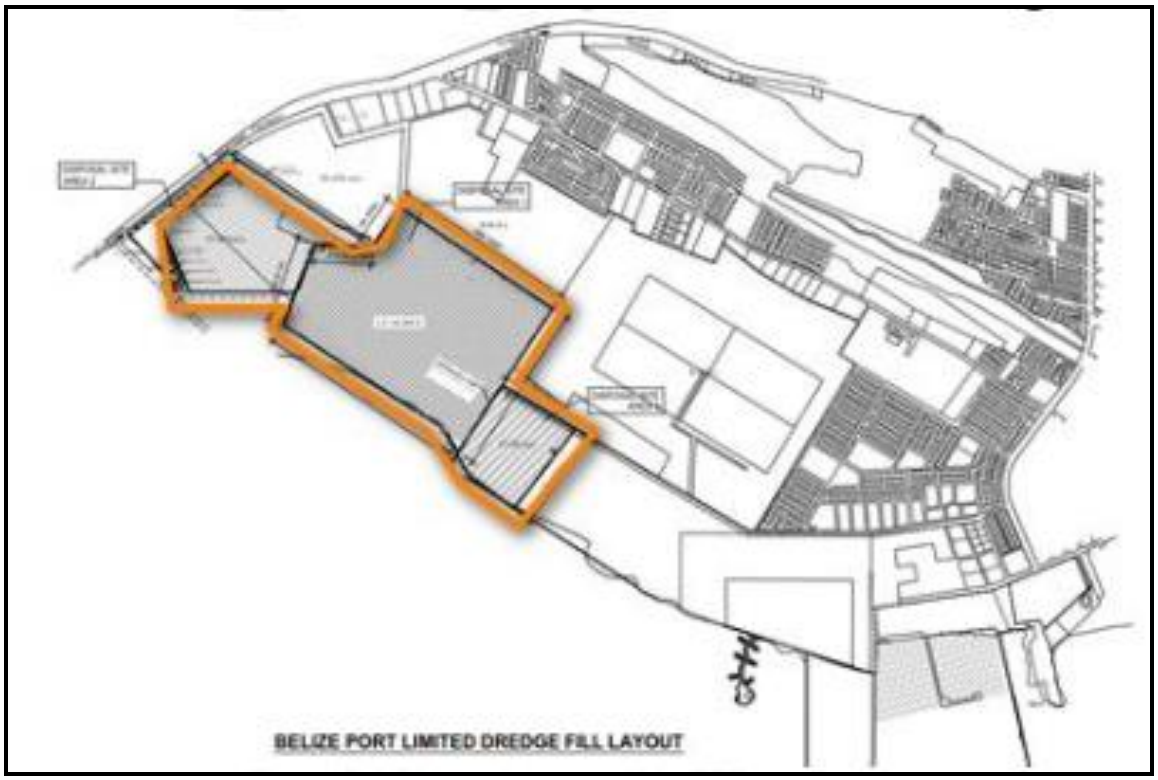


Figure 5.34: Area slated for disposal of spoil in 2005 EIA.

5.6.4 Use of Other Wetlands

As an alternative the marshland, to the west of the project and south of Faber Lagoon has been proposed as a potential disposal area (**Figure 5.35**). However, it was found that the distance along the discharge pipeline of the dredger to this location is approximately 10 km. A combination of floating pipelines and land pipelines would be needed to pump the dredged material onto the onshore disposal site.

This option had several serious constraints. In the first instance the surrounding areas are not easily accessible; therefore, the pipes would have to be installed on the side of the road and will interface with users of the road. The reclamation area itself requires special swamp equipment and no guarantees can be made in regard to the containment bunds and outflow discharge water. The marshland, as a destination for the unsuitable material, was considered cost prohibitive and liable to produce unacceptable environmental and social impacts. In addition, the proposed site would lie next to the Burdon Canal Nature Reserve which would increase the potential for negative impacts to the protected area.

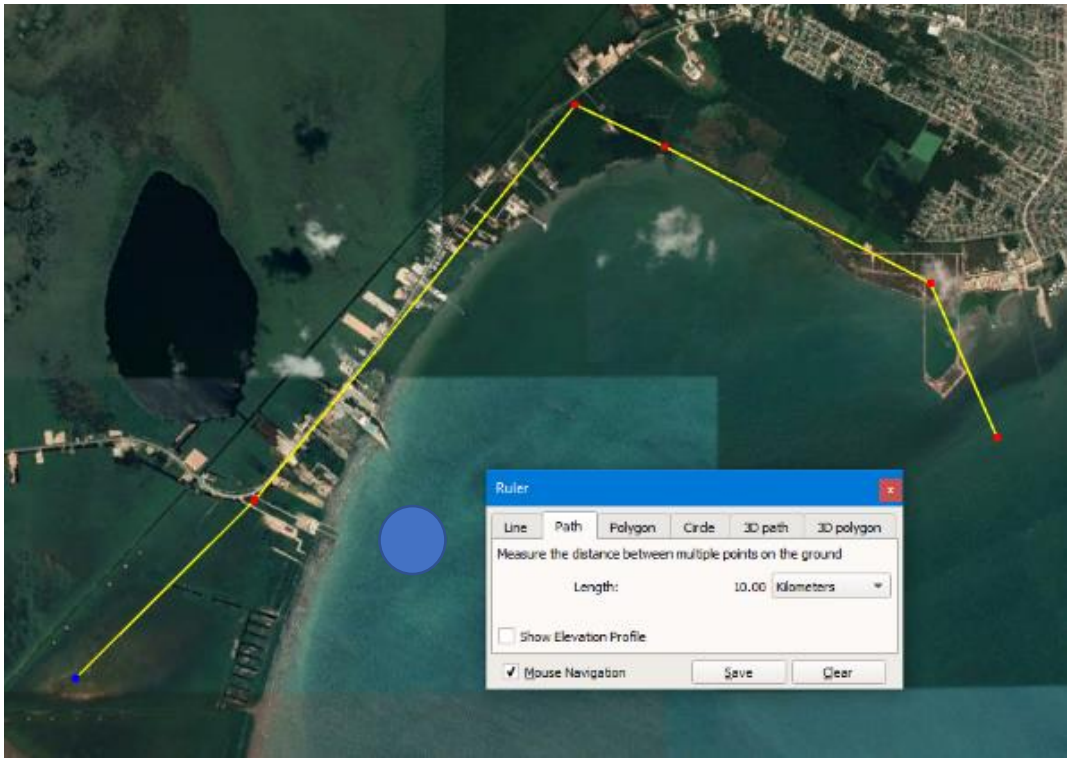


Figure 5.35: Marshland Area considered for disposal of dredge spoils.

5.6.5 Near-Shore Disposal Not Belonging to PoBL

South of the Future expansion area, in the bay, the water is shallow and not used for navigation. The top sediment layer consists of very fine materials and any disturbance (including wave and current motion and propeller action from vessels) brings these fines into suspension causing turbid waters.

For these reasons the area is not attractive to marine flora and fauna and is consequently characterised by a very low diversity and abundance. This is in contrast to the rich coral reefs that border the bay of Belize City on the east. The species that do occur are resilient to turbid water and low water and sediment quality. Due to the poor quality of the habitat and low economic and social importance of the area it is being considered as a potential dredge spoils disposal site.

Two options are available for the delivery of the dredge materials to the site:

- Pump from shore through pipelines into small bund containment with geotextile and install turbidity curtains at the limits;
- Dispose with shallow draught Split Hopper Barges (SHB) directly below waterline.

In case of disposal with SHBs the material will be spread out over an area with depths between 2 and 6 metres. Closer to shore the water is too shallow to navigate.

The concern with this option is the stabilization of sediment after the dredge operations and the removal of the sediment curtain. It is feared that the sediments would still be highly mobile and would become re-suspended very easily causing sedimentation downdrift for an extended duration. To address this concern the options as listed in section 4.4.2 are considered.

5.7 Sediment Analysis

In March of 2018, JDN carried out a site investigation study of the sediments of the project area to be dredged (**Table 5.6**). More detail on the results from the laboratory (Eurofins) can be found in **Annex VII** (BZE-Port Loyola - Lab results sediment quality to the JDN 2018 report). The results are summarized as follows:

1. **Heavy Metals** – Heavy metals in marine sediments may have either a natural or an anthropogenic origin. Concentrations of Heavy Metals found in the samples were in general higher closer to shore and in the access channel. Arsenic, Chromium and Nickel showed higher values, but concentrations stayed below NOAA's PEL level (Canada) as well as Cefas's AL2 levels (UK).
2. **Mineral oil** - The level of mineral oils turned out to be slightly elevated in the turning basin (T1, T2) and near the coast (DA1, DA2). The values vary between 90 mg/kg and 130 mg/kg dry matter. These results are however clearly below the intervention levels for reuse applicable in for example the Netherlands (5,000 mg/kg dm) and Belgium/Flanders (1,500 mg/kg dm).
3. **PAH** - The PAH's were in most cases under the detection limit and in case detected concentrations were very low.

Summary

Because of the volume of material to be dredged and the available area on land, a combination of disposal areas will have to be considered including deep-sea disposal. Material to be dredged contained very low or negligible amounts of heavy metals, mineral oils and polyaromatic hydrocarbons and are well within the acceptable levels for deep-sea disposal as required internationally.

The following summarizes the in-situ volume calculations per destination:

- Onshore: 3,000,000 - 3,500,000 m^3 in-situ
- Nearshore: 4,000,000 - 4,500,000 m^3 in-situ

It must also be considered that 500,000 m^3 extra of over dredge materials by volume is required to reach design level, as there typically are vertical overdredging tolerances related to dredging campaigns.

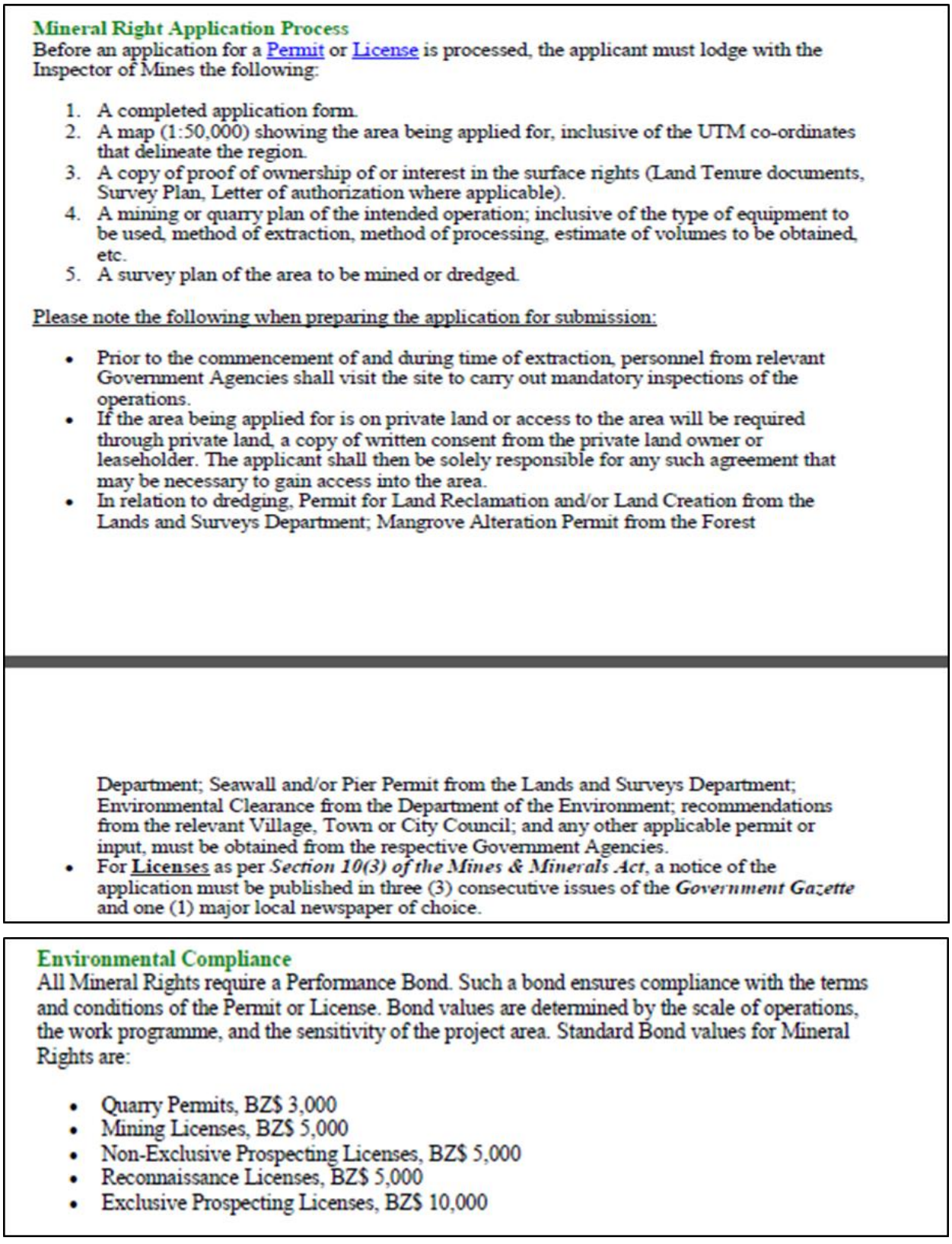
Dredging Legal Requirements

The Mines and Minerals Act, Chapter 226, Substantive Laws of Belize, Revised edition 2003 establishes that the right to all minerals is vested in the Crown. Mineral rights may be obtained for the removal of, use of, disposal, sale or other use of, through an application for a mineral right.

The scope and magnitude of the proposed dredge works would require the application and approval of a Mining License as the volumes to be extracted exceed 16,000 cubic yards and the end use of the material is commercial in nature, all extracted materials are subject to a 3% royalty rate payable per quarter, **Figure 5.36** details the requirements and process for obtaining a Mining License.

Table 5.6: Summary of sediment analysis in the project zone.

		Locations											
Parameter	Unit	AC1	AC2	AC3	AC4	T1	T2	DA1	DA2	RL	ExDA	SA1	SA2
Soil analysis													
Dry matter	% (m/m)	45.7	43.4	44.4	47	28.8	32.2	35.9	41.8	42.4	60	57.1	64.4
Metals													
Arsenic (As)	mg/kg dm	19	13	15	13	14	15	17	19	12	<10	19	<10
Cadmium (Cd)	mg/kg dm	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Chromium (Cr)	mg/kg dm	38	34	41	39	45	44	42	47	35	23	15	14
Cupper (Cu)	mg/kg dm	8.3	5.2	<5.0	6.6	13	11	13	11	5.7	<5.0	<5.0	<5.0
Mercury (Hg)	mg/kg dm	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	<0.10
Nickel (Ni)	mg/kg dm	16	13	16	16	23	18	19	18	15	9.7	5.5	5.8
Lead (Pb)	mg/kg dm	12	<10	12	12	19	15	16	16	10	12	<10	<10
Zinc (Zn)	mg/kg dm	39	32	36	41	51	48	57	49	34	38	13	14
Mineral oil													
Mineral oil (C10-C40)	mg/kg dm	67	83	74	54	96	120	100	130	61	<50	28	<50
Polycyclic Aromatic Hydrocarbon PAH													
PAH (total OVAM (10)K	mg/kg dm	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PAH (total EPA 16)	mg/kg dm	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16



Mineral Right Application Process

Before an application for a Permit or License is processed, the applicant must lodge with the Inspector of Mines the following:

1. A completed application form.
2. A map (1:50,000) showing the area being applied for, inclusive of the UTM co-ordinates that delineate the region.
3. A copy of proof of ownership of or interest in the surface rights (Land Tenure documents, Survey Plan, Letter of authorization where applicable).
4. A mining or quarry plan of the intended operation; inclusive of the type of equipment to be used, method of extraction, method of processing, estimate of volumes to be obtained, etc.
5. A survey plan of the area to be mined or dredged.

Please note the following when preparing the application for submission:

- Prior to the commencement of and during time of extraction, personnel from relevant Government Agencies shall visit the site to carry out mandatory inspections of the operations.
- If the area being applied for is on private land or access to the area will be required through private land, a copy of written consent from the private land owner or leaseholder. The applicant shall then be solely responsible for any such agreement that may be necessary to gain access into the area.
- In relation to dredging, Permit for Land Reclamation and/or Land Creation from the Lands and Surveys Department; Mangrove Alteration Permit from the Forest Department; Seawall and/or Pier Permit from the Lands and Surveys Department; Environmental Clearance from the Department of the Environment; recommendations from the relevant Village, Town or City Council; and any other applicable permit or input, must be obtained from the respective Government Agencies.
- For Licenses as per *Section 10(3) of the Mines & Minerals Act*, a notice of the application must be published in three (3) consecutive issues of the *Government Gazette* and one (1) major local newspaper of choice.

Environmental Compliance

All Mineral Rights require a Performance Bond. Such a bond ensures compliance with the terms and conditions of the Permit or License. Bond values are determined by the scale of operations, the work programme, and the sensitivity of the project area. Standard Bond values for Mineral Rights are:

- Quarry Permits, BZ$ 3,000
- Mining Licenses, BZ$ 5,000
- Non-Exclusive Prospecting Licenses, BZ$ 5,000
- Reconnaissance Licenses, BZ$ 5,000
- Exclusive Prospecting Licenses, BZ$ 10,000

Figure 5.36: Requirements and Process for the award of Mineral Rights.

5.8 Options for Shoreline Protection

The project is not proposing the creation of any beaches however there will be reclamation and/or creation of land for the purposes of the expansion of the Port Facilities, EPZ and Cruise Tourism areas. For the creation or reclamation of the areas to be utilized three main options have been analysed as appropriate stabilization methods; use of interlocking sheet piling (with concrete cap), rock revetments (groins, jetties, wave break) or a combination of sheet piling with an exterior rock revetment to act as wave break. **Figures 5.37 a, b and c** show examples of all three methods.



Figure 5.37a: Interlocking Sheet Piles driven into competent substrate and anchored in order to provide a deeper water section with a vertical wall for berthing or docking.



Figure 5.37b: Rock Revetment used to encircle water body and provide stabilization for fill material.



Figure 5.37c: Sheet Piling with Concrete Cap re-enforced with rip rap on seaward side to act as wave break and shore guard protection.

Preferred Option

The choice of any of the three above hard engineering structures is a function of water depth, cost determinations and intended use of the reclaimed/created area:

- For areas used for berthing and docking the Interlocking Sheet Piles with concrete cap, dead man anchors and steel tie backs would be the preferred option. The area to be used would be enclosed with sheet piles driven into competent substrate first, some sheets would be driven below the water level to act as dewatering gates. Deadman anchors and steel tiebacks would be put in place, then area filled with pumped dredged material, then concrete cap placed once fill material is compact enough.
- For areas requiring just stabilization for useable land mass, Rock Revetments built from rip rap encircling the area to used would be the preferred option. The rock revetment would be built in a similar manner to a groin or jetty, on top of the seafloor, but enclosing the area to be filled (connected back to land or itself), once the structure is in place the interior is filled and water allowed to filter through the interlocking rocks within the sidewalls.
-

5.9 Lands and Survey Department Consultation

One-on-one meetings and interviews were held with representatives of government agencies including the Fisheries Department, Department of the Environment, Mines and Mineral Department, Forestry Department, Lands and Survey Department and Ministry of Tourism). These consultations yielded valuable technical feedback/guidance on issues of concern identified in the TOR as well as the opportunity to show that all major issues were being adequately addressed. This information was shared via PowerPoint presentations followed by a Q&A session.

On March 30th of 2022, the Developer wrote to the Lands and Survey Department detailing a clear description of the future/possible plan, specifically clarifying the following in regard to the placement of dredged materials in the project's nearshore area:

- There will be no land reclamation, the top elevation of the placement area will at all times remain at a minimum of 1m below mean low water levels;
- To accommodate the additional materials, the nearshore area discussed previously is expanded from 750 acres to approximately 1200 acres;
- Full navigability of the designated nearshore area will be maintained with the design depth of the placement area;
- There will be no interference with the project area's hydrology;
- Our modelling and scientific investigations show that no impact to coastal properties will occur;
- There will be no interference with the Port terminal or berth pockets; Geotextiles will be used to ensure all disposed dredged materials will remain in place.

The assessment by our environmental experts indicates that our proposed alternative material management plan will have no adverse environmental or social impacts and all construction and operational activities remain unchanged and within the boundaries of the project area studied

The nearshore area would be completely encircled with floating turbidity curtains rated for coastal deployment. In order to ensure no impact to ambient or down-current water quality it can be chosen either to double the curtain row at the outer perimeter or divide the inner area in smaller cells formed by geotextile curtains.

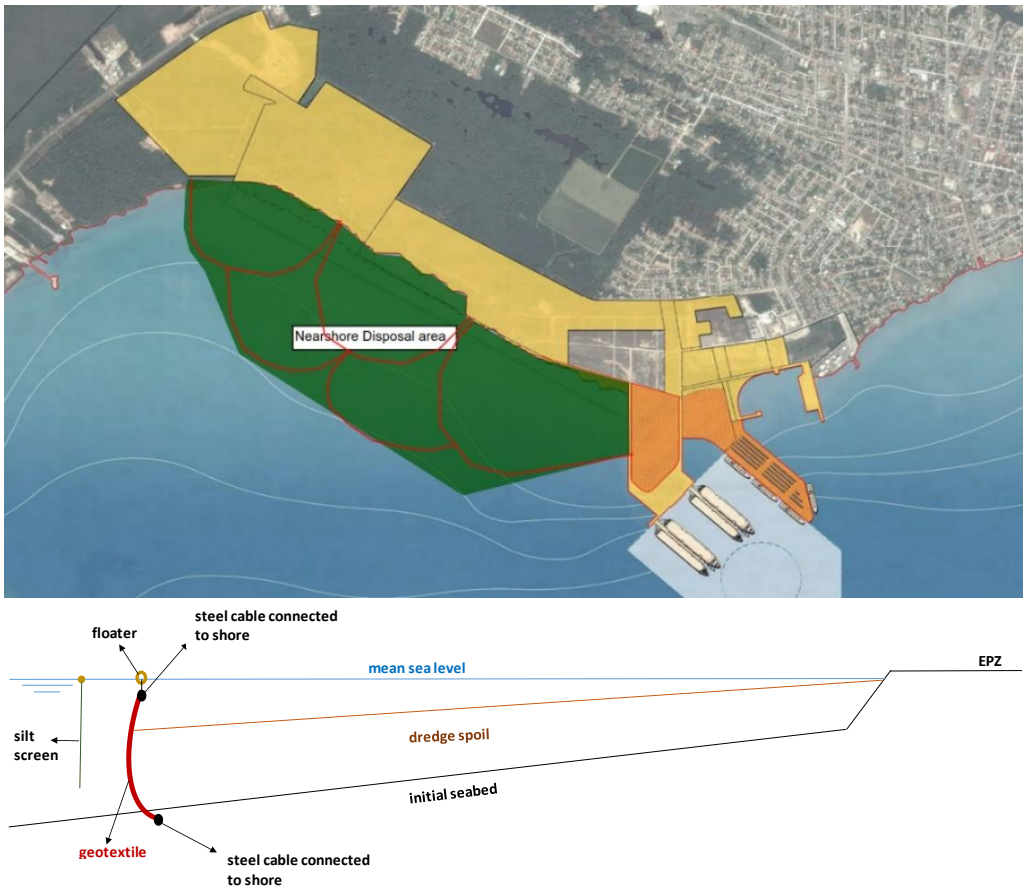


Figure 5.31: Nearshore containment

The perimeter and interior cells of the nearshore site would be encircled by a geotextile, connected to shore via clearly marked steel cables and suspended by floating boom (see **Figure 5.31**).

Dredged material will be conveyed to the nearshore placement area via pipeline or through placement by shallow draft, split-hull barges. The nearshore placement site is to remain a marine environment. The top elevation of the containment cells will at all times remain at a minimum of 1m below mean low water. The above methodology will remain unchanged with the proposed alternative.

The nearshore area initially discussed prior to the withdrawal of offshore placement of dredged materials required a footprint of approximately 750 acres. This footprint, at initial calculations, allowed for the placement of up to 2 million m^3 of material. Because this site will now contain more material, the footprint must expand to approximately 1200 acres.

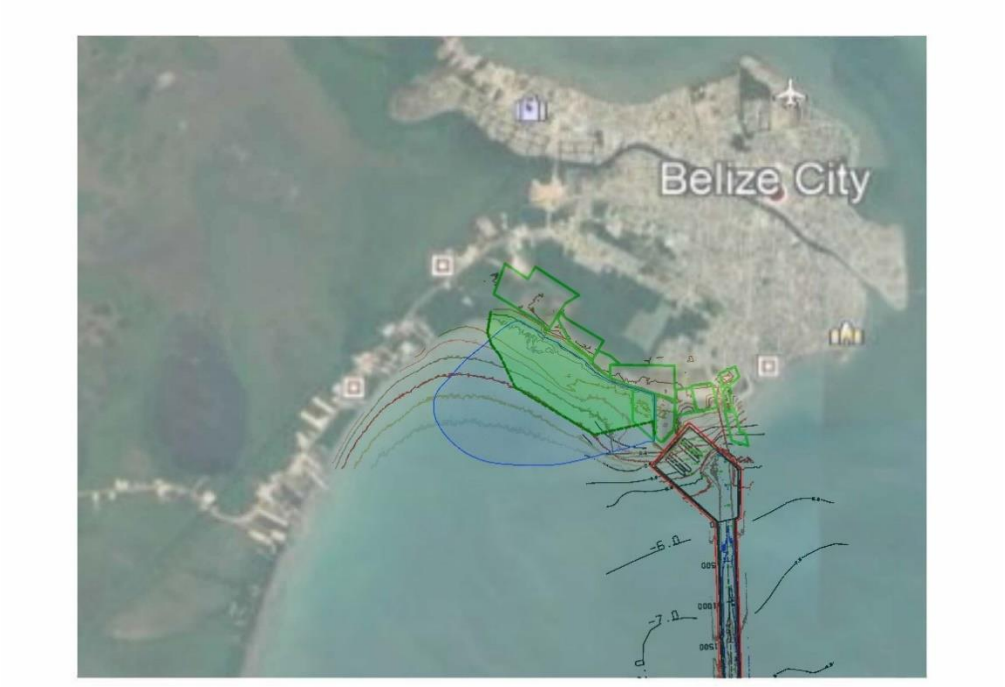


Figure 5.32: Original nearshore site (green) and expanded nearshore site (blue).

The proposed footprint of the expanded nearshore has been optimized to ensure no down current hydrological impact (see **Figure 5.32**). The method for containment and placement remains unchanged.

Furthermore, the Developer offered to make the team of technical and environmental experts available fora virtual meeting with the Lands and Survey Department, affording an opportunity to discuss any permitting requirements and answer any questions the Department might have. A copy of the letter as delivered on April 2nd, 2022, is attached in **Annex XIV**

CHAPTER 6: IMPACTS TO FLORA AND FAUNA

6.1 Introduction

The baseline data, methodologies and field investigation results for flora and fauna are addressed in **Chapter 2, Section 3.8** which looks at the prevailing baseline conditions in the project area. The ecosystem including the flora and the fauna of the project area has the potential to be negatively impacted by the proposed developmental activities. It is believed that direct and indirect impacts to the ecosystems of the project area will be those associated with impacts related to the dredging activities viz:

1. The site preparation activities related to the dewatering sites for the onshore disposal of dredged materials,
2. land reclamation and
3. The nearshore disposal of the unusable dredged material.

The primary impacts arising directly from these three main activities have been ameliorated to a great extent by the fact that most of dredging footprint is occurring in area previously heavily subjected to dredging and hence already heavily disturbed. This included dredging in 2002 with the dewatering site completely cleared in 2004 in preparation for the deepening of the channel as was proposed in the 2005 ESIA. These earlier dredging operations disturbed existing marine and terrestrial ecosystem resulting in current very low species abundance. .

6.2 Impacts and Mitigation Measures

The proposed development will cause disturbance to both the marine and terrestrial project sites. None of the terrestrial sites that make up the project footprint are virgin lands and the entirety of the contemplated project construction activities including the marine areas will take place on areas previously disturbed.

The development's terrestrial uplands will be used for dredged material management and land reclamation for vertical construction of both the cruise tourism village and an expanded cargo operation. The marine areas will be composed of a nearshore material disposal site just to the south of the Project's uplands and the berthing and navigational features, which will be sited in the existing channel and turn basin footprint. All of the above sites were cleared or otherwise disturbed during a previous dredging campaign at the port and accordingly show extremely low biodiversity and species abundance.

Terrestrial sites forming a part of the development include the Dredged Material Management Area, Belize Light Industry and Logistics Center, the Belize Cruise Center area, and the Port of Belize Trade Center. Both the Cruise and Trade Centers will incorporate existing uplands and shallow land reclamation.

Marine sites forming a part of the development include the Near Shore dredge material placement area, the Berthing Area, the Cruise/Cargo turning basin, and the Navigation Channel. All of these sites except the Near Shore area sited in the location of the current Port of Belize navigational features. **Table 6.1** summarizes the approximate area of each site noted in the above narrative.

Table 6.1: Estimated approximate marine and terrestrial area that will be disturbed.

TERRESTRIAL SITES:	
Dredged Material Management Area	378.8 Acres
Belize Light Industry and Logistics Center	10.9 Acres
Belize Cruise Center	40.3 Acres
Port of Belize Trade Center	67.2 Acres
Subtotal	**497.2 Acres**
MARINE SITES:	
Nearshore Dredged Material Placement Area	370.0 Acres
Berthing Area	75.0 Acres
Turning Basin	163.0 Acres
Navigation Channel	352.0 Acres
Subtotal	**960 Acres**

It should be noted that both the Cruise Center and Trade Center sites will be made up of current terrestrial project sites, or reclaimed wetlands or shallow sea-bottom. These were included in the terrestrial sites for ease of presentation.

6.2.1 Dredging Impacts to Marine Ecosystem

The mitigation measures range from definitive physical interventions to procedural matters. Physical measures immediately related to the dredging and reclamation activities are largely focused on containing and arresting the sediment plume arising from the excavation activities and the subsequent conveyance of the dredged spoils to the reclamation site (See **Table 6.2**).

The land-based containment of the dredged spoils entailed earthen bunds fitted with baffles to slow the speed of the influent slurry and in effect precipitate more of the spoils before the effluent stream was returned to the sea (See **Table 6.2**). The sea-based containment of the dredged spoils will be realized through the deployment of a geotextile barrier. Turbidity curtains will be deployed outside of seaward of this barrier.

Turbidity curtains will also be deployed in the nearshore areas of the land-based reclamation site to ameliorate and arrest the turbid influences of the effluent stream. Procedural interventions will include water quality monitoring, particularly turbidity, as well as inspection of the couplings of the spoils discharge pipes. Other monitoring measures relate to navigational aids including markers and running lights for boat traffic (See **Table 6.2**).

The sea floor is made up of muddy and very fine sediments that is easily re-suspended with minimum mechanical movement. This is especially evident in near shore areas such as near the docking facilities and the turning basin. The lifeforms in the area consisted primarily of a layer of colonial diatoms and cyanobacteria over the surface of the muddy bottom giving it a dark brownish to red coloration. Apart from these life forms, no other organisms were observed as part of the benthos environment.

Biodiversity in the project area is very low due to heavy sedimentation and siltation in the area. Light penetration is limited and any potential organism that may grow in this environment is smothered by the heavy silt. Additionally, the soft muddy environment in not suitable for attachment of sessile organisms that grow in benthic environments. A few bi-valves, such as clam and oysters were found living deep in the mud. Based on these observations it is reasonable to assert that both the direct impact from dredging and the indirect impacts associated with the projected increase in turbidity would be negligible due to prevailing background conditions.

The area west of the main channel and near Robinson point was found to have the highest biodiversity in the area. The area is 35 feet deep in the area nearest to the channel and have the characteristics of a poorly developed Gorgonian reef. Constant and heavy sedimentation is evident, and some benthic algae appear dead due to smothering from sediments. Skeletal remains of hermatypic corals were also observed in this area.

At shallower depths *Thalassia testudinum* is dominant and cover most of the benthic substrate. Greater care and attention will need to be given when dredging in this area. The secondary impacts associated with a potential increase of turbidity in the water column would be temporary in nature.

Impacts: The dredging impacts to the marine environment relates to the actual dredging or excavation activity itself, the deposition of the dredged spoils on the areas to be reclaimed, and the nearshoredisposal of the flocculent clays and silt or ‘fines’ that would be unsuitable for reclamation.

The main impacts to marine habitats, flora and fauna are related to sedimentation and turbidity influences. These influences or variables can impact the seafloor or benthos, as well as the water column or pelagic environment. In the case of the latter it affects water quality, in particular issues such as dissolved oxygen (DO) and temperature as dead and decaying organisms and organic debris accumulate on the seafloor, the decomposing activities by aerobic bacteria strips the water column of dissolved oxygen, resulting in decreased DO.

Potential impacts to the seafloor may range from damage and destruction to habitats in the area immediately affected by the dredging of the seafloor, to the smothering or blanketing of the seafloor by re-deposited dredged factions downstream of the dredging activity. The turbidity influences of suspended solids in the water column has the effect of impeding and arresting photosynthesis resulting in declining primary and secondary productivity. This has negative implications for both vertebrate fish-life and invertebrates, as well as plant-life in the area.

The most severe impacts are expected to be at the excavation site itself. This impact has been classified as 'Major' (See **Table 6.2**). This categorization has been assigned given the volume of dredged materials that will be removed. It should be noted however that this impact is 'localized' and is confined to the pre-existing shipping channel that was previously excavated in 2005.

The mechanical removal or dredging of the seafloor is expected to affect epi-fauna such as sea cucumbers, as well as in-fauna such as tube worms and clams (See **Table 6.2**). These fauna are not expected to be in abundance given the degraded state of the environment from the previous dredging event in 2005. It should also be noted that this type of fauna are not of importance to traditional commercial or subsistence fishers.

The other impacts have been categorized as being either moderate or minor. This includes the downstream impacts associated with the 'blanketing' of sediments and the sedimentation and turbidity impacts associated with the de-watering of the dredged spoils (See **Table 6.2**). This 'moderate' ranking has been in large measure to the ecological nature and status of the receiving environment. In relation to the latter – the habitat and ecosystems in the area of influence of the project are in a relatively poor state of health. This is a function of the effects of the aforementioned dredging event in 2005.

In regards to the ecological nature of the area: The ecology is a mosaic of habitat in the inner and mid-longitude of the southern barrier lagoon. These habitat include: gorgonia stands, degraded and fossilized coral outcrops, bare mud and sandy bottom, compacted pavement areas, punctuated by macro-algal stands and seagrass meadows. Much of the latter two are characterized by sparse or low density coverage or biomass. In general, the habitat in the area is of relatively low productivity and diversity, compared to habitats on the eastern margins of the barrier lagoon and the reef crest and backreef areas.

Apart from the immediate ecological issues – the other impact that has been addressed is in regards to navigation (See **Table 6.2**). It should be noted that the impacts associated with navigational safety relates to both the dredging and conveyance of dredged spoil to the reclamation sites,. This function has been assessed in the 'moderate deleterious' category. This is a function of the overall scope of the project.

It needs to be noted that there are positive ecological impacts to the project. This is associated with the FAD effect of the pylons supporting the piers or trestle ways. This is a function of the volume and diversity of fish attracted to the area which is of interest to fishers.'

The long-term impact to fishes and fisheries is assessed as beneficial due to the creation of additional pelagic habitat and a migratory route as a consequence of excavating the access channel and turning basin.

Mitigation Measures

The Developer will use 'Turbidity curtains', around the effluent return areas. The operation will ensure that the curtain is deployed per the manufacturer's instruction. The curtains will be monitored and where necessary faulty couplings will be immediately repaired or replaced. Turbidity will be monitored in the vicinity of the dredging sites and also at a reference location that is unaffected by the works (to be identified during the baseline monitoring campaign).

Monitoring will be executed before the start of the works, during the dredging works and upon completion. Furthermore, mobile turbidity monitoring will also be done near the sensitive environmental receptors that are located closest to the dredging and/or reclamation site (see **Chapter 5 Section 5.6**).

Table 6.2: Dredging impacts and mitigation.

Location	Primary or Direct Impacts	Indirect or Residual Impacts	Severity of Impacts		Geographic Scope			Mitigation
			Mag. & Dir.	Time Frame & Rev.	L	R	N	
CONSTRUCTION PHASE								
Borrow Site or Excavation channel	Physical or mechanical removal of the seafloor	Habitat damage and loss for in-fauna and sedentary and slow-moving epi-fauna such as tube worms, clams, and sea cucumbers.	Maj & -ve	LT & N/Rev	√			Monitoring spoil discharge pipes to ensure that there are no leakages along its path including couplings which should be repaired or replaced as the case may require.
		Smothering or 'blanketing' of benthic habitat and sessile and slow-moving invertebrates in the vicinity of the dredging	Mod & -ve	LT & N/Rev		√		Moderate impact of re-suspension of sediments by suction dredging re-deposited component on a recurrent and daily basis. Define and implement turbidity monitoring programme to ensure that irradiance or penetration of light is at least 25% of it value at the surface 2,000 ft downstream of the turbidity curtains Harvesting and offsite deposition of flocculent clay silt and other 'fines' offsite in the deep ocean away from sensitive ecologies
		Decrease in dissolved oxygen in the water column leading to physiological stress and possible demise of slow-moving and sessile organisms	Mod & -ve	LT & N/Rev		√		Completion of dredging operations in as short a timeframe as possible
Reclamation and dewatering site	Sedimentation and turbidity influences associated with the de-watering	Sedimentation and turbidity influences blanketing nearshore ecologies, impeding photosynthesis leading to decreases in primary and	Mod & -ve	MT & N/Rev	√			Installation of baffles in spoil impoundment bunds to slow influent stream velocity and enhance precipitation of solids at reclamation sites Deployment of turbidity curtains in the

	effluent stream	secondary productivity and in general the abundance and diversity of flora and fauna in the nearshore environment						nearshore adjacent the reclamation sites
Navigational hazard	Anchorage of the dredge, spoil discharge pipes and transportation of dredged fines to dispoal sites creates possibilities for collision at sea incidents	Injury, death, damage to property and the environment from collision at sea incidents	Mod & -ve	MT & N/Rev		√		Ensure that navigational lights and marker buoys are deployed and activated in and around the dredge, spoils discharge pipes, and that marker buoys are large, brightly colored and lights marking the dredge and path of the spoils discharge pipes lit between 6:00 PM to 6:00 AM on a daily basis.
								Ensure that the vessel transporting dredged material to be placed on the seafloor observed all navigational protocol consistent with national navigational laws and protocols including the use of sea lanes and keeping running light appropriately installed and functional at all times.
								Develop and implement public awareness programme on the existence of the dredging operation and the need for the public to proceed with caution in the area of operation, as well as informing on the existence of the transportation arrangements associated with the disposal of the 'fines'.
OPERATIONAL PHASE								
Reclaimed area	FAD Effect of support pylon of piers or trestle way, as well as colonization of seawalls, rip-rap and other hard surfaces by macro-alga,	The Fish Attracting Device (FAD) of pylons or piles in the water column, and the mini-ecosystems sets up on said piles and other hard surfaces will significantly enhance fish biomass and diversity in the area creating opportunities for sports fishers, as well as subsistence and commercial	Mod & +ve	LT & N/Rev	√			

	sponges, gorgonians, hydrozoans, tunicates and other attached invertebrates	fishers						

KEY:

- **Headings**

Mag. & Dir. = Magnitude and Direction Rev. = Reversible N/Rev. = Not Reversible L = Local R = Regional N = National

- **Narrative**

Maj. = Major Mod. = Moderate Min = Minor -ve = Negative +ve = Positive LT = Long Term M = Medium Term ST = Short Term

6.2.2 Impacts to Terrestrial Ecosystem

Based on the projected quantity of dredge material, approximately 7.5 million m^3, there is the need to dispose of some of these on the remaining low-lying areas belonging to the PoBL. This area had been completely cleared in 2002 (**Figure 6.1**) and surrounded by a berm contributing to the prevailing conditions noted in the terrestrial ecosystems survey. The impacts usually associated with land preparation for its use as a dewatering site which entails vegetation clearance and the construction of drains and berms is greatly reduced to the occurrence of these activities earlier.



Figure 6.1: Area completely cleared and filled in 2002.

Some of the vegetation has regrown requiring the removal of approximately 19.5 hectares of secondary growth. The clearance of this vegetation will lead to even lower bird and wildlife populations in the area.

Little natural vegetation cover remains and according to the terrestrial survey is largely restricted to a mix of mixed mangrove scrub and basin mangrove in the western portion of the property. Much of the remainder of the property is now a heavily impacted scrubland with isolated pockets of regenerating buttonwood and black mangrove on the coastal strip.

The survey also reported that “the reclaimed land area of the property is an inhospitable environment for most species of amphibian and reptile” and terrestrial mammals. Whilst the regenerating vegetation provides habitats that could be colonized by a number of species, intermittent fires would have devastating impacts on any such colonists. These areas can

therefore be considered as largely devoid of significant populations of herptiles and mammals. Even bird abundance in the area had decreased with changes in the area's ecosystem since the 2005 ESIA.

Whilst the property is not considered critical to any species of wildlife, the long-term trend of land development in the surrounding landscape and associated habitat loss has cumulative impacts on many of them and can result in decreasing species diversity and avian abundance in the immediate area.

The cumulative impact of clearing the remaining secondary regrowth is classified as minor and irreversible. This will be mitigated through the landscaping activities considered for the green belt intended to act as a visual barrier separating the activities in the cargo terminal from those of the cruise ship terminal. Additional, landscaping of the new boulevard and other area coupled with the shoreline replanting of mangroves will provide habitat for birds and small wildlife species serving as an added attraction for visitors to the area.

6.2.3 Impacts of Land Reclamation of Nearshore Areas

The area that is considered for land reclamation has no sensitive ecosystems based on the baseline data gathered by JDN in 2018 and that of BET. The area is muddy and only has algae and bacteria (**See Figure 6.2**). The deposition of the material in the area however needs to be.

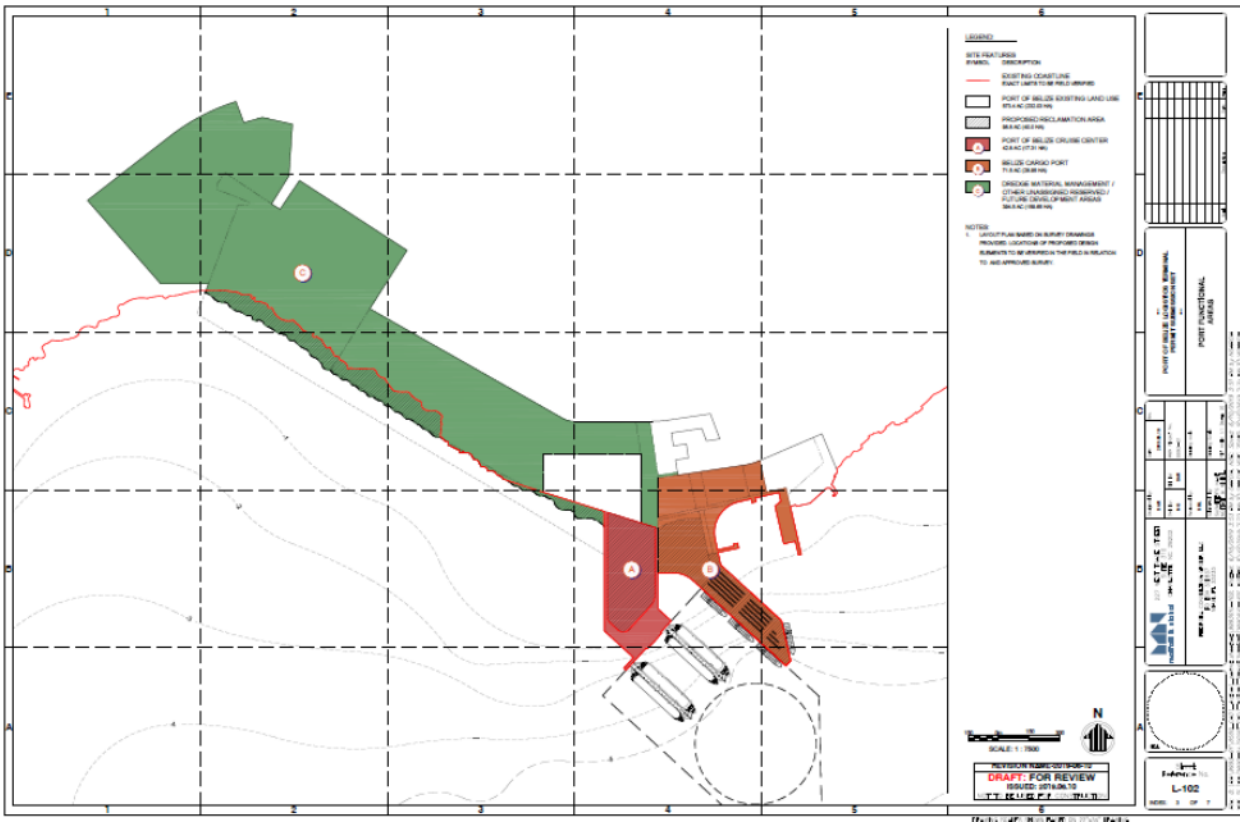


Figure 6.2: Land Reclamatione area to be filled labelled A and B.

contained so that it does not cause excessive sedimentation in areas downstream from the deposition site. The impacts from this activity are assessed as minor and irreversible

6.2.4 Potential Beneficial Wildlife Effects

The impacts on wildlife are those relating to the modification and alteration of habitat, as well as the introduction of non-natural conditions that would modify the behaviour of animals. The elimination of wetlands in the project area, will lead to those species that would be associated with these habitats to be affected. However, due to the fact that the area has already been cleared, and all flora on the site is secondary and, in some cases, tertiary growth, the impact is drastically reduced. Thus, the primary impacts in regard to the 'decrease in wetlands' is classified as minor to moderate.

One of the other wildlife related impact is in regard to the 'increase in wildlife and birds that tend to thrive in urban settings. The commissioning and operating of the Belize Cruise Terminal and other aspects of the development brings with it the increased availability of feed for wild animals in the form of discards. These species would include raccoons, opossums, possibly coatis, and a number of scavenging, opportunistic and predatory birds such as the Herring Gull (*Larus argentatus*) and the Grackle (*Quiscalus mexicanus*) (2005 Port EIA). Pests such as rats could also be a problem. The impact of these is expected to have a moderate primary impact.

6.2.5 Other Potential Impacts

The potential for water logging and ponding associated with the dewatering of dredged material and its impact on drainage could create additional habitat for mosquitoes with a subsequent increase of mosquito borne diseases such as malaria and dengue impacting residents in the immediate project area. This will be mitigated by ensuring proper drainage in the project area and a pest control program.

6.3 Conservation Issues

The conservation issues of the proposed development would relate to both threatened and endangered species as well as protected areas management.

The conservation species of significance that may be adversely impacted by the proposed implementation activities and operational phase of the project is the West Indian manatee. The ecosystems survey indicated that "any increase in fast boat traffic through these near-shore waters will exacerbate the already critical situation faced by the subpopulation of manatees living in, or traversing, them." It recommended as mitigation measure "the establishment of strictly enforced no-wake zones for any new boat activity within 2.5 km of the shoreline or cayes in this area (Walker, P. pers. obs.)." Negative impacts on the dolphin population from increased boat activity associated with the development, are therefore assessed as likely to be far lower than on the manatee sub-population. The following measures will be implemented to safeguard

the manatee populations

Boating procedures – Boat operators and tour guides usually work for independent tour operators and will not come directly under the PoBL management structures. Notwithstanding this, they will be provided with the following best practices which were developed by Sea to Shore Alliance and will be required to adopt them as a condition of their contract agreement:

- To the extent possible tour boats should stay in the deep water channels, however operators should be aware that manatees also use deep water channels when travelling.
- If feasible tour boats should avoid passing over sea grass beds and shallow areas where manatees might be feeding.
- If manatees are spotted, the operator should maintain a minimum safe separation distance of 20m. bearing in mind that other manatees including calves may be in the area.
- Boats should not travel over an area where a manatee was recently spotted as they might surface to breathe.
- Operators should be aware that manatees usually flee shallow waters for the channel on the approach of a boat where they might end up running into another boat.
- If there are several boats on a tour they should travel in well-spaced single file along a single well-defined route. This reduces the risk that manatees fleeing from one boat would run into another.
- Boat operators should look out for mating herds and take evasive action.
- If it is intended to observe manatees the boat operator should cut his motor.
- While traveling through areas frequented by manatee a lookout should be posted at the bow.
- The operator should obey posted speed zone and no wake signs.
- Visitors should not be allowed to pet or touch manatees even when this practice increases visitor appreciation.
- All workers, employees, boat captains and guides should know that harassing these animals in any form is illegal.
- Report anyone found to be boating dangerously or any practice found to be detrimental to the area's manatee population.

A full Manatee Management Plan will be produced before the project enters its operational phase. In case of dead or injured manatee the following organizations will be contacted:

Organization	Contact Information

Sea to Shore Alliance	**501-615-3838**
Belize Forest Department	**501-822-1524**

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CHAPTER 7: WATER RESOURCES

7.1 Water Resources

This section provides an overview of potable water management that the Development will undertake to address potential environmental impacts associated with water use. Access to a constant supply of potable water is an essential support service required for the development to operate successfully.

Chapter 3.3.1 addresses water quality in detail as part of the environmental baseline data, and **Annex IX** presents the drinking water quality baseline data collected in 2019. **Figure 7.1** below provides an abstract of the baseline data included in **Annex IX**, with **Table 2.29** offering the accompanying GPS coordinates of the sample sites:

Figure 7.1: Baseline Water Quality Data from 2019

NATIONAL DRINKING WATER QUALITY MONITORING PROGRAM
Chemical Data Sheet
Public Health Bureau

Sampler's Name: Mr Rancharan Date Sample(s) Collected: 11.4.2019

District: _____ Date Sample(s) Analysed: 12.4.2019

Indicate by ticking, the type of sample: ☐ Routine ☐ x Special ☐ Repeat

Was sample(s) sent with ice packs or ice ☐ x Yes ☐ No Was sample received cold ☐ x Yes ☐ No

Bottle #	Description of sampling location	Time Collected am pm	Nitrate-N (mg/l)	Sulfate (mg/l)	Phosphate (mg/l)	Turbidity (NTU)	pH				
AC-1			0.9	3,300	0.05	3.29	8.07				
AC-2			0.9	2,900	0.02	2.75	8.28				
AC3-1			0.8	2,800	0.02	1.93	8.29				
AC3-2			0.8	2,700	0.03	2.40	8.31				
RL			0.9	3,100	0.03	1.89	8.31				
T2			0.9	2,800	0.03	7.00	8.29				
DA-1			0.8	2,900	0.02	3.52	8.31				
EXDA			0.8	2,800	0.03	3.08	8.30				

Below this line for laboratory USE ONLY

Name of Analyst A. Flowers

Table 2.28: Dive Sites Locations (*All Projections are WGS-84)*

Point	Latitude	Longitude	Recorded Depth
AC4-1	17°24'14.0" N	88°11'23.2" W	12m
AC4-2	17°23'52.5" N	88°11'58.5" W	7m

AC3-1	17°24'58.8" N	88°11'39.3" W	10m
AC3-2	17°24'56.5" N	88°11'52.1" W	10m
RL	17°27'14.5" N	88°10'43.5" W	10m
DA1	17°28'26.3" N	88°13'16.0" W	5m
T2	17°28'07.3" N	88°12'13.4" W	8m
AC1	17°27'19.1" N	88°11'58.3" W	11m
AC2	17°26'19.3" N	88°12'03.0" W	10m
ExDA	17°27'21.1" N	88°14'26.7" W	5m
SA1	17°22'56.2" N	88°12'19.5" W	10m
SA2	17°22'18.3" N	88°11'12.3" W	6m

Figure 2.30 below presents the location of the water quality sampling points on a map.



Figure 2.30: Water quality sampling points near the Port of Belize.

7.2 Occupancy

The projections show that at maximum capacity approximately 13,500 persons (including visitors and staff) will use the facility**.** The number of transient visitors that utilizing the various amenities and services would vary along with staffing as described below.

The proposed project will include the construction of a number of restaurants and shop units. At full occupancy these would require approximately 250 workers.

7.3 Potable Water Supply

(i) Potable Water Source

Belize Water Services Limited will be the main supplier of potable water. BWSL already supplies the existing Port of Belize facility with all its potable water needs. Over the years it has been a safe and reliable source of potable water for Belize City and its satellite communities. Other supply options were considered including desalinization and rainwater harvesting. **Table 7.1** compares the various potable water supply options. Some options were rejected based on cost and need, however there is the potential that the project will harvest rainwater for use except for human consumption

For human consumption bottled water will be used. Treated wastewater from the wastewater treatment facilities will also be reused on site mainly for the irrigation of lawns and hedgerows. BET preliminary contacts with BWS indicates that the water treatment plant at Double Run has ample capacity to accommodate the 138,150 gpd demands of the project.

(ii) Projected Potable Water Demand

Calculating daily water demand requires that certain assumptions are made in regard to usage.

These assumptions are:

1. The facilities will be used primarily by newer ships carrying around 5,000 cruise ship passengers.

Table 7.1: Selection of the Preferred Water Source for Cruise Ship Terminal.

Option	Rationale	Strategy	Impacts
1-Water Desalinization	Supplement the proposed option and not consume water supply for Belize City Residents	Install a water desalinization plant capable of producing 140,000 gallons of water a day.	Possible salinization of soils due to inappropriate capping of wells, cross contamination etc.

2-Rainwater Harvesting	Harvest rainwater from the seasonal rains thereby reducing the dependency on the proposed method and reducing the overall energy cost.	Construct cisterns as an integral component of the construction of buildings.	Water may not suffice proposed project, cross contamination of potable water sources due to its wide distribution network.
3- BWS (Preferred Option)	Provide affordable potable freshwater to the project.	Utilize the theory of obtaining fresh water from a reliable supplier	Considering the project site, it is quite easy to join in to the main BWS line

2. Only 10% of the crew will disembark the ship
3. Average of 34.3% of cruise ship passengers will prefer to stay on board the ship for numerous reasons. This is supported by Cruise tourism data (Allianz Global Assistance).

It is expected that on average the Port of Belize's cruise tourism facility will require 10 gals/person/day for cruise ship guests and crew, and 15 gals/person/day for staff to give a total of 138,150 gallons per day (gpd) at full capacity **(Table 7.2**) based on maximum daily occupancy rate and demand.

Table 7.2: Water Demand for Cruise Terminal Project.

Type	Description	Occupancy	Person/ unit	Total Volume GPD[1]
A	Passengers	13,140	10	**131,400**
B	Ship Crew	300	10	**3,000**
C	Support Staff	250	15	**3,750**
Estimated Total Daily Water Demand				**138,150**

[1] **GPD = Gallons per day.**

Water will also be needed for operational and maintenance purposes such as washing of equipment, firefighting and irrigation. This will be sourced from recycled water and potable water sources.

(iii) Potable Water Distribution

During the first phase the facility's water distribution pipes will link up to a 6" water main that feeds the port area. Eventually the main line running across the project area will link up to the 14" BWS water main running along the George Price Highway eventually create a loop and avoiding dead ends (**Figure 7.2**).

The water distribution system will consist of mains and valves to distribute water to the different areas of the project site and reduce dead ends in the distribution system. All the distribution system will be pressurized for maximum yield. The system will utilize 150 psi PVC AWWA 900 pipe. To the greatest extent practical, the system will include looping using shut off valves to prevent site wide water loss in the event of a breakage. Where it is not practical to provide looping (places like the remote bathrooms) dead end lines will be used with proper valves. During the final engineering works, fire hydrants will be placed at strategic locations.

7.4 Water Conservation

The proposed project will develop and implement a proper water management plan to address the required water volumes including sourcing and distribution.

The project will develop and implement strict water conservation measures. These measures will include the education of the staff and guests on the importance of water conservation and by the installation of flow reduction devices and engineering controls. Other water conservation strategies will include:

a) Only low flush toilets will be used.

b) All taps will be outfitted with water saving devices.

c) Turn off all taps when not in use including during cleaning.

d) All faucets working properly without leaks.

e) Report immediately any leaking faucets or toilets.

f) Only use phosphate free detergents.

g) Encourage reuse of rinse-water at Laundromats in the first wash cycle.

h) Install meters in the kitchen and Laundromat to track the consumption of water.

i) Implement effective employee training program about water conservation.

Standard water conservation measures will be implemented to reduce water consumption and minimize water loss. These conservation methods will reduce operating cost and conserve energy.

7.5 Users within the zone of influence

An inventory of other users within the zone of influence includes the following users:

a) Artisanal small-scale fisherman
b) Commercial fisherman
c) Boaters transporting people
d) Tour guides

e) Residents further down who travel via water
f) Military

The poor values presented by the background water quality data strongly indicates minimal disturbance to no will be experienced due to the project impacting water quality in the area.

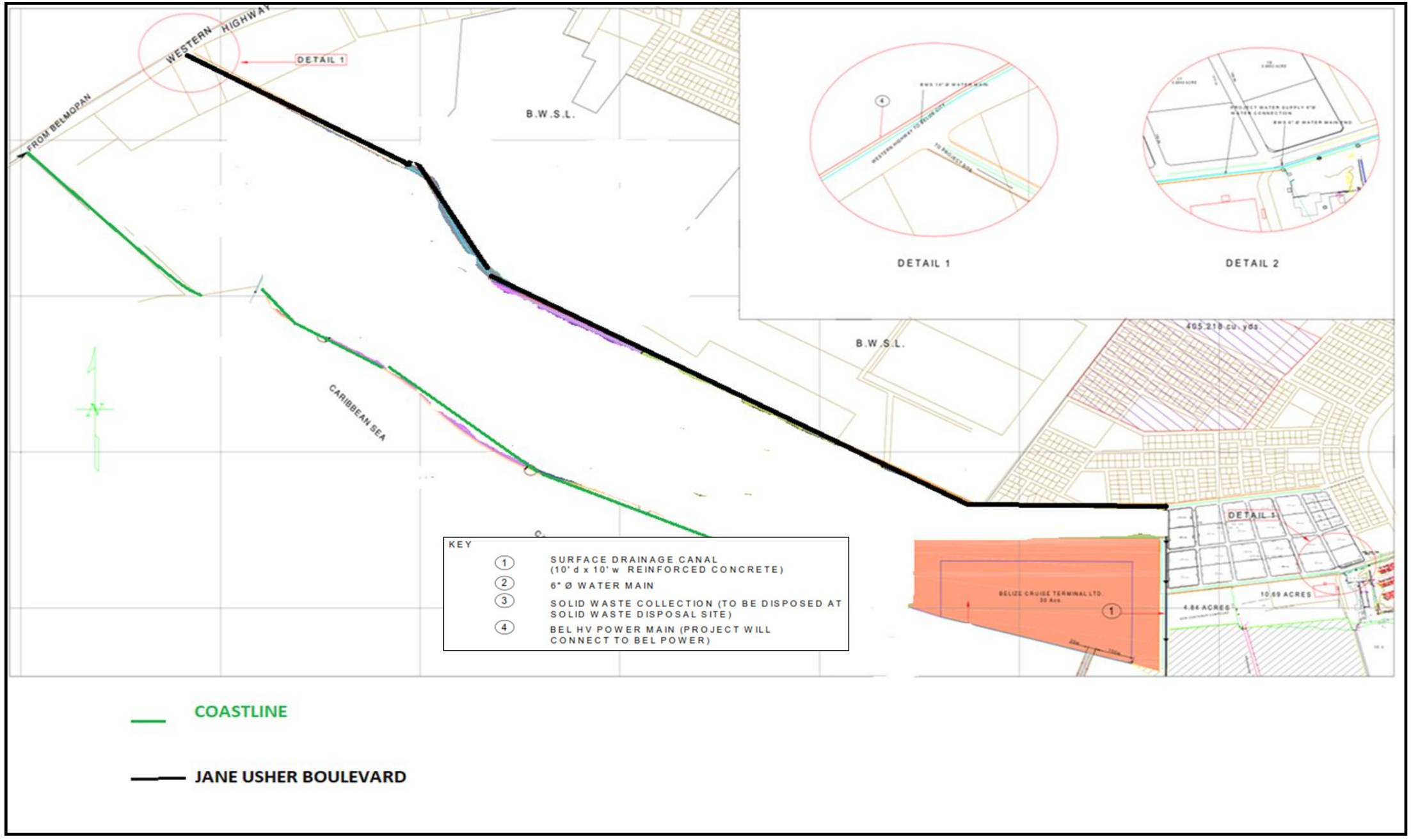


Figure 7.2: Schematic of water supply pipes from BWS to the Cruise Terminal.

CHAPTER 8: WASTEWATER MANAGEMENT

8.1 Introduction

This section provides an overview of the wastewater management process that the Development will undertake to address the potential environmental impacts associated with water use. Potential development alternatives are examined to determine the best treatment option available.

Wastewater treatment is a process used to remove contaminants from wastewater and convert it into an effluent that can be returned to the water cycle with minimum impact on the environment, or directly reused. In this regard, it is anticipated that the wastewater generated by Port of Belize will be comprised of sewage waste from the use of public facilities, cruise ship bilge wastewater and grey waters. The latter will be generated from the hospitality areas of the project.

8.2 Constituents

Wastewater constituents are characterized in terms of their physical, chemical and biological composition. **Table 8.1** provides a summary of the typical domestic wastewater composition that is expected to be generated by the visiting cruise ship passengers, service providers and support staff. Determining wastewater composition is important in determining the design features of the selected wastewater treatment.

It must be noted that the project also includes the expansion of the cargo ship docking bay trestle, which means that more ships will be calling into port. The composition of the wastewater generated by the cruise port facility is expected to fall into the weak domestic effluent category based on the nature of the project.

Table 8.1: Composition of untreated wastewater.

Constituent	Weak	Medium	Strong
Alkalinity	50	100	200
BOD	100	200	300
COD	240	500	150
Total Suspended Solids TSS	100	200	350
Total Dissolved Solids TDS	200	500	1,000
Total Organic Carbon TOC	75	150	300
Total phosphorus	5	10	20

8.3 National Effluent Limitations Standards

The Department of the Environment is the competent authority to enforce the Environmental Protection (Effluent Limitation) Regulations that are intended to control and monitor discharges

of effluent into any inland or marine environment. The regulation and its amendment is divided into three schedules with the last schedule further divided into Class I and Class II waters. The set of parameters and its discharge concentrations must be complied with in order to mitigate any environmental degradation of the receiving environment. It is expected that the chosen wastewater treatment option meets and exceeds the discharge levels set forth in the Effluent Limitation Regulation.

8.4 Wastewater Management Plan

The following summarize the wastewater management plan for the proposed cruise tourism development and docking facility.

8.4.1 Wastewater Production

The production of wastewater by the project will consist primarily of black and grey water produced by the cruise ship passengers, the crew and support staff. Cruise ship passengers are expected to generate the highest volumes which will vary depending on the number of ship arrivals. Calculating the volume of wastewater produced by the project requires making certain assumptions that will then be used in assisting in the overall wastewater treatment and collection design.

These assumptions are:

1. Wastewater production is normally calculated using the environmental engineering standard of between 70% to 80% of total water demand).
2. Cruise tourism data show that the average cruise ship passenger generates between 40 to 50 gallons of wastewater per day or 2 gallons per hour average on board the ship. This equates to 7 gallons per day based on a 4-hour cycle period (ABC Tourism CIC).
3. The chemical composition of the wastewater will remain the same and the parameters for BOD, COD, NH^3-N, and suspended solids should be used to portray the main wastewater characteristics.

With these assumptions in mind, **Table 8.2** summarizes the wastewater volumes generated from the different sources. It is estimated that the Port of Belize project will generate about 95,580 gallons of wastewater per day at full occupancy during the operational phase. Knowing the expected volume of waste water that will be produced is important when designing the treatment and collection system. A much smaller treatment system than the volume calculation indicates is recommended due to the fluctuation of the production percentages at different times of the day, site occupancy and project activity.

Table 8.2: Estimated Wastewater Production Volumes.

Type	Unit Description	Occupancy	Units (gpd)	Total Volume (gpd)

A	Cruise ship passengers	13,140	7	91,980
B	Cruise ship crew	300	7	2,100
C	Support Staff	250	10	2,500
	Total	**13,690**		**95,580**

8.4.2 Wastewater Loading

It is anticipated that the project will generate loadings as follows. TSS at 36.1 kg/day, BOD_5 at 36.1kg per day and 27.1kg/day for TOC, and 1.8 kg/day for Phosphorus (**Table 8.3**). These loadings are typical rates that any treatment system will have to deal with to reduce the concentrations to acceptable levels. The pH of the waste will be in the range of 6.5 to 8.5, with a majority being slightly on the alkaline side at 7.0.

There are several feasible and environmentally friendly technologies available to treat the wastewater to an acceptable disposal standard in line with the Effluent Limitation Regulations of Belize.

Table 8.3: Project Domestic Wastewater Profile.

Constituent	Weak	Daily Load
Alkalinity	50	18.1
BOD	100	36.1
COD	240	86.7
Total Suspended Solids TSS	100	36.1
Total Dissolved Solids TDS	200	72.3
Total Organic Carbon TOC	75	27.1
Total phosphorus	5	1.8

8.4.3 Wastewater Collection and Treatment System

Collection systems collect the generated wastewater and carry the waste as either dissolved or suspended solids from the different areas of the project site and convey it to the wastewater treatment plant. The wastewater collection system must be properly designed and constructed to provide a water velocity of 2.5 feet per second. Velocities which are too high or too low can be detrimental to the operation and maintenance of the collection system. The collection system conveys the wastewater and the solids to a treatment plant where the pollutants are removed before the treated wastewater is discharged to the environment.

Collection systems are complex networks that include the following components:

1. Service laterals which connects the residential/commercial entities to the gravity sewer,
2. Gravity sewers in which flow is conveyed by gravity,
3. Force Mains in which the flow is conveyed via a pump station,
4. Pump Stations and pumping equipment,
5. Special structures such as manholes, valves, vaults, meter stations, diversion structures and siphons,
6. Treatment plant facility that will receive the wastewater and treat if prior to disposal.

It is expected that the project's wastewater collection and treatment system will include these components. Lift stations or pumping stations as shown in the **Figure 8.1** will move the wastewater from the different gravity sewers and service laterals to the treatment plant.

Inspection chambers or manholes which will connect the gravity mains will be placed at strategic locations where necessary based on the development layout or where required as per the master plan's final design. A 1% slope will be given to the service laterals and gravity sewers because the topographical contour is basically flat. The service laterals will consist of 4"- 6" PVC materials with recommended clean outs for easy service due to blocking or collapse. Gravity sewers will be 6" PVC and of a similar slope.

The pumping stations and pumping equipment will be strategically located to move the wastewater towards the treatment plant. The stations will consist of both a dry and wet well with the respective pumps and valve assemblages. Pump station automation can be achieved with electronic level sensors, float valves and alarms. **Figure 8.1** depicts typical sites where such stations are commonly placed.

Figure 8.1 shows three (3) options for the placement of the Utility Zone (UZ). The best option is Option 1, and the placement of the plant is shown in **Figure 8.2**. This allows any excess effluent to be conveniently directed to the effluent drain of the BWSL Sewer Ponds. In addition, since this area is in the Utility Zone, it will reduce the noise pollution in regards to generator noise etc. on the residents on the other side of Jane Usher Boulevard. It will also make it easier for deliveries to be made to the UZ by having an entrance and an exit direct to Jane Usher Boulevard reducing the bulk delivery traffic within the confines of the facility

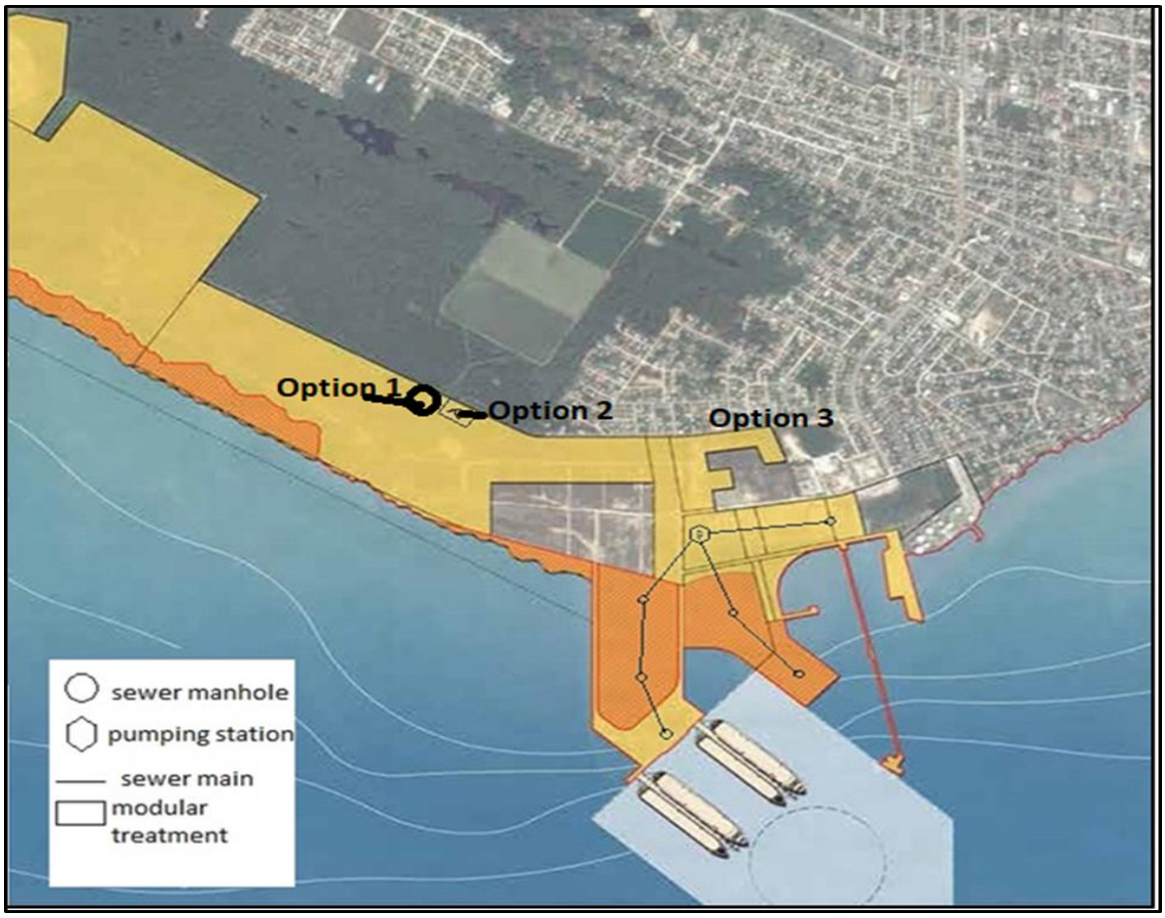


Figure 8.1: Schematic Concept of proposed sewer collection network.

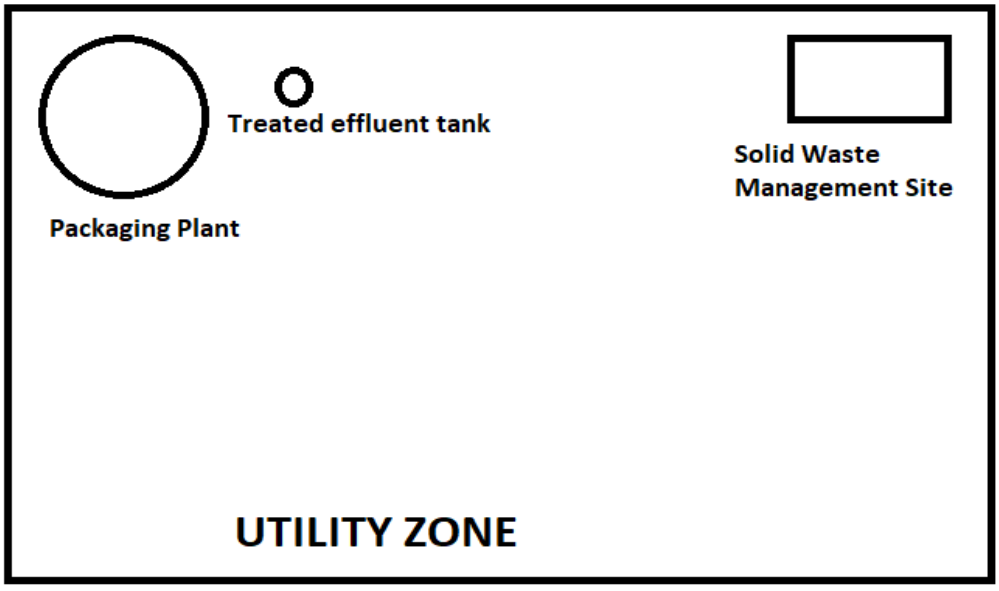


Figure 8.2: Layout of Utility Zone in reference to Packaging Plant and effluent tank location.

8.4.4 Wastewater Treatment Options

There are many different types of wastewater treatment plants which could be used to treat the wastewater produced at the site (**Table 8.4**). The alternatives presented below are all available options that can treat the projected volumes and constituents in the wastewater flow at the site.

Option # 1 "Extended Aeration".

These are often referred to as activated sludge treatment for treating sewage or industrial wastewaters using aeration and a biological floc composed of bacteria and protozoa. The general arrangement of an activated sludge process for removing effluent loading includes the following main features:

Table 8.4: Wastewater Treatment Options.

Component	Option #1 & Justifications (Chosen Option)	Option #2 & Justifications	Option #3 & Justifications
Wastewater Treatment	Installation of SBR Treatment Technology: • SBRs can consistently perform nitrification as well as denitrification and phosphorous removal. • Significant reductions in nitrate nitrogen can occur by incorporating an anoxic cycle in the system. • SBRs can be manned part time from remote locations. • Systems require less space than extended aeration plants of equal capacity. • SBRs have little operation and maintenance problems, but high-power consumption.	Installation of Extended Aeration System • EAS plants do not achieve denitrification or phosphorus removal without additional unit processes. • Flexibility is limited to adapt to changing effluent requirements resulting from regulatory changes. • A longer aeration period requires more energy. • Systems require a larger amount of space and tankage than other "higher rate" processes, which have shorter aeration detention times.	Installation of Trickling Filters • Additional treatment may be needed to meet more stringent discharge standards. • Possible accumulation of excess biomass that cannot retain an aerobic condition and can impair TF performance • Requires regular operator attention. • Incidence of clogging is relatively high.
Reclaimed water reuse	• High reuse potential for non-potable uses including firefighting and irrigation.	• High reuse potential for non- potable uses including firefighting and irrigation	• Medium reuse potential based on water quality.

- An aeration tank where air (or oxygen) is injected in the mixed liquor.
- A settling tank (usually referred to as "final clarifier" or "secondary settling tank") to allow the biological flocs (the sludge blanket) to settle, thus separating the biological sludge from the clear treated water.

Option # 2 "Sequencing Batch Reactors" (SBRs).

Package SBRs are typically manufactured to treat wastewater flow rates between 0.01 and 0.2 million gallons per day (MGD); although flow rates can vary based on the system and manufacturer. All biological treatment phases occur in a single tank as a fill and draw or batch process. SBR systems contain either two or more reactor tanks that are operated in parallel, or one equalization tank and one reactor tank. The type of tank used depends on the wastewater flow characteristics (e.g. high or low volume) and the site and wastewater characteristics.

Option # 3 "Trickling Filters".

A trickling filter is a type of wastewater treatment system consisting of a fixed bed of media over which wastewater flows downward and causes a layer of microbial slime (biofilm) to grow, covering the bed of media. Aerobic conditions are maintained by splashing, diffusion, or by forced-air flowing through the bed. Typically, sewage flow enters at a high level and flows through the primary settlement tank. The supernatant from the tank flows into a dosing device which delivers flow to the arms of the filter. The flush of water flows through the arms and exits through a series of holes pointing at an angle downwards. The system is followed by a clarifier for the separation and removal of the sloughed film.

8.4.4.1 The Preferred Treatment Option

Based on the information provided on the options above, the Port of Belize project will invest in an SBR type package treatment plant. The high level of treatment that such a system offers particularly for the removal of nitrogenous and phosphorus waste from the effluent and the relevant location of the project is the deciding factor. Although it has higher power consumption the SBR system has the following advantages:

1. High effluent quality; reduces main pollutants including ammonia by 96%, and reduces phosphates by 88%,
2. SBR operates on a storage and batching system storing the effluent at peak times in the PST and treating it in small batches throughout the rest of the day – thereby ensuring that each batch receives the full treatment time eliminating peak surges,
3. There are no moving parts or electrical components within the tank. All functions within the tank are operated by air power generated by a small compressor/ blower,
4. The process is simplified since all the unit processes are operated in a single tank. As a result, a final sedimentation tank and return activated sludge pumping are not required,

5. Operation is flexible; nutrient removal can be accomplished by operational changes,
6. Compact facility with systems requiring less space (small footprint) than extended aeration plants-of equal capacity.
7. The system allows for automatic and positive control of mixed liquor suspended solids (MLSS) concentration and solids retention time (SRT) through the use of sludge wasting.

The treatment system or wastewater treatment plant (WWTP) selected for the project will be located at the mid-portion of the property as shown in **Figure 8.1** and will require an area of about 1 to 1.5 acres of land at full capacity. The treatment system will be modular in design allowing it to be sized initially to accommodate the small flows of the project then expanded to its final capacity.

8.4.4.2 Reclaimed Water

Reclaimed water is the terminology used to describe the reuse of treated wastewater. The preferred treatment system is expected to produce quality disinfected treated water for which three alternatives is being considered for disposal.

1. The first alternative is to recycle the effluent for irrigation purposes. In this option the treated effluent will be stored in holding tanks where it will be pumped to an irrigation system to irrigate the green areas, lawns, and hedgerows. Unfortunately, this option will only use up a portion of the treated effluent.
2. The second disposal alternative will be to connect into the disposal canal the Belize Water Services Uses to dispose of their wastewater for which an agreement with BWS will be needed.
3. Another option would be to select and construct a site where the treated effluent can be disposed.

All of these alternatives are considered environmentally friendly (**Table 8.5**) and will not pose any long-term impacts to the receiving environment. It is important to note that the treated wastewater is expected to be of excellent quality that will meet and exceed the present DOE standards.

Table 8.5: Wastewater Alternative Uses.

Wastewater	Purpose	Description
	Irrigation	Lawns, hedgerows, shrubs etc.
	Fire Fighting	Fire combating (Optional)
	Other	Non-potable uses

8.5 Wastewater Impacts

Wastewater effluents are major contributors to a variety of water pollution problems. Owing to lack of, or improper wastewater treatment facilities, wastewater containing domestic and industrial wastes, are often released into surface waters resulting in pollution which degrades the receiving water body and results in extensive ecological degradation including decline in water quality and availability, loss of species, and changes in the distribution and structure of the aquatic biota.

The release of raw and improperly treated wastewater onto water courses has both short and long-term effects on the environment and human health. It is expected that there will be proper enforcement of water and environmental laws at the site to protect the health of the receiving surface water bodies.

The potential wastewater impacts associated the project are nutrient enrichment or eutrophication and fecal coliform contamination of the receiving environment. The main source of nutrients (phosphates and nitrates) will be from sewage and grey water. Since all effluents are to be conveyed from their source(s) of origin via underground pipes to the wastewater treatment plant no nutrient enrichment is expected to affect the sea or other receiving water body from 'point sources'.

The SBR system that will be used to treat the wastewater will reduce macronutrients to levels where they do not pose a threat to the environment: In this regard effluent quality includes Ammonia <1 mg/l, Total Nitrogen < 10 mg/l and Phosphorus 2-3 mg/l.

Although the Port of Belize will release treated effluents via the existing BWS canal it will in no way magnify any of the problems associated with the existing BWS system if any due to the quality of the treatment in the SBR system.

The potential risks from fecal coliform contamination is a non-issue given the efficiency of the SBR wastewater treatment system hence the proposed project should in no way add to or exacerbate the situation. The impact from fecal coliforms has therefore been evaluated as minor adverse.

8.6 Wastewater Mitigation Measures

Although the project is major in scope, nutrient pollution should not be an issue of concern given the fact that no untreated sewage effluent is destined for any open water body.

The primary impacts associated with human wastes effluents are eutrophic or nutrient enrichment, increases in the risks of pathogenic diseases, increases in BOD and suspended solids. The mitigative responses to these impacts include the application of the SBR treatment system along with the reuse of a portion of the treated effluents for irrigation purposes (**Table 8.6**). It is also noteworthy to point out that some of the effluents from the wastewater plant will be recycled in an irrigation scheme for lawns and reserve areas.

Table 8.6: Mitigation Measures for wastewater impacts.

Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
Human Waste and Domestic Effluents	1a. Nutrient enrichment from the dispersal of nutrients into the environment.	1a1. Stimulus to the aquatic environment, include: increase in phytoplankton, seagrass, macroalgae and the intertidal mangroves.	1a1a. Installation of SBR Sewer Treatment Technology to convert wastes to 'Tertiary' Levels, where Total Nitrogen Loads are reduced to less than 10 mg/l and Phosphorus are reduced to 2-3mg/l.
			1a1b. Reduce discharge going into the environment by recycling treated effluent for irrigation purposes.
	1b. Pathogenic microbes that can negatively impact human health and marine mammals, especially to recreational areas down the coast	1b1. Infection of humans and marine mammals such as dolphins/manatees with pathogenic viruses and bacteria.	1b1a. Thorough disinfection of effluents potentially going into water column or otherwise recycling of the treated effluent for irrigation purposes.
			1b1b. Reduction of effluents going into the environment by recycling and reuse of treated effluents
	1c. Suspended Solids from undissolved components of human waste and domestic effluents.	1c1. Suspended solids would impede light penetration in the sea and erode or arrest photosynthesis.	1c1a. Application of treatment system to reduce TSS to less than 10mg/l: This in combination with effluent recycling to reduce suspended solids in the water column to insignificant levels.
	1d. Sedimentation associated with settlement of flocculent faction of human waste and domestic effluents.	1d1. Blanketing of benthos or sea floor, resulting in the suffocation of slow moving and sedentary invertebrates.	1d1a. Application of treatment system to reduce TSS to less than 10 mg/l: This in combination with effluent recycling to reduce suspended solids in the water column
	1e. Increase in BOD substances and consequent reduction in dissolved oxygen.	1e1. Precipitation of physiological stress and in extreme circumstances death in relation to sessile and slow moving marine invertebrates.	1e1a. Application of treatment system to reduce BOD to less than 10 mg/l: This in combination with effluent recycling to reduce BOD to insignificant levels in the water column.

CHAPTER 9: SOLID WASTE MANAGEMENT

9.1 Introduction

Solid Waste Management is defined as the "control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economics, aesthetic, engineering and other environmental considerations".

In its general scope, solid waste management can include complex inter-disciplinary relations with the relevant authorities including Public Health, DOE and Solid Waste Management Authority (SWaMA) as well as the contractors necessary to carry out the management activities.

It is expected that there will be onsite solid waste generation by the transient cruise ship visitors, the on-site support staff. Although full occupancy at the site is not expected most of the time, it is recommended that the solid waste management program be able to cope with the highest theoretical occupancy rate which is estimated to be up to 13,690 persons on the site.

The volume of waste generated by this level of use and among such a diverse group can include waste products in all classification classes. For this reason, the project will be required to develop and implement a proper Waste Management Plan produced as a Manual aimed at identifying the waste streams and offering environmentally responsible disposal alternatives. It is important to note that at no time will any International Waste from the cruise ships be handled and treated by the project.

9.2 Waste Management Manual

The Port of Belize project will develop a Waste Management Manual detailing the overall responsibility for the waste management at the port (including collection and treatment of waste and compliance with national regulations). If during the operational phase waste handling and disposal is contracted (outsourced) to an external waste operator it is the obligation of the project managers to ensure, that the waste operator complies with all existing national regulations, the Environmental Compliance Plan for this project and other important clauses specified in his contract agreement. The Port of Belize will update the Manual each time it is changed or amended and distribute the revised version to relevant stakeholders in and outside the port.

An important aspect of Solid Waste Management plan will be to prevent disposal of potentially hazardous waste illegally into the sea. This is a pervasive problem oftentimes involving ships and the ports they visit. It stems from unsatisfactory waste handling and/or illegal dumping due to inefficient waste management operations, lack of oversight control, recovery systems and inefficient information flow. The International Convention for the Prevention of Pollution from

Ships, MARPOL 73/78, and European Council Directive provide an international framework on management of ship and port wastes.

9.3 Waste Classification

The waste produced by the project will be classified according to three basic categories. These categories include the following:

1) Construction and Field Waste (Waste category 1)
2) Domestic Waste (Waste category 2)
3) Commercial Waste (Waste category 3)
4) International Waste (Waste category 4)

It is anticipated that these categories will cover all the solid waste generated by the project. Any waste management system adopted must have the inherent flexibility and ability to cope with these waste categories.

9.3.1 Construction and Field Waste

The main objective of Solid Waste Management (SWM) is to reduce the amount of waste produced on construction sites by setting out how building materials, and any resulting waste, will be managed during a project. The plan is then updated during the construction process to record and confirm how materials are reused, recycled or disposed of.

Activities during the construction phase will include land preparation including land clearing, demarcation and topographical contouring and levelling. Within this realm, the environmental impacts would be moderate but considering that the project has been previously cleared and prepared, it is expected that the environmental impact in relation to field waste would be very minimal.

Construction waste streams will come mainly from the construction of commercial establishments (**Figure 9.1**) including tourist visitation centers along with any ancillary buildings needed to provide entertainment. Normally it is estimated that between 5-10% of the building materials used on construction sites is eventually discarded as waste.

Construction waste will consist of wood, panel boards, insulation, nails, electrical wiring, and rebar. The bulk of construction waste is made up of broken concrete blocks, bricks, concrete masonry and leftover wood products either damaged or unused for various reasons during construction.

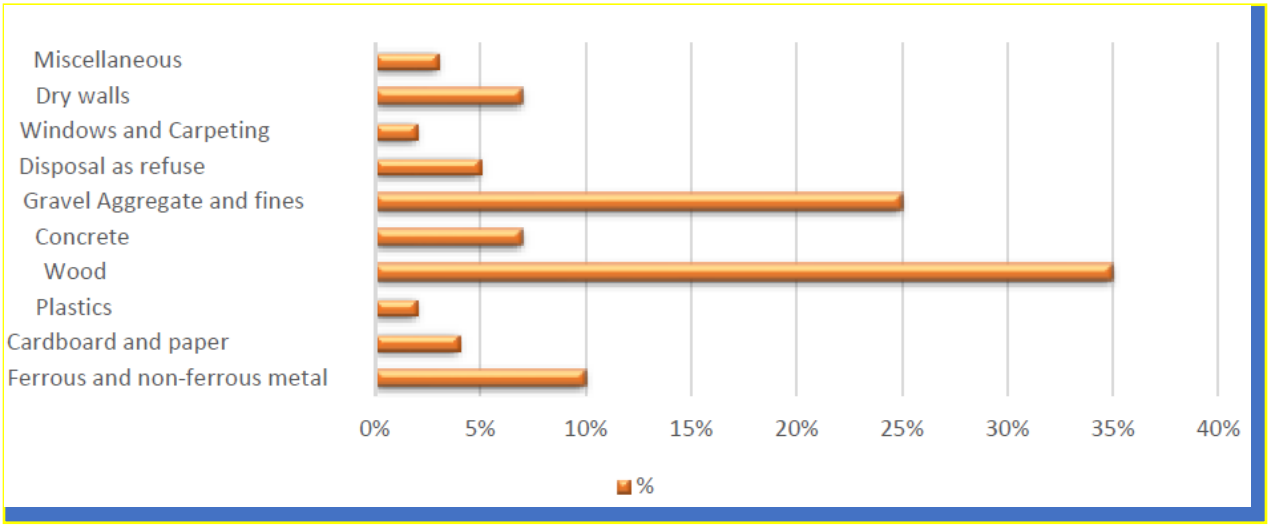


Figure 9.1: Construction Waste Material Distribution.
Adapted from WBDG (Tom Napier)

9.3.2 Domestic Waste

Waste produced in this category will accrue mainly during the operational phase and will constitute the highest volume of any type of waste produced by the project. It is difficult to estimate how much waste will be produced per person by staff and cruise ship passenger due to lack of available data, however it is well known that certain categories of tourists consume far more processed goods, cleaning products and disposable goods than the average Belizean.

It is expected that the average cruise ship passenger will be generating less solid waste than tourist at typical Belizean tourism destination since the Port of Belize site will only be used as a transit point to other inland or island destinations. For this assessment, the domestic waste generated by the average cruise ship passenger and crew is estimated at 1 lb/day and 3.0 lbs/day for the staff corresponding to the national average.

Table 9.1 shows that the solid waste generated by the project per day will be approximately 14,190 lbs/day (14.190 yd^3) or 70,950 lbs/week based on 100 % occupancy, however this can be influenced by the number of port calls, rate of disembarkation, tour destinations and weather.

Table 9.1: Estimated Solid Waste Production.

Type		Unit Description	Occupancy	Production (lbs/day)	Total Volume Production
A		Cruise ship passengers	13,140	1	13,140
B		Cruise ship crew	300	1	300
C		Support Staff	250	3	750
		Total	**13,690**		**14,190**

9.3.3 Commercial Waste

Commercial waste will be generated during the operational phase and is expected to constitute the smallest solid waste volume. Commercial waste will be generated during maintenance and repair activities and will include discarded electronic equipment, clothing, straps, pallets, hydrocarbon waste etc.

9.3.4 International Waste

According to the MARPOL 73/78 Convention signed between Belize and the IMO, international waste is classified as waste generated from cruise ships during their voyage to Belize and which has also not been serviced at any Belizean port. MARPOL classifies the international waste into the following groupings based on the handling and treatment/disposal methods to be used:

- Annex I - Oils;
- Annex II - Noxious Liquid Substances carried in Bulk;
- Annex III - Harmful Substances carried in Packaged Form;
- Annex IV - Sewage;
- Annex V - Garbage;
- Annex VI - Air Pollution.

Under the MARPOL Convention it is unlawful for any vessel to dispose of solid waste into the sea or coastal lagoons. Based on MARPOL guidelines for Annex I-VI Waste, the Port of Belize project will not have the necessary Waste Reception Facilities (WRF) to receive such waste. The Port of Belize will look into the possibility of having proper WRF to at least be able to accept Annex V waste.

As a result of not having adequate WRF as per the Marpol Convention the project site will not be receiving international waste from vessels until the proper WRF is attained. Because of this, the Port of Belize will not be required to provide the necessary facilities for the collection, transportation and disposal of solid waste generated by international water vessels. This will continue in effect until the Port of Belize has met the standards required under the MARPOL Guidelines and International Maritime Organization (IMO) Guidelines that it has the proper WRF to be able to accept waste, in the Annex 1-V category.

9.4 Waste Management Strategies

The Solid Waste Management Plan focuses primarily on the disposal of domestic waste which will be separated into organic and inorganic components. The Plan calls for the separation of solid waste into those that can be treated on site from those that will have to be transported to the municipal solid waste transfer site for further separation and final disposal.

The inorganic solid waste will be collected, compacted and transported to the Solid Waste Transfer Station where the recyclable materials can be separated into combustible and non-combustible materials if so required. The organic waste such as leftover food and waste from

landscaping etc will be placed in compositing bins. Composting of such materials can provide a rich source of nutrients for landscaping purposes on the site. The onsite composting system will be located to the back of the project where all organic related material will be kept.

9.4.1 Waste Minimization Strategy

Given the cost of solid waste management it is incumbent on the developer to reduce the amount of waste produced to the minimum amounts. Waste minimization is the most environmentally sound approach to managing waste, therefore, the solid waste management plan will implement and develop a waste minimization strategy designed to reduce overall domestic waste production.

The waste minimization strategy will include the following:

Reduction – Refers to reducing the amounts of waste produced by using less of particular resources. For example, this may include the use of less packaging or purchasing goods in larger containers or in bulk reducing the need for packaging.

Reuse - Once materials are bought for the project, they should be reused as many times as possible. This may include reusing pieces of lumber in the construction program or taking broken pieces of masonry and reintegrate into concrete. This creates savings for the Developer while reducing the cost of waste disposal.

Recycle – this is a process of converting the waste materials into new materials and objects. This includes identifying the materials that can be recycled such as aluminium, plastics, glass, garden waste, paper and metals among others. Presently in Belize, there are several businesses that collect waste materials for recycling. This can decrease the need for new resources thereby reducing energy usage, air pollution (from incineration), and water pollution (from landfilling).

As can be seen from **Figure 9.2**, about 47% of domestic waste produced on construction sites are typically considered as organic waste, 16% are classified as paper waste and 19% plastics. If reduction, reuse and recycling are fully considered and implemented at the site solid waste production could be minimized to 2,554 lbs per day.

9.4.2 Waste Collection and Transportation

The collection and transportation of solid waste typically account for more than 85% of the cost of solid waste management and therefore needs proper planning and management in order to be cost effective and efficient. In consideration of this, the project will incorporate the following:

(i) Waste Collection

Waste collection is the process of collecting solid waste at the point of production (commercial, tourism) to the point of treatment or disposal. The process starts when waste is placed inside bins for collection and transportation.

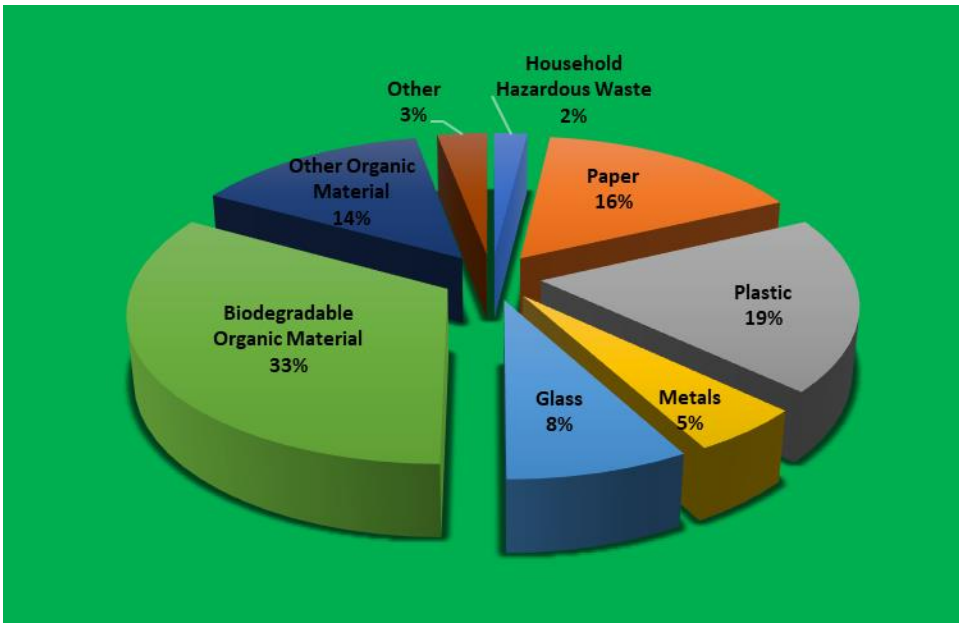


Figure 9.2: Waste Distribution System.

Collection routes and frequency of collection needs as well as the treatment process needs to be carefully considered to control cost. With this in mind, the following waste collection mechanisms will be implemented:

- **Service Arrangements** – The project will enter into a public-private arrangement to transport its waste to the waste transfer site where all the inorganic and recyclable portion of the waste will be sorted.
- **Collection System Administration** – The Port of Belize Management will be responsible for solid waste administration on the site including record keeping, maintenance, standby equipment, and costs of garbage collection and disposal/recovery.
- **Service Level** – Waste will be collected every two days for transfer to the Mile 3 Waste Transfer Station on the George Price Highway.
- **Collection Containers** – The project will use containers that are easy to handle and clean. The containers should be able to contain odours and keep out animals and insects to prevent the spread of diseases. **Figure 9.3** shows typical waste containers that may be used on the site.

(ii) Waste Transportation

It is anticipated that a proper waste collection vehicle will be used to collect the non-organic portion of the solid waste and all the organic, plastic and paper waste for eventual processing.

Transportation – a standard waste collection truck will be used to collect the non-organic component of the waste and transfer this waste to the Waste Transfer Site.



Figure 9.3: Waste Separation Example.

Waste Transfer Facilities - These facilities provide a safe, efficient, and cost-effective link a between a community's solid waste collection program and the final waste disposal facility, which in Belize is the regional sanitary landfill site.

The waste is dumped onto a concrete floor (the "tipping" floor) inside the transfer station. There the Recyclable materials such as PET bottles (soft drink and water bottles), HDPE bottles (Clorox/bleach bottles), glass bottles, aluminum and steel cans are sorted out manually and removed from the facility for recycling. The residual waste is then loaded by a front-end loader into large-capacity transfer trailers and hauled to the regional sanitary landfill site.

(iii) Waste Disposal – Regional Sanitary Landfill

The Regional Sanitary Landfill site is located 2 miles off the George Price Highway at Mile 24 along a paved access road. This is the country's only Sanitary Landfill and the final disposal site for waste originating from municipalities in the Western Corridor (Belize City, San Ignacio/ Santa Elena – Benque Viejo, San Pedro Ambergris Caye and Caye Caulker).

(iv) Educational and Sensitization Program

The Solid Waste Management Plan for the project will develop and incorporate an educational and sensitization plan to inform staff and cruise ship passengers of the importance of solid waste management and its impact to the receiving environment. In addition, collection schedules, receptacle locations and other components will also be made known.

The project will also be utilizing signs and notices to convey the message of proper solid waste management. These signs and notices will be placed at strategic locations around the project site and will be aimed at conservation of the receiving environment.

9.5 Solid Waste Impacts

Improper solid waste disposal and management can result in serious environmental impacts including air, soil, and water pollution. Indiscriminate dumping of wastes can contaminate surface and ground water supplies and in an urban setting like Belize City can cause clogged

drains resulting in flooding in the rainy season while creating fertile grounds for the breeding of mosquitoes and other pests. Uncontrolled burning of waste and improper incineration contributes significantly to urban air pollution.

Greenhouse gases are generated from the decomposition of organic wastes, and untreated leachate pollutes surrounding soil and water bodies. Health and safety issues also arise from improper solid waste management. Insect and rodent vectors are attracted to the waste and can spread diseases such as cholera and dengue fever. Using water polluted by waste for recreational use can also expose individuals to disease organisms and other threats to health.

Exhaust fumes from waste collection vehicles, dust stemming from disposal practices and the open burning of waste also contribute to overall health problems. Because of its coastal location, sea birds and aquatic life can be attracted to the area by smell or presence of readily available food scraps. This holds true for sea birds such as pelicans and frigatebirds as well as the crocodiles and fish. Plastics indiscriminately entering marine waters and entering the aquatic food chain is now of global concern and getting worst by the day.

Generally, all food scraps will be composted and stored in a manner inaccessible to rats and other feral creatures. Small amounts of hazardous waste will be produced by the project and will include spent batteries, light bulbs, aerosols, paints and sprays as well as used hydrocarbons such as used oil and fuel used to clean machinery parts. If not properly managed this can produce localized contamination of the soil and water.

9.6 Mitigation of Solid Waste Impacts

All inert construction waste produced at the site such as plasterboard, mortar, tiles will be used as landfill material in the lower areas of the property. Wood pieces will be recycled into the construction program as will other materials that can find useful application around the site. All other organic materials such as concrete bags, paper, cardboard and wood that cannot be further recycled will be collected for disposal. During the construction and operational phases of the project it is expected that a considerable amount of wrappings and packaging materials will be produced. The project will emphasize reduction of waste through the purchase of products with less packaging. Before the operational phase begins, PoBL will produce an updated Waste Management Plan which will detail the management of all waste streams on the site.

All waste will be subjected to management as per the waste management hierarchy with only materials that cannot be recycled or reused taken to landfill for final disposal. The main mitigative response to be implemented by the project will be the judicious collection and segregation of solid waste into organic and inorganic and recyclable components.

The following table describes the mitigation measures and monitoring measures for solid waste.

Table 9.2: Solid Waste Mitigation Measures.

No	Development Activity	Primary Impacts or Environmental Disturbance	Secondary and Tertiary Level Environmental Impacts	Mitigation Measures
1.0	Commissioning of the project including the visitor centre, commercial establishments, restaurants, administration etc.	1a. Discarding of waste food and food containers.	1a1. Attraction of feral animals to the area to scavenge and in effect shift the ecological balance of the area.	1a1a. Judicious collection of discards by staff and recycling of impervious plastic, glass materials for transportation to the Waste Transfer Site where these will be separated and treated.
				1a1b. Definition and implementation of public education campaign focused on cruise ship passengers, staff and crew in the form of interactive posters and brochures.
		1b. General discarding of cans, bottles and plastics containers from foods and general packing materials.	1b1. Habitat for mosquitoes and other insect pests, as well as aesthetic pollution from odor and unsightly accumulation of solid waste.	1b1a. Separation of waste into organic and inorganic components with the inorganic further separated into recyclable such as metals, glass, plastics paper and cardboards. where they will be stored in bins before they are collected for transportation to the Waste Transfer Site
			1b2. Entanglement and ingestion of plastics floating in the water column by sea crocodile, birds and other fauna in the area.	1b2a. Judicious collection, confinement and disposal of solid wastes as described above.
		1c. Food tainted waste from Cruise Ships	1c1. Introduction of diseases, pests and parasites	1c1a. Develop and implement the necessary WRF to receive Annex V waste.

CHAPTER 10: ENERGY GENERATION

10.1 Introduction

The Port of Belize Limited project will require a reliable energy supply (electricity) during both the construction and operational phases. Of the two phases by far the greater amount of energy will be required during the operational phase with the need to power the facilities and provide for the need of the guests.

10.2 Energy Demand

The project's energy requirements are associated with the construction and operation of the Tourism Village and the cargo port improvements. The energy demands are expected to be mainly for "domestic and commercial purposes" as no refuelling operations is currently being considered in this phase of implementation. The assessment is primarily based on the need to power the various buildings that will comprise the tourism village for lighting, refrigeration, cooking, and for the powering of electrical appliances and for the provision backup power and operation of the waste -water system.

Table 10.1 gives a breakdown of the project's electricity demand as unit equivalents. BET used the "accepted consumption standard" widely adopted for all EIAs prepared in Belize to estimate energy demand which in turn is based on the average 10,000 kilowatt-hours (kWh) of electricity used each year per U.S. household.

Although in Belize, the average is around 8,000 kWh, the higher value is used to estimate energy use as the target population are international tourists from developed countries. Based on the expected port improvements and the new cruise ship terminal and its amenities and considering that most of the energy demand will be during cruise ship port calls, the project will require approximately 10,608-megawatt hours (10,607,500 kWh) of electricity annually. An additional amount is included for common areas lighting and the operation of associated facilities to bring the total up to 11,698-megawatt hours.

The power supply for Section A, which will require improvements of the existing port facilities will be absorbed by the present Port of Belize Limited as part of its operational expenses, while Section B comprising the new cruise terminal and village will be absorbed by the Port of Belize Cruise Tourism Village.

Table 10.1: Energy Requirement for the Development[1].

Description	Units	Units Equivalent	Yearly Energy Use x 10,000 Kw/Hr
Section A: Improvements to the Present Port Facilities[2]			
General Cargo Area and Bulk Cargo	1	1	10,000
Local Berthing Facility	1	1	10,000
Container Yard	1	1	10,000
Sub-Total			**30,000**
Section B: Cruise Terminal Facilities			
Cruise Terminal Piers	2	0.25	5,000
Cruise Terminal and Tourism Village			
North and South Pier Arrivals (#1 and #2)	2	0.5	10,000
Arrival Plaza and Performance Area (#3)	1	0.25	2,500
Tourism Village (#4)	7	1	70,000
Logistics Area (Parking Areas) (#5, #6 and #10)	3	0.25	7,500
Charter Boat Basin (#7)	1	0.25	2,500
Charter Boat Operation's Building (#8)	1	0.5	5,000
Port of Belize Administration Building (#9)	1	0.5	5,000
Cruise Activity and Operations Centre	7	150	10,500,000
Sub-Total			**10,607,500**
10% Complex Lighting and Unaccountable			1,060,750
Totals			**11,698,250**
			11,698 mW/hr

[1] Based on Chapter 1 Figure 1.6. [2] Increase of electricity use due to improvements and cost being absorbed by the Port of Belize present port facility.

10.3 Energy Source

The Port of Belize is already connected to the National Grid owned and operated by Belize Electricity Limited (BEL). As such the project area is already served by transmission lines and other power infrastructure required for the provision of electricity and the development will only require small extension of these services to reach the new development area. Expansion of these facilities and services will require consultation with BEL.

Energy generation during the construction phase of the project will be a combination of temporary power transmission from the BEL grid and equipment generated power. Most energy from BEL will be used to power the site office and for security lighting. During the stakeholder consultations with BEL, the Company's representatives saw no problem in providing the

expanded facilities with energy during the construction and operational phases since they will have substantial additional megawatts from solar and gas turbine coming on stream..

All marine equipment to be used during the dredging/marine construction works will be self-powered and will not rely on the national grid. The dredge and associated equipment are heavy fuel consumers which will use primarily low grade bunker fuel which may or may not be sourced in country. The fuel consumption is very difficult to estimate since it will depend on the hours of work and the size of the dredge.

10.4 Alternative Energy Sources

The use of solar and/or wind power are low pollution options, however, both these options cost significantly higher than connecting to the national grid (**Table 10.2**). In addition, solar power is only available during the day. The option of using storage battery is available but adds significantly to the cost. Wind energy is dependent on the availability wind with sufficient speed. Wind energy also requires sufficient space to place the turbines and associated structures.

Table 10.2: Comparison of Three Alternative Sources of Energy.

Criteria	Wind Energy Turbine	Solar Photovoltaic	Generator
Installation Cost	• Not amenable to easy installation. • High Cost.	• Not amenable to easy installation. • Somewhat readily portable. • High Cost.	• Easy to transport, install and uninstall quickly. • Low to Medium Cost.
Operation Cost	• High up-front capital costs but no fuel costs. • Operate with little maintenance after initial set up. • Limited consumer education, limited distribution and servicing networks.	• High up-front capital costs. • Operate with little maintenance after initial set up. • Limited consumer education, limited distribution and servicing networks.	• Continuous maintenance after set up. • High consumer education, abundant distribution and servicing networks. • Medium to high fuel costs.
Reliability	Dependent of wind speed.	Dependent on available radiant energy.	Very Reliable
Environmental Impact	• Renewable Resource. • No atmospheric contaminants or thermal pollution. • Little Noise pollution. • Aesthetics. • Impact associated with killing of wildlife (birds and bats).	• Renewable Resource • No atmospheric contaminants or thermal pollution. • No noise pollution. • Need to dispose of panels and spent storage batteries at end of life span.	• Non-Renewable Resource • Atmospheric contaminants. • Require air pollution control retrofits. • Possibility for fuel to spill. • Noise pollution.

	• "Wind turbine syndrome" specifically from vibration and low frequency noise. Shadow flicker. Disposal of spent storage batteries		• Thermal pollution.
Capacity	Because the wind blows intermittently, wind turbines often produce about 25-30% of their rated maximum output.	Requires battery storage for night time use or during cloudy or foggy days.	Able to work continuously.
Installation Area	Requires a large area to install to accommodate wind vanes.	Can use unit roofs for installation.	Relatively small installation area.

10.5 Power Transmission Routes

It is always preferable to use the route of least resistance providing environmental and social impacts are within acceptable limits. To that end the transmission line will follow the main access roads and adjoining complex roads network. To increase the aesthetic appeal of the site, and to reduce the risk of fallen power lines in the event of a storm, most of the transmission lines will be buried underground.

The final route for the power transmission lines will need to be approved by BEL. The installation of all infrastructures such as electricity poles, power lines, down guys, transformers, etc., will either be carried out directly by qualified BEL or under their supervision. The final installation of the services will need to be inspected and approved by BEL before connection to the services.

10.6 Fuel Management, Health and Safety

Fuel for cooking, transportation and to run the backup generator will also be required. Fuel for transportation and for cooking is readily available from the commercial sector. The demand will be according to the different kiosks' sizes, vehicle fleet sizes and the capacity of the backup generator.

10.6.1 Cooking Fuel

Fuel such as butane/propane will be stored using recommended commercial guidelines and must be in compliance with national regulations. The installation and maintenance of cooking ranges and ovens and associated piping will be done by trained and certified personnel.

The transportation of butane/propane will be the responsibility of the supplier, who will follow the recommended guidelines for the transportation of Hazardous Materials. The supplier will also be responsible for the refilling, inspection and replacement of any faulty or corroded container.

10.6.2 Transportation Fuel

The project will need to provide fuel the machinery and facilities installed at the site. The gasoline and diesel fuels for the generator will be stored in an Aboveground Storage Tanks (ASTs) similar to that installed at the existing Port of Belize facility. The tank will be either independently purchased by the developer or supplied by a local fuel supplier. If the tank is provided by the local supplier, the supplier will be responsible for the upkeep of the fuel storage tank.

The storage tanks will each have a capacity of 3,000 gallons and will be located in the Cruise Activity and Operations Centre within containment walls capable of storing 110% of the largest tank's total volume capacity. In addition, the ASTs will be enclosed with a chain link fence at least six 6 feet high to prevent access by the public. Visible warning signs, fire extinguishers and other requirements will be installed in accordance with the Department of Environment and National Fire Service (NFS) storage guidelines. Should permanent fuelling services for boat charters be required at a later date, the project will seek DOE's approval.

10.6.3 Back-up Generator Fuel

The project will install a backup diesel generator at the Cruise Activity and Operations Centre to be use in times of load shedding by the national grid. The diesel fuel for the generator will be stored in an Aboveground Storage Tank (AST) similar to that of the transportation fuel. The tank will be either independently purchased by the developer or supplied by a local fuel supplier.

If the tank is provided by the local supplier, the supplier will be responsible for the upkeep of the fuel storage tank. The storage tank will have a capacity of 1,000 gallons and will be located next to the transportation fuel storage area (see **Section 8.6.2**) and either within its independent containment walls capable of storing 110% of the tank's total volume capacity or within the transportation fuel containment walls. This is subject to final design and location of both.

10.6.4 Miscellaneous

The use of fuel for miscellaneous purposes will be limited to avoid unnecessary contamination of the environment. Such fuel will be stored in industry's approved fuel containers and secured.

10.6.5 Fuel Management

During the construction and operation phases, the project administration and all contracted parties, will adhere to the recommended local guidelines (current and anticipated) and international standards, and best practice for fuel transportation, loading and unloading. During construction, the temporary storage of fuel will be in a bunded structure with proper safety signage. The facility must always be available for follow up inspections by relevant government authorities, including the DOE and National Fire Service.

In addition, the developers will develop a Fuel Handling, Spill and Fire Contingency Plan to address prevention, containment, and cleaning of fuel/oil spills and leaks as well as fire prevention and fire fighting capabilities.

10.7 Energy Generation Impacts and Mitigation Measures

The impacts of energy generation associated with the backup generator and power from the national grid are considered low if properly managed. The use of petroleum products (e.g. diesel, gasoline and used oils) will need careful oversight and the implementation of mitigation measures. The project will implement the following during the acquisition, installation and operation of the energy system on site:

- Back-up generator will only be used in the event of a power shortage.
- Security/Maintenance Personnel will be trained to properly manage and handle fuel spill threats. In the event of a spill or leak these will be immediately cleaned up and disposed of according to applicable environmental guidelines and in conformity to the requirements of the ECP. All waste oil or contaminated fuel will be removed from the cruise tourism village and taken to an approved DOE site for disposal/recycling.

Table 10.3 provides an assessment of potential impacts and identifies mitigation measures to address the threat.

Table 10.3: Matrix of Potential Impact as Result of Power Generation.

Subject	Potential Impacts	Magnitude of Impact	Mitigation
National Grid	Aesthetic	Low	• Whenever possible power supply line will be placed under ground.
Back-Up Generator	Noise Pollution*	High	• Procure engine designed for low noise emission. • Use exhaust silencers.
	Air Pollution*	High	• Procure engine designed for rated high efficiency. • Use recommended fuel and lubricants only. • Maintain a schedule maintenance plan.
	Fuel and Oil Pollution Risks	Medium	• Store fuel and oils (new and used) in a properly sealed industry's approved fuel container. • Conduct regular equipment preventive measure checks. • Transport fuel in industry's approved containers only.

* Noise and Air pollution can be resolved or greatly reduced through technological development.

CHAPTER 11: TRANSPORTATION AND CRUISE SHIP MANAGEMENT

11.1 Marine Based Transportation

11.1.1 Existing Conditions

The offshore area of the proposed development is used as a transit lane for all types of marine vessels. Boat traffic through the area includes fishing vessels, regularly scheduled tour operators, dive boats and leisure crafts. Local cargo boats and hourly scheduled passenger boats to the nearby cayes are also common.

Large cargo ships/vessels, cruise vessels and tankers etc, utilize the Grennels' or English Caye Channel to access the Belize City Port and the Belize City area. All cruise ships currently anchor in an area east of the project area where passengers disembark unto tenders and are ferried to Fort Street Tourism Village in Belize City or unto other marine vessels to other marine and inland destinations.

The fuel tankers that service Belize also utilize the area; however, due to the specific requirements of the offloading operation, the vessel has designated moorings, adjacent and north to the local berthing facility, which the vessels use to ensure stability.

In addition to the area being used as a thoroughfare by cruise ships, cargo ships, passenger vessels and fishermen delivering local daily catches to Belize City, the seafloor of Grennels' Channel are known to be utilized for recreational scuba diving by tourists and commercial fishing, however, the areas from Robinson point to Belize City is not used due to low visibility and the lack of corals in the area.

11.1.2 Potential changes to navigation from the dredging activity

The dredging will occur primarily within an area that has been previously dredged. It is anticipated that during dredging and disposal of dredge materials the normal navigation route used by small boats and large vessels that frequently travel to Belize City via Grennel's Channel and smaller vessels coming from Turneffe and other areas along the coast will not be affected since these vessels use shallower and calmer waters around the offshore mangrove cayes.

Navigation buoys removed during the dredging exercise will be relocated as soon as possible to their exact location after the dredging in the immediate area of the existing buoys' location has been completed. This will ensure safe navigation during dredging. After dredging is completed the existing buoys will be shifted to the new perimeter of the widened channel.

Figure 11.1 shows the existing navigation channel from the Port of Belize property. This route will continue to be used by the Port of Belize during the entire construction program. The

Dredging Contractor as part of his contractual agreement must ensure that navigation to and from the port are not impacted in any significant way from the dredging activity and the channel is always open to the passage of marine vessels.

The Port of Belize, like all international ports worldwide, adheres to ISPS (International Shipping and Port Security) standards. The area around the Port is a security exclusion area. Outside this exclusion area is open to private marine traffic. To the southwest and west of the Port of Belize property is the BDF Maritime Wing and the Old Belize marina along with other private entities whose vessels regularly traverse the area. The interest of all parties have been considered and taken into account in terms of continued access. Since all private entities use shallow draught vessels that do not require dedicated channels to navigate these will be able to bypass the dredge equipment.



Figure 11.1: Existing navigational channel from the Port of Belize.

When dredging within the nearshore areas especially in the berthing area and the turning basin the dredge operator may use floating pipeline to convey the spoils to land. The floating pipeline may temporarily disrupt navigation of private vessels; however they will be adequately fitted with warning signed to alert vessels. If the length of the pipeline reaches over a certain distance

that severely inconveniences local boat traffic a portion may be sunk to allow shallow draught vessels to cross.

11.1.3 Anticipated Water Transport Needs

The project will have the following transportation needs during the dredging phase of the project:

Dredging Phase:

1. Transportation of workers to and from the dredge on a daily and rotational basis,
2. Transportation of food and sundry supplies to the dredge,
3. Transportation of inspectors/supervisors to the dredge site when necessary,
4. Transportation of fuel, spares, and equipment to the dredge,
5. Transportation of certain types of solid waste from the dredge,
6. Emergency evacuations from the dredge,
7. Transportation of dredge spoils to the placement sites.

As outlined above, service vessels will be deployed to the dredge to ferry materials and supplies, carry people and provide offsite movement of solid wastes. The following strategy has been devised to attend to the water transport needs of the project:

i) ***Haulage of Dredge Spoils*** – the operator/developer will have to ensure that the dredge being used can provide substantial amounts of haulage capacity. To move this huge amount of materials they intend to use a Trailing Suction Hopper Dredge which stores the spoils in the hopper of the vessel which is then taken to the disposal site and released. Using the vessel's dredge material storage capacity will ensure that the benthic areas in the nearshore environment and associated areas are not seriously affected by the dredging activity since the dredge will store the dredged material in its hopper for disposal at another point.

ii) ***Transport of Workers, Management Personnel*** – The project/developer will need a vessel to service its operations. Staff and workers will be required to service the ongoing operation. Some of these workers will be housed on the dredge and will be working on a shift basis. To that end it is anticipated that daily runs will be made to shore.

11.2 Marine Based Transportation Requirements

11.2.1 Requirements for the Access Channel

The purpose of the access channel is to provide a navigable channel for marine vessels reach the Port of Belize City. The main users of the port access channel are the container/cargo ships, cruise vessels and oil tankers. At present the port imports all types of cargo mainly from the USA, CARICOM, Europe, Asia and South America. A fuel tanker arrives frequently just east of

the PoBL terminal, offloads its cargo and then departs (**Figure 11.2**). There are also several barge services from Belize City to Caye Caulker and San Pedro which transport cargo to the cayes from the low berth area (**Figure 11.3).**

It is expected that with the expansion and dredging of the turning basin and the dredging of the access channel , an improvement of the general cargo area and bulk cargo at the port and a new terminal for cruise ships, ships with a draft of around 11 – 12 meters will be able to safely access



Figure 11.2: Typical view of Cargo Ship offshore



Figure 11.3: Current Layout of Belize City Port Facility.

the port and be able to moor alongside the dock, enabling a fast turn-around of ships calling at port. In addition, it is expected that cargo volume handling will increase requiring more manpower and creating additional jobs.

Since the Port of Belize is a customs area with permission needed to enter, marine vessel traffic upstream of the port is limited mainly to workers of the nearby local cargo docks, and service piers in the area including the Belize Coast Guard and Old Belize Marina among others.

The impact of the operational phase of the proposed access channel dredging on international shipping and domestic marine traffic, fishing and land-based tourism activities is expected to be limited.

The dredged access channel will be 190 meters in diameter and the turning basin will be 550 meters wide and 12 meters deep with the channel being further straightened. This means that ships coming into and out of the port will have a straighter lane to navigate through. By extending the width of the channel it will increase the manoeuvrability space for ships utilizing the channel. There will also be some dredging for berthing along the two cruise terminal piers and the cargo terminal for docking of vessels.

11.2.2 Impacts of the Proposed Modified Access Channel and the Dredging Activities on Navigation and Safety at Sea

The dredging of the channel will be carried out using a Cutter Suction Dredger (CSD) (**Figure 11.4a**) and a Trailing Suction Hopper Dredge (TSHD) (**Figure 11.4b**). The CSD will cut the soil with a cutterhead, which is pumped directly to shore through a floating pipeline.

The dredge spoils in the channel will be removed by means of a suction pipe (TSHD) and a drag head (TSHD) (**Figure 11.5**) then loaded into the hopper of the vessel. The vessel then mobilizes to the area where the spoil is to be deposited and then releases the spoils by opening doors located at the bottom of the vessel or by pumping through a discharge pipe.

Approximately 2.5 million m^3 the dredged material will be utilized to reclaim the cruise ship terminal area and cargo terminal and deposited on project lands prepared for dewatering of the dredged material.

Dredging will be a 24-hour operation. During times when ships are navigating through the channel the dredge will move to the side of the channel so as not to impede their movement. Since all ships coming into the Belize City harbour are steered in by a Port of Belize pilot the times when these ships traverse the channel can easily be relayed to the dredging crew. Hence, a reliable two-way communication with the Port of Belize and the dredging contractor is paramount but easily achievable.

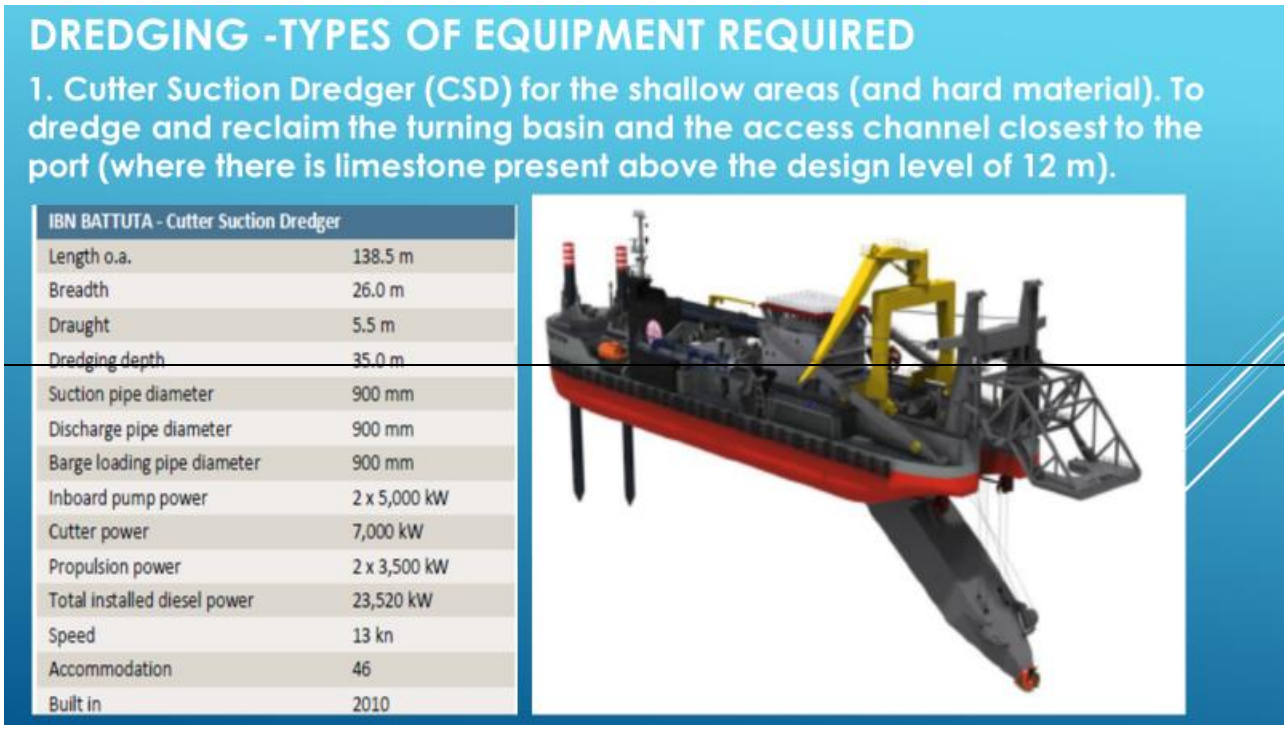


Figure 11.4a: Cutter Suction Dredger (CSD) for shallow waters.

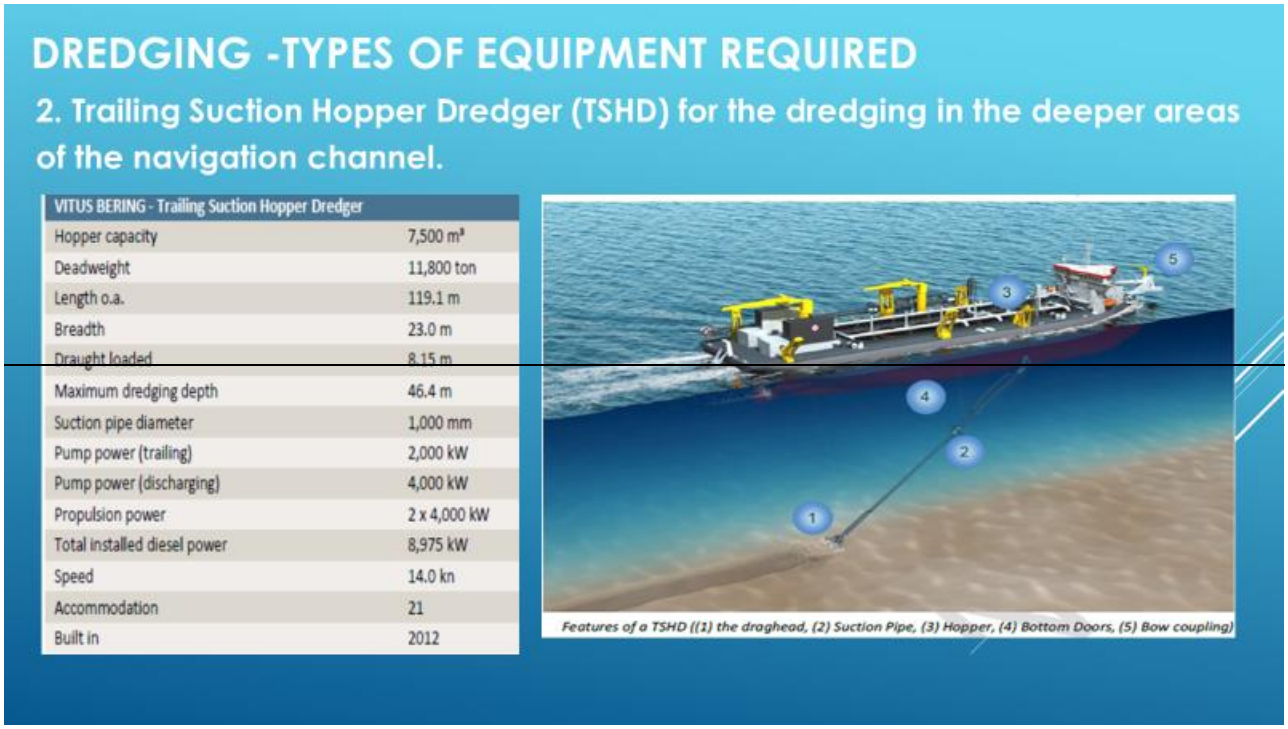


Figure 11.4b: Trailing Suction Hopper Dredge for deeper waters.

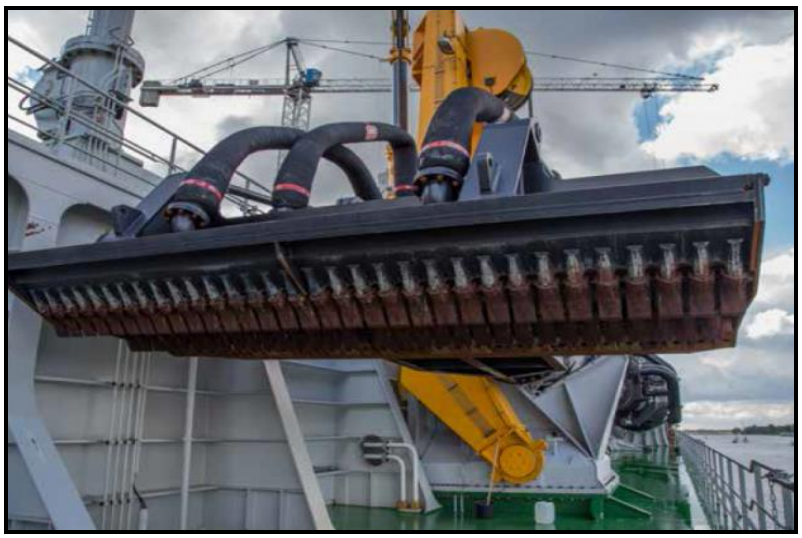
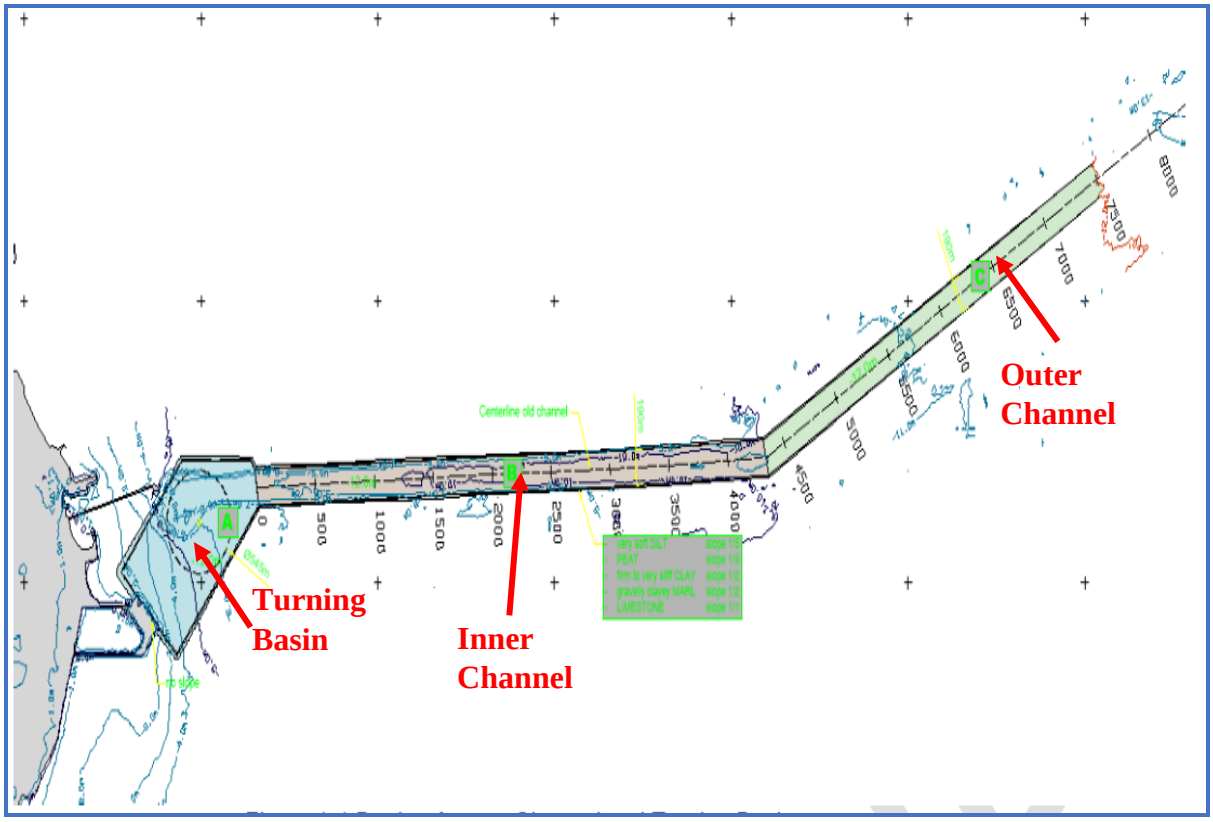


Figure 11.5: Drag head at the end of the suction pipe.

11.2.3 Specifications (dimensions) for the proposed expansion and modification of the access channel

The proposed expansion will not affect the length of the channel; however, the width and depth will be increased. An average width of 190 meters is being proposed for the entire channel. The depth will be 12 meters in the turnaround basin and length of channel (**Figure 11.6**).



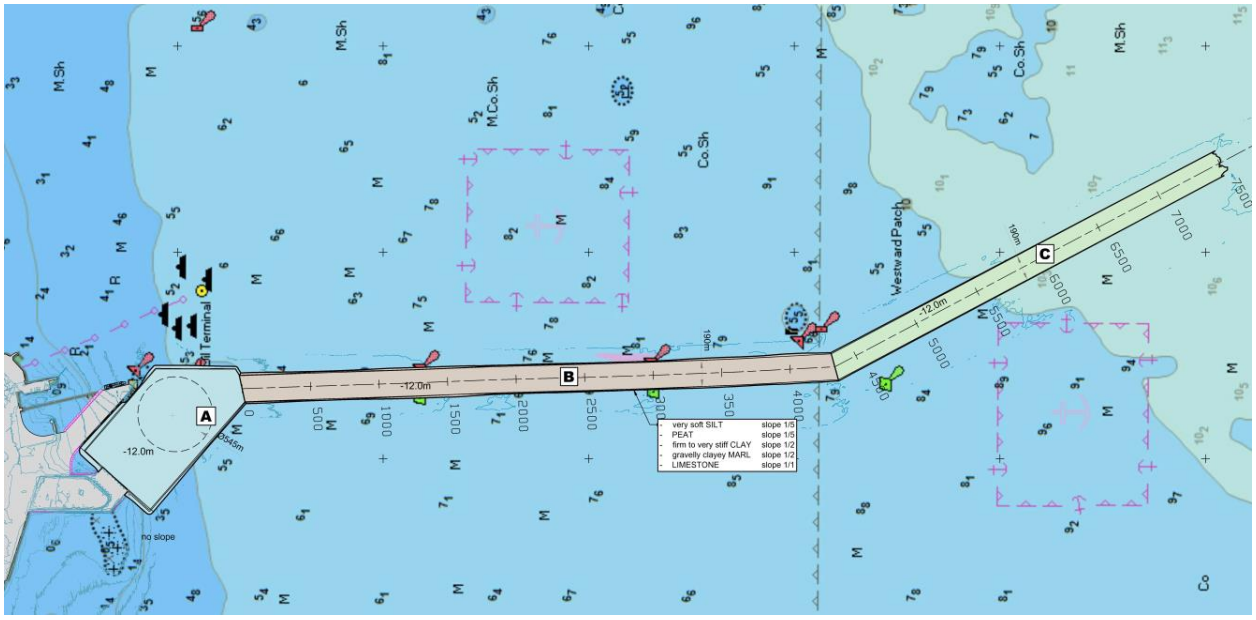


Figure 11.6: Layout of Dredging Operation. A: turning basin; B: Inner Channel; C Outer Channel

11.3 Land Based Transportation

11.3.1 Existing Conditions

The present access to the proposed Cruise Tourism Village area is via Caesar Ridge Road which runs into Central American Boulevard with access to Fabers Road for transportation onward to either the Philip Goldson Highway or the George Price Highway. The present route is heavily used by trucks and individuals leaving and entering the Port of Belize compound, truck tankers associated with the ESSO fuel depot, customers leaving and arriving at the Customs and Excise Office. In addition, a construction company operating heavy machinery is located behind the Customs House, and this as well as the regular pedestrian and vehicular traffic of people that live in the area creates congested conditions.

Parking is also very limited in the area, and it is assumed that neither the Port of Belize nor Customs House will want additional traffic to utilize their parking areas, which is presently not adequate to service their customers. At times customers at the customs and port facilities need to park on Caesar Ridge road due to the unavailability of parking space.

11.3.2 Anticipated Transport Needs

The Cruise Tourism Village will have the following transportation needs during both the construction and operational phases of the project:

Construction Phase:

- Transportation of workers to and from the site on a daily and rotational basis;
- Transportation of materials and equipment to the site;
- Transportation of inspectors/supervisors to the site when necessary;
- Transportation of fuel, spares, and equipment to the site;
- Transportation of solid waste from the site;
- Emergency evacuations from the site;
- Transportation of the dredge spoil to the fill site;
- Parking of construction equipment.

Operational Phase:

- Transportation of workers to and from the terminal on a daily and rotational basis,
- Transportation of food and sundry supplies to the terminal;
- Transportation of guests to their tour destinations,
- Transportation of fuel, spares, and equipment to the terminal;
- Transportation of solid waste from the terminal,
- Emergency evacuations from the terminal;
- Parking of buses, Taxi's etc.

11.3.3 Potential Changes Due to Increased Traffic

The proposed project will result in increased traffic within the project area, especially when the cruise ship passengers alight the vessel and embark on inland and city tours in taxis, or buses. Since cruise ships will dock onshore, guests will no longer be required to board tender vessels to reach Belize City to embark on tours.

This will benefit the economy by encouraging a higher percentage of guests to partake in tours, especially those who are physically challenged or are senior citizens. Increased participation in tours will require more vehicles, especially buses and individual tour vehicles in the area with the possibility of further exacerbating the already congested traffic in Port Loyola Area. Parking will need to be provided to accommodate tour operator and the employees of the Tourism Village businesses and cruise terminal

The development plan calls for the construction of a new boulevard on project land that will lead to the cruise terminal (north to south) and connect to the Jane Usher Boulevard and the George Price Highway (**Figures 11.7 and 11.8**). This will provide easy access to the highways for inland tours and avoid traffic congestion, the project is proposing to build a road, using its

private land, that will extend Jane Usher Boulevard to the George Price Highway by Mile 3, just East of the Belize City Solid Waste Transfer Station (**Figure 11.8**). The main cruise tourism road network is shown in **Figure 11.8.** A typical road section is shown in **Figure 11.9.**

The creation of the link to George Price highway would divert the passenger traffic from Belize City, considerably reducing congestion and pollution in the busiest parts of the city. The link would also provide a new and efficient means of accessing the George price Western Highway for all Belizeans. The new road with dual carriageway will be outfitted with high capacity drainage which will remove any runoffs coming from adjacent neighbourhoods and the PoBL compound to nearby canals and/or the sea.



Figure 11.7: Map showing route out of the Cruise Terminal to Major Highway.

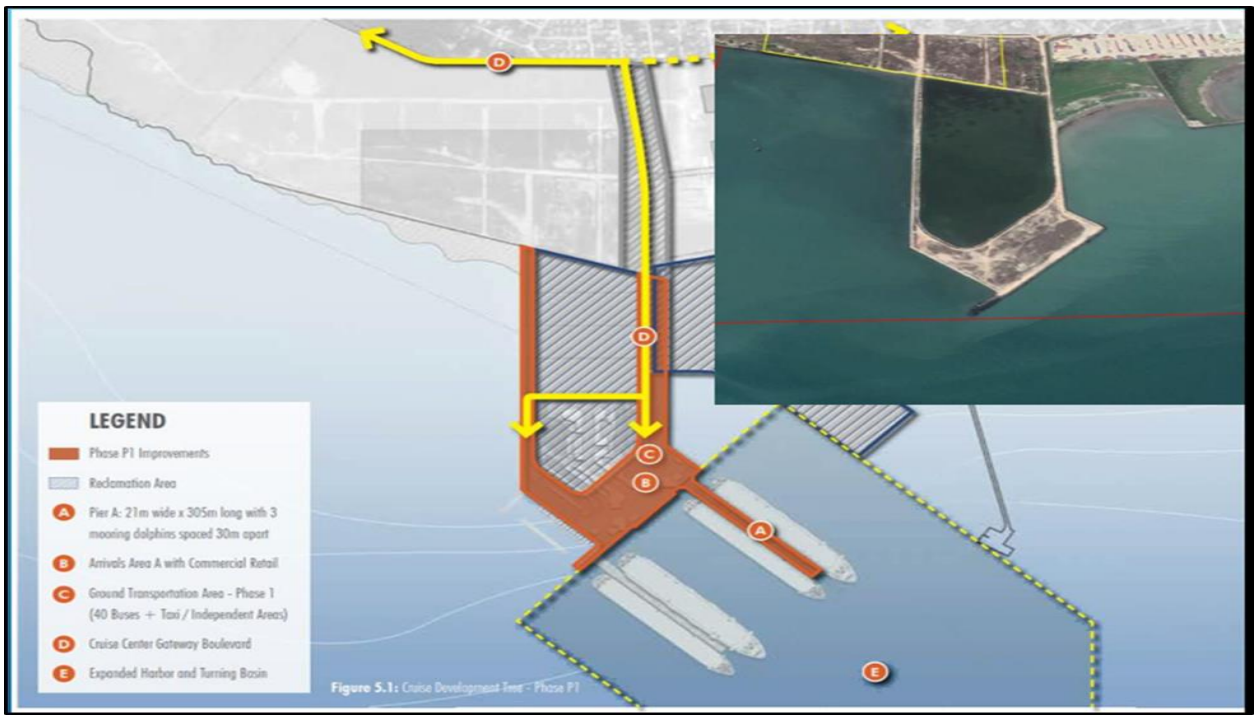
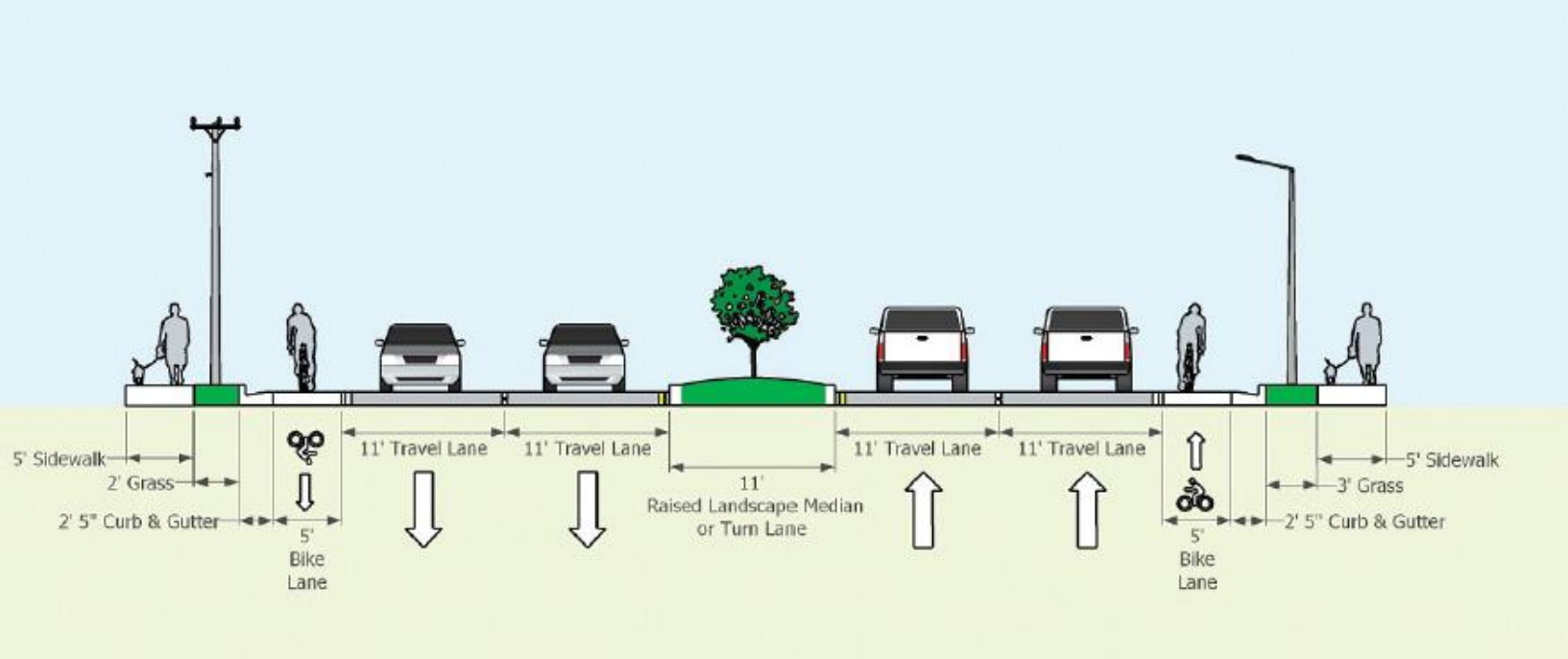


Figure 11.8: Traffic Flow in compound.



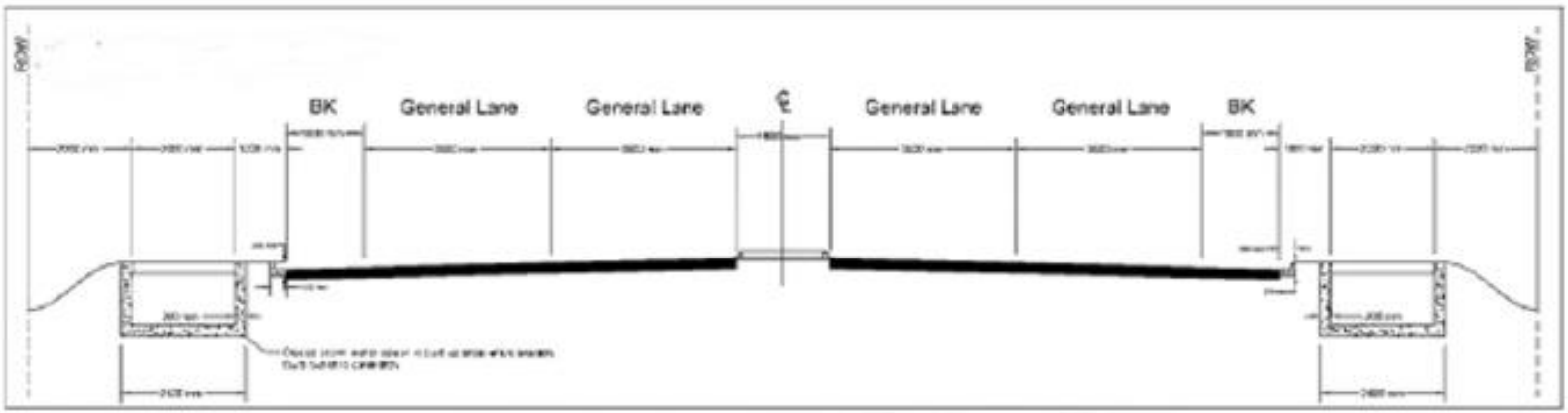


Figure 11.9: Propose design PoBL road section.

11.3.4 Layout of Compound

The compound will provide adequate parking for buses and tour operators (areas #5, #6 and #10), thus avoiding further congestion on Caesar Ridge Road due to parking (**Figure 11.10**).

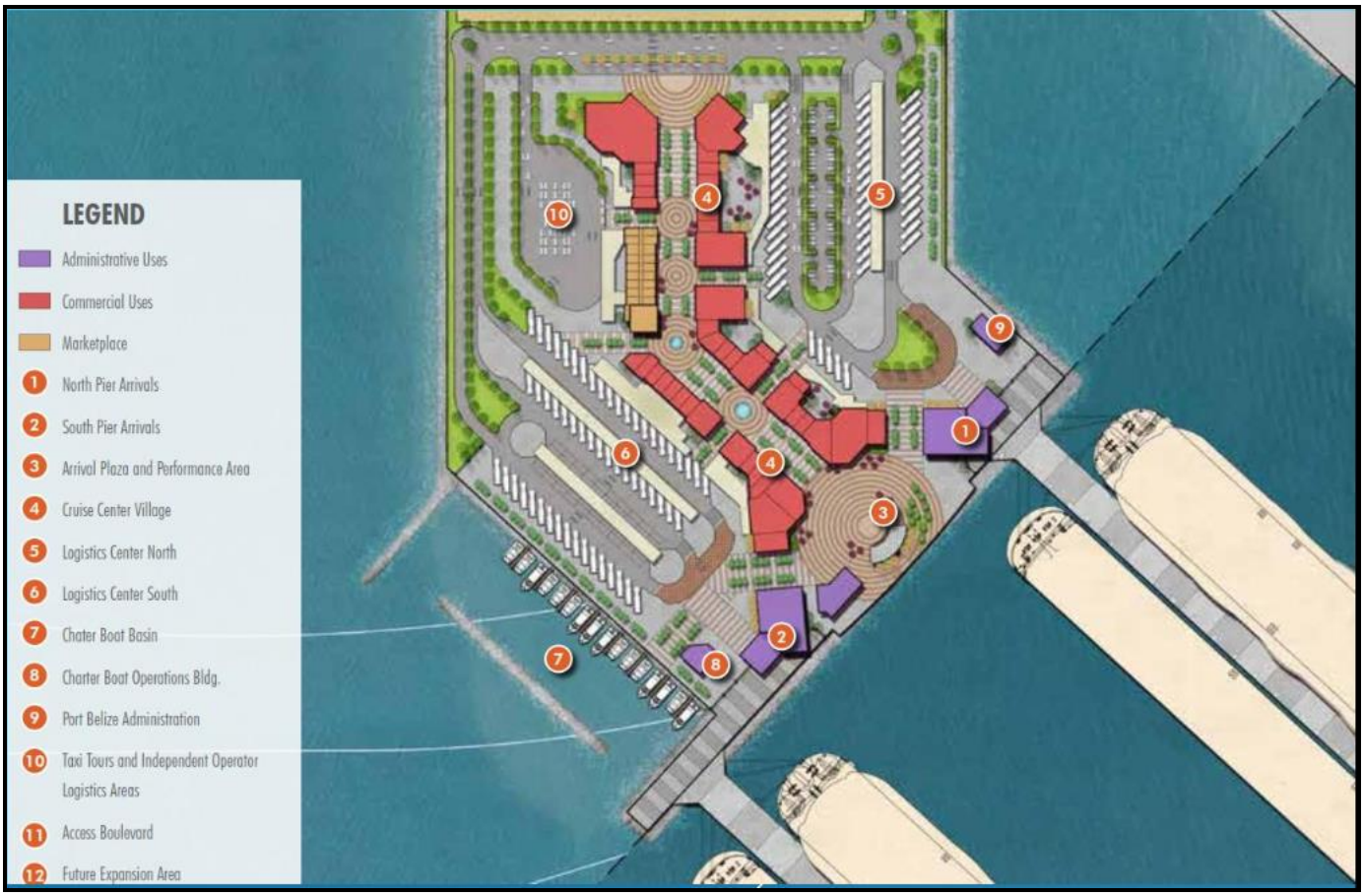


Figure 11.10: Layout of PoBL compound.

11.4 Conclusion

Belize City has grown significantly since the 2005 Port of Belize ESIA. Large areas of land near the project site that were once mangroves stands have been filled and are now residential areas. This has caused a lot of changes in the traffic flow which is being addressed in the project design to ensure that traffic congestion is not an issue. In the 2005 EIA it was noted that using the Caesar Ridge Road or Central American Boulevard would add to the current traffic congestion. The study recommended using an alternative route based on the use of Jane Usher Boulevard as an outlet to the George Price Highway. The current project has adjusted the plan to allow for the implementation of this option.

This coupled with the newly built Chetumal Street and bridge, and the new bypass at mile 8 on the George Price Highway, should prevent the project from contributing to any traffic congestion in Belize City. The design of the alternative route will ensure that any access/exit point will not

obstruct the free flow of traffic in the area while ensuring that visibility from each direction is clear and obstruction free.

11.5 Impacts and Mitigation Measures for Transportation

11.5.1 Potential Terrestrial Impacts

The project area is already heavily utilized by traffic to and from the Fuel Depot and the Belize City Port. After the completion of the project, overall traffic volumes will increase significantly potentially resulting in the following.

- Increase in traffic near project site and on the highways,
- Increase in traffic congestion at junctions leading away or to project site,
- Unsafe access points to Jane Usher Boulevard and George Price Highway;
- Concerns for traffic safety for residents and businesses in the area;
- Inadequate road design and signage to ensure traffic safety and efficiency.

11.5.2 Mitigation Measures for Terrestrial Impacts

- Construct new access road to the George Price Highway (GPH) linking the Jane Usher Boulevard and Cruise Tourism Village to relieve congestion;
- Upgrade and utilize roads in the immediate vicinity of the Port of Belize and Customs House. These would offer alternatives, especially to individual tour operators who use small vans or taxis and are doing City Tours;
- Consider a roundabout at the junction of new road with that of the George Price Highway;
- Ensure that the access/exit point(s) to the George Price Highway are wide enough with good visibility to facilitate traffic free flow.
- Upgrade of Jane Usher Boulevard to a paved dual carriageway;
- Ensure that the parking facilities are close to the entry exit points into the project site itself;
- Place proper lighting and signs on internal roads and parking areas and along the new access road.

11.5.3 Potential Transportation Impacts to the Marine Environment

The operations at the Port of Belize presently have minimal effect on existing marine traffic, however, an increase in new activities in the area will require mitigation with the dredging activity causing the most disruption (**Table 11.1**). The Port in conducting this new expansion, will also need to adopt measures that will ensure the activities does not affect current Port operations. Main impacts are expected to accrue in the following areas:

- Increase in number of boats and vessels in the area;
- Disruption of traditional user activities in the area;
- Disruption of transportation routes in the area.

As mentioned before, domestic marine traffic will be affected minimally during the dredging operation. Appropriate signs if necessary, will be placed during the dredging phase and buoys temporarily removed for dredging will be re-installed at their previous location or new locations where the channel has been widened.

Although, fishing may be temporarily affected during the dredging operation, it should be noted that this activity is not permitted near the port facilitates for safety reasons. It is expected that any disturbance immediately outside and near the access channel due to sedimentation will be minimal and things should return to normal quickly. Activities, such as fishing around nearby cayes and along the reef will not be affected.

11.5.4 Marine Mitigating Measures

The following mitigation measures are recommended to address the identified impacts:

- Ensure that marine shipping lanes are properly buoyed and lighted at nights with colours conforming to national regulations;
- Designation of alternate routes for traditional users;
- Ensure that the dredge operators are aware of the shipping schedule, so that they allow free-flow of vessels accessing or exiting the Port of Belize via the access channel and Grennels' Channel;
- Constant sustained contact with users of the project area should always be maintained and notices issued. This will ensure safety of traditional users and avoid major accidents.
- The Port of Belize will ensure that proper procedures are in place to regulate boating and shipping traffic during the construction phase. This will include the placement of appropriate signs, signals and the use of manned boats to interact with water users and to ensure that safety measures put in place are being adhered to.
- During the dredging phase, ships and boats using the channel and especially the berthing and turning basin will be forced to stay within designated traffic lanes and to reduce speed and propeller thrust force within designated areas to reduce the potential for erosion and sedimentation along the shoreline and adjacent to the shipping lanes.

Table 11.1: Potential Impacts with their Residual Impact Magnitude/Duration/Scope.

Activity & Conditions	Potential Impacts	Comments	Residual Impacts Magnitude/ Direction/Duration/Scope
Traffic / Roads	- Increase in traffic to the area	- upgrade all roads in the immediate vicinity of the Port, Customs House and project site	High/Positive/Decades/Local
	- Increase in traffic congestion	- Utilization of new access/exit from Jane Usher Boulevard to George Price Highway	High/Positive/Decades/Local
	- Access to Jane Usher Boulevard	- Acquire and compensate residents for necessary land required to access the roads	High/Negative/Decades/Local
	- Increase traffic impact on George Price Highway entry/exit points	- consider a round-about large enough to allow free flow of traffic,	High/Positive/Decades/Local
	- Placement of parking area	- Placement of parking area where access points are easily accessed	High/Positive/Decades/Local
	- Poorly designed roads and improper signage	- Ensure that signage is installed, and proper road design is followed. - Allow for placement of proper lighting along new access road.	High/Positive/Decades/Local

Traffic - Marine	- Increase in number of vessels in area	- Regulation of traffic moving through or near the shipping lanes being dredged - placement of temporary buoys or markers to warn users of area	High/Minimal Change/Short /local
	- Disruption of traditional user activities in the area	- traditional use areas to be avoided if possible, if not coordinate with users	High/No change/short/local
	- - Disruption of traditional transportation route	- alternate routes identified, - maintain open communication with users, - safety measures put in place, buoy, sign etc., - coordination between dredgers and Port in regards to shipping schedules.	High/No change/short/local

CHAPTER 12: SOCIAL IMPACT ASSESSMENT

12.1 Introduction

This Social Impact Assessment (SIA) considers Belize City to be the immediate impact zone, extending considerably beyond the traditional view of the immediate vicinity of the project site, being the Port Loyola Electoral Division. This project entails among others:

1) The construction of a cruise terminal, which includes the construction of a docking pier for cruise ships and the construction of a tourist village and,
2) The expansion of the cargo terminal.

In summary the projects seeks to create infrastructure to enable cruise ships visiting Belize City to dock in a safe harbour and efficiently disembark and load passengers and amenities as necessary and also to allow larger cargo vessels to make port calls in Belize City and benefit from the well-established economies of scale intrinsically linked with the use of larger ships.

This SIA makes reference and draws information from relatively recent national experiences with similar types of developments and from interviews with key stakeholders consistent with the Stakeholder Engagement Plan (SEP) (**Annex XV**) specifically developed for this project as required by the TOR. Approximately, 90% of stakeholders identified in the SEP were contacted and yielded valuable feedback. This feedback is discussed in the Stakeholder's Perceptions and Concerns section of this report.

The SIA presents various aspects of the social context using both official published census data and unofficial estimates to present the most accurate context possible given the paucity of current official social statistical data. A tailored social survey instrument was developed consistent with the SEP and administered to gather a social "snapshot" of the persons living in closest proximity to the project site (**Annex XV**). This invaluable feedback from responders revealed various aspects of their quality of life; employment status, education, length of time living in the area and their knowledge and perceptions regarding possible benefits and concerns about the project.

This SIA is not intended to be an academic or exhaustive exercise but an objective pragmatic view of the existing social context permeating Belize City and focuses on critical social concerns that are likely to be impacted given the large scope of the project throughout all its phases and provides possible mitigating solutions.

It is a well-established fact that large development projects, like the Port of Belize Project, have the potential to impact the local social fabric of society through the use and competition for resources and the introduction of new cultural influences. Specifically, these may include competition for and resultant scarcity and price increases for schools, medical facilities, communication, roads and transportation, markets, health, water supply and demand, sanitation, waste disposal and housing. This may challenge the ability of the local authorities and service providers to meet the increasing local demand.

The potential benefits of the project, with its focus on tourism and shipping, will extend far beyond Belize City and must be placed at the apex of national importance. The tourism industry became the top foreign exchange earner in 2015 (Economy Watch, 2015) and is expected to continue to grow and be a key driving force in the Belizean economy.

The Port of Belize and its operations was classified as essential services in 2015 (Channel 5, 2015), this state regulation signals the paramount importance of shipping for the nation and the critical importance of the business conducted by the Port of Belize. Belize stands to benefit and to become more competitive given the shipping trade demands and the economy of scales intrinsically linked to the success of the shipping industry and world trade.

12.2 Stakeholder's Perceptions and Concerns

In keeping with the Stakeholder Engagement Plan, a survey was developed and administered to a small sample of persons living in proximity to the Port of Belize to gather information on living standards and lifestyle and to gather stakeholder perceptions and concerns about the Port of Belize project.

The survey sample consisted of twenty random responders, who were head of households living in the immediate project area. The survey revealed that on average residents lived in the project area 15 years with the mode being 10 years. Responders were most concerned about increased traffic and traffic congestion, dust, noise, flooding and erosion.

The use of dredge material to fill the Port of Belize Private lands was not flagged as a concern except in one instance where the responder suggested that if the landfill was not done properly, it could result in flooding of the nearby community. Other responders suggested that the dredging material could be shared with the community to reduce the current garbage landfill practice in the area (**Figure 12.1**).

Project benefits identified catered exclusively towards the tourist industry, highlighting, increase employment for tour guides, retailing of arts and craft and hair braiding.

Generally, the survey revealed that the vast majority of responders had potable water, use flushing toilets, and had access to a large diversity of communication mediums including phones, television and radio. In regard to employment, 40% of the responders had full-time employment, 30% reported part-time jobs and 30% were unemployed. In education, 40% had completed Primary school, 30% completed secondary school, 25% had a combined 6th Form and university degree.

Fifty percent of responders knew that the Port of Belize project was not a new venture, however 100% reported not being consulted about the project at that time.



Figure 12.1: Use of garbage to fill backyards.

In summary, it could be said from the survey that responders enjoy many basic and modern amenities that sustain a good quality of life, however high unemployment and low education levels are areas of concern. There is a need for public consultation and education about the project.

One on one meetings and interviews were held with representatives of government agencies including the Fisheries Department, Department of the Environment, Mines and Mineral Department, Forestry Department, Lands and Survey Department and Ministry of Tourism). These consultations yielded valuable technical feedback/guidance on issues of concern identified in the TOR as well as the opportunity to show that all major issues were being adequately addressed. This information was shared via PowerPoint presentations followed by a Q&A session.

Recommendations from this group included the following;

a. Ensure consultation with the Belize City Council to ascertain the project's compatibility with their long-term plan for the development of Belize City,

b. Ensure that dewatering sites for the onshore dredged spoils were properly designed and

c. Berms should be constructed to prevent any breach during the dredging process that could adversely impact the Port Loyola area.

In addition, meetings were held with NGO and Private sector representatives and summarized below.

(i) Chamber of Commerce and Industry

True to the interests of the Chamber, those consulted recognized the importance and need for the project and focused their concerns primarily on the economic impacts of the project. Given the Project's size and scope, their concerns focused on the imminent impact on the Fourth Street Tourism Village (FSTV) given the emergence of business competition via the Port of Belize Project. It was conceived that the implementation of the project would render the FSTV in its present form obsolete, recognizing the importance of democratic free enterprise and the advantages of the current Port Project.

(ii) Turneffe Atoll Sustainability Association (TASA)

Mr. Valdemar Andrade, Executive Director of TASA expressed the paramount importance of the Turneffe Atoll and of its incalculable economic contribution to the country. This reasoning appears to be consistent with many if not all serious environmentalist and among ordinary Belizeans. Mr. Andrade recognized the importance of the project and the need to improve the present capacity of the Port of Belize but wanted to be reassured that the project would not cause any harm to the health of the Turneffe Atoll before he could give his full support to the project. The following recommendations were made:

a) Piers to conduct emergency repairs of ships,

b) Replanting of mangroves,

c) Preferred for the disposal of dredge spoils on land, given the negative perception, of sea disposal of dredging spoils among fishers.

This information reflects his personal opinions and not the Board.

(iii) Belize Audubon Society

Those present at the meeting, including Mrs. Amanda Acosta, Executive Director were clear about the science behind the models to analyse the plumes of the dredging material dumped at sea but preferred to see the entire Environmental Impact Assessment and the completed study before they provided an official opinion and position. They trusted the models but cautioned that spawning occurred at Caye Bruckel and this must be of high consideration. They were not opposed to disposal at sea as a possible option.

(iv) Belize City Council

Counsellor for works, the city engineer and others present had no major concerns but expressed support for the project and emphasized the need for the upgrading of the cargo terminal's capabilities as well as that of the newly proposed cruise terminal. They were also supportive of a program to make dredged fill material for residents with low lying properties within the project area.

12.3 Social Impacts and Mitigation Measures

Belize City provides all of the basic resources and services normally expected or associated with a modern city within a developing country. There is vibrant commerce and markets to provide a wide range of food, clean tap water, electricity, sewerage and waste disposal plus a network of streets and bridges, schools and hospitals and multitude of places for worship and entertainment, restaurants and hotels, parks and playgrounds to name a few. This section is grounded on two fundamental pillars, Social Systems Theory and Community Development Framework, in identifying social impacts and proposing mitigations measures.

Social Systems Theory postulates that a system is a set of interacting elements driven to make a functional whole (Zastrow, 2016). These interacting elements are too numerous to be singularly identify but these include all the interactions people have within their environment; a child going to school, a mother looking for work, a broken water main in the neighbourhood that has temporarily interrupted access to potable water, or the shooting murder of someone, all are examples of systems in action. The theory also states that a change in one element can negatively or positively affect the entire system or part(s) of the system.

Community Development Framework on the other hand, offers a platform to identify issues and concerns that matter to people and provide a framework that promotes community development; by connecting people to existing structures to engage in community building, economic participation, neighbourhood improvement, and sustainable development (Netting, Kettner, McMurtry & Thomas, 2017).

The issues and concerns identified by stakeholders, is consistent with the community development principles and are well aligned within the purview of Social Systems Theory.

The mitigation measure(s) proposed for each identified social issue draws from regional and local best practice experience with similar works that have been proven to be effective and practical. In instances where no mitigation measure is required, it means that the impacts on quality of life, livelihood and health are insignificant. Impacts are both positive and negative emphasizing that although this project will create social pressures it also provides opportunities for social and community development.

12.3.1 Occupational Health and Safety

a) Workers Health and Safety

Stakeholders did not identify workers' health and safety as a concern; however, rights based best practices in the labour movement recognize the need to protect workers and given the scope of construction and operational activities of the project could expose workers to health and safety risks. In particular, the following activities could have negative health impacts: noise and dust from demolitions and excavations (stress, ear and eye problems); working with heavy equipment (strains and accidents); heavy lifting, and working under noisy conditions (hearing and stress/psychological impacts).

Excavations and transportation of materials can cause further negative health and safety impacts. The need for an on-going, proactive workers' health and safety plan applies for the full duration of the Project.

b) Community Health and Safety

The project will address community health and safety concerns during the construction stage by implementing adequate mitigation measures to control noise and dust as per section 12.3.5. During the operational phase impact from traffic and associated noise and dust will be a major concern. The project will address this issue by extending the Jane Usher boulevard to route traffic away from congested areas of outside Belize City (see Section 12.3.4.

Mitigation: Contractors shall adhere to the occupational health and safety of workers by adopting the OSH Bill recommended standards. Employer is expected to provide workers with protective clothing, noise reduction equipment and regulated hours of work plus training in safety procedures.

12.3.2 Land

Like in any growing city, Belize City, has seen increased demands for land due to population growth which has resulted in the establishment of communities like Yarbrough extension, Mahogany Street Extension and Belama phase 1 to 4 among others. The communities identified are located South and West of the old capital (Belize City) given the only available marshy land spaces that have been reclaimed and made available for city expansion. In many instances, much of the newly established communities and other communities like Port Loyola that is closest to the port project, remain in swampy marshy grounds.

Mitigation: It is conceivable, that a portion of the dredge spoils, resulting from the port project could be made available to nearby communities for the filling of residential lots to uplift the aesthetics of the community and create more healthy living conditions among other benefits. Clearly, this will need to be approved by the relevant authorities and require collaboration and support from local government authorities for it to achieve the intended outcome. Priority should be given for the establishment of new green public spaces, existing parks and playgrounds, schools and educational centers like the YMCA, and residents with low-lying properties.

12.3.3 Education and Health Services

Sustainable community development must not result in overwhelmed educational and health services. Some challenges reported in the school system include overcrowded classrooms at both the primary and secondary school level.

Belize City has the largest health care system in the country. It includes several hospitals, polyclinics, private doctors and a wide range of specialized services like optometry, dentistry and medical laboratory services. Tertiary level healthcare to treat chronic illness like cancer and renal failure is limited.

The Port of Belize Project is not expected to exert any meaningful pressure on the educational or health care system at any stage of the project including at its operational stage.

Mitigation: None needed

12.3.4 Road Infrastructure

The issue of increase traffic and traffic congestions have been concerns articulated by residents. Belize City has seen major street infrastructure works that have substantially uplifted the appearance of the city and improved the flow of vehicular and pedestrian traffic. The Central American Boulevard and the Yarbrough Street Extension have been renovated and move substantial traffic to and from the Port of Belize.

However, most streets in constituencies nearest the Port of Belize Project including Port Loyola, Lake Independence and the Collet Division did not benefit as much as other areas in the city from the aggressive street reconstruction project. This disparity is perhaps most visible in the Port Loyola area along with the presence of overgrown yards and poor maintenance of drainage infrastructure.

It is believed that the expanded Port of Belize Project will add substantial amounts of new traffic to the two main streets in the area, namely, Central American Boulevard and Yarbrough Street Extension and other side streets.



Figure 12.2: Street in the Port Loyola Area.



Figure 12.3: Drainage Canal Port Loyola Area.

Mitigation: The port project provides for this increase and proposes the construction of a new road leading through out of the Port of Belize through the Jane Usher Boulevard linking up with the George Price Highway. It is anticipated that this new road will not only serve the increased traffic volumes arising from the project but also divert much of the existing traffic away from the Central American Boulevard thereby reducing traffic flow along that heavily populated area. (see **Figure 12.4**).

12.3.5 Noise and Dust Pollution

Noise and dust pollution were two issues of concern raised by resident and are expected to be a very serious concern, especially during the construction phase of the project. The areas along the major roads near the project are densely populated with residents, businesses, primary and secondary schools and ever step must be taken to reduce noise and dust pollution to minimal acceptable levels.

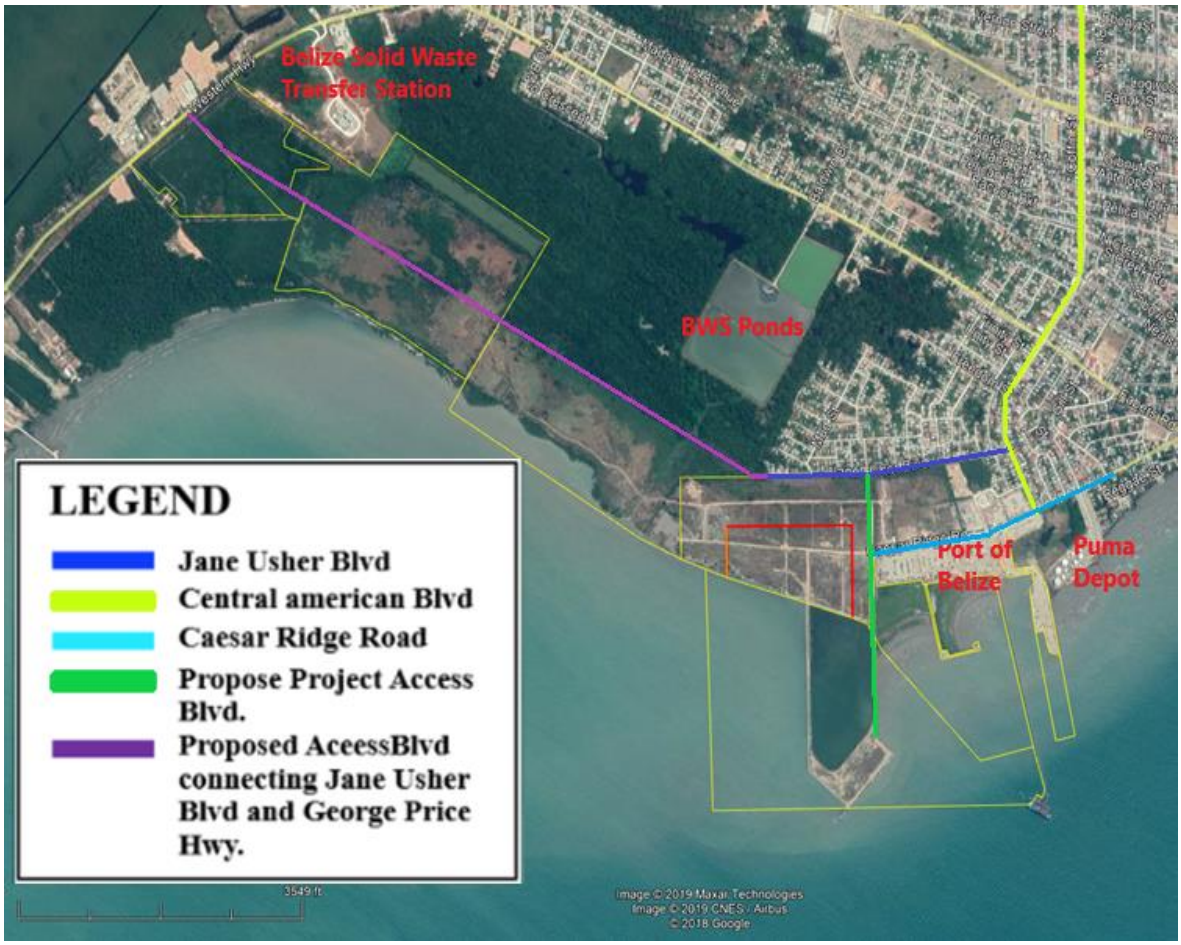


Figure 12.4: Cruise Tourism Village and Jane Usher Extension Boulevards.

Mitigation Measures:

The following mitigation measures are proposed to address the potential impacts:

1) Contractors must ensure proper maintenance of vehicles, equipment and machinery. All vehicles and equipment used for construction must be fitted with exhaust silencers and the use of "Jake Brakes," also known as compression release engine braking systems strictly forbidden in populated residential areas.
2) Equipment for water sprinkling of roads must be available and regular road sprinkling must be strictly monitored to reduce dust pollution.
3) Implement a Grievance Redress Mechanism (GRM) to ensure that citizen complains can be lodged and expeditiously addressed throughout the construction phase of the project. This mechanism must be led by a social practitioner working with a high degree of autonomy to safeguard the interests of citizens and serve as a liaison among the central government/local authority, community and the project.

12.3.6 Social Welfare Services

The community development framework recognizes the importance of social welfare services in providing relief to the most vulnerable in society. Due care must be exercised with the introduction of any large-scale project that could potentially add strain to social welfare services. Belize City offers most if not all the state sponsored social welfare assistance programs inclusive of services for children with special needs and diverse abilities, the elderly and the homeless population.

Faith based and charity organizations provided other essential welfare services to a broad range of persons. It is not anticipated that the Port of Belize project will pose any additional strains to this sector. On the contrary, the economic activity resulting from the project could be used to expand much needed social welfare services.

Mitigation: None needed.

12.3.7 Tours and Hotel Accommodations

The project will increase cruise ships port calls to Belize City creating a substantial need for land based transportation to inland destinations and within Belize City. It is not anticipated that the increase cruise ships will increase pressure on hotel accommodations as ship visit only occur during the day and leave in the evening.

Mitigation: The Ministry of Tourism along with the Belize City Council will lead the establishment of a monitoring mechanism to identify and address tours and transportation challenges with a view to identify issues and resolve conflicts.

12.3.8 Labour and Employment

The project will require highly specialized workers during the construction stage and is expected to employ upwards of 500 workers of various skills levels during the operational phase. As is the case of most cruise ports workers will be drawn mostly from the local area which should dramatically improve the economic outlook for south side Belize City. It is expected that many of these workers will undergo training for their roles which will improve their future employability in the industry.

If these workers are not available locally, they must be sourced from the districts or internationally. This presents a good opportunity for the transfer of knowledge, skills and technology. Also, during the construction stage, there will be a need for a broad work force of skilled and unskilled workers. This opens opportunities for much needed employment and on the job training.

Mitigation:

1) Close collaboration with the immigration department to issue timely work permits to foreign workers with specialized skills.

2) The project in consultation with contractors should compile a list of specialized workers needed and or employed to be given to the Labour Department to promote and or disseminate specialized career options to meet existing and future needs.

3) Every effort must be made, whenever possible and practical to do so, to employ workers from within the community. This may enhance public goodwill, improve civic pride and reduce unemployment and poverty.

4) The project in collaboration with the Belize City Council must ensure that sufficient and adequate commercial spaces are available for Belizeans to engage in commercial activities catering to the tourism industry emanating from the project. This may include hair-braiding services, sale of locally made arts and craft, cultural apparels, food and beverage, and tours among others.

12.3.9 Security and Visitor Welfare Requirements

The security of visitors and workers is of paramount importance to any cruise tourism port. The Port of Belize will recruit and train security personnel to enforce the facilities rules and regulations on site and ensure the security of visitors and staff within the facility. It is expected that PoBL will liaise closely with facilities receiving their guest and with tour operators to ensure that adequate security is available to ensure the personal safety of all visitors.

The PoBL may engage the services of a private security firm for this work or may chose to train and recruit its own security services. For visitors choosing to go on walks and tours within Belize City the facility will rely upon the Belize Police Force and the Tourism Police unit to ensure the welfare of its guest.

12.3.10 Social Inclusion

Social inclusion is a hallmark of social development and the PoBL project has a golden opportunity to support local inclusion. By creating opportunities for local participation at every level, throughout the life of the project, PoBL can provide much-needed economic opportunities and social upliftment for the south-side communities of Belize City and upgrade the condition of women and children in the area.

Mitigation: The Government of Belize should undertake and initiate a longitudinal comprehensive assessment to determine the social and economic impact of the project ten years from its initiation. This requires obtaining a range of benchmark indicators; however, this must not impede the initiation of the project.

12.4 Survey Information

A comprehensive stakeholder engagement exercises was undertaken within the scope of this study. The methodology and detailed results, including time stamps and one-on-one consultation feedback, may be found in **Annex XVI**. To preserve the confidentiality of the exercise, a

physical packet of the actual completed surveys has been delivered to the Department of the Environment. Respondents to the survey cover over two thousand persons countrywide, primarily centred in the direct area of influence. These consultations ensure that thorough information is made available to the general populace.

PERSONS AND ORGANIZATIONS CONSULTED

NGOs	Governmental Organizations/ Statutory Boards/Utility Providers	Private Citizens
• Belize Chamber of Commerce and Industry • Belize Audubon Society • APAMO • NAVCO - 9 Village councils • Turneffe Atoll Sustainability Association (TASA) • SEA • BTIA • ARREP • APEB • BCSP • BSCAP • NICH • WCS, WWF, Manatee, Healthy Reefs Conservation, Belize Gamefish Association, Healthy Reefs (additional consultation to be done) • No response Oceana and FECTAB	• Fisheries Department • Department of the Environment • Mines and Mineral Department • Forestry Department • Lands and Survey Department • Ministry of Tourism • Belize City Council • Belize Tourism Board (BTB) • Belize Port Authority (BPA) • Coastal Zone Management Authority and Institute (CZMAI) • Belize Water Services Ltd. • Belize Electricity Ltd. • Belize Solid Waste Management Authority (BSWaMA) • BELTRAIDE	• Residents of Port Loyola 35 • Fisher Folks • Media houses and their viewership • Residents and businesses countrywide • Tour operators • Tour Guides • students • 3 Tertiary Educational Institutions • Belizean Diaspora • Port of Belize Management 11 • Port of Belize Staff 90 • Stevedores 5

Figure 12.5: Persons and Organizations Consulted

12.5 Local Community Consultations

A total of six different sessions were held throughout the period of April 27th to June 20th of the present year to conduct consultations to determine the views and/or concerns of those living in the communities nearby the Project site, particularly the Port Loyola area, Jane Usher Boulevard area, and Faber's Road Extension. Participants indicated the street address in which they reside. With this data, approximate GPS coordinates were obtained to correspond to the reported addresses

Figure 12.6 below indicates how most of the survey participants reside in the vicinity of the Port Loyola Area in the vicinity of the Project site. There were few conscientious citizens from other parts of Belize City that also took part in the information session and the survey by traveling to the area based on the advertisement of the event which was on Love FM and Social media news.

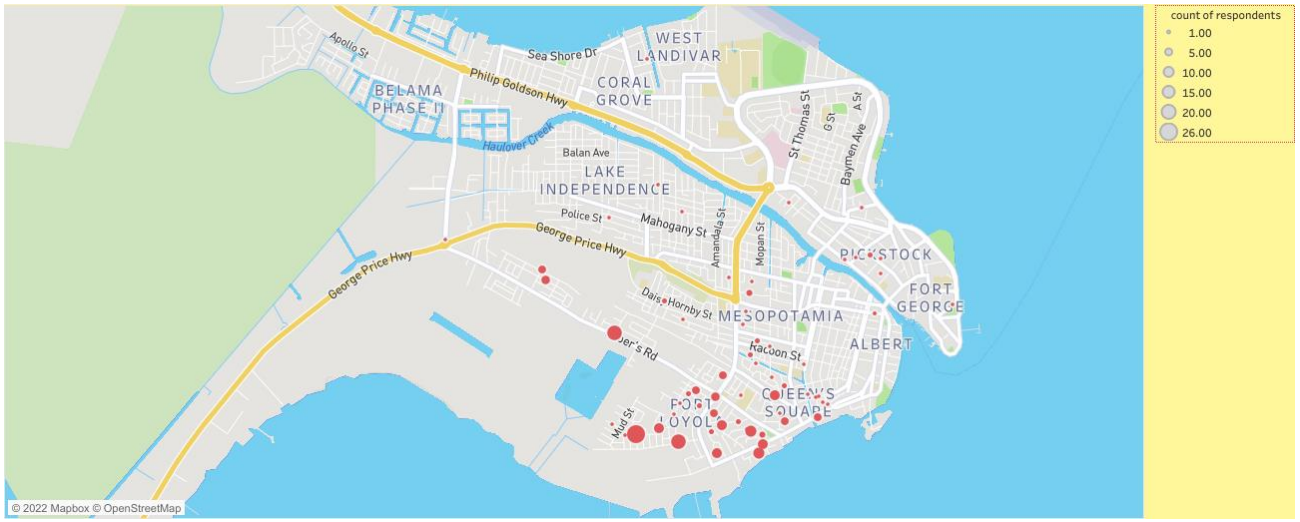


Figure 12.6: Respondents by listed place of residence

These sessions provided an opportunity for the neighbors of the Port of Belize to get exposed to the proposed capital investment project for the expansion of the Port of Belize, especially engaging those residents that might not be able to participate in other means of consultive discussions, meetings, debates, etc., due to some unforeseen reason.

The survey respondents and participants not only learned the positive impacts and the risks this project was taking but gave them a chance to express their concerns and opinions regarding such project. A total of 275 persons were engaged in this process, from which a total of 220 completed the survey regarding the project development. The full Port Loyola Consultation Report as produced by Chamberlain Consulting, including a detailed description of all methodologies implemented and surveys conducted is included in **Annex XVII**.

The sample size methodology referenced in the Report included as **Annex XVII** presents several iterations of the sample size, and this methodology yielded that between 184-350 adults could be surveyed to thoroughly reflect a representative sample size. Engagement shows 275 persons were engaged, of which many identified as fisher folks or mariners. A total of four participants are in overall disapproval of the project, twenty-one is of neutral stance and one hundred and ninety-five participants have a positive outlook about the project and are in overall agreement.

A mixed methodology of techniques has been employed through these local stakeholder engagement exercises to ensure that the sample size was met and that persons who engage are given a full presentation and ability to pose questions and provide feedback, with only face-to-face sessions conducted using the following vehicles:

Public meetings

Public meetings are often the cornerstones of public participation processes and allow stakeholders to raise their concerns in open forums. One of these was hosted at the Cumberbatch field in the Caesar Ridge Area, Muslim School on Faber's Road, and at the Jane Usher Basketball stadium for residents of the areas, respectively as well as host forums where it was possible to congregate persons from the area such as the Ministry of Youth Department, Gateway as well as homes, yards, and businesses where residents of the area congregate.

Open Houses and Focus Groups

Open houses are regularly used to supplement public meetings. An open house makes it easier for people who are unaccustomed or unwilling to speak in front of large groups to engage in one-on-one dialogue with a member of the ESIA team. Our Open houses were geared to provide sufficient and accessible information to enable stakeholders to:

- Become informed and educated about the proposed project and its potential impacts, building their capacity to participate;
- Identify issues of concern, offer suggestions for enhanced benefits, comment on alternatives and contribute local knowledge and experience, and;
- Verify that their comments, issues of concern, and suggestions have been captured and
- Considered.

Focus-group discussions are especially powerful when clarifications are required from the community or when the developer will need to assess the population's opinions on a particular issue. Focus-group meetings can also be held, as far as logistics allow, when specifically requested by a given interest group. As recommended in our first round, the community liaison is a critical party in focused discussions with attendees supported by residents in the area. Three residents of the area supported this initiative Lashanda Gonguez Apolonio, Latanya Gonguez and Kishawn Diego.

Internet

A dedicated email address has been maintained to which comments and issues can be sent. stakeholders@portofbelize.com is established to receive comments and is being responded to by the persons delivering presentations and conducting the surveys. That said, the DOE has advised that persons in Port Loyola still experience difficulties accessing the Internet., andInternet access was viewed simply as a complementary function to the other mechanisms described here.

Written Records

Written records were maintained for all community engagement processes. These include photos, registration sheets, and surveys where possible, as not all participants will be willing to register, respond, or be photographed formally. These include records of the issues raised by stakeholders and how the developer responds to these.

12.6 Conclusion

The Port of Belize Project has the potential to transform the tourism industry in Belize city and bring much needed economic and social development opportunities to south side Belize and, for the long-term, the development of Belize on a whole post this worldwide recession. The project includes 100-150 workers in the preconstruction phase and 400-500 workers in the construction phase and hundreds of entrepreneurial opportunities, which means thousands of direct and indirect jobs in an impoverished community, including employment for all areas of the construction industry (light machine operation, welding, electrical, plumbing, engineering, architecture, lab testing, and masonry, etc.). This will provide spill-off work in block making, material provisioning at such a large scale that is much needed, especially within this post COVID19 wake of unemployment. Post-construction, the market opens for the service sector, Engineers, musicians tour services and operators, etc. The project has wide appeal among a wide cross-section of Belizeans, including the rank and file citizenry, highly-trained environmental professionals, local government officials, and the business community.

There are direct benefits to be derived from such a project since it will offer the kind of development opportunity and promote entrepreneurial spirit similar to what was visible in the Fort George Division along the Marine Parade Drive and the Fort Street Tourism Village and surrounding areas. It is indisputable that such development was only possible given ambitious visionary planning. The same vision and plan are responsible for the development of the tourism product in Belize and now has the potential to make the Port of Belize project a monumental success. The south-side of Belize City's future economic growth and expansion will be intricately linked to the Port of Belize project where a bulk holding facility, as well as a state-of-the-art cruise ship port, will exist where ships may dock alongside the port allowing for vast numbers of visitors to visit mainland Belize inclusive of the disabled who were often reluctant to come on board during tendering processes.

Larger ships mean passenger growth, which means more tourism dollars from those who alight the vessel. As visitors fall in love with Belize, so do their interests in overnight tourism. With its home in Southside Belize and especially in Port Loyola, we envision that these opportunities can contribute to hopefulness and reduction in crime.

Having a socially responsible investor within this area also means more opportunities for the children of the area as planned investments are made in these communities adjacent to the project in education, sports, and cultural preservation. Citizens within this community can also expect immediate growth in property values.

This social assessment views the Port of Belize project as having the potential to transform the tourism industry and bring much need economic and social development opportunities to south side Belize and for the long-term development of Belize.

Chapter 13: Disaster Prevention and Emergency Management

13.1 Overview

Belize lies in the hurricane belt and is vulnerable to the hazards associated with land falling hurricanes namely: torrential rainfall, hurricane force winds, storm surges and floods. Flash floods and riverine floods are also common and are often generated by tropical or frontal convection that are unrelated to tropical cyclones. Droughts and related heat waves will become more intense under impending climate change. Other regional geophysical hazards that may affect the country but are rare include seismic activity and tsunamis. Possible manmade hazards are those associated with fires, chemical spills, oil spills and explosions.

Emergency Management is the discipline dealing with and mitigating risks. It is a discipline that involves preparing, supporting, and rebuilding when natural or manmade disasters occur. The actions to avoid or ameliorate the impacts depends in part on the evaluation of the risk and the measures taken to address and prevent the perceived risks.

13.2 Hazards, Vulnerability, Exposure and Risks

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) on climate risk concept considers: hazards, exposure and vulnerability to assess the risk factor or levels for people and assets, such as the propose Cruise Terminal development in Port Loyola, Belize City. **Figure 13.1** shows the impact chain concept to evaluate climate-related risks in accordance to the IPCC AR5, 2014.

Risks

The risk is the potential for consequences where something of value is at stake and where the outcome is uncertain. Risk results from the interaction of vulnerability, exposure, and hazard. The focus is on climate-related risks (i.e. risks related to extreme events as well as slow onset trends).

Hazards

Usually refers to climate-related physical events or trends or their physical impacts. It may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. Examples include rise of temperatures or of sea level (climate-related trend); hurricanes (climate-related event), floods (impacts).

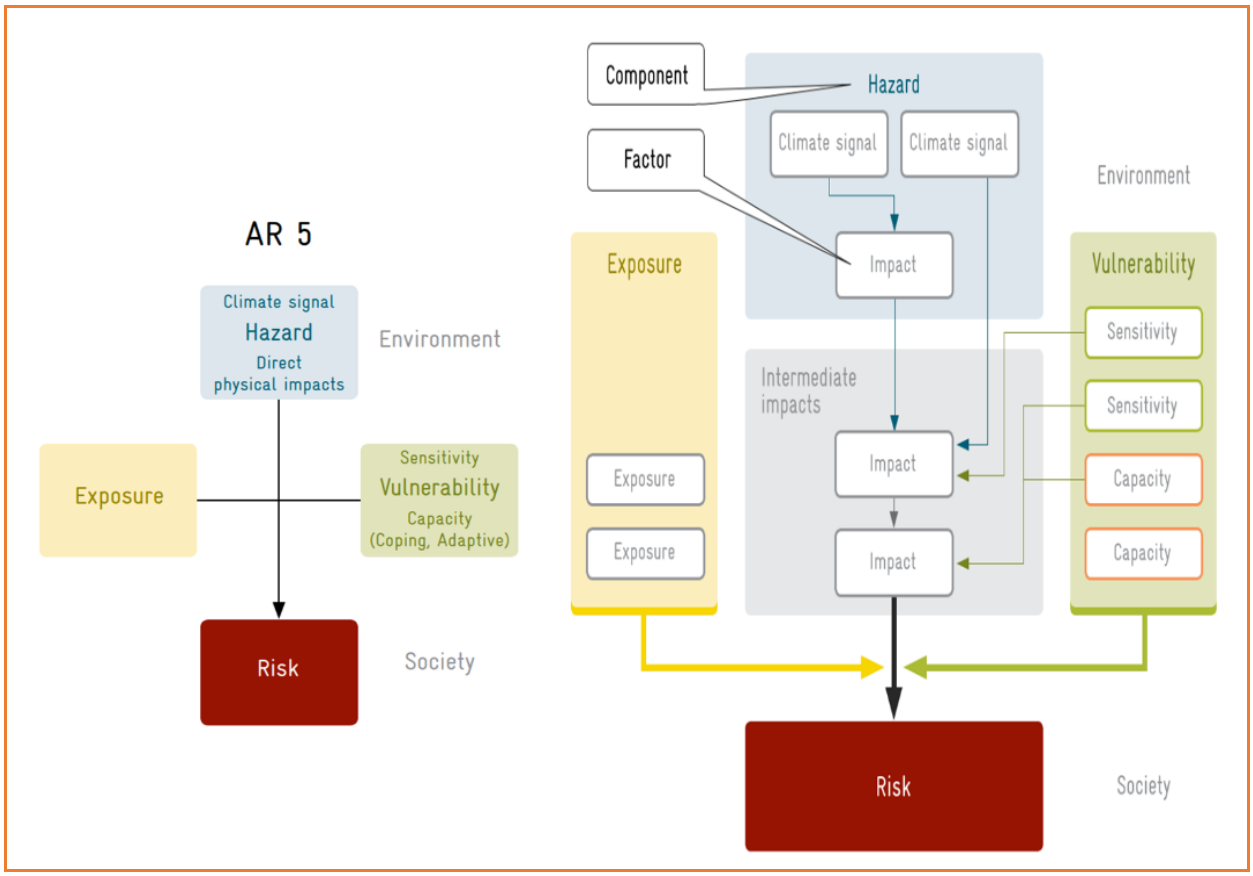


Figure 13.1: IPCC AR5 impact chain concept to evaluate climate risks.

Exposure

This refers to the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected. The most important criteria for the exposure = presence / relevance.

Examples are presence of tourism infra-structure or sensitive ecosystems.

Vulnerability

This refers to the disposition to be adversely affected. The two elements of vulnerability are: sensitivity and capacity. That is, sensitivity to harm and lack of capacity to cope and adapt. Capacity is the ability of societies and communities to prepare for and respond to current and future climate impacts:

- Capacity to cope (immediate/medium term response to hazard)
- Capacity to adapt (knowledge, techniques, technologies, institutions and economy): ability of the system to take advantage of opportunities, or to respond to consequences

An example, having an effective early warning system or not for flood or hurricane emergencies.

Adaptation

Adaptation is the process of adjustment to actual or expected climate and its effects.' Adaptation seeks to:

- moderate or avoid harm or
- exploit beneficial opportunities

Generally, adaptation measures can reduce the risk by focusing on one of its components: exposure or vulnerability.

The risks are evaluated after analyzing each hazard, the exposure of the assets, their vulnerability, and putting a weight to each, respectively.

Following this approach, we have:

$$\text{Risk} = (\text{Hazard} * W_H) + (\text{Vulnerability} * W_V) + (\text{Exposure} * W_E) / W_H + W_V + W_E$$

13.3 Hazards and Risk Index

From another perspective, risk assemment takes into consideration the likelihood or probability of the hazards occuring and the consequences or impacts. As before, the likelihood or probability of a hazard impacting an asset is related to its exposure, while the consequences or impacts are related to its vulnerability or capacity to cope (immediate reponse or to adapt in a longer period of time). The outcome of the risks may range from very low or insignificant, moderate (minor), High (significant), very high (major risks) to extreme (or severe). Extreme or severe risk category would probability be prohibitively costly to mitigate and could jeopaerdize project implementation.

Based on these definitions, it can be seen that ***risk analysis*** may be carried out in an objective manner, while ***risk assessment*** is much more subjective and should include public policymakers. **Risk Management** is the process of implementation of actions required to quantify, mitigate and control risk. Risk Management is closely related to the concept of safeguards according to the NEMO (2010)

In Disaster Risk Management (DRM) several criteria can be used to determine levels of vulnerability. These may include but are not restricted to: population density and annual growth rates, Human Development Indicators set against long-term urban growth rates, and real adjusted GDP per inhabitant set against illiteracy percentages, or set against child mortality rates. From these indicators, population density and growth rates provide an initial baseline assessment of a country's vulnerability, on the basis that countries with higher population densities are more vulnerable. Another major vulnerability criterion is poverty, which is useful in characterizing the sectors of a society that are most vulnerable to disasters. Housing and infrastructure in disaster-prone area increases a country's vulnerability.

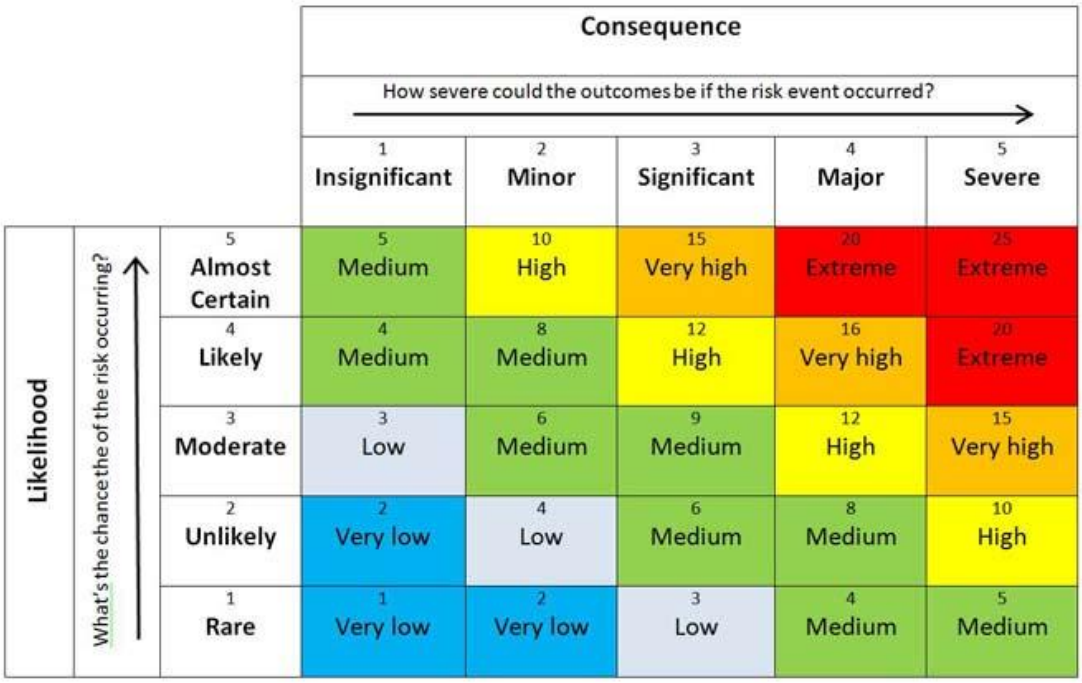


Figure 13.2: Risk Assessment Matrix.

13.4 Meteorological and Hydrological Risks and Hazards Impacts and Mitigation

The main hydrometeorological hazards range from: tropical cyclones and hurricanes, and related hazards (torrentail rains, flash floods and inundations, destructive winds, storm surge and tornadoes), droughts, and heatwaves. Extended droughts and bushfires are also hazards in the natural environment related to climate variability and climate change that may impact the Project Area.

(i) Geophysical hazards - May include earthquakes, and tsunamis.

(ii) Man-made Technological Hazards - Man-made hazards that can directly or indirectly impact the components of the Project Area include:

Chemical Fires	Release of toxic fumes	Oil Spills	Explosion
Road traffic accidents	Urban fires	Medical Emergency on Project Site or Schools	

13.5 Evaluating the Risk Index Associated with Natural and Tecnological Hazards

The Risk Assessment matrix illustrated in **Figure 13.1** will be used to evaluate the Risk Index for the major hazards identified and reviewed, then prioritized in order of significance.

(i) Impacts - Impacts, either negative or positive, caused by natural or man-made hazards on communities or infrastructure are evaluated through *risk analysis* and *risk assessment* that

Table 13.1: Hazard Risk Index for the proposed Cruise Tourism Terminal project at the Port of Belize.

Major Hazards	Likelihood	Consequence	Risk Index	General Impacts	Mitigation Measures
Tropical Cyclones & hurricanes; **Storm Surge**	Almost Certain (5). Increased frequency of Cat III hurricanes or stronger events because of Global Warming. Higher storm surges associated with elevated frequency of intense hurricane impacting coastal communities	Severe (5)	**25** ***Extreme***	- Demolish housing, commercial and road infrastructure, commercial assets and degrade forested areas and mangrove forests, damages coral reefs; disrupts manufacturing and commerce, results in loss of life and property. - Also, can cause severe damage to trestle	- NEMO maintains Preparedness Mode and keep the Public Informed; Hurricane Early Warning is updated and in place. - Solid engineering designs and works carried out during Cruise Terminal construction, improved drainage and coastal protection - Step-up inspection and ensure building standards are used. - maintenance and inspection schedule set up for Cruise Terminal facility. - Contractors have Hurricane Emergency Plan they implement at declaration of Preliminary Phase (Red I) - Cruise Terminal administration develop its Hurricane Emergency Plan and do simulations and update Plan annually. - Staff should be familiar with Plan and their roll.
Pluvial Floods in Belize City & Port Loyola	Annual floods caused by intense downpours Likely in Port Loyola (4). Increased frequency of extreme flood events likely under warmer climatic conditions.	Major (4)	**16** ***Extreme***	- Degrade infrastructure including city streets and highways and buildings. - Inundate and damage property and goods.	- Monitor Weather bulletins and advisories. - Activate Community First Responders with CEMO - Review Flood Mitigation Plan - Regular inspection by MOWs / City Council engineers during street construction, culverts installation and drainage works, and buildings. - Cruise Terminal Facility administration liaise with Port of Belize, CEMO and MOW's operational Road Inspection and Maintenance Unit.

Major Hazards	Likelihood	Consequence	Risk Index	General Impacts	Mitigation Measures
Urban Fires and Wildfires	Almost certain (5) in warmer environmental conditions and extended drought events	Significant (3)	**15** ***Very High***	- Loss of property and assets. - Land degradation. - Increased sedimentation from degraded landscape. - An urban blaze may become a disaster if mismanaged.	- Cruise Terminal authority has a Fire Emergency Plan and conduct drills with employee. - Keep communities and stakeholders informed. - Equip establishment with fire-fighting equipment and have clear demarcated fire escape route. - Liaise with Belize City Fire Service and have SOP for tourist evacuation in an emergency. - Secure construction equipment & assets in safe zones. - FD improves forest management and wildfire control
Heat Waves	Likely (4)	Significant (3)	**12** ***High***	- Major Health hazard among employee and tourists, the young and elderly in the community. - Increased chance of Fire outbreaks - Increase the usage of energy to cool offices and operational floor.	- CEMO/MOH/Red Cross should trained first responders in establishments (Cruise Terminal operations) and communities - Contractor has trained First Aiders. - Liaise with Belize Red Cross, KHMH, and Private Health Services.
Earthquakes & Tsunamis	Moderate (3)	Minor (3)	**9** ***Medium***	Rare event but terminal and support infrastructure could be impacted	- Build public awareness to respond to an earthquake. - Use Improved designs for Infrastructures - Improved warning system, and ensure that staff & employee familiar with alarm siren - Liaise with CEMO & DEMO - Identify a safe zone for employee and visitors
Coastal protection slippage or collapse	Likely (4)	Significant (3)	**12** ***High***	May increase coastline erosion and sedimentation. Coast zone becomes more exposed sea level rise and energetic wave action during storms.	- Stabilize the shoreline or repair/ rebuild the seawall - Install signage - Regular road inspection by Port of Belize / MOW's / CEMO Engineers and maintenance crew.

Major Hazards	Likelihood	Consequence	Risk Index	General Impacts	Mitigation Measures
Oil Spills	Moderate (3)	Significant (3)	**9** ***Medium***	- Pollution of coastal water around spill site. - Contamination of soils - negative impact for some marine organisms	- DOE/NEMO should review and conduct regular exercise to address oil spills in the Coastal Zone. - Training for first responders (Construction crew/others) - Cruise Terminal administration and Port upgrade their oil spill Contingency Plan
Explosion (Construction & Cruise Terminal Operational Phase)	Likely (4)	Significant (3)	**12** ***High***	- May result in loss of life and property. - Hazardous to Cruise terminal infrastructure and sensitive equipment - Disrupt operations and result in loss of revenue	- Have safe repository for explosive material. - Ensure safe operational procedure - Training for first responders (Construction crew/employees). - Have an inspection schedule for sensitive and/or heavy equipment and gas tanks on site
Chemical Fires	Likely (4)	Minor (2)	**8** ***Medium***	- Loss of life and property. - Contamination of air and water resources - Can impact nearby residents and businesses in Port Loyola	- Safeguard chemical material. - Have recovery contingency plan - Cruise Terminal and Port of Belize shall develop an evacuation Plan and identify safe zones. - Post a list of all Emergency Numbers in a highly visible Notice Board in Offices, and list should be updated regularly. - Staff and other Employee must have regular training to respond to a chemical fire and explosion.
Medical Emergency	Likely (4)	Significant (3)	**12 Medium**	- Could result in loss of life or serious body injury - May disrupt operations - Can impact visitor's perception of the Belize Cruise Terminal safety.	- Contractors should have a Plan for a medical emergency - Draft and adopt a Medical Emergency Plan - Trained first aiders in staff and among employee. - Communication and Evacuation procedures must be clearly understood by first responders and tested.

(ii) determine the consequences and importance of the impacts and hence the intensity of the hazards.

(iii)Mitigation - is the measures necessary to reduce the negative impacts of the hazards. Both the IDB and world Bank Bank promulgate *ex-ante* risk reduction measures to reduce Belize's vulnerability to natural hazards.

The Risk Index for several key hazards that are likely to impact the project during its operational period is evaluated using Table 13.1 and tabulating the results in Table 13.2.

The prioritized hazards are listed in **Table 13.2.** As can be observed, tropical cyclones and hurricanes and their related hazards, including destructive hurricane-forced winds, torrential rainfall, floods and tornadoes, tops the list. Second was floods (inundations) and flash floods; followed closely by urban wildfires and heatwaves.

Table 13.2: Prioritized Hazards that can impact the proposed Cruise Terminal construction and operational phase.

Priority	Hazard	Risk Index	Remarks
1	**Tropical Cyclones & Hurricane**	**25** ***Extreme***	- Hurricanes and associated hazards are at the top of the list of extreme hydro-meteorological phenomena to impact the Port of Belize Cruise Terminal project sites. All contingency measures should be implemented during construction and operational phases to build resilience.
2	**Coastal Floods and Flash Floods**	**16** ***Extreme***	- Measures to reduce loss of life and property should be implemented locally in the zone of influence for annual flood events. Access road or street infrastructure to project sites should meet ASSHTO standards for safety and resilience, while infrastructure designs should meet building standard for extreme, hazardous conditions.
3	**Urban and Wildfires**	**15** ***Very High***	- Urban fires are common in Belize City. Large urban fires near the project site or within the Cruise Terminal facility could result in loss of life, property and suspension of operations. - Landfalling hurricanes crossing or impacting the vicinity, destroys buildings and forested areas along their path inland. Authorities and private landowners should clear all fallen trees and debris, to reduce fuel load in subsequent fire season.
4	**Heat Waves**	**12** ***High***	- Heat waves are a major health issue during oppressive and extended dry season/drought conditions as a result of Global Warming. FD/NEMO/Public Health/Administration should have a trained team of first responders to deal with heat wave stress and heat related illnesses. Administration should have a Plan to address heat stress and other medical emergencies in the workplace. Health insurance should be encouraged for staff and employee.
5	**Coastal protection**	**12** ***High***	- More likely to occur where structure is impacted by wave actions and structural stress because of external forces

Priority	Hazard	Risk Index	Remarks
	slippage and collapse		(docking and weight). - Critical sites along the sea wall should be identified and stabilized. - Shoreline or beach should be maintained and stabilized against erosion due to wave actions and sea level rise.
6	**Explosion (Construction & Cruise Terminal Operational Phase)**	**12** ***High***	- Rare, but can happen especially during construction phase. Cruise Terminal Administration should have a SOP to deal with accidental explosions during construction and operation. Liaise with DOE/NEMO/DEMO/Coast Guard/BDF Response Team
7	**Medical Emergency**	**12 High**	- Very likely among visitors and staff/employees. - Cruise Terminal Administration must have a Medical Response Plan. - Contractors must have a Plan to address a medical emergency at work site
8	**Oil Spills**	**9** ***Medium***	- Have SOP to deal with accidental oil spills. Liaise with DOE/NEMO/CEMO/Coast Guard
9	**Earthquakes & Tsunamis**	**9** ***Medium***	- Rare but likely event. NEMO has an Emergency Plan for Seismic Emergencies and Tsunamis. - Get staff and employee familiar with these Plans. - Public education necessary in communities in the zone of influence (Port Loyola, Belize City). Should be done regularly, not after the impact.

13.6 Impacts and Mitigation

An over-arching mitigation measure to reduce the impacts for assets in the proposed development is to transfer risks for extreme hydro-meteorological events through comprehensive insurance schemes or portfolios. A second mitigation measure for the Project is to incorporate risk reduction measures in all infrastructure development and operational plans of the development, to reduce the impacts of climate change and extreme weather phenomena, and technological hazards. A tested and effective Emergency Plan should be streamlined into the daily operations of the establishment.

Table 13.3 is a summary of natural and technological hazard impacts and proposed mitigation measures for assets and infrastructure for the proposed Cruise Terminal facilities at the Deep-Water Port.

Table 13.3: Summary of Natural and Technological Hazards, Impacts and Mitigation in connection with the proposed Cruise Terminal Development project.

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	Operation	Construction	Operation			
Tropical cyclones & Hurricanes	- Disrupt & delay the works - May damage material, undermine buildings and pier - Loss of life or property	- Disrupts Cruise Terminal & Deep-Water Port operations, - Results in loss of revenue - Loss of life & property/assets - Administration incur cost if not insured - Destabilize wall of dredged channel and turning bay. - Increase sediment build-up in navigation channel and turning bay	- Contractor must have a hurricane emergency plan - Have insurance - Safeguard life & property to reduce loss - Construct Cruise Terminal infrastructure to withstand major hurricane events and meet International safety standards for Cruise Terminal construction.	- Cruise Terminal Administration should have a tested Hurricane emergency Plan - Update Plan annually and rehearse from time to time - Have insurance - Safeguard property to reduce losses - New staff and employee must be trained on emergency response - Visitors safety is a priority and are evacuated from danger zone in the Alert phase	- Contractor - Cruise Terminal Administration/ Emergency Coordinator - Liaise with NEMO/CEMO/ Coast Guard on issues connected with DRM	- Period during construction phase - During Cruise Terminal operational phase., especially during high season.	- Contractor insurance portfolio - Disaster Mitigation costs should be budgeted annually into Cruise Terminal budget (should include costs of equipment and training)
Coastal	- Disrupt	- Disrupt	- Have a Flood	- Have a Flood	- Contractor	- Period during	- Contractor

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	**Operation**	**Construction**	**Operation**			
floods & Flashfloods.	transport - May flood project site - Undermine construction activity & infrastructure - Loss of material - Loss of life	access to Cruise Terminal for a short time - Disrupt transportation - Suspension of operations - May cause flooding of Cruise Terminal arrival area - Damage to property, loss of life	Emergency Plan - Have a contingency plan to safeguard material, property & life - Have insurance - Build Cruise Terminal infrastructure and access to be resilient to floods	Emergency Plan - Update Flood Plan Annually - Have contingency plan to safeguard life and property in flood emergency - Sensitize staff and employee on flood hazard	- Cruise Terminal Administration - Liaise with NEMO/CEMO/ Coast Guard on issues connected with DRM	construction phase - During regular operational phase and high season	insurance portfolio - Flood Mitigation costs should be budgeted annually
Storm Surge	- May impact construction site at the Deep-Water Port - May disrupt or delay works - Damage material, loss of life	- Disrupt operations - May impact or undermine infrastructure on site and off site (in the City and access roads) - Cruise Terminal	- Design Cruise Terminal must meet standards for Cat V hurricane and storm surge. (e.g. ASSHTO Standards for public infra structure)	- Administration must have a tested Hurricane Plan and Contingency Plan for imminent Storm Surge and coastal floods - Get insurance - Sensitize staff and employee on storm surge risks	- Contractors - Cruise Terminal Administrations and the MOE - Cruise Terminal Administration should liaise with NEMO/CEMO/ Coast Guard/BDF	- Construction period - Operational phase and high season	- Contractor insurance, Contract Security fund. - Insurance of all Cruise terminal assets, including infrastructure and berthing/ disembarkations facilities etc. - Cost will be incorporated in

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	Operation	Construction	Operation			
	and property	may incur financial loss if not insured - Loss of life and property	- Have a hurricane plan. - Liaise with NEMO/CEMO/ Coast Guard	for Belize City.			coastal flooding emergency budget line.
Tsunamis	- May impact construction sites near the coast - May disrupt or delay works - Damage material, loss of life and property	- Disrupt business - May impact or undermine infrastructure - Facility may incur financial loss if not insured - Loss of property and life	- Familiarize workers with NEMO Tsunami Emergency Plan - Contractor should have insurance	- Familiarize staff and students with NEMO Tsunami Emergency Plan - Safeguard life and property - Administration should have insurance	- Contractors - Administration and Port - Liaise with NEMO/DEMO	- Period during construction phase - During operations	- Contractor insurance portfolio - Flood Mitigation costs should be budgeted annually
Urban & Bushfires	- May impact construction site - May affect human health and safety	- May disrupt operations - May result in loss of assets - May result in smoke inhalation and human	- Have firefighting equipment - Have a clearly defined fire escape route posted at strategic	- Install fire extinguishers in strategic location in buildings and landing area. - Liaise with Fire Department and get suitable staff	- Contractor - Cruise Terminal Administration - Liaise with Forest Department, Fire Department, NEMO/CEMO	- Construction phase - During regular operational phase and high season. -	- Contractor insurance portfolio - Fire insurance

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	Operation	Construction	Operation			
		health impacts	location in Cruise Terminal lounge and administrative building - Have a fire hydrant network installed on the premises	members trained in the use of fire extinguishers, and fires response procedures. - Regularly check and maintain fire extinguishers, fire hydrants and other equipment			
Earthquakes	- May impact construction sites. - May undermine or impact Cruise Terminal infrastructure	- May disrupt operations - May very likely damage main infrastructure - May damage access road infrastructure - May directly or indirectly impact communication and other utilities	- Have contingency Plan for seismic event - Familiarize workers on Earthquake Emergency Plan. - Update Plan if deemed necessary during construction phase.	- Familiarize staff and employees on NEMO's Earthquake Emergency Plan - Conduct Earthquake simulation (at least once each year with staff and employee - Liaise with NEMO/CEMO/ Belize Red Cross/Coast Guard	- Contractor is the responsible to safeguard life and property for seismic events during construction - Cruise Terminal Administration responsible for safety during seismic events during working hours - Administration liaise with NEMO/CEMO/ Red Cross/Coast Guard	- Construction phase - During regular operational phase of Cruise Terminal -	-Contractor insurance -Cruise Terminal assets insured

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	**Operation**	**Construction**	**Operation**			
		- May start disastrous fire					
Chemical Fires	- Can impact Project Site during construction	- Can impact Cruise Terminal during regular or high season operational phase	- Contractor has a Contingency Plan to address chemical fires, toxic fume release, oil spills, and explosion	- Cruise Terminal administration develops a Contingency Plan to address chemical fires, toxic fume release, oil spills, and explosion	- Contractor - Cruise Terminal administration - Liaise with DOE/NEMO/DEMO/Coast Guard/BDF	- Construction phase - Regular and High Season periods	- Cost contingent with extent of chemical fires and damages - Cruise Terminal authorities should have insurance - Contractor should be protected by insurance and/or contract security
Toxic fumes release	- Can impact Cruise Terminal site and nearby areas of Port Loyola during construction	- Can impact Cruise Terminal operational site and adjacency zone of Port Loyola	- Contractor has a Contingency Plan to address chemical fires, toxic fume release, oil spills, and explosion	- Cruise Terminal authorities develop a Contingency Plan to address chemical fires, toxic fume release, oil spills, and explosion	- Contractor - Cruise Terminal administration - Liaise with DOE/NEMO/DEMO/BDF/Coast Guard	- Construction phase - Regular and High Season periods	- Cost contingent with extent of toxic fumes accident and damages - Cruise terminal authorities should have insurance - Contractor should be protected by insurance and/or contract security
Oil Spills	- Can impact Project Site during construction	- Can impact Cruise Terminal during	- Contractor has a Contingency Plan to address	- Cruise Terminal authorities develop a Contingency Plan	- Contractor - Cruise Terminal administration - Liaise with	- Construction phase - Regular and High Season periods	- Cost contingent with extent of oil spill and damages

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	Operation	Construction	Operation			
		regular & high season operational periods - May disrupt road traffic for an extended period	chemical fires, toxic fume release, oil spills, and explosion	to address chemical fires, toxic fume release, oil spills, and explosion	DOE/NEMO/DEMO/Coast Guard and BDF		- Cruise terminal authorities should have insurance - Contractor should be protected by insurance and/or contract security
Explosion	- Can impact Project Site during construction	- Can impact project site during operational periods	- Contractor has a Contingency Plan to address chemical fires, toxic fume release, oil spills, and explosion	- Authorities of the Cruise Terminal develops a Contingency Plan to address chemical fires, toxic fume release, oil spills, and explosion	- Contractor - Cruise Terminal administration - Liaise with DOE/NEMO/DEMO/BDF/Coast Guard	- Construction phase - Regular and high season operational period	- Cost contingent with size or power of explosion and damages - Cruise Terminal authorities should have insurance - Contractor should be protected by insurance and/or contract security
Road Traffic Accidents & accidents at Cruise Terminal zone of influence	- Can disrupt access road /highway/ Street traffic	- Can disrupt access road to Deep Water Port - May result in loss of life and property	- Contractor must be prepared to assist during road traffic accident near project site during construction phase.	- Cruise Terminal authorities liaise with Belize Red Cross and BERT Ambulance and nearby Polyclinic/KHMH	- Contractor - Cruise Terminal administration - Liaise with DOE/NEMO/CEMO/Belize City Council Traffic Department.	- Construction phase - Regular and high season operational periods	- Cost for damages may be prescribed by court - Cruise Terminal authorities should have insurance - Contractor should be protected by

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	Operation	Construction	Operation			
			- All precautions must be taken to avoid traffic accidents/other accidents inside Cruise Terminal zone				insurance and/or contract security
Urban Fire	- Can disrupt construction and delay works	- Can reach Cruise Terminal property and result in loss of material assets and life.	- Contractor and crew may be asked to assist in putting out the fire	- Cruise Terminal authorities liaise with Belize City Fire Service - Training for staff and selected employees on fire emergency response	- Contractor, Fire Department - Cruise Terminal Administration, Fire Service, CEMO, Police	- Construction phase - Regular and High Season operational phase.	- Cost contingent with extent of urban fires and damages - Cruise Terminal authorities should have insurance - Contractor should be protected by insurance and/or contract security
Medical Emergency	- Is very likely at project site during construction	- Very likely among staff /employees & visitors	- Have trained First Aider with each work gang. - Have a Medical Emergency Plan to respond if medical emergency turns critical. - Liaise with BERT	- Cruise Terminal administration has a tested and updated Medical Emergency Plan for workplace. - Have at least two First Aider on Staff. - Liaise with Belize Red Cross, HECOPAB, and ambulance	- Contractor - Cruise Terminal administration liaise with NEMO/DEMO/ Red Cross & KHMH	- Construction phase - Regular and High Season operational phase of project	- Contractor should have insurance and/or Contract security funds. - Cost to Cruise Terminal administration dependent on nature of medical emergency.

Natural Hazards	Impacts		Mitigation Measures		Responsible Entity/Agency	Timing	Equivalent Cost incur
	Construction	Operation	Construction	Operation			
			ambulance, Astrum Helicopters and KHMH/Polyclinics	service in Belize City.			

13.7 Natural Hazards

13.7.1 Tropical Cyclones and Hurricanes

The most prominent natural hazard that affects Belize City and by extension the proposed Cruise Terminal Development project in the Port Loyola area, Southside Belize City, is landfalling tropical cyclones and hurricanes, and their associated hazards, including destructive hurricane-force winds, torrential rainfall, floods, storm surges and tornadoes.

The Belize City area has experienced several hurricanes over the past 100 years (**See Table 13.4**). During this timeframe four (4) hurricanes made a direct hit on the area: The impacts of at least one of these storms (namely Hurricane Hattie) was catastrophic. The area has a relatively high risk to landfalling hurricanes, with predicted storm surges of over 6 m. for a Category V hurricane (See **Figure 13.3**).

Table 13.4: Hurricanes affecting the Belize City and related storm surge at landfall.

Name	Year	Category on Landfall	Landfall Distance mls	Location	Estimated Surge m (ft)
No Name	1921	–	0	Direct hit	3.66 (12.0)
No Name	1931	–	0	Belize City & Orange Walk Town	3.05 (10.0)
No Name	1934	–	0	Direct hit	2.59 (8.5)
No Name	1934	–	< 50	Moved along the coast	2.44 (8.0)
Hurricane Janet	1955	5	> 50	Corozal Town	2.44 (8.0)
Hattie	1961	5	0	Direct hit	3.17 (12.14)
Fifi	1974	2	> 50	South of Placencia	12.0 (3.7)
Greta	1978	2	< 50	Dangriga Town	1.8-2.1 (6-7)
Hurricane Keith	2000	2	< 40	Caye Caulker, Caye Chapel and San Pedro	1.20 (3.94)
Hurricane Iris	2001	4	< 50	Placencia	4.6 (15.1)
Hurricane Richard	2010	1	< 40	Gales Point	0.91-1.52 (3-5)
Hurricane Earl	2016	1	< 40	Northern Lagoon	1.83 (6.0)

(Source: R. Frutos 2019)

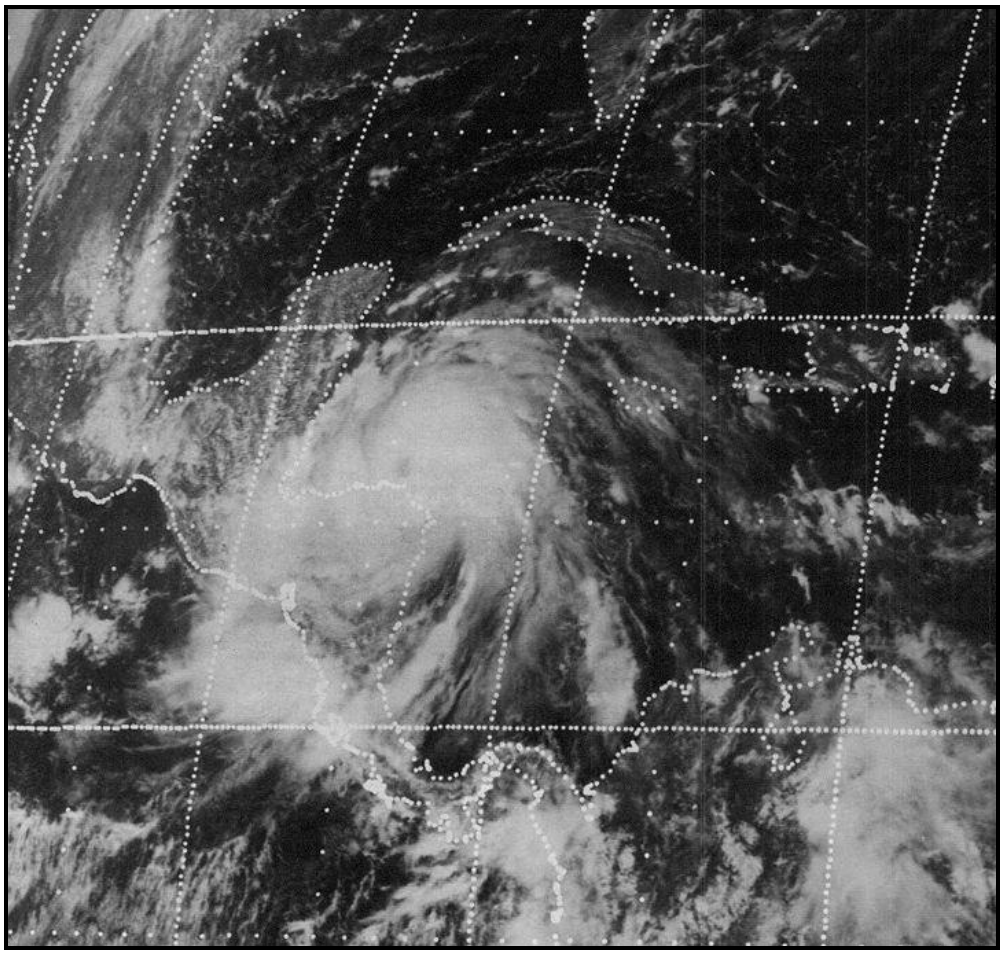


Figure 13.3: Hurricane Fifi at peak intensity just north of Honduras on September 18, 1974.

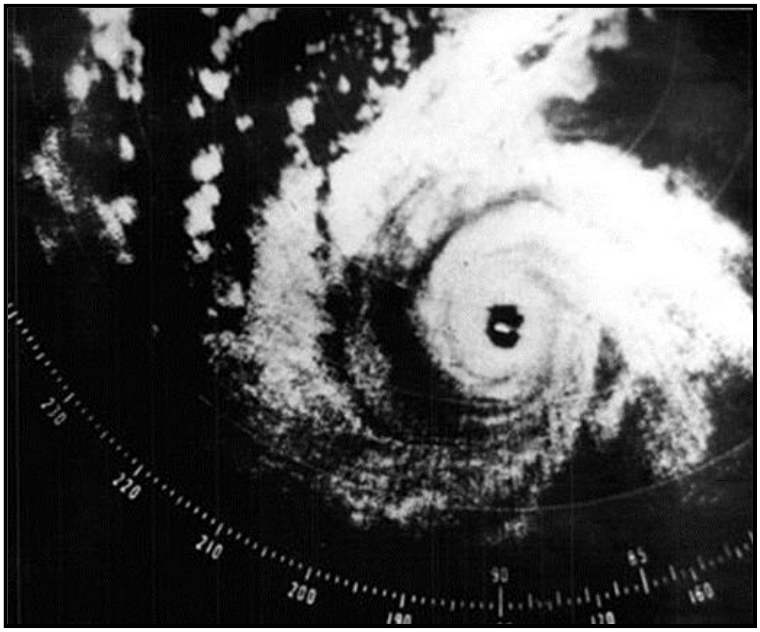


Figure 13.4: Radar image of Hurricane Fifi nearing landfall in Belize.
(Source: Belize Met Service, 1974)

13.7.2 Climate Change-Related Increases in Storm Intensity and Frequency

In a study conducted by Knutson et al. (2010) on climate change and tropical cyclones, it was concluded that the global frequency of tropical cyclones will either decrease or remain essentially unchanged while mean intensity (measured by maximum wind speed) increases by 2% to 11%, and tropical rainfall rates increase by about 20% within 100 km of the cyclone by year 2100. However, the models were not well-resolved for basin-specific areas and confidence in the projections were low (IPCC 2013).

The IPCC Fifth Assessment concludes that there is low confidence in region specific projections of storminess and associated storm surge for the early 21st century due to uncertainties in projections of cyclone frequency and tracks. Projections for the late 21st century have more confidence (more likely than not) that tropical cyclone intensity will increase in the Western North Pacific and North Atlantic (IPCC 2013). Changes in storm intensity related to climate change have not been included in the storm surge analysis due to the low confidence in the regional projections.

13.7.3 Climate Change Projections and Impacts

The impacts of Climate Change are already being experienced across the productive sectors of Belize, affecting the livelihood of much of the population (GOB-NCCO, 2015). As a small, insignificant contributor to global greenhouse gas emissions, Belize has limited capacity to contribute to mitigation of global climate change. However, the country is committed to play its part in support of the UNFCCC target to limit the increase of global average temperature to 1.5 °C compared to pre-industrial levels. In this respect, Belize's Nationally Determine Contribution (NDC) is guided by its commitment to strategically transition to low carbon development, while strengthening its resilience to the effects of Climate Change.

The future climate for Belize will likely be characterized by increasing temperatures and declining levels of precipitation possibly arising due to a shift in the rainy season and extended dry season. One study projected a median temperature increase of 2.0 °C (3.6 °F) for the Caribbean region and 3.2 °C (5.7 °F) for the Central American region, and they project a median decrease in annual precipitation of 12% for the Caribbean region and 9% for the Central American region (UNDP, 2009). Average annual temperatures are expected to increase 3.5 °C (6.4 °F) over the 90-year period, while average rainfall is expected to decrease by 100 mm (IPCC, 2007).

The coastal lowlands in northern Belize are vulnerable to sea-level rise (McSweeney, *et al.* 2012). The climate models project sea-level rise in the region by the 2090s, relative to 1980-1999 sea-level as follow: 0.18 to 0.43 m under SRES B1; 0.21 to 0.53 m under SRES A1B; 0.23 to 0.56 m under SRES A2 (McSweeney, *et al.* 2012). The damages to infrastructure resulting from sea level rise, coupled with increased frequency of intense tropical cyclones, and the economic effects on the tourism sector, the largest contributor to GDP, could negatively impact

the sustainable development of Belize (UNDP, 2009). The impacts on the coastal zone of Belize and the Deep Water Port area, Port Loyola in particular, are: increased seas level rise and tidal influence on flood conditions; increased ambient temperatures; stronger hurricane making landfall along the coast of Yucatan and Belize, provoking destructive storm surges and coastal flooding; and extensive coastal erosion (e.g. the on-going Monkey River village situation).

On the other hand, the latest IPCC projections (August 2021, see below) expect a decrease in mean precipitation and an increase in aridity. This might be beneficial regarding the risks of river-flooding. But as outlined in the flood risk assessment, the Project will not affect the overall hydrology of the rivers and will maintain the existing drainage system.

Surrounding communities will not be impacted by the climatic changes induced by the Project since there are none.

The construction methods and project design of Port Loyola Cruise Terminal and Cruise Village will consider Sea-Level Rise (SLR) according to the latest IPCC projections. Appropriated waterfront structures will be integrated in order to secure potential erosion. In that respect, reclaimed land levels and shore-protections will be designed accordingly in order to mitigate the vulnerability versus climatic changes and sea-level rise. The retainment bunds that surround the areas will be built with sufficient height to ensure free return of the excess water from the dredging process and stormwater.

Submerged disposal facilities are designed to contain the dredged materials and are, in essence, not affected negatively by climate changes, saltwater intrusions, coastal erosion, ...

During detailed design the latest projections edited by IPCC (August 2021) regarding the Climatic Impact-Drivers (CID) for the SCA Region (Southern Central America), see figure below, are considered.

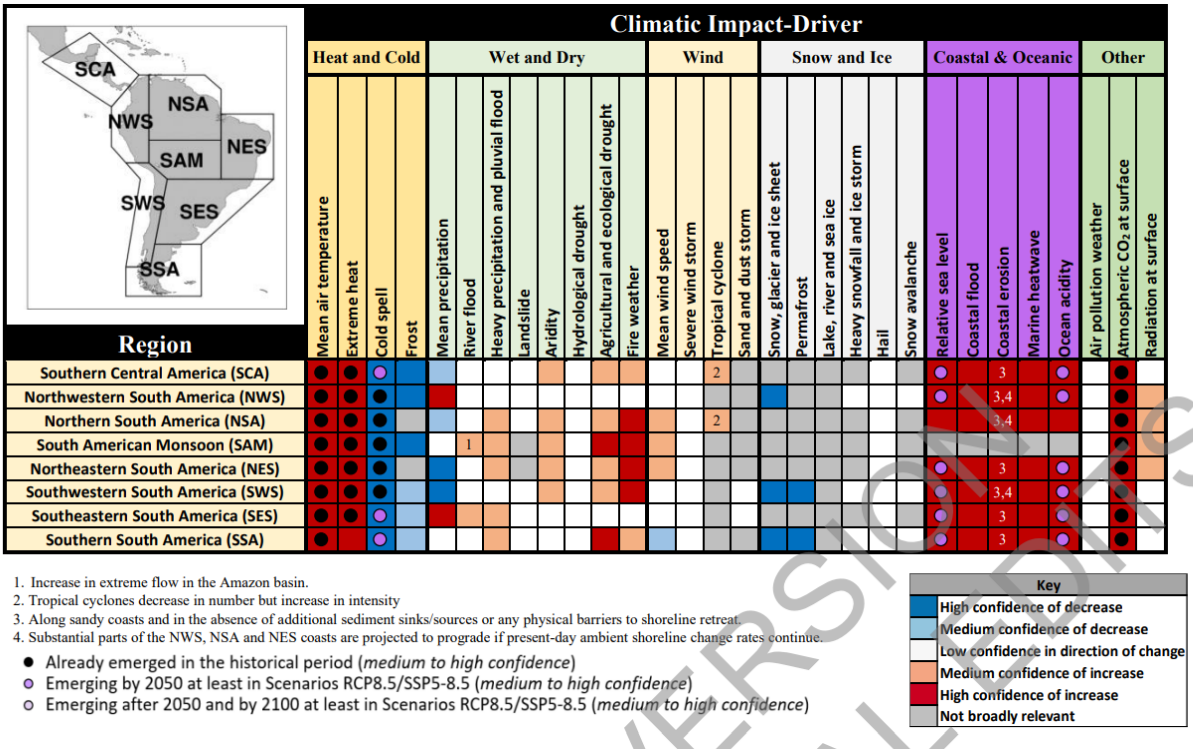


Figure 13.5: Latest version of IPCC Report (Aug 2021)

The construction methods and project design will anticipate the impact of sea level rise during the design life of the project. The onshore reclamation areas will be designed with retainment bunds that surround the areas, with sufficient height to ensure free return of the excess water from the dredging process and stormwater

13.7.4 Summary Climate Change Model Projections for Belize

Table 13.5 is a summary of the regional climate change model projections for Belize.

Table 13.5: Regional Climate Model Projections for Belize.

- **Temperature**: 2-4 °C increase in temperature projected for 2050 to 2080
- **Precipitation**: -20 to -30% by 2050 & -50 to -60% by 2080 – Increased in spatial and temporal variability
- **Sea Level Rise:** 0.32 to 0.63 m by 2080
- Storm surge: 2040 – 2065
  - Category 2 hurricane = 2.47 m
  - Category 5 hurricane = 5.87 m
- Storm surge: 2081 – 2100
  - Category 2 hurricane = 2.91 m
  - Category 5 hurricane = 6.31 m
- Increased frequency of major hurricanes (Cat 3 or stronger)

13.7.5 Storm Surge and Winds

Storm surge is an additional short-term increase in coastal water level resulting from atmospheric disturbances (pressure and wind) associated with the passage of extreme wind events such as tropical storms and hurricanes (Golder and Associates, 2017). Storm surge is highly variable with each storm and is dependent on storm intensity, size, angle of approach, storm speed, and coastal bathymetry.

Depending on the storm event, flooding from storm surge in the project area may be combined with pluvial and riverine flooding from intense rainfall in the City and upland and rain in the upland watershed, thus increasing the flood severity. **Figure 13.6** is a map of the TAOS Storm Surge Model result for a Category V hurricane making landfall near Belize City. As can be observed, the model run project a 6 – 7 m storm surge just north of the Belize city area for a westward land falling Cat V hurricane around or just south of the project site at the Deep-Water Port. Such an event has a 50 to 100-year Return Period.

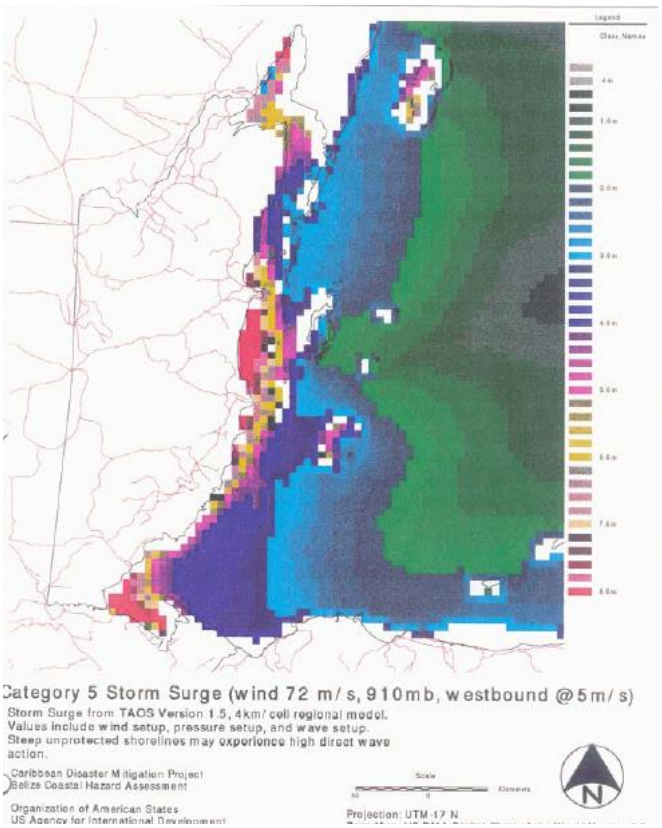


Figure 13.6: TAOS Storm surge projection for the Belize City area.
(Source: OAS, 1995)

Golder & Associates (2017) conducted a review of available storm surge and storm-related data (wind, pressure, storm track) for coastal Belize and the Yucatan Peninsula. The Atlas of Probable Storm Effects (OAS 1999) produced as part of the Caribbean Disaster Mitigation Project (CDMP) provides estimates of return intervals for maximum winds, maximum wave heights, and maximum storm surges for the entire Caribbean Sea including Belize.

However, it was noted that the maps provided in the Atlas of Probable Storm Effects (OAS 1999) are coarse in resolution (1 km grid) and are not designed to be used in cases where site-specific information is required. Also, the data used for creating the maps were old and several years of hurricane data were missing. It was concluded therefore that the results for Belize were not realistic.

A national level assessment was completed for Belize (OAS 1995) using the same dataset and produced storm surge and wind hazard maps for each of the five Saffir Simpson hurricane categories (summary of the categories is also provided below and see result for a Cat V in Figure 10.). The predicted wind speeds and storm surges near Belize City are substantially higher, but realistic than the basin-wide study results and are summarized in **Table 13.6** for Category 3 to 5 storms.

Table 13.6: TAOS Storm Surge Model Results for Belize.

Storm Category	Predicted Wind Speed	Storm Surge
Category III	180 - 198 km/hr 112 – 123 mph	3 – 4 m (wind 198 km/hr, 95 kPa, westward bound at 19 km/hr
Category IV	217 - 233 km/hr 135 – 145 mph	5 – 5.5 m (wind 233 km/hr, 92.8 kPa, westward bound at 19 km/hr)
Category V	233 - 252 km/hr 145 – 157 mph	5.5 – 6.5 m (wind 252 km/hr, 910 kPa, westward bound at 19 km/hr)

(Source: OAS, 1995, Golder & Associates 2017)

A report by Climate and Development Knowledge Network (2014 in Golder & Associates, 2017) suggested a storm surge of 6.1 m predicted for Belize City for a Category 5 hurricane, however, the source of this information was not clear though it is consistent with the information in **Table 13.6**. **Table 13.7** is a summary result of return periods for different ranges of storm related winds as evaluated by Golder 7 Associates (2017) from hurricane track dataset for Belize.

Table 13.7: Extreme wind speed return intervals based on identified hurricanes and tropical storms affecting Belize (Period: 1931 -2016).

Return Period (Years)	Wind Speed mph (km/hr)	95% Confidence Interval mph (km/hr)
2*	55 (89)	N/A
5	77 (124)	58 - 95 (94 – 153)
10	108 (174)	83 - 134 (133 – 216)
25	144 (231)	108 - 178 (175 – 287)
50	167 (268)	125 - 208 (202 – 335)
100	188 (303)	140 - 235 (226 – 379)

The 2-year return period is based on the wind speed distribution for Miami, Fl. (Yeo et al, 2012) due to the lack of data for Belize City and the poor fit in the curve at lower return periods.

13.7.6.1 Floods

Belize City and surrounding low-lying coastal mangrove wetlands are prone to coastal flooding associated with intense rainfall events and storm surge. Increasing sea level rise resulting from Global Warming will only exacerbate coastal floods. The map in **Figure 13.7** shows the areas of Belize City that are prone to floods, which include the Cruise Terminal site in the Port Loyola area.

Historic intense rainfall events and urban flooding have disrupted commercial operations and damaged property, resulting in loss of revenue and costly repairs or replacement.

Coastal flooding in the Belize City area is classified as high. This means that the area is vulnerable to damaging wave action and pluvial flooding. The return period for pluvial flooding is once every 2 years and for surge flooding once every 10 years (JDN, 2018). Project planning decisions, project design and construction methods must consider the level coastal flood hazard. In accordance with the IPCC (2013), there is high confidence that extremes in sea level will increase with mean sea level rise, yet there is low confidence in region-specific projections in storm surge. Hence, projects in low-lying coastal areas such as deltas, should be designed to be robust to projected increase in global sea level.



Figure 13.7: Map of flood prone areas in Belize City.
(Source: Cherrington and Courtney, 2017.)

13.7.6.2 Project Impact and Flood Risk Assessment

The Developer's Engineer and Contractor, Jan de Nul Group (JDN), completed a Flood Risk Assessment (Assessment) on February 16 of 2022. The purpose of the Assessment, which can be found in **Annex XVIII**, was to determine whether the Project would adversely affect the local hydrology and flood risk to the residential areas surrounding the project, particularly the nearby wetlands, Jane Usher area, Port Loyola Area, and Faber's Road Extension. .

All previously produced data indicates conclusively that the Project will not represent a flood risk to Port Loyola and the surrounding areas and any increased flood risk caused by the Project is non-existent. Indeed, local flood risk is likely to be substantially reduced and mitigated by the nearshore placement of dredged materials.

The different identified flooding sources and variables were analyzed to assess any impact the new Project might have on the surrounding residential areas near the Port and the conclusions are the following:

- The new port terminals (cruise terminal and bulk handling facility), as stipulated in the Project scope do not negatively impact Belize City's different flooding sources;
- On the contrary, the presence of the Port Loyola cruise terminal and bulk handling facility will reduce marine flood-risks by waves, swells, and storm surges;
- The presence of a nearshore dredge material placement area in Sibun Bight will create a shoal that will dissipate incident waves and storm-surges. This subsequently lessens the impact a storm event will have on the existing coastlines surrounding the Port Loyola area;
- The upland dredge placement area for dredged materials is designed to control the transport waters during construction, groundwaters, and other fluvial/pluvial waters by securing drainage to sea, including the existing drainage system. This reduces any flooding risks in the residential areas adjacent to the Project site.

JDN's study thus concludes that a seaward expansion of the nearshore area will have no impact on the area's flooding risk with no possible link between the slight reduction of depth in the nearshore area and an increase in potential upland flooding risk. Indeed, the reduction of depth in the nearshore area will serve as a wave attenuation, reducing wave impact along the coastline.

13.7.6.3 Hydrodynamic Impact and Modelling Timeframe

The project's engineering team has undertaken an extensive and state-of-the-art hydraulic modeling scope. The purpose of this scope was to assess the potential impact the project may have on regional and local hydrology and assist in the optimization of the project's marine features to ensure long-term stability.

The modeling relied on a combination of statistical, measured, and hydrodynamic factors to accurately predict how the project's coastal structures (multi-purpose cargo terminal, 2 cruise piers, navigational features, and nearshore placement area) would impact hydrology. The foundation of the hydrodynamic model was the Delft3D-FLOW model, calibrated with hydrometeorological measurements and a regional bathymetry produced by JDN during the 2018 site investigation.

Conditions were placed on the project's engineering team with regard to the coastal structures, specifically requiring that all designs ensure no interference with the local hydrology, no impact

on any coastal properties or their functionality, and no interference with the proposed facilities navigational features.

After substantial modeling and design efforts, the engineering team and the hydrodynamic study concluded that the project's coastal structures (piers and terminal) and the expanded nearshore placement site will have a negligible impact on either the regional or local hydrology. The noted impacts, occurring only at the extremes of measured weather (July, during maximal ebb/flood conditions), were limited to a slight increase in residual velocity at the southern edge of the nearshore placement site of 0.06 m/s and a slight reduction of residual velocity along the nearshore placement site's western edge of 0.05 m/s. No changes whatsoever are noted within the project's navigation features or south of the nearshore placement site. The changes in residual velocity discussed above are extremely mild and below a threshold that would have a measurable impact.

The complete Hydrodynamics Conditions Report is included with this Addendum as **Annex XIII**

There are no prevailing standards that determine minimum periods for hydrodynamic modelling and numerical simulations. Generally, hydrodynamic modelling timeframes are evaluated on a case-by-case basis and are typically a function of the scenarios to be modelled. These scenarios rely heavily on:

- Operational conditions;
- Storm conditions with a return period of X years;
- Long-term impact;
- Available data.

The purpose of the report included in **Annex XI**I was to identify any possible impact the Project's new cruise and bulk terminals, land reclamation, nearshore placement of dredged materials, etc. would have on the hydrodynamic conditions of Port Loyola and surrounding areas (Sibun Bight and nearby shores).

The model's predominant goal was to assess what happens during average operational conditions throughout the year, noting that due to the impact of global climate change, recent years would be more representative than previous years. This drove the selection of the 2018 data as a benchmark, and the month with the most intense wind and waves (July '18) was chosen to ensure that the maximal potential operational impact was thoroughly evaluated.

The results of the hydrodynamic modelling effort indicated that, despite choosing the most historically impactful month as a benchmark, the values of flow velocities and bed shear strength remained low, ascertaining that throughout the rest of the year any impact will be even lower. The inclusion in **Annex XII** presents that during operational conditions the hydrodynamic

behavior outside the project area remain unchanged. Based on the conclusions of this study, there are no scientific reasons to expand the modeling timeframe.

The hydrodynamic model presented utilized some of the most advanced methods for hydrodynamic modeling currently available. This modeling effort conformed to prevailing international standards and best practices and the Project Engineer (JDN) has used this same approach and modeling system in the most exigent jurisdictions with success at a planning, execution, and long-term level.

JDN has assessed the hydro-meteorological current-flow conditions as shown in Figure 4, which presents the vector fields for a 10-year return period (RP) (Vw = 16,31 m/s) easterly winds, and high river discharges. The image clearly demonstrates how currents remain low in the bight.

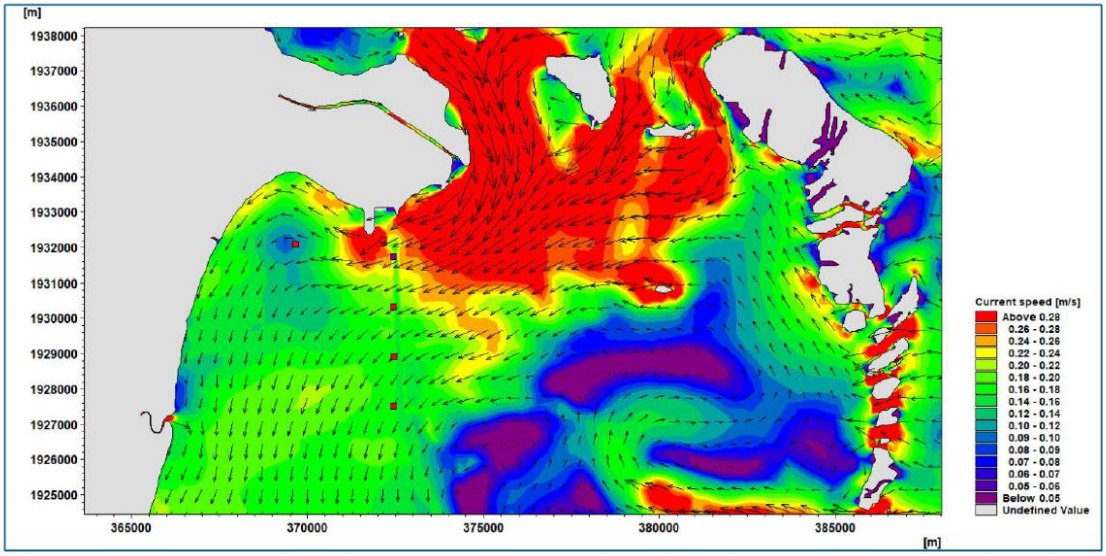


Figure 13.8: Current-flow intensity under RP 10-year Easterly winds (Vw = 16,33 m/s) conditions and high river outflow regime (rainy season discharge of Belize River and Sibun River)

13.7.6.4 Mitigation Measures

During extreme events, the normal flow pattern in Sibun Bight is altered due to extreme winds and/or river flow rates. While it is well established that the presence of an extended shallow area (the Project's nearshore placement area) will dissipate the incoming wave energy and reduce the wave impact on the existing shoreline, current flow simulations will be done during Detailed Design of the nearshore disposal area and the selected containment method to ensure any risks are properly mitigated prior to construction commencing.

As part of the Detailed Design of the nearshore placement area and containment structures JDN will initiate additional detailed modelling to fully understand the behavior of the final nearshore placement area under extreme conditions, and the efficacy of the silt screens both during hydraulic filling and under extreme conditions. This can only be done when the final dredge and

placement of dredged materials methodology are fully defined, which can only occur once the regulatory conditions are entirely defined.

13.7.7 Earthquakes and Tsunamis

A tsunami is a series of long-wavelength, long-period ocean waves that may take hours to come on shore. The first wave may not be the highest or most energetic. Tsunamis, also known as seismic sea waves, are generated by earthquakes, less commonly by submarine landslides, infrequently by submarine volcanic eruptions and very rarely by large meteorite impacts in the ocean, although the latter was more frequent in Earth's geologic past. **Figure 13.9** is a map of the Caribbean historic tsunami events in the region.

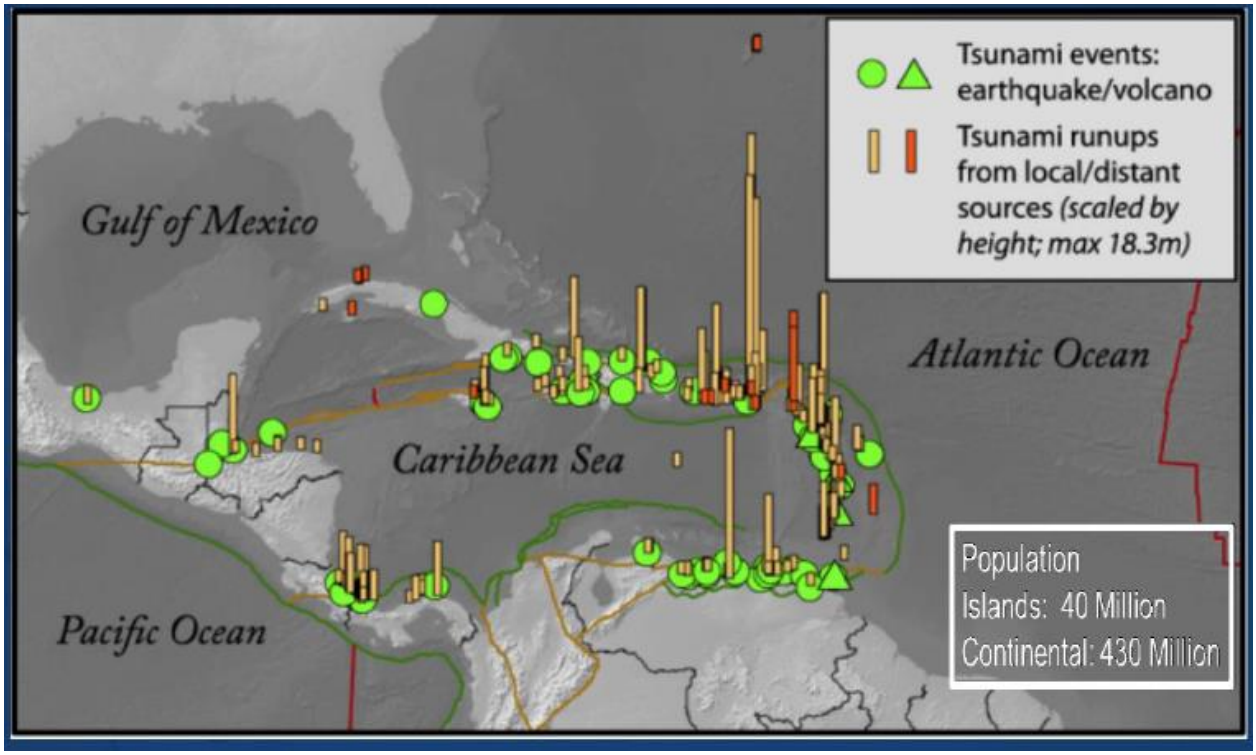


Figure 13.9: Tsunami Events and Earthquakes in the Caribbean Region.
(Source: von Hillebrandt-Andre, Christa, 2013.)

Tsunamis are different from other hazards because of their fast onset and unpredictable character and may give coastal communities little time to prepare. In the absence of a Tsunami Warning System, coastal communities may be caught off guard. The potential for many lives to be lost is at stake if exercises or simulations never take place or infrequent. Recent tsunami events have given rise for the need to improve national disaster risk reduction policies and plans. Understanding tsunami hazards is the foundation for motivations to conduct exercises, and for understanding why conducting Exercises is important.

The country of Belize lies adjacent to the plate boundary zone between North America and the Caribbean tectonic plates and is thought to be the source of the 7.0 magnitude Haiti earthquake in January and last May's earthquake in Honduras, whose epicentre was 140 miles from Belize City (Humes, 2018). **Figure 13.10** is a map showing the epicentre of the January 9th, 2018, Earthquake of magnitude 7.6 near Roatan, Honduras, that triggered a Tsunami Warning for coastal territories of the north-western Caribbean, including Belize.



Figure 13.10: Tsunami warning mobilizes Belize Emergency Response Authorities (Recorded Jan. 9 2018).

The Deep-Water Port area of Belize City is classified as a zone with medium to low tsunami hazard according to current available information and evaluated index. This means that there is a 2% chance of a potentially damaging tsunami occurring in the next 50 years (JDN, 2018). Based on this conclusion, the impact of tsunami may be considered in different phases of the project for any activities located near the coast. Hence, project planning decisions, project design, and methods of construction should take account of the level of tsunami hazard.

Climate Change impact: Coastal areas at risk of tsunami will increase as global sea level rise, in particular near the main fault lines (e.g. in the western Caribbean). The IPCC (2013) global sea level rise projections depend on a variety of factors and estimates for 2100 range from 20 cm to near 1 meter. However, regional changes in sea level are difficult to predict. Projection for Belize coastal zone are provided in another section of this Report. Projects in low-lying coastal areas such as deltas, should be designed to be robust to projected increase in global and regional sea level.

13.8 Management Plan: Hurricane Emergency

13.8.1 Hurricane Plan for the Cruise Terminal

13.8.1.1 Hurricane Warning System

The "official alert" system for hurricane entails coordination between the management of Belize Cruise Terminal and the Belize Meteorological Service. The Belize Cruise Terminal Management will also supplement their information on the threat of hurricanes from the Internet.

Hurricane Watch

During the "Hurricane Watch" Phase, which means that a hurricane may threaten within 36 hours, the Belize Cruise Terminal will initiate activities to take action if the Belize Weather Bureau issues a warning. The management will be kept informed by radio and television of the progress of the storm.

Hurricane Warning

During the "Hurricane Warning" Phase, which means that a hurricane may threaten within 24 hours, all procedures will be put in place to evacuate the Cruise Terminal facilities and secure the buildings and other standing structures in the commercial and industrial areas of the Belize Cruise Terminal.

The advisories that are to be issued by the National Emergency Management Organization (NEMO) are as follows (**Figure 13.11**):

- THE PRELIMINARY PHASE
- SECOND PHASE RED 1
- THIRD PHASE RED 2
- FOURTH PHASE **GREEN**

Figure 13.11 shows the Hurricane Emergency Flag Signals for the country of Belize.

THE PRELIMINARY PHASE

This comes into effect when a hurricane moves into the area south of 21 degrees North Latitude and West of 80 degrees Longitude, or approximately 500 miles or 2 days away from coastal Belize (depending on the speed of the hurricane). If a hurricane threat enters the preliminary phase, a red flag will be raised by Government at the Courthouse Wharf. The National Weather Bureau will issue periodic updates on the hurricanes progress through its designated radio station (Currently LOVE FM).

In this phase, the Belize Cruise Terminal and Management will convene a meeting with all supervisory level personnel informing them that all recreational activities at the resort are to cease. The Emergency Coordinator of Belize Cruise Terminal will then be responsible for

placing a public service announcement on the NEMO-designated radio station informing all clients, potential clients and employees that the facilities will be officially closed for business upon the issuance of a Second Phase.

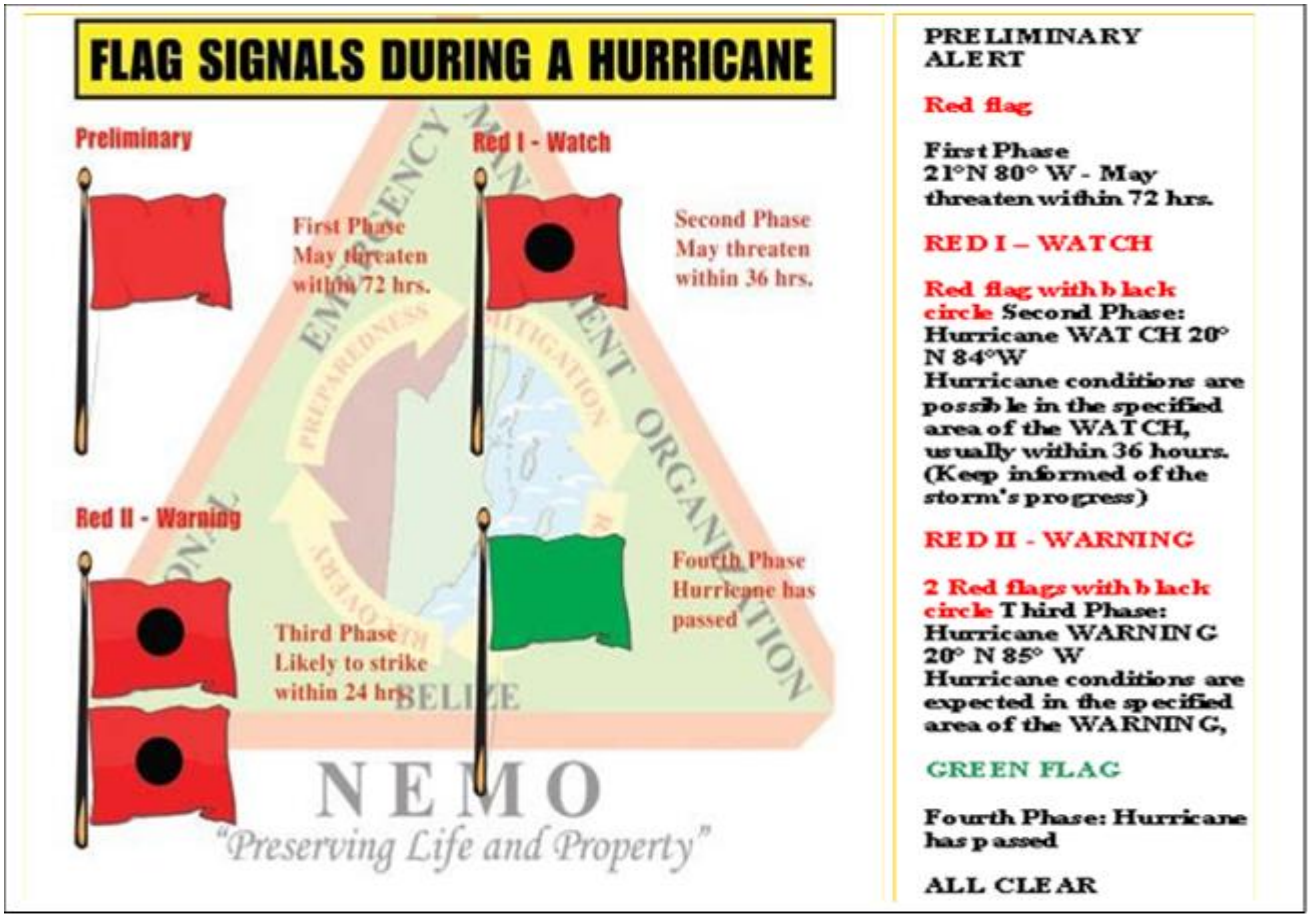


Figure 13.11: Hurricane Emergency Flag Signals for the country of Belize.

SECOND PHASE RED *1:* ALERT

The "Second Phase" of the National Hurricane Alert System is effective when a hurricane moves into the area south of 20 degrees North Latitude and West of 84 degrees West Longitude, or approximately 260 miles, or 1 day away from Belize.

When the second phase RED 1 is implemented during normal working hours, the hurricane plan will be put into immediate effect. Should the second phase be called during off hours, the Emergency Coordinator will contact managers and supervisors by cell phones and/or CB Radios, who will contact the employees under their charge to report to the main office for instructions.

On arrival at the main offices of Belize Cruise Terminal all employees are to book in with the receptionist, so that everyone can be accounted for. The employees are to then carry out their assigned duties as described in the hurricane emergency plan.

During this phase all of the buildings in the Cruise Terminal areas are to be boarded up and secured. During this phase, all boats from the marina are to be taken up the Sibun River and/or Belize River to safe harbour. During this phase no Carnival Ships are to be in port [the Belize Cruise Terminal Main Pier/Trestle], ships destined for Belize will be diverted to other ports of call such as Cozumel until the 'All Clear' is given or until all repairs are made in the event that the storm has hit.

SECOND PHASE RED 1

During the second RED 1 phase all sensitive equipment and files will be relocated to the upper quarters of the buildings. This sensitive equipment includes computers, filing cabinets, computer software, CD's and other electronic data storage facilities.

During Red 1 Phase, transportation arrangements will be affected to retrieve the boat crew the boat crews that had taken boats upriver via overland route back into Belize City.

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During the second RED 1 phase all sensitive equipment and files will be relocated to the upper quarters of the buildings. This sensitive equipment includes computers, filing cabinets, computer softwares, CD's and other electronic data storage facilities.

During Red 1 Phase, transportation arrangements will be provided to retrieve the boat crews that had taken boats upriver via overland route back into Belize City.

THIRD PHASE RED 2: WARNING

The "Third Phase" of the hurricane will be announced when a hurricane is likely to strike the coast of Belize in a matter of hours. At this time the Belize Cruise Terminal will be deserted, save for key buildings housing essential security personnel.

When the hurricane is only a few hours away from the coast of Belize and NEMO determines it is likely to hit Belize, the Third Phase or Red 2 will come into operation and TWO RED FLAGS, each with a black square in the centre, will be flown at the Courthouse wharf. If the hurricane continues to be an imminent threat to the greater Belize City area and consequently the Belize

City area the Belize Cruise Terminal Management will send home all the employees associated with the Hurricane Preparedness Programme, to attend their domestic situations, except for key security personnel and the Emergency Coordinator.

FOURTH PHASE GREEN: ALL CLEAR

The "Fourth Phase" or **ALL CLEAR** will be declared by the authorities after the hurricane has passed, or alternately after it ceases to be a threat and it is safe to return to the project area and/or to review the effects of the storm. All staff members will be summoned to the main office of the Belize Cruise Terminal after the all clear. Barring catastrophic damages, the necessary repairs will be made to the facilities and the operations will be resumed as soon as possible.

13.8.1.2 Pre-Season Procedures

At the beginning of May each year, the Emergency Coordinator of Belize Cruise Terminal will ensure that the following items are available and properly maintained in operational readiness for use:

- Emergency lighting, including both plug-ins and flashlights with spare batteries and bulbs.
- Electrical tape with spare heavy-duty extension cords.
- Standard first aid kits fully up to complement.
- Rainwear, rubber boots, hard hats, gloves, swim vests.
- All hand-held radios are functional with spare batteries and chargers.
- Duct tape minimum 12 rolls 2". Spare rope 5/8" 200 feet.
- Tools, hammer, nails. Sledgehammer, axe.
- Lumber, both 1" and 4", also plywood sheeting for protection of windows etc.
- Ladders, tow bar/chain.
- At least two tarpaulins for damage control.
- Wrecking bars for use afterwards.

The Emergency Coordinator will ensure that all this equipment is checked and available at all times during the hurricane season. During the hurricane season, any overhanging trees in the Cruise Terminal areas will be pruned.

The Emergency Coordinator will also ensure that all buildings and assets such as equipment, boats and vehicles are photographed (digital with date) at the beginning of each hurricane season, for possible insurance claims.

The Emergency Coordinator will also ensure that all company boats and vehicles are inspected for serviceability and always maintained with full fuel tanks. The assignment of boats and vehicle for hurricane emergency response purposes will be made at the beginning of the hurricane season. The Emergency Coordinator of Belize Cruise Terminal will also ensure that all non-national employees are registered with their respective Embassies or Consuls.

13.8.1. 3 Pre-Hurricane Procedures

At the issue of the Preliminary Phase, the Emergency Coordinator will post the tracking map and start plotting the course of the hurricane at the main office.

The Emergency Coordinator will also ensure that all personnel are familiar with the hurricane response plan, and their roles and responsibilities under the plan, and are indeed able to carry them out.

The Emergency Coordinator will also ensure that all new office equipment is indexed for relocation. This means that all items will be color-coded, so that they can be moved in a prioritized order, so that if the response time is unduly short, the more important items will be transported first.

The color-coding will be as follows:

- **RED TAG** – These are items that are crucial to the operation of the companies and must be saved: examples are Pharmaceuticals, Computer Drives, Priority Files, Accounting records, insurance documents and land titles;
- **WHITE TAG WITH YELLOW "X"** – These are items that are needed and will make it easier to function after a strike: Examples are computer monitors and keyboards, printers, office machinery, other files for the current year, tax records, legal documents and shop stock;
- **NO LABEL** – These are items that would be suitable to relocate if time allows: Examples are desks, tables, chairs, pictures, fans and A/C units.

13.8.1.4 Roles and Responsibilities

In the event that the Hurricane Emergency Plan is activated at Second Phase RED 1, the following will be carried out by those designated below:

1. Executive Director

Has overall responsibility for the implementation of emergency precautions related to the protection of the physical assets of the Belize Cruise Terminal. He/she has control and

responsibility for the administrative records (including pre-numbered documents, files, and computer backups), critical office equipment (such as PCs printers, calculators), and their evacuation. He/she is to be assisted in this by the Office Manager, as well as safeguarding all payroll related records and individual employee files. He/she will also keep all keys after evacuation and ensure their safety. The Emergency Team will make prior arrangements to secure their homes if they are required to be engaged up to the last minute.

2. Office Manager

The Office Manager is responsible for maintaining the indexing system regarding store's-inventory. He/she will also run a complete backup of all critical computer files and software. The safeguarding of all backup information off-site at the Project Proponent's residence will be accomplished on a recurrent and sustained basis. This exercise will be done weekly during the hurricane season.

The Office Manager will also ensure that when the Second Phase Red 1 goes into effect the payroll is completed and ready for the disbursement of salaries. When the Third Phase is declared the staff will then be paid their salaries in cash. The Office Manager is also responsible for collecting all cash and cheque payments and making immediate deposits at the bank.

Upon return to duty after a hurricane event, the Office Manager will retrieve all official receipts, bank statements, cash invoices, deposit slips, other documents considered important for the resumption of operations of Belize Cruise Terminal.

3. Emergency Coordinator

The Emergency Coordinator of Belize Cruise Terminal will be responsible for executing and coordinating the overall hurricane preparedness plan, including all weather updates and planning updates. The Emergency Coordinator will be responsible for plotting the path of the hurricane and informing company personnel of the potential effects of the storm. Records with photographs/videos of the condition of the facilities on leaving and after the storm are also the responsibility of the Emergency Coordinator.

Action During Hurricane - After all the equipment and supplies have been secured and moved to safety, all personnel will be sent home except key security personnel. The supervisory staff will be issued with radios and/or cell phones to contact the Emergency Coordinator throughout and after the storm.

Reporting - The Emergency Coordinator will inform the Executive Director of Belize Cruise Terminal of the full extent of the damages after the hurricane. This is to be done verbally in the first instance, complimented by a detailed written report, within a timeframe of not more than three (3) days after the hurricane has passed. The Executive Director shall have the responsibility to advise the GOB and/or NEMO of any damages after the hurricane has passed.

13.8.1. 5 Post-hurricane Procedure

On declaration of the Fourth Phase **GREEN** (**All Clear**) has been declared by the authorities, the following will take place:

- Personnel should report to work on the day following the all clear phase. If a staff member is unable to report to work within the specified time period he/she shall make every effort to contact the Emergency Coordinator or his/her immediate supervisor by any means necessary to inform him/her of the situation.
- In the event of a Hurricane hit, staff will be expected to report to work one to three days after the **All Clear** has been given, unless otherwise informed through an official news release from the Executive Director.
- An official assessment of damages and loses will be completed and submitted to the Executive Director.

Table 13.8 List of emergency contact telephone and mobile numbers for the Belize District and San Pedro

Table 13.8: List of Emergency Numbers.

Institution	Telephone Number	Institution	Telephone Number
Central Regional			
Karl Heusner Memorial Hospital	2231548; 223-5686; 223-5691	NEMO Headquarters Belmopan CEMO Belize City	822-2054; 822-0995 227-0363
Fire Station Belize City	207-7378	Belize Medical Associates (Private)	223-0303
BERT Ambulance	223-0078; 223-0549; 223-3392	Belize Health Care Partners (Private)	223-7870
Police: Belize City	Emergency 911; 202-5333 Faber's Rd Precinct 207-7131 Eastern Division	Buttonwood Bay Medical Centre (Cardiology) (Private)	223-1901

13.9 Earthquake and Tsunami Response

The National Meteorological Service is the National Tsunami Warning Focal Point. The NMS though NEMO, will issue a Tsunami Warning upon receipt of such a warning from the Pacific Tsunami Warning Center. Upon receiving confirmation from the Met Department and NEMO, the National Fire Service will '***sound***' the Tsunami Warning as follows:

1. Four 15-second blasts of a fire engine siren broken up by 5-second pauses, following which;

2. There is a three-minute break and the warning begin again; and
3. Continues with the same sequence until an all clear has been given.

NEMO has reached an agreement with the telephone companies BTL and SMART to issue text messages to subscribers at the time a Tsunami Warning is issued.

Table 13.9: Tsunami Readiness Guidelines.

Categories
MITIGATION
Mit-1. Have designated and mapped tsunami hazard zones.
Mit-2. Have a public display of tsunami information
PREPAREDNESS
Prep-1. Produce easily understood tsunami evacuation maps as determined to be appropriate by local authorities in collaboration with communities.
Prep-2. Develop and distribute outreach and public education materials
Prep-3. Hold at least three outreach or educational activities annually
Prep-4: Conduct an annual tsunami community exercise.
RESPONSE
Resp–1. Address tsunami hazards in the community's emergency operations plan (EOP).
Resp–2. Commit to supporting the emergency operations center (EOC) during a tsunami incident if an EOC is opened and activated.
Resp–3. Have redundant and reliable means for a 24-hour warning point (and EOC if activated) to receive official tsunami threats.
Resp–4. Have redundant and reliable means for 24-hour warning point and/or EOC to disseminate official tsunami alerts to the public.

(Source: UNESCO IOC, 2019)

'Signs of a Tsunami' durable poster should be displayed in highly visible area of the Cruise Terminal compound and establishment. An illustration is shown in **Figure 13.12**.

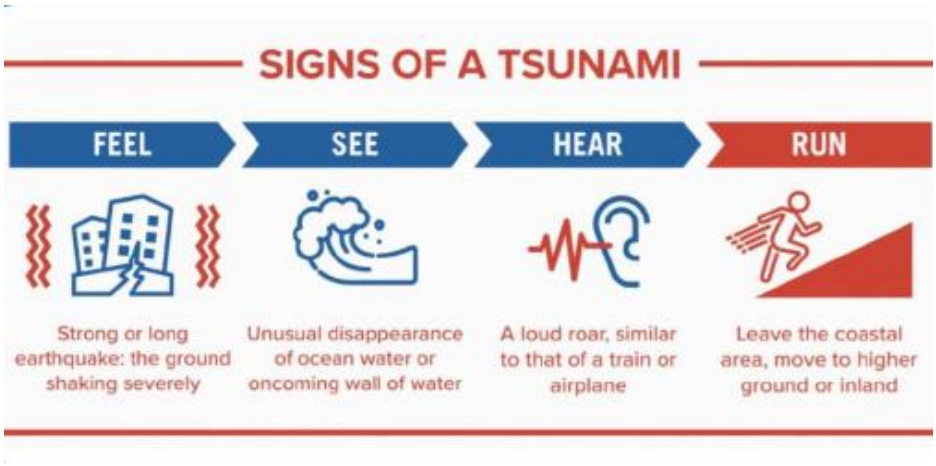


Figure 13.12: Signs of a Tsunami.
(Source: UNESCO IOC, 2019)

The Cruise Terminal authorities should therefore develop a SOP to respond to the Tsunami Warning for Belize City, and respond accordingly. Because of the very limited response time, the establishment should always remain in a state of alert and have a safe location to transfer and safeguard important documents and sensitive assets such as computer disk drives and safe deposit boxes.

13.10 Fire Prevention and Response

13.10.1 Introduction

The fire prevention and response plan will focus on the possibility of a fire and any fire outbreak, whether large or small, that might occur. It is therefore important to consider its likelihood and, the Cruise Terminal proprietors will develop a response plan aimed at addressing the awareness and the mechanism necessary for its response.

13.10.2 Environmental Policy

The purpose of this policy plan is to include appropriate response mechanism that will protect life first and foremost. The general aspects of these environmental policies are to ensure a safe and professional transition between the different stages of fire response procedures. For all intent and purposes, the Cruise Terminal proprietors will abide by the elements stated in this section in an effort to carry out its duties to the best of its abilities in regard to Fire Response procedures.

13.10.3 Purpose of Plan

The purpose of the plan is to ensure that the coordinating mechanism will ensure maximum safety of life and property during a blaze, is put in place, and to ensure the developer and guests are familiar with the mechanism. The purpose of the Fire Prevention and Response plan for the proposed Cruise Terminal development is to:

(i) increase awareness to residents, guests, management and others of the need for a fire prevention and response plan;

(ii) To establish the coordinating mechanisms necessary for management to prepare and implement measures to safeguard life and property of all concerned should a fire occur in a building or within the area of the terminal itself;

(iii) Indicate all possible evacuation routes on the premises.

13.10.4 Policy

To ensure the safety of the staff, residents and visitors following a fire outbreak and to ensure that all the relevant firefighting procedures are exercise and implemented. A good management policy comes from the implementation obligatory response plan designed to cover all aspects of the preparation sequence involving all the different components. The following Policy is always intended to be used:

To be fully efficient and well prepared in the advent of a fire and to carry out the procedures for its control.

13.10.5 Target and Scope

The Fire Response Plan is geared towards all those responsible for conducting firefighting measures and is a part of the response team. Likewise, this plan should be disseminated among the management and staff as well as other employees and visitors. It is important that all the staff is aware of the fire response plan and to take prompt action according to the roles and responsibilities during a fire. This ready state can be accomplished by carrying out the appropriate fire drills.

13.10.6 Structure and Composition

As required by the Disaster Management Plan, the Emergency Coordinator will appoint a reliable member of staff to act on his behalf. The Emergency Coordinator is still responsible for the plan and its execution. As is the case, this coordinating mechanism will be supported by the various other department heads (**See Fig. 13.13**). This structure will ensure a safe transition between the different response phases and recovery stage. Likewise, this structure will promote the proper chain of command in fire response.

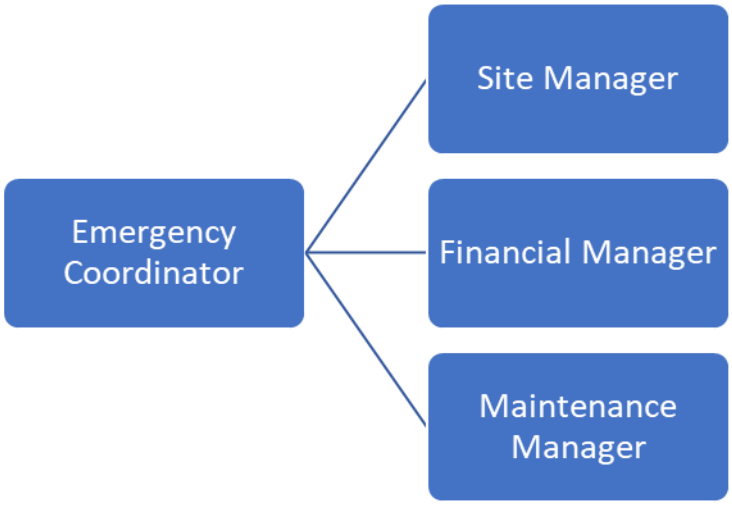


Figure 13.13: Structural Concept of Fire Response Plan.

As stated earlier, all departments shall be responsible for following the fire emergency plan in accordance with this policy. The following response shall take place during all fire alarm activations.

The Fire Response Plan shall be comprised of:

a. The Emergency Coordinator, as chairperson.
b. Fire Responder Chairman, as second chairperson
c. Financial or Administrative Manager as Secretary of Operations *
d. Site and Maintenance Manager as Supervisors of Operations and Damage Control of their respective departments.
e. The Environmental Liaison as Supervisor of Environment and Safety Contingency Plans and Procedures.
f. All Supervisors and Staff as Reporting Officers.

* This endowment is relevant considering that fire outbreaks are rare and are equally dangerous if not addressed and thus the Emergency Coordinator can focus on other important issues.

13.10.7 Fire Response Management

Roles and Responsibilities

The Response Plan will have the overall responsibilities to:

- Carry out the necessary awareness and preparedness plans of the establishment.
- Foresee all relevant plans and procedures.
- Have in place a plan of action in order to facilitate an effective and smooth performance for the course of action.
- Have regular meetings in order to assess and evaluate the plan for respective departments.
- Develop new, efficient and safer ways for courses of action.

Command Centre

The command centre will be predetermined as described by the management team. This center will be the closest but safest area where the fire outbreak has occurred and from there coordinate with the relative personnel to combat and control the fire.

Activation

The activation of the Fire Response Plan will be in the hands of the staff and management upon verification. This will trigger the adequate response mechanism and mobilization of the required equipment. At some point, there must be a member on call to supervise and coordinate the appropriate response procedures. Likewise, the Emergency Coordinator and the Fire Responder must be notified and briefed. The Coordinator will liaise with the Belize City Fire Service until the latter takes control of the fire suppression upon arrival on site.

Fire Protection Equipment Systems

All structures and buildings on the property will be protected from fire in one form or another. The Cruise Terminal authorities will install protection systems to protect lives and property which are summarized below:

1) ***Fire alarm detection and notification systems.***

- ***Smoke detectors:*** The project will install fire detection equipment in the form of smoke detectors in each of the units and in the building hallways and walkways. The smoke detectors will activate the smoke alarm possibly signalling a fire or of something burning.
- ***Manually activated pull station:*** Buildings and the terminal will have manually activated pull station in the event that someone sees a fire. It is essential that staff, other employees and visitors are aware of these warning devices and their potential use in detecting fires.

2) ***Fire Suppression Systems.***

- ***Hydrants:*** The proposed project will look at the feasibility of installing fire hydrants throughout the development in coordination with Port of Belize Limited. These hydrants would be spaced out according to the sewer zone layout. Pumps at each sewer zone and at the arrival pier will be used to pressurize the fire hydrant loops. Water for these hydrants will be source directly from the BWS mains, connected to the property
- ***Fire Extinguishers:*** The Cruise Terminal proprietors will install multi-purpose dry chemical (Class ABC) fire extinguishers in strategic location in establishment. Dry chemical extinguishers will range in sizes of 5 lbs to 10 lbs and will be installed in the hallways and walkways. These will also be installed at key areas such as, containment walls, generators, electrical panels, maintenance areas, Utility Zone etc.
- ***Sprinkler Systems:*** The only sprinkler system that will be installed in the main terminal floor and access walkways. This is because of the high risk of a delayed response.

- ***Commercial Kitchen hood exhaust/suppression system (foam):*** This only applies to the restaurants on the property. Industrial ranges have an exhaust hood to vent fumes and integrated in the hood is a fire suppression system consisting of a foam water mixture.

Fire Prevention

Fire prevention is an important aspect in precluding its occurrence. While water is not a limiting factor at the project site, its immediate availability may not be possible at the location of an accidental fire. Measures designed to prevent, and control fires include:

(i) Use of fire-retardant materials - The use of non-flammable building material will be encouraged within the project. For example, the use of sheet roofing instead of shingles will be encouraged and the use of fire rated doors, fire resistant windows and barriers.

(ii) Qualified personnel to install electrical system - Only certified Electricians will be allowed to carry out any electrical work on the premises. Each building, after completion should be approved by the Belize Electricity Limited.

(iii) Building Codes - The project will call for the construction of buildings, with heights above (1) one and possibly (2) two stories high. Adherence to the requirements of the Central Building Authority and identified codes are to be used by the engineers of the project, in order to ensure adequate construction of buildings. The engineering standards will also include provisions for adequate and safe wiring; plumbing, heating, and cooling systems are also to conform to acceptable building codes.

(iv) Ethical Practice – It is important to keep the work area free from debris and clutter and to report any unsafe conditions. Likewise, it is important to exercise care in the use of electrical equipment, not to overload electrical outlets, not to block exits, corridors or fire safety equipment, observe the 'No Smoking Policy', learn the fire plan and evacuation routes, learn to use fire combating equipment etc. Fire prevention is the most important concept in considering a Fire Plan.

13.10.7.1 Fire Responses

As mentioned previously, fire outbreaks are unpredictable but can be prevented. It is difficult to portray a response plan for the project site considering the different scenarios that might arise from a fire. It is important though, to have in mind certain tips and guidelines relating to the event of a fire. These guidelines may come in the form of a fire combating plan whereby trained staff may utilize the different fire controls to extinguish the fire.

Fire outbreaks sometimes require an evacuation plan and for this reason it is important to plan along these lines. Although an unlikely occurrence, it is important to consider such a plan, especially for the hotel, restaurants and other areas constantly congested by guests and visitors. The evacuation plan will involve the use of evacuation cards to disseminate the procedures and conditions necessary for an evacuation. These cards must be handed out and made known to

each member of staff and management as well as visitors entering the Cruise Terminal. These cards should also be posted in each building, office, as well as public areas.

Considering the possibility of a fire and its consequences, the following responses will be incorporated into the general response plan. These response procedures will also be posted as flash cards in the marina and terminal building. In addition, these 'flash cards' will be translated if needed to convey the message to those who do not speak or understand English.

Small fires

Fires first start small and then grow large as time progresses and if there is enough fuel, oxygen and heat for the fire.

Actions to be taken:

(i) Sound the alarm

(ii) Use an extinguishing media preferably a fire extinguisher to fight the fire.

(iii) Do not fight a large fire with a fire extinguisher.

(iv) Check to see that the fire is completely extinguished.

(v) Inspect the fire area and assess for damages.

(vi) Close off the area for safety purposes.

At some point, the Emergency Coordinator needs to be notified of the situation. A report of the incident should be submitted to the Emergency Committee for assessment.

Large Fires

Utilize these procedures if a large fire occurs such as in a building unit or otherwise:

Actions to be taken:

(i) Sound the Alarm

(ii) Use an extinguishing media such as a fire extinguisher and the fire hydrant to fight the fire.

(iii) If possible, remove any fuel (combustible material) that could be engulfed by the fire

(iv) Use fire hydrant and full pressure aiming at the base of the fire

(v) Evacuate any persons within the area or found in the area at the time of the incident

(vi) Once contained, check if the fire has been completely extinguished

(vii) Inspect the fire area and assess for damages

At some point, the Emergency Coordinator needs to be notified of the situation. A report of the incident should be submitted to the Emergency Committee for assessment. Notify any member of the National Fire Service for further investigation and recommendation.

Fire at the Cruise Terminal Bay

(i) Any person who discovers a fire or smoke should report it immediately to the Harbour Master or hailing on VHF Radio. If there is no telephone nearby, activate the fire alarm station located nearest to you and then go to the nearest telephone and call the Security Booth or the Harbour Master Office. If you have a VHF radio, communicate the problem as a distress call.

(ii) When speaking to the Harbour Master or the Security Officer, give them the exact location of the fire or suspected fires. A marina staff member will notify the Emergency Coordinator or Fire Responder and dispatch a response team to the affected area.

(iii) If the fire can be easily and safely extinguished, do so utilizing the marina fire extinguishers and fire hydrants, then advice the Security Booth and Harbour Master Office immediately.

(iv) If imminent danger exists, advise the Security Booth that you are leaving the area, and then retreat to a safe area.

Evacuation Procedures

Should the Harbourmaster, Emergency Coordinator or Fire Responder at the scene recommend that the area be evacuated, the following plan must be put into effect:

- The terminal and security personnel will manually give the signal for evacuation utilizing VHF radio communication.
- An alternative signal will be broadcasting a message utilizing the marina VHF.
- The message given to Boaters on their boats in the marina should be: *"There is an emergency that requires the immediate evacuation of the marina. Please leave immediately. There is no need to panic. Please take your vessel to a safe area outside the marina. If you need assistance, let our staff know via radio transmission on channel 16."* Security and terminal personnel will strategically position themselves on the docks and piers to assist with directing the boaters out of the marina.
- For boats left in the marina unattended, marina personnel will retrieve the keys and take the boats outside the marina and anchor them in a safe place.

- After the fire has been extinguished, the damage must be assessed and then clean-up procedures will begin.

13.10.7.2 RACE Fire Plan

The following response acronym is a summary of the response actions that any guest, visitor and staff of the establishment must practice when an outbreak occurs in a hotel building or congested area.

- **Rescue -** Remove anyone who is in immediate danger by the fire or smoke. Sometimes it is prudent to sound the alarm first, because if you are overcome by the effects of the fire or are injured, then there may be no one available to assist you and other lives may needlessly become imperilled.
- **Alert/Alarm -** It is important to alert others to the fire and get help as soon as possible.
- **Confine -** Shut all doors and windows and turn off all fans and air conditioners. Check all areas. Smoke travels from point of origin through ducts, shafts, etc.
- **Extinguish –** Use the fire extinguisher or other mediums to combat the fire
- **Extinguisher Usage**

Fire extinguishers will be utilized throughout the project site, especially to combat small controllable fires. Use the acronym PASS to operate a fire extinguisher.

P Pull the pin to break the seal tag.

A Aim the hose at the base of the fire. Stand a safe distance away from the fire.

S Squeeze the handle to discharge the fire extinguisher.

S Sweep the hose from side to side.

13.10.7.3 Damage Assessment and Evaluation

Damage assessment and Evaluation

After a Fire

- Ensure that the fire has been completely extinguished and under control
- Check area for accessibility and road/path/boardwalk condition.
- Receive immediate report from Security Personnel on any potential damage.
- Obvious damages to buildings must be carefully inspected and check for hidden damages.
- Managers must check their respective areas and submit a report on significant damages.

- All Managers must prioritize repairs. This is important in issuing materials.
- A coastal inspection is to be made along with appropriate water sampling.
- All vehicles/boats/carts are to go through a routine maintenance check.
- Chemicals are to be carefully examined and any spill quickly cleaned up.

Note: Every Manager or Supervisor must submit a report to the Emergency Coordinator as soon as time permits. This is important in evaluating the effectiveness of the procedures stated by the Fire Emergency Response Plan.

Documentation - It is imperative to document all the pertinent activities relating to Response Plan. This includes training/drills, corrective and preventive actions as a result of the training/drills and the reporting requirements. The latter would involve the local involvement of governmental authorities and the National Fire Service. All of the above issues have been discussed. Thus, the following sections summarize the documentation issues.

Training and Drills - Training will be provided for all staff through orientation training upon employment and annual re-training, in addition to department specific training. This includes all fire combating (Fire Extinguishers, Hydrant, Bucket Parade) and response training. All staff is expected to participate in unannounced practice fire drills when requested.

Training is important, especially considering the location of the project site. In addition, it streamlines the response procedures and response time. Furthermore, training and drills will help the staff to familiarize themselves with the different stages and thus 'test' the response capacities of the individuals in charge.

Corrective/Preventive Action - In disaster management, these actions are usually encountered as a result of the training exercise where critical errors are corrected, and a preventive plan is activated. This can also be attributed to improper training or lack of effort on the part of the individual. In any case, quick decisive actions must be carried out in order to rectify the situation. This action must also be recorded and documented into the plan.

Reporting Requirements - It is important to make a report of any fire outbreak. This requirement is requirement is necessary for both internal and external purposes. It is imperative to take into account these actions and UPDATE the preparedness plan. In retrospect, the project must ultimately liaise with the nearest Fire Department and establish a firm link.

Conclusion - The Fire Emergency Response Plan for the proposed Cruise Terminal Development is a dynamic tool that will assist the Emergency Coordinator and the Emergency Committee in the decision-making process in regard to Disaster Management and Contingency. This plan is intended to go hand in hand with the relevant Fire Service Code. Likewise, this plan must be updated to include all the infrastructure and building that will be constructed on site. So, at this moment, this fire response plan is just a generic version of the actual plan that will be updated once in its in full operation.

13.11 Spills and Toxic Fumes

Introduction - The Spill Contingency and Response plan provides an organizational structure and procedures for preparing and responding to oil spills, leaks, toxic fumes and explosions. This plan is to be used by the Cruise Terminal development in response to petroleum product spills and/or leaks.

Each spill is different, and it is not practical to develop a spill response procedure, which will encompass every situation. It is better to understand the goals of the response plan in order to tackle every spill situation. Such understanding coupled with training will enable those involved in the response effort to determine the best response procedures for given circumstances.

Purpose of the plan - The purpose of the plan is to outline the procedures necessary to reduce and contain the effect of a spill by means of a well-coordinated response and is intended for the following purposes:

- To increase employee awareness on Spill Response procedures.
- To define the coordinating mechanisms necessary for Managers and staff to utilize their resources in response procedures.
- To establish and define clearly the roles and responsibility of Management in Spill Contingency and Response Procedures.

Objective - The goal of the Response Plan is to contain the spill in as little time as possible in order to prevent further environmental impact on the surroundings. With this, it is important that the following be noted:

- To respond to all spills and leaks that warrants containment and recovery efforts.
- Always have the equipment available and ready
- Carry out training in the use of equipment necessary to contain the spill.
- Establish the Terms of Reference (TOR) in which the plan will abide by.

Scope - The plan is intended for the territorial waters travelled by the refuelling vessel, its adjoining shoreline and for spills of other petroleum products on the shoreline and cayes.

Composition - The Spill Contingency and Response Team is comprised of:

a. The Maintenance Manager as the onsite Coordinator of Containment and Response Procedures.
b. Site Manager as Assistant onsite Coordinator of Containment and Response Procedures.
c. Emergency Coordinator as Overall Coordinator (Spectator)
d. The Supervisors as Clean up and Recovery Coordinators.
e. The Environmental Liaison Officer as Containment and Mitigation Coordinator.

* Replacements or shifting of responsibilities should be made known to everyone in the Team.

In absence of the onsite Coordinator, the Assistant Coordinator will take his place. The Emergency Coordinator of the Emergency Committee should be notified at once updating him/her on the conditions and actions taken by the Team.

Command Centre - The Command Centre will be at the Cruise Terminal floor and will be the responsibility of the Composition Members to keep all other responder abreast of the situation via cell phones, land lines, email etc.

Authority - This plan is developed under the Disaster Management Plan of the Belize Cruise Terminal and can only be activated by designated management personnel assigned by the Emergency Committee.

Activation - The onsite Coordinator will oversee activating this Plan. Activation roles consist of:

- Informing the Emergency Coordinator of the situation, who will thereby inform the Department of the Environment.
- Informing the General Manager of the plans and activities carried out by the Team.

The onsite Coordinator or Assistant has the authority for the total or partial activation of the Plan. Judgment will be made in accordance to the Tier levels.

Deactivation - This will be in conjunction with the Emergency Coordinator, the onsite Coordinator and a representative of the DOE, if so warranted.

Responsibilities - The following is a list of responsibilities and duties assigned to Team with regards to the implementation of the Spill Containment and Recovery Plan

The Team leader will have the overall responsibilities for:

- Overseeing all Emergency procedures and to carry out the necessary awareness and preparedness.
- Adhering to the Terms of Reference
- Having in place a Plan of Action in order to facilitate an effective and smooth performance for the course of Contingency.
- Conducting regular meetings with members of the Team in order to assess and evaluate the Response plans for Spill recovery and containment
- Ensuring that all new staff workers be briefed on the plan when hired and that all other workers are briefed on an annual basis.
- Ensuring that all Spill Containment and Recovery Equipment are inspected and maintained on a quarterly or regular basis.

Alert and Notification

- Any boat captain transferring fuel shall immediately notify the Maintenance Manager of the spill or leak on board the boat.

- Any staff noticing any petroleum spill or leak shall report the matter immediately to the Maintenance Manager or Emergency Coordinator

13.12 Spill Response Plan

13.12.1 Response Priorities

- Safety to human life is the highest priority in any response and should ensure that all management personnel are protected.
- Containment of incident to stabilize the situation.
- Minimize and prevent any adverse environmental impact

Response:

Basic response information that should be available whenever an action is taken includes the following:

- Type of oil involved: this could be lubricating oil, engine oil, waste oil, diesel fuel, and gasoline fuel.
- Size of spill: this includes all the Tier levels described by DOE.
- Location of spill: this involves the whole coastal waters and shoreline
- Prevailing Conditions: choppy seas, windy, rainy, overcast, sunny, calm, low/high tide.
- Environmental sensitivity of potential or actual impact area: this includes the sensitive area of the Deep-Water Port.

The following should be employed according to the nature of the discharge and prevailing conditions:

- Prevent and contain the flow of oil.
- If the spill does not threaten any resources in the marine environment, monitor the movement and behaviour of the spill.
- If sensitive areas or resources are threatened take active measures to protect the resources.
- Contain spread of oil if possible.

Response Action Guidelines:

On site Coordinator

- Direct operations as possible
- Identify spilled product
- Determine the facts concerning the spill
- Determine how the spill can be stopped if still in progress
- Organize incident site-equipment, command post, safety parameter

Environmental Liaison Officer

- Evaluate threat to environment, natural resources
- Provide guidelines for protection of these
- Work with clean-up personnel and advise and monitor process
- Document the spill including interviews, photographs, video, sketches
- Advise on use, or not, of clean up products, dispersants

Department of the Environment (DOE)

- Assist/Coordinate with Coordinator of operations if clean-up is still in progress

Response Options

Various options exist for capture and treatment of spilled oil, whatever is used will depend on the oil, location, resources, sensitivity, weather conditions, and skills.

Containment

(i) Spills on land

- Covering spill with absorbing material
- Diking spill to prevent spread and recovering spilled product for recycling
- Recovering any contaminated material for disposal

(ii) Spills in water or in marine environment

- Deployment of booms
- Spreading of absorbent materials
- Skimming and recovery of oil for recycling

(iii) Clean Up

Marine

- Skimming pooled oil
- Pressure flushing
- Manual cleaning
- Absorbing then removing
- Use of detergents and solvents, dispersants

Reporting and Documenting

Documentation is important for various reasons:

- Serve as basis for updating and amending the plan
- Prevention and mitigation of future spills

- Reduce cost and time

Documentation should include:

- Initial alerting report: who made the report
- Chronological order of occurrences
- Work and personnel used for spill management
- Damage and impact report

Contingency Response and Safety Equipment

Actions taken prior to a spill can significantly reduce the environmental impact. Such actions include having the following equipment available:

Table 13.10: Response Equipment

Maritime Spills	Inland spills
2000-foot containment boom, 12-inch float, 24-inch skirt	***Boom***
15 kw generator set	***Protective clothing***
3-inch transfer pump; diesel driven	***Rubber gloves***
Protective clothing	***Rubber boots***
Rubber gloves	***Safety glasses***
Neoprene boots	***Respirators***
Respirator	***First aid kits***
First aid kits	***Absorbent pad***
Safety glasses	***Shovels***
Absorbent pads	***Rakes***
Skiff	***55-gals drum***
Rakes	***Pitch fork***
Shovels	
55-gals drum	

Health and Safety

Spill response safety cannot be covered by a set of rules for all situations. Common sense, sound judgment and safe practices should be used. In a spill response, an evaluation must be made of all hazards present. Spill response teams must evaluate risk from each task required in a clean-up operation. If the risk is moderate or high, alternatives with lower risk must be found.

Personal Protective Equipment

For oil spills, only Level D will be used as described by the National Emergency Preparedness Plan for Oil Spills. Level D is the lowest level and specifies that there are no indications of hazardous conditions and the work functions preclude contact with any hazardous substance. Equipment for this level includes:

- Full or half mask respirator

- Splash suits (one or two pieces)
- Oil resistant gloves
- Oil resistant boots
- Hard hats

On Site Safety Plan

This plan consists of the protective equipment need to be worn by the clean-up crew to be fully protected from any danger associated with the recovery efforts. The Health and Safety Official will make sure that a risk analysis is conducted and evaluated before any protective equipment is issued.

Clean Up Options:

This is the most important step once the conditions of recovery have been evaluated and once they are favourable. The following methods can be used in containment and recovery efforts:

- Dispersants
- Chemical Agents
- Bioremediation
- In Situ burning

13.12.2 Spill Prevention Measures

Spill Detection - The possibilities of spills are greatest in the following areas

- At the gas station or depot when loading into the truck
- During transportation of fuel to Terminal,
- While unloading the fuel at the tanks.

Leaks - This type of incident can occur throughout the entire process and is of major concern and is usually from damaged fuel lines and leaking pumps.

Transportation - It is best not to transport fuel during heavy rains. Fuel trucks must be road worthy during transportation.

Loading of Fuel

- Fuel trucks or containers must never be overfilled.
- Fuel hose must be drained properly before reusing.
- Containers must always be properly sealed and kept as such.

Unloading of fuel from trucks to tanks

- Care must be taken when coupling the fuel hoses to the fuelling tanks
- All emergency equipment must be working correctly

Unloading of Fuel

- Fuel pump must be properly placed and functional
- Pump hose or tube must be drained properly before dispensing another tank.
- The current volume of the tank must be known before dispensing begins.

13.12.3 Response Procedures

(i) In case of Spills

- Contain spill wherever possible. If spill occurs, wipe the area with absorbent pads. If the spill occurs on a boat, then wipe spill with absorbent pads, cloth and mop spill.
- If the spill is less than a gallon, contain and mop up spill.
- If drums are used to collect the waste/recovered fuel/oil, then the drums must be cleaned afterwards to prevent soil contamination.

(ii) In case of leaks

- Stop pumping or unloading immediately
- Identify and contain the area and repair lines immediately
- If leak is on a boat, mop up any fuel spills with absorbent pads to prevent any water contamination.

(iii) Container falling into water

- Remove container from water as soon as possible.
- If a leak occurs, then the container must be removed immediately from the water
- If more than 10 gallons leaks, then notify the Maintenance Manager and Emergency Coordinator.

13.12.4 Complementary Information

- Records of the amount of fuel being transported should be kept at hand.
- Number of drums should also be recorded.
- Weather conditions and wave swells should be noted as well.
- Practice safety measures throughout the entire process.
- Absorbent materials should be kept on board. E.g. Spill Kit (10 absorbent pads and 2 booms) and cloth.

In an effort to minimize potential spills and leaks of fuel during the entire refuelling process, it is best to observe and practice these measures at all times. A spill here and there isn't much, but when combined, the volume spilled can be huge.

13.13 Action Plan

(i) Procedures for Product Spills, Tank Leaks

The following procedures will be used to treat and mop up any product spills:

Spillage of Oil/Chemicals on Pavement

- Prevent any of these substances from entering storm water systems or septic tanks, drains or from any natural water system.
- Mop up and contain spill immediately with degreaser, sandbags, saw dust, sand soil or absorbent pads
- If any spills enter the storm water the flow must be intercepted before it can contaminate other environments.
- If natural water systems are contaminated use absorbent booms, absorbent pads and sandbag dams for containment and absorption.

Spillage of Oil/Fuel/Chemicals on Soil

- Prevent spread of the substance by using sandbags, sand or soil, absorbent booms or planking to divert flow.
- Prevent any of these substances from contaminating groundwater (it may be necessary to remove contaminated soil).
- Rescue any endangered plants immediately.
- Plough soil for aeration and apply fertilizer/suitable-neutralizing chemicals, degreaser if viable (not detergents).
- Water soil to bring oil to surface and mop up with absorbent materials as described below.

Tank and Pipeline Leaks

- Operator should inform the Maintenance or Site Manager immediately of any leaks.
- Find the source of the leak and stop any further leakage.
- If soil has been contaminated it must be rehabilitated as follows: plough soil for aeration, apply fertilizers, and keep moist. For very permeable soils, venting and biotreatment including nutrient and bacteria are required.
- Prevent fuel from contaminating groundwater.
- If leak is on pavement then follow above procedure.

Spill control and clean up

Acceptable absorbents for use in petroleum, oil and lubricants (POL) spill clean-up are listed below. These are organic and inorganic materials for spill clean-up as a pollution minimization.

These items are accepted for inclusion in the contaminated soil temporary storage site (**Table 13.11**):

Table 13.11: Items accepted for contaminated soil temporary storage.

Straw	**Chicken feathers**	**Clay (kitty litter)**
Sawdust	**Cork**	**Calcium sulphate**
Wood chips, paper (cellulose)	**Sand**	**Pumice**
Ground corncobs	**Dirt**	**Peat Moss**

Disposal

Contaminated material must be disposed in an environmentally safe manner.

- Contaminated materials such as absorbents must be collected and tightly wrapped in a container and taken to the local landfill for disposal.
- Contaminated soil and sawdust must be taken to a control site where it will be left to degrade naturally. Add molasses, sawdust, Biosorb or fertilizer to further enhance the degradation process.
- Check monthly for water accumulation and treat effluent in a separator. Vegetation growth is a positive sign of regeneration and soil recuperation.

(ii) Documentation

It is imperative to document all the pertinent activities relating to Spill Contingency and Response Plan. This includes training/drills, corrective and preventive actions as a result of the training/drills and the reporting requirements. The latter would involve the local involvement of governmental authorities and the National Fire Service. All of the above-mentioned issues have been discussed. Thus, the following sections summarize the documentation issues.

(iii) Training and Drills

Training will be provided for all staff through orientation training upon employment and annual re-training, in addition to department specific training. This includes spill detection and response training. All staff is expected to participate in unannounced spills drills when requested.

Training is important, especially considering the location of the project site. In addition, it streamlines the response procedures and response time. Furthermore, training and drills will help the staff to familiarize themselves with the different stages and thus ‘test’ the response capacities of the individuals in charge.

(iv) Corrective/Preventive Action

In disaster management, these actions are usually encountered as a result of the training exercise where critical errors are corrected, and a preventive plan is activated. This can also be attributed

to improper training or lack of effort on the part of the individual. In any case, quick decisive actions must be carried out in order to rectify the situation. This action must also be recorded and documented into the plan.

(v) Reporting Requirements

It is important to make a report of any spill or leak irrespective of the reporting requirements. This requirement is necessary for both internal and external purposes. It is imperative to consider these actions and UPDATE the response plan. In retrospect, the project must ultimately liaise with the Department of the Environment for materials, additional training and guidelines.

13.14 Conclusion

The Spill Contingency and Response Plan for the Cruise Terminal development is a dynamic tool that will assist the onsite Coordinator and Emergency Coordinator of the Emergency Committee in the decision-making process in regard to Disaster Management and Contingency. This plan is intended to go hand in hand with the relevant practice in spill/leak containment. This plan will ultimately be updated to reflect the true fuel transportation mechanisms as wells as the contact persons in charge. These elements are essential in maintaining an efficient response team.

CHAPTER 14: SUMMARY OF IMPACTS

14.1 Introduction

This section summarizes the environmental impacts of the proposed development on the natural environment, the economy and social aspect of the project's zone of influence. Potential impacts have been identified based upon knowledge of the existing environment and experience with similar operations elsewhere and addresses residual impacts and cumulative impacts. Relevant impacts are described in terms of their significance at the local, regional, or national level as appropriate.

Initially, these impacts are considered without taking into account any proposed control measures that will be employed by the project to address them. The residual impacts are those resulting after implementation of the recommended mitigation measures while the cumulative impacts are those changes to the environment caused by the combined impact of past, present and future activities. The assessment of residual risk associated with each identified impact assumes the effective implementation of the proposed control and management strategies relevant to each identified impact.

While the proposed Port of Belize improvement project is projected to have significant positive social and economic benefits, it has the potential to negatively impact the surrounding water quality, drainage of the area and ecosystems within the project area during the project implementation and operational phases. In addition, to these environmental issues, the activities of the proposed activities could temporarily, negatively impact the lives of residents of nearby communities and traditional uses of adjacent and surrounding waters.

The assessment provides abatement measures that are tailored to reduce these potential adverse impacts to the point where the impacts are insignificant or within acceptable limits, either through effective design and best practices or through sound environmental management of the activities to be undertaken.

An environmental impact is defined as *"any change to an existing condition of the environment*". A social impact likewise refers to "*any change to an existing social condition of nearby residents and affected parties"*. The nature of the impacts may be categorized in terms of:

- Direction -positive or negative,
- Duration -long or short term,
- Location -direct or indirect,
- Magnitude -large or small,
- Extent -wide or local,
- Significance -large or small.

Tables 14.1 and 14.2 provides two different types of impact matrix summarizing the potential

environmental impacts associated with the proposed activities. The first matrix (**Table 14.1**) assesses the direction, duration, location, magnitude, extent, and significance of the projected impacts primarily related to the project's implementation phase. **Table 14.2** looks at the operational phase of the project.

As can be seen from the matrices, most of the negative environmental impacts are predicted as either minor and of small significance and are very localized and of short duration. The activities with the highest potential impacts are that associated with deep sea disposal, which has been withdrawn by the developer as a disposal option. The overall socioeconomic impacts are assessed as positive in direction, with a major magnitude and of long-term duration, with a large significance and national (wide) in extent.

14.2 Summary of Main Impacts Introduction

It is the opinion of EIA preparers that if best management practices and sound mitigation measures are incorporated throughout the project's implementation and operational phases, the level of impacts will be within acceptable limits and will not place an unbearable stress to the area's ecosystem and social fabric. The ultimate hope is that the project's implementation could serve as an example demonstrating that economic gains and social advancement is possible without sacrificing important environmental and natural resources assets.

It is a basic premise that all developments will produce some environmental impacts. The important consideration must be that the residual impacts should be acceptable and far outweighed by the project's socioeconomic benefits to the Country as a whole and not only the developers.

The impacts of a typical development of this scale will be felt mainly in the areas of physical alterations to the coastal and inland ecosystem, solid and liquid waste disposal, water supply and distribution, energy generation, effects on the native wildlife species of the area from a combination of factors, dredging and the disposal of dredged material and increased transportation.

However, due to the prevailing environmental conditions of both the immediate areas proposed for dredging, land reclamation and nearshore disposal sites, the actual impacts are likely to be significantly smaller than is normally the case. The terrestrial ecosystem is already highly disturbed and the immediate marine ecosystem where dredging and land reclamation is proposed is very silted with almost zero visibility and almost barren of biodiversity.

It is recognized that a project of this size cannot be successfully implemented without some negative environmental impacts, however it is incumbent on the developer to reduce these to their lowest possible level, or negate them entirely though the implementation of best practices and applicable mitigation measures. Within a global recession, a careful balance must be considered for developmental projects in line with the environment and social improvements which can positively impact the lives of people within the community and country. Potential

Table 14.1: Project Implementation Phase Impacts.

ACTIVITY/IMPACT	DIRECTION		DURATION		LOCATION		MAGNITUDE		EXTENT		SIGNIFICANCE	
	Pos	Neg	Long	Short	Direct	Indirect	Major	Minor	Wide	Local	Large	Small
1. Dewatering Site Preparation												
Vegetation Removal		x	x		x			x		x		x
Increased sediment runoff		x		x		x		x		x		x
Increased shoreline erosion		x		x	x			x		x		x
Noise		x		x	x			x		x		x
2. Dredging & Land Reclamation												
Habitat alteration		x	x		x		x			x		x
Water quality impacts		x		x	x			x		x	x	
sedimentation		x		x	x			x		x		x
3. Nearhsore Disposal		x		x	x	x	x		x		x	
4. Construction Activities												
Material Transport		x		x		x		x		x		x
spillage		x		x	x			x	x			x
Impact on marine traffic		x		x	x			x		x		x
Impact on road traffic		x		x		x		x		x		x
4. 1 Improper Material Storage												
Water contamination		x		x	x			x		x		x
Suspended solid runoff		x		x	x			x		x		x
4.2 Construction Works												
Noise		x		x	x			x		x		x
Dust		x		x	x			x	x			x
Visual intrusion		x	x		x		x			x		x
Refuelling of vessels and fuel storage onsite		x		x	x		x			x	x	
5. Construction Crew												
Sewage generation		x		x	x			x		x		x
Solid waste generation		x		x	x			x		x		x
Emergency response		x		x	x			x		x		x
Water Consumption		x		x		x		x		x		x
Food Hygiene		x		x		x		x		x		x

6. Landscape & Replanting												
Vegetation/habitat reintroduction	x		x		x		x		x		x	
7. Socio Economic Impacts	x		x		x		x		x		x	
Employment	x		x		x		x		x		x	
Impact to neighbourhood	x		x		x		x			x	x	

Table 14.2: Project Operational Phase Impacts.

ACTIVITY/IMPACT	DIRECTION		DURATION		LOCATION		MAGNITUDE		EXTENT		SIGNIFICANCE	
	Pos	Neg	Long	Short	Dir	Ind	Major	Min	Wide	Local	Large	Small
1. Water supply/Consumption												
Sustainable supply (BWS)	x		x			x	x			x		x
Water conservation methods	x		x		x		x			x		x
2. Wastewater generation/Disposal												
Sewage		x	x			x	x			x		x
Greywater		x	x			x		x		x		x
3 Solid Waste Management												
littering		x	x		x			x		x		
Water pollution		x	x			x		x		x		x
Coastline cleanup	x		x		x		x			x		x
4 Energy Generation												
Noise pollution from backup generators		x		x	x			x		x		x
Water pollution/from oil spills or leaks		x		x	x			x		x		x
Air pollution		x		x	x			x		x		x
Greenhouse gases/ climate change	x		x			x		x	x			x
5. Transportation/Traffic												
Traffic accidents		x	x			x		x		x		x
Fuel spills		x	x			x		x		x		x

4. Impact to Area's Ecosystem												
Water Pollution		x		x	x			x		x		x
Erosion		x		x	x			x		x		x
Solid waste generation & disposal		x	x		x			x		x		x
7. Site Access to Cargo and Cruise Terminal												
Increased traffic		x	x		x			x		x		x
Impact to longshore currents		x	x		x			x		x		x
Impacts to ecosystem		x	x		x			x		x		
Impact to fishery	x		x		x			x	x			x
8. Lighting												
Disturbance of nocturnal fauna		x	x			x		x		x		x
Visual intrusion		x	x		x		x			x		x
9. Social												
Job Creation	x		x			x		x		x	x	
Introduction of diseases		x	x			x		x		x		x
10. Economic benefits	**x**		**x**		**x**	**x**	**x**		**x**		**x**	

impacts from dredging and spoils disposal were identified from the engineering assessments and site visits and mitigation measures formulated accordingly by the Nextera team.

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To assist in ensuring that the mitigation measures are being properly implemented and performing as expected, a robust monitoring program is being recommended.

14.3 Terrestrial Ecosystem Impacts

The negative impacts to the existing terrestrial ecosystem is assessed as minor in consideration that the present land to be impacted by project activities have been heavily impacted by past activities and the clearance of the secondary growth of approximately 19.5 hectares will have minimal impacts to the fauna that utilize the area.

There exists a large opportunity for the developers to engage in landscaping of the area with native ornamental plants and local trees and to carry out a mangrove replanting program along the denuded coastline and new reclaimed shoreline as a coastal protection measure and as means of attracting birds to the area. Migrant birds in particular are of interest to tourists. Many of these birds use littoral forest such as those bordering the coastline downstream. The repopulation of areas with native plant species may increase the site capacity to host a higher and more diverse number of species.

Care will need to be taken to avoid that leftover food is properly stored and made inaccessible to pests, wildlife and birds that could become a problem. The developer will ensure that they utilize animal proof containers.



Efforts will need to be made to control mosquitoes in the area as these could compromise the welfare and enjoyment of tourist and workers. Heavy reliance on chemical repellents and mass spraying with dangerous chemicals can seriously pollute the environment especially the ground water and stagnant pools where they occur. The developer will utilize only pesticides registered by the Pesticide Control Board and those classified as environmentally friendly (Biologicals).

The cumulative impacts of land clearance activity to the terrestrial flora and fauna of the area is assessed as minor in comparison to the existing development in the area and those expected to occur in the near future since most of the remaining uncleared land in the area has been privatized and are slated for development.

14.4 Marine Ecosystems impact

Like the terrestrial Ecosystem the immediate marine ecosystem where dredging and land reclamation activities are proposed, is heavily disturbed. Both the access channel and turning basin had been dredged before and more recently in 2002. The area is highly turbid due to

sediments from both the Haulover Creek and Sibun River and to a smaller extent the canals and drains that discharge empty out into the immediate area. The turbidity is often to the level where there is zero visibility and for the most part is barren. Clearer waters are found closer to the Robinson Point area with a subsequent increase in marine biota.

Direct impacts due to the dredging of the channel and basin will result in very minimal loss of any valued receptors or biota. It is expected that the deepening of these areas may actually lead to the increase of pelagic fish species in those areas thereby increasing fish life in these areas. Despite, the prevailing turbid conditions it is still recommended that "Turbidity curtains" will be used around the effluent return areas.

The curtains will be monitored and where necessary faulty couplings will be immediately repaired or replaced. Turbidity in the water column will be strictly monitored with the use of regular monitoring in both the project area and any sensitive receptor sites near the area (see Chapter 5). The residual impacts attributed to siltation of adjacent areas is assessed as minor. The cumulative impacts from these and other activities in areas are also assessed as minor and temporary in nature.

14.5 Impacts Related to Transportation

14.5.1 Terrestrial Impacts

Several areas of environmental concerns arise in respect to the proposed cruise terminal, cargo terminal improvement, and construction of the Tourism Village.

(i) Drainage

Areas that are presently surrounded by berms as well as those that will border new ones will need to be properly drained to prevent the backflow of stormwater and inundation of nearby Jane Usher Boulevard, the GPH and adjacent properties. Drains will be cleared and excavated as part of the proposed drainage solutions paying special attentions to those traversing the dewatering site like the BWS effluent drain. The impacts of these activities to land transportation in the area are assessed as minor. Major drains will be built along the expansion to Jane Usher Boulevard which will be transformed into a dual carriageway. These drains will be designed to move any water flowing towards the Port of Belize area from adjacent neighbourhood to the sea or municipal drainage canals.

(ii) Land Transportation Impacts

The greatest impacts to land transportation will be those mainly associated with the operational phase of the project which will increase tremendously the flow of traffic in the area while at the same time alleviating the current traffic congestion in downtown Belize City and emissions

related issues associated with operational activities of the Fort Street Tourism Village.

The construction of a new boulevard from the new Tourism Village to the GPH will allow for less downtown congestion and a more efficient dispersal of buses and taxis to inland destinations. In addition, cargo trucks will no longer be limited to using Fabers Road or the Central American Boulevard but will have a more direct access to the Port of Belize though the new boulevard. To reduce the risk of accidents at the junction with the GPH, a roundabout is proposed.

The residual impacts to land transportation are hence assessed as positive in these aspects and with long term consequences. The cumulative impacts to increased traffic of the GPH is assessed as moderate as it is expected to increase due to greater number of tourists projected to be offloaded with the ability to safer offload onshore.

(iii) Mitigation

i) New access road to the George Price Highway linking the Jane usher Boulevard and Cruise Tourism Village;
ii) Upgrade and utilize roads in the immediate vicinity of the Port and Customs House. These would also offer alternatives, especially to individual tour operators who use a small van or taxi and are doing City Tours;
iii) Consider a roundabout at the junction of New road with that of the George Price Highway;
iv) Ensure that the access/exit point(s) to the George Price Highway are wide enough to facilitate traffic free flow.
v) Upgrade of Jane Usher Boulevard;
vi) Ensure that the parking facilities are close to the entry exit points into the project site itself;
vii) Proper lighting and signs should be placed on internal roads and parking areas and along new access road;

14.5.2 Marine Transportation Impacts

Usually motorized boats can create environmental impacts in several important categories. The developer is committed to managing the use of boats and other water vessels for tours to reduce the impacts of increase boat traffic in the area with safety as the priority consideration. The following are recommended mitigation measures.

Mitigation Of marine impacts:

i) Ensure that marine shipping lanes are properly buoyed and ensure that at night the buoys are lighted with their corresponding colour. Although the increase will be in cruise ship which do not leave the port at night, but precaution is always better than cure;

ii) The designation of alternate routes for traditional users;

iii) Ensure that the dredge operators are aware of the shipping schedule, so that they allow free-flow of vessels accessing or exiting the Port or Harbour of Belize via the access channel that is being dredged and Grennels' Channel;

iv) Constant contact with users of the area should always be maintained and notices issued. This will ensure safety of traditional users and avoid major accidents

v) all watercrafts will maintain a safe operating distance from other water vessels;

vi) all watercrafts will be required to be visibly identifiable at a minimum distance of 100 meters (night or day) by being outfitted with flags or other high-visibility markings, safety lighting and collision warning equipment (air horns or safety flairs);

vii) all watercraft operators will be properly trained in watercraft handling & safety;

viii) All workers transported by sea will be required to wear life vest;

The threat to marine life will be mitigated significantly by having the area operate as a no wake zone and having outboard vessels utilize propellers guards. Both the Cargo Terminal and Cruise terminal will be properly outfitted with proper lighting and safety equipment. The residual impacts of increase maritime traffic in the area is assessed as moderate with the cumulative impacts of these also assessed as moderate and long term.

14.6 Impacts Associated with Construction Phase

The impacts associated with the tourism village construction activities are from a socioeconomic point of view assessed as positive creating job opportunities for one of the poorest areas of Belize City. The project will have a long term positive social and economic impact that would be national in scope in comparison to all other impacts that are classified as local in scope. Policies will be put in place to ensure that contractors employ women and do not engage in any child labour and hire local tradesmen and labourers.

The residual environmental impacts of these construction activities are assessed as minor and temporary in nature. The following mitigation measures are proposed to minimise the potential adverse impacts of these activities.

14.6.1 Solid Waste Generation

During the construction phase of the proposed project, solid waste generation may occur mainly from two points:

i) From materials used in the construction activities
ii) Solid waste generated from the day-to-day living activities of the crew within the worksite.

Mitigation:

i) Garbage bins should be strategically placed within the work camp and construction site.

ii) The bins at the construction site should be adequately designed and covered to prevent waste from becoming airborne, accessed by vermin and to minimize odour.
iii) The bins should be emptied regularly, and all material scheduled for disposal to the nearby transfer station.

14.6.2 Wastewater Generation and Disposal

With every construction worksite comes the need to provide construction workers with sanitary conveniences. The disposal of the wastewater generated at the construction campsite has the potential to have a negative impact on the ecosystem of the area despite the fact that this is intended only for the duration of the construction period.

Mitigation:

i) Provide portable sanitary conveniences for the construction workers for control of sewage waste. A ratio of approximately 20 workers per chemical toilet should be used.
ii) All toilets should be serviced regularly.
iii) All waste from the portable toilets should be placed in sealed containers for final disposal at the nearby BWS ponds with prior permission.

14.6.3 Storage of Raw Material and Equipment

Raw materials, for example sand, gravel, and cement and other materials used in the construction of the proposed development will be stored onsite. There will be a potential for dust to become air or waterborne.

Stored fuels and the repair of construction equipment has the potential to leak fuels, oils etc.

Mitigation:

i) Raw materials that generate dust should be covered or wet frequently to prevent them from becoming air or waterborne.
ii) Equipment should be stored on impermeable hard stands surrounded by berms to contain any accidental surface runoff from spills.
iii) Bulk storage of fuels and oils should be in clearly marked containers (tanks/drums etc.) indicating the type and quantity being stored.
iv) In addition, these containers should be surrounded by berms to contain the volume + 10% being stored in the event of an accidental spillage.

14.6.4 Noise Pollution

The proposed construction of the cruise and cargo port terminal and the tourism village and other related ancillary facilities will involve pile and sheet wall driving, building construction, and landscaping. It is anticipated that construction activities will take place seven (7) days per week.

Pile and sheet wall driving will be the first step which will necessitate heavy motorized equipment to carry out work. In addition, it can be expected that the construction activities would be supported by a diesel generator to provide electricity required by the various power tools, pumps and other equipment that would be used.

Construction of the exterior enclosure or "shell" of the cargo port and reclaimed shoreline areas as well as those of the related buildings will include construction of the framework (installation of beams and columns), floor decks, facade (exterior walls and cladding), and roof construction. These activities will require the use of a number of power tools and equipment. Interior construction and finishing of the building will include the construction of interior walls, installation of lighting fixtures, and interior finishes (flooring, painting, etc.), as well as mechanical and electrical work. It is expected that much of the construction work would be carried out within a 24 months period.

The general construction phase is expected to last 24 months. During this period the noise level in the area can be expected to be significantly elevated. The impact of this noise is limited, since the nearest community located in the Jane Usher Boulevard area is approximately one kilometer away. Hence, very few persons other than the construction and port facility workers themselves would be impacted.

The types of noises emitted from the power tool equipment are considered intermittent noise with the exception of noise from the generator, which is considered as continuous noise.

The proposed construction activity will general generate intermittent noise within an estimated 100 dBA which is the noise produced from a power saw or similar type equipment according to a report entitled "Noise levels and exposure patterns to do-it-yourself power tools" by L. G. McClymont and D. C. Simpson. In many developed countries occupational safety standards require that employees handling these tools for prolonged period be given ear plugs or other noise abatement safety equipment. A report produced by the University of Oxford provides the following information contained in **Table 14.3** that gives a good comparison of the different noise levels associated with different activities.

Table 14.3: Noise Level Comparison.

Activity	dB(A)	Activity	dB(A)
Quiet office	40-50	Power drill	90-
Normal conversation	50-60	Heavy lorry (7 m away)	95-
Loud radio	65-70	Bar of a night club	95-
Tractor cab	75-85	Road drill	100-
Busy street	78-85	Chain saw	115-

Mitigation:

i) Use equipment that has low noise emissions as stated by the manufacturers.

ii) Limit night time operations of noise-generating equipment on land as much as possible to reduce the potential of creating a noise nuisance to nearby residents. Other lower noise emitting activities could be programmed if work is to proceed late into the night.
iii) Construction workers operating equipment that generates noise should be equipped with noise protection. As a guide, workers operating equipment generating noise of 80 A weighted decibels (dBA) continuously for 8 hours or more should use earplugs. Workers with more prolonged exposure to noise levels of 70 - 80 dBA should wear earmuffs.
iv) Maintain power tools in optimum condition.
v) Fit silencers or mufflers on generators.
vi) Keep power saw blades sharp.
vii) Use vibration damped blades.

14.6.5 Air Quality

Site preparation and construction has the potential to have a two-fold direct negative impact on air quality. The first impact is air pollution generated from the fugitive dust from material cut and the second is airborne dust from the storage and use of sand and cement. Fugitive dust has the potential to affect the health of construction workers, and nearby community.

Mitigation:

i) Worksite sand storage site should be dampened every 4-6 hours or within reason to prevent a dust nuisance and on hotter days, this frequency should be increased.
ii) Keep cement stored in enclosed area or under tarp.
iii) Use sanders with vacuum bags.
iv) Construction workers working in dusty areas should be provided and fitted with masks.

14.6.6 Emergency Response

During the construction phase of the port terminals and proposed tourism village the possibility of accidental injury is high. There exists the possibility for either minor or major accidents.

Mitigation:

i) A lead person should be identified and appointed to be responsible for emergencies occurring on the site. This person should be clearly identified to the construction workers.

ii) The construction management team should have onsite first aid kits and make arrangements for a nurse and doctor from a nearby community to be on call for the construction site.

14.6.7 Social

There are many potential economic benefits of a project of this scale. The most obvious of which is the generation of employment. Workforce requirements during the construction phase alone a total of 450 to 500 workers will be required, while projected operational workforce requirements will be about 300 to 500 people. Besides direct employment opportunities are the skills and aptitudes that the workforce will acquire during the construction and operational phase of the project and which can be marketed to other employers thus increasing employability prospects for all workers. These skills will help to grow the economy and modernize the country while encouraging recipients to set up their own businesses as service providers further increasing employment.

Another obvious benefit is the contribution to the local economies, especially to Southside Belize City. Based on available skillset and qualified applicants the Developer anticipates hiring 15% of its local construction workforce from within the Port Loyola area. The Developer will also strive to introduce a capacity program to help Port Loyola residents qualify for construction work. Contractual arrangements with local tour operators/guides, artisan and crafts people, suppliers, retailers, vendors, maintenance and service businesses, and transportation businesses have the effect of injecting much needed capital into the economy, directly to these individuals but also indirectly as these people spend that money – the eminent multiplier effect.

The not so obvious economic benefits of this project include foreign exchange earnings, direct financial contributions to nature protection and competitive advantage attained when the entire community works towards sustainable tourism. Tourist and residents entering terrestrial and marine reserves will contribute directly to their sustainable management through the payment of fees, donations and other gratuity.

Mitigation:

i) hire local tradesmen and labourers
ii) hire women
iii) do not hire child labour

14.7 Impacts Associated with the Operational Phase

14.7.1 Water Supply and Consumption

It can be reasonably concluded that the supply of fresh water will be provided by have only minimal environmental impacts. The mitigation measures are those more related to water conservation measures which are recommended.

Mitigation:

The development will ensure operational measures are employed in order to properly manage the use of this resource.

i) Only low-flush toilets will be used.
ii) All taps will be outfitted with water saving devices.

Housekeeping:

i) Staff will be required to not leave the taps running while cleaning.
ii) Make sure that all faucets do not leak and are in good repair.
iii) Cleaning and maintenance staff will be required to report immediately any leaking or dripping faucet or toilet
iv) Laundry staff will use only the minimum required amount of phosphate free detergent in the laundry.
v) Laundry staff will be encouraged to re-use rinse-water in the first cycle of washing of the next load.
vi) Meters will be installed in key areas to track the consumption of water.
vii) Establish an effective employee training program about water conservation.

14.7.2 Wastewater Generation and Disposal

The operation of the facilities will generate large amounts (95,580 gallons of wastewater from guest water usage, and from the operation of the laundry and kitchen facilities. The approved capacity of the recommended SBR treatment plant for the proposed project will be able to meet and exceed doe effluent standards. The two (2) main impacts relevant to the proposed undertaking are increased nutrients and fecal coliform in the water column.

The situation resulting from the increased nutrients in the water column is generally referred to as eutrophication. Eutrophication is primarily caused by the elevated presence of limiting nutrients such as phosphates and nitrates. Phosphates are generally derived from grey water effluents, while sewage effluent from the flushing of toilets is the main source of nitrates. In general, a major source of phosphates in grey water effluents is from detergents. However, the assessed impact that would arise from the discharge of treated effluent in the receiving environment is predicted as minor because of the level of treatment that will be met by the proposed wastewater treatment system which will exceed DOE's Effluent standard requirements.

In addition, the residual impact and cumulative impact to the area is thereby assessed as minor since BWS has its main effluent discharge drain traversing the property while the city has several drains and canals that discharge their contents in the nearby coastal area with these carried downstream along the coastline as indicated by the water quality assessment of the project area.

These measures incorporate a water recycling scheme for irrigation. The sewage technology to be applied is one which is considered as state of the art and is classified as an "advance wastewater treatment" system which means that the treatment will provide a reclaimed water product that:

(a) Contains not more, on an annual average basis, than the following concentrations:

1. Biochemical Oxygen Demand (CBOD5) . . . . . 10 mg/l

2. Suspended Solids . . . . 10 mg/l
3. Total Nitrogen, expressed as N . . . . . 3 mg/l
4. Total Phosphorus, expressed as P. . . . . 1 mg/l

(b) Has received high level disinfection, by means of chlorination, ozonation, or ultraviolet radiation to kill any pathogen. This chlorine will be completely removed before ambient discharge.

The presence of fecal coliform on the environment and its potential impact on the proposed development is an important one since it could negatively impact future recreational uses of the area's coastal waters. A result of the field survey indicates that there were very low levels of Fecal Coliform and Total Coliform counts in the area despite BWS discharge point nearby.

Mitigation:

i. The City sewage system does not cover the project area, therefore there will be the need install a state of the art treatment plant that will treat wastewater to meet the following standards:

- Biochemical Oxygen Demand (CBOD5) ≤ 10 mg/l;
- Suspended Solids ≤ 10 mg/l;
- Total Nitrogen, expressed as N ≤ 3 mg/l;
- Total Phosphorus, expressed as P ≤ 1 mg/l.

ii. Install a wastewater collection system that will prevent issues with leaks.
iii. Treated effluent resulting from the wastewater treatment plant will receive the high-level disinfection, by means of chlorination or ultraviolet radiation to kill any pathogen.
iv. The excess chlorine will be completely removed before ambient discharge.
v. Wastewater will be recycled for landscaping.
vi. Wastewater coming from kitchen will be sent through a grease trap before being sent to the package plant.

14.7.3 Solid Waste Management

The waste that will be produced by the project will be classified according to three basic categories that have been used in numerous studies involving solid waste management. The project will therefore develop and implement the mechanisms necessary to undertake the classification process which will ultimately be to assign each type to a treatment category scheme. These categories include the following:

1. Construction and Field Waste (Waste category 1)
2. Domestic Waste (Waste category 2)
3. Commercial Waste (Waste category 3)
4. International Waste (Waste category 4)

It is anticipated that the distribution of these categories will cover all the solid waste that will be generated by the aforementioned project. Nevertheless, regardless of the composition or characteristics, any system employed to process this waste must have the inherent flexibility to cope with these characteristics.

The proper management of solid waste is an issue of great importance because of the type of project and the impacts which the mismanagement of solid waste could have on the environment of the area.

In regard to the project, the potential for residual impacts would remain for many common domestic wastes have the possibility of negatively affecting the environment because of their chemical properties, non-biodegradability, contaminating factor and proliferation of vermin and pest which are carriers of many well-known diseases. Furthermore, because of its coastal location, the sea birds and aquatic life can be attracted to the area by smell or presence of readily available food scraps.

This holds true for sea birds such as the pelicans or frigates as well as the crocodiles and fish. Generally, all food scraps should be composted and operated in a manner where pests such as rats and rodents and general wildlife won't have access to it. Hazardous waste will also be produced by the project although not in huge proportions. If not properly managed this can produce localized contamination of the soil and water. Examples of these include spent batteries and light bulbs in all forms, aerosols and sprays including insecticides, for beautification or sanitation as well as paints, thinners and hydrocarbons such as fuel and lubricants.

Mitigation:

One of the major impacts of the food component of organic wastes is the attraction of nuisance animals such as raccoons, opossums, crocodiles, snakes and birds to the site to scavenge and hunt. The main mitigative response to be implemented by the project will be the judicious collection and segregation of the wastes into organic and inorganic and recyclable components. Food Scraps will be placed in animal proof containers. These wastes are to be taken to the Waste Transfer Site and eventually to the Sanitary Landfill. Other measures would include the following:

i) Implement a green procurement policy to ensure the purchase of environmentally friendly alternatives.
ii) Promote and implement a waste separation program to separate the organics from the inorganics.
iii) Garbage bins should be strategically placed and readily accessible to tourist and workers.
iv) The bins should be emptied regularly, and all material scheduled for disposal to the nearby transfer station
v) Ensure that a central collection centre is enclosed to prevent access by pests or wildlife.
vi) Use only properly covered, animal proof containers and provide visible signs.
vii) Provide Waste Reception Facility as per Annex V- MARPOL Waste.

viii) Implement a coastline clean-up program for the collection of marine debris washed up to maintain the aesthetics of the area and prevent it from becoming an eyesore to tourist.

14.7.4 Energy Generation Impacts

The residual impacts associated with the project meeting its energy needs is assessed as minimal. Its cumulative impact to the national grid which will be its main source of electrical energy is also classified as minimal and would be most welcomed by BEL. Hence, the only other issues of concerns is ensuring that consideration be given for having Power lines run underground to avoid the marring of the aesthetics of the area by overhead poles lines.

The impacts of energy generation associated with the backup generator which will be used during national grid outages is considered low. However, petroleum oils (diesel, gasoline and used oils) and noise pollution which are considered two of the main polluters will need to be mitigated.

Mitigation:

The project will advise contractors during construction and management during operation to take into consideration the following mitigation steps during the acquisition, installation and operation of the energy system selected:

- Back-up generator will only be used in the event of a power shortage.
- Fuel and waste oil spills and leaks will be a constant threat. Security/Maintenance Personnel will be trained to properly manage and handle these threats. In the event of a spill or leak these will be immediately cleaned up and disposed of according to the environmental guidelines.
- Noting that the project area is adjacent to the BWS sewage ponds and bordered by urban housing and sea, all waste oil or contaminated fuel will be removed from the cruise tourism village and taken to the approved DOE site for disposal/recycling.

14.7.5 Emergency Preparedness

While this subsection is not necessarily based on the impact which an activity or set of activities could have on the environment, its emphasis lie on how well the possibilities of natural and manmade disasters are being integrated in the overall project design and development.

For the proposed project, it is important that measures be taken to address the potential types of risks that can arise from various sources and affect the operation and success or sustainability of the project in some form or fashion. The risks identified are those posed by: i) hurricanes and tropical storms; ii) earthquakes; iii) fires; iv) fuel/oil spills and leaks and chemical fires; v) sea level rise as a result of climate change; and vi) those posed by medical emergencies.

How well the development addresses these potential risks in the overall planning, development and management of the facility will determine to a great extent the success of the project. An

important mitigation measure for any development of this nature against these risks is the need to ensure adequate insurance coverage to address these potential risks. However, additional mitigation measures must be considered by the development in early planning stage and operational stages to prevent the occurrence.

Mitigation:

i) Provide proper insurance coverage for all identified risks.
ii) Establish an emergency response team.
iii) Appoint a senior staff member as the emergency response coordinator.
iv) Develop a comprehensive emergency response plan supported by individualized emergency response plan from the identified risks or threats.
v) Ensure structures are designed to withstand hurricane force winds.
vi) Ensure design of structures take into consideration the potential for seismic movements and sea level rise due to climate change impact.
vii) Ensure that all structures confirm with local and international fire codes for similar type structures.
viii) Provide and maintain emergency response equipment: first aid kits, smoke detectors, fire alarms, fire extinguishers, fire cart, absorbent pads and booms and radios.
ix) Provide training to staff in first aid and emergency response, first aid and CPR.
x) Maintain and update a list of emergency related numbers.
xi) Require management and staff to carry out the various emergency response drills associated with the various identified risks or threats.

14.7.6 Social and Economic Impacts

The proposed development can be classified as a relatively large development with national scope socioeconomic ramifications. The Project is assessed as having an indirect net positive effect directly affecting Belize's southside Yarborough and Port Loyola communities and more indirectly the rest of the nation.

Having said this, it is apparent that the project will render the Fort Street Tourism Village obsolete and would impact those service providers and vendors who rely on the existence of FSTV for their source of income. Measures will need to be taken to provide the necessary space and facilities to allow these vendors and service providers to be able to relocate. Other potential mitigation measures include the following.

Mitigation:

Locally sourced labour as a development condition to ensure net direct positive effects on residents/community. Jobs in senior and managerial positions will be made available to Belizeans with training in the hospitality sector. In so far as requisite skills allow special consideration of a quota system for women and youth will be implemented.

i) PoBL will require contractors to implement policies for workers induction and a socio-

culturally appropriate code of conduct for interacting with adjacent communities. This is inclusive of training on gender related issues and sexual harassment of adult females, sexual exploitation of adolescent girls; the latter elements could be arranged through the Ministry of Human Development/independent social workers.

ii) PoBL and contractors will work actively to promote local access to Project employment in both the construction and the operations phases. To do this, contractors will apply transparent and fair employment policies and work with local representatives to source local labour.

iii) On-the-job training during operations phase; also, education support programme for staff with skills-based training of select staff for ground maintenance, landscaping, plumbing, electrical, etc. at the ITVETS and other institutions.

iv) PoBL to require contractors to adopt strict construction and operation practices with best technology and health and safety training to ensure the safety of its workers in line with the NOSH Bill.

v) Skilled and semi-skilled workers should be hired to enhance economic opportunities in the area, as well as the potential for long-term employment community gains and identification with the project.

14.8 Data Deficiencies and Impact Prediction Uncertainties

This ESIA drew heavily on past dredging activities within the mouth of the Belize River and within the present access channel and the turning basin to predict impacts. During those activities monitoring were carried out and the impact of the activity documented which is being used to inform this subsequent planned dredging operation.

In addition to this, project engineers and project consultants have carried out detailed surveys and collected numerous samples for testing to better understand the existing environment and the likely impacts disturbance of such environments could cause. There is every reason to believe that if the dredging operation takes as planned, the impacts would be within acceptable limits and would respond well to the mitigation measures contained herein.

14.9 Port of Belize Capacity and Cumultative Impact on Belize Cruise Tourism Capacity

Pre Covid-19, the projected operational capacity of the cruise terminal was 850,000 to 900,000 annual passengers, with an anticipated average increase of 5% a year to a potential, theoretical maximum capacity of 2,500,000. COVID-19 severely impacted the cruise industry, and the expectation is that cruise passenger volumes will not return to their record 2019 numbers until 2025-2026. The Western Caribbean is not immune the pandemic's effects, and the cruise terminal is likely to operate at a reduced capacity for 2024-2026, with passenger volumes

starting at 500,000 per year in 2024 and gradually increasing to the initially projected 900,000 passengers by 2026.

Cruise lines have supported the Port of Belize's proposed development for a number of factors, including its location, the development team's track record of successful infrastructure development, the project's financial viability, and the extensive and thorough environmental and engineering assessments upon which the development plan is built. The Project's ideal location allows cruise passengers more time onshore and deeper access to Belize's interior through improved connectivity and the elimination of tendering.

The cumulative impact of multiple cruise ports will be marginal as the cruise lines will likely have the same number of calls in Belize whether there are two (Port of Belize and Harvest Caye) or five ports (Port of Belize, Harvest Caye, Port Magical, Stake Bank, and the Fourth Street Tourist Village (FSTV)). With a maximum operational capacity of 2,500,000 passengers and four Oasis-class berths Port of Belize can satisfy the industry need for shoreside berthing capacity. Harvest Caye down south is Norwegian Cruise Lines' (NCL) private island destination, and any project in Northern Belize will have limited to no impact on the Harvest Caye passenger volumes as it will remain NCL's private island destination. Conversely, NCL will likely have limited calls for Northern Belize in any scenario.

As a Developer we are unable to comment on other potential projects or their viability. What can be said is that the Port of Belize expansion is the only option available in Belize that provides the opportunity to add the desperately needed improved cargo handling facilities. It is also the only project that provides the cruise lines with the onshore berthing facilities and the full passenger guest experience they have been asking for and is likely preserve cruise tourism for Northern Belize, reversing the decline in cruise tourism numbers by offering shoreside berthing, eliminating the need for tendering, and delivering a satisfactory Belizean mainland cruise guest experience at the right location.

Typically, throughout the cruise industry when there are numerous projects being proposed, the project that addresses the cruise industry need best and gathers financial commitments from the cruise lines is the one that comes to market, and it is therefore unlikely that multiple Northern Belizean cruise ports will be built.

With the combined benefit to the country's economy from both cargo and cruise traffic, the Port of Belize expansion fits the strategic needs of the GOB and delivers ample socioeconomic benefits to Belizeans at an existing facility.

CHAPTER 15: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

15.1 Introduction

This section of the report provides a summary of the assessment of the potential environmental and social impacts the project could have environmentally and socially on the study area and the identified mitigation measures. In most cases, it is possible to reduce the potential adverse impacts to the point where the impacts are insignificant or negligible, either through effective design, the use of green technologies and best practices or through sound operational management of the Port of Belize Access Channel dredging, Ship Tuning Basin, construction of a Cruise Ship Terminal and its accompanying activities (trestles, buildings, roads etc.), nearshore disposal of spoils , and the reclamation of land.

The proposed project takes into consideration the following:

a. Expansion of the existing cargo terminal and upgrading cargo terminal;

b. The dredging scope will entail the dredging of the 7.5 km long access channel with a depth to a depth of -12m CD;

c. Inner Channel: 190m wide x 4,500m long;

d. Outer Channel: 190m wide x 3,000m long and side slopes between V1:H1 and V1:H5;

e. The dredging of turning basin will 550m wide and 1,200 m long and a depth of -12m CD as well as the dredging of berth pockets along the two proposed piers to the same depth;

f. Construct 2 cruise terminal trestles (piers) extending southeast from the Tourism Village will be constructed to accommodate shore-side berthing of four (4) Oasis-class cruise ships. Each pier will be 21 m wide by 320 m long with three mooring dolphins 30 m apart, extending the berthing are by another 72 m. The distance between piers is planned at 230 m. Each pier will fall within the Port's defined security zone and will meet the requirements of international Ship and Port Facility Security Code;

Much of the impacts of the proposed project activities are attenuated by the fact that the cargo pier, channel access, spoil deposition area (surrounded by berm and cleared of flora) is already in place with the proposed activities providing an opportunity to improve the existing issues with Cruise Tourism safety and other issues associated with the current conditions of the existing cargo port. Hence, the proposed project has the potential both to reduce the current environmental impacts to the Belize City Harbour and improve the socio-economic benefits of the Port Loyola area and the supporting environmental services it offers to the communities in the area and Belize as whole.

15.2 The Environmental and Social Management Plan

The proposed Environmental and Social Management Plan (ESMP) takes into consideration the mitigation of both the direct and indirect impacts assessed for the following main issues:

1) Geotechnical and Dredging Issue
2) Disposal of Dredged Material
3) Impacts to Ecology
4) Potable water Needs
5) Liquid and Solid Waste Management
6) Transportation Related Issues
7) Emergency Preparedness
8) Social Impacts

In this context, the proposed project is to be guided by the ESMP, which emanates from the identified potential negative impacts and a series of identified mitigation measures, which are in turning based on their economic, technical and ecological viability.

While much of the proposed measures contained in the ESMP are aimed at ensuring that the project activities implement best management practices; it also addresses the indirect impacts due to the nature of the project proposed. The ESMP recognizes that the indirect impacts could have more lasting changes than the direct impacts of the project itself. In the instance of this project these potential indirect impacts are assessed as having a net significant positive impact which is National in scope. Hence, the ESMP includes measure to address the following:

a. avoid impacting areas of significance for ecological reasons
b. account for maintenance or enhancement of potential socioeconomic benefits the project could have,
c. reduce impacts to flora and fauna,
d. protect against unacceptable levels of impacts associated with proposed dredging and disposal of dredged material,
e. avoid the degradation of water quality,
f. ensure the safety of cruise ship passengers, workers and the public,
g. ensure that safe access to the project while addressing potential negative transportation issues identified.

In so doing the project will assist tremendously in maturing the growing cruise tourism potential of Belize and improve present constraints affecting Belize's major Port. The upgraded port will also facilitate the bulk cargo aspect of the port tremendously improving one of Belize's important infrastructure asset and allow for improved market access for agricultural produce abroad.

Nextera worked with JDN to identify potential engineering impacts upon which subsequent mitigation measures are based.

15.3 Main Components of the ESMP

The key in any successful ESMP is to adequately identify the potential negative impacts and their implications and to develop a supporting environmental and social management plan. As with all management functions, effective management tools, and best practices based on a process of constant improvements is what is required.

The implementation of environmental and social management standards, best practices, and the use of established protocols is important in helping to reduce environmental and social impacts as measured by some objective criteria. Thus, the environmental and social management plan proposed for the Dredging of the Port of Belize and the construction of a Cruise and Cargo Terminals and Other Supporting Related Activities Project involves the close integration of the following:

1. ***Environmental/ Social Impact Mitigation Plan*** – Impact mitigation is the most critical component of the environmental and social study process. It aims to prevent adverse impacts from occurring and keeps those that do occur within an acceptable level.
2. ***Environmental/Social Monitoring*** – Environmental and social monitoring provides information that can be used for documentation of the impacts that result from the construction and operational activities. This information enables more-accurate prediction of the associated impacts and the necessary feed- back mechanism essential in adjusting the ESMP. Therefore, the monitoring system is a platform of measuring projected impacts and in identifying unanticipated adverse impacts or sudden changes in impact trends essential in the implementation of an environmental and social management program based on the concept of constant improvement.

15.3.1 Environmental and Social Impact Mitigation Plan

Identifying the appropriate mitigation measure for an identified impact must take into consideration its cost- effectiveness as these have the potential for significant financial implications. The outcome however must effectively address the impact with little or no residual repercussion to the environment or on local stakeholders. Thus, there will be continuous monitoring of the effectiveness of the mitigation measures throughout the project's cycle that will be implemented to protect and conserve the environment and social setting of the study area as best as possible.

Considering the continuous improvement in impact mitigation, the implementation of the project's ESMP will have as its objectives:

a. to find better alternatives and ways of doing things;
b. to enhance the environmental and social benefits of the project;
c. to avoid, minimize or remedy adverse impacts; and
d. to ensure that residual adverse impacts are kept within acceptable levels.

It is important to establish and maintain close collaboration, with clearly defined roles and responsibilities relating to Port of Belize expansion and improvement project, between the Port of Belize Limited (PoBL), Belize Port Authority (BPA), Department of the Environment (DOE), Mining Unit and The Belize City Council (BCC), Fisheries Department, Forest Department and TASA.

15.3.2 Environmental and Social Monitoring

Monitoring is a supportive component to the mitigation measures. As such, the monitoring program is intended to provide information necessary to ensure that the recommended mitigation measures are implemented in accordance with the requirements of existing national legislations and those contained in DOE's ECP. The results of monitoring are also used to determine the need for additional measures at an early stage. In addition, compliance monitoring by DOE is also supported by a series of other environmental and social monitoring requirements using predetermined key indicators to ensure that impacts to the area's ecology and social fabric are discovered in time to prevent or repair adverse effects.

There are numerous advantages in implementing a monitoring program to track the course of all the projects components. Essentially, the monitoring will:

a. provide information that will enable more accurate prediction of impacts;
b. warn the Contractor(s) of unanticipated adverse impacts to the environment or on local stakeholders;
c. provide information that can be used to evaluate the effectiveness of the mitigation measures; and
d. ensure that all the respective targets and deadlines are met in an environmentally and socially responsible manner.

The PoBL will ensure that the recommended measures are included as conditions in the contracts with contractors or subcontractors who would be carrying out the activities. PoBL is encouraged to hire or identify an Environmental, Health and Safety officer who will be responsible for ensuring compliance and in-house monitoring of the Environmental and Social Conditions contained in the ECP and contractors would be required to do likewise. In addition, the PoBL is also required to monitor and supervise the construction activities to ensure compliance with design specifications and the conditions contained in the ESMP and subsequent contracts. Compliance Monitoring will be the responsibility of the DOE supported by the Mines and Minerals Office and other governmental and non-governmental agencies.

15.4 Mitigation Plan Construction Phase

15.4.1 Ecosystems and Biodiversity Impacts and Mitigation Measures

As determined in the Environmental Baseline and Impacts Assessment, majority of land reclamation and dredging-related impacts on ecosystems, biodiversity and environmental

services of the project area have already occurred as a result of the construction of the existing facility in the 1970's, a dredging operation in 2002 and the submission of an EIA in 2005 that received clearance. However, there are still impacts that will need mitigating during the upgrading of the port facility. It is critical that best practices are followed throughout the construction phase of the planned upgrade, and subsequently during the operation and maintenance of the upgraded port facility and its entire infrastructure.

Preventative, mitigation and restorative actions have been identified for each of the identified impacts, both direct and indirect, from the proposed project. The timescale and prioritization for implementation is presented, along with the identified organization or agency responsible and the corresponding monitoring indicators, in the mitigation matrices.

15.4.1.1 Habitat loss from Increased Channel and Turning basin Footprint

i) Maintain the dredging to those proposed by JDN. The scope of the dredging works is defined as follows:

1. Dredging of the 7.5 km long access channel with a depth of -12 m CD by 190m wide and side slopes between V1:H1 and V1:H5.

2. Dredging of turning basin with a diameter of 550 m and a depth of -12m CD.

3. Dredging of berth pockets along two piers.

CD1: Chart Datum is the level below which depths are indicated and above which heights of the tides are expressed; usually mean level of low water at a spring tide.
Zone A is the Main Turning Basin of approximately 550 meters wide by 1,200 meters long.
Zone B is the Inner Channel of approximately 190 meters wide by 4,500 meters long.
Zone C is the Outer Channel of approximately 190 meters wide by 3,000 meters long.
Confine works to the exact new proposed footprint of the canal and turning basin wherever possible and prevent excessive siltation of adjacent waters and properties.

ii) Use equipment free from oil/fuel leaks for the dredging and maintenance of drainage ditches and reclaimed area.

iii) Rehabilitate and replant all possible beach and property border sections;

iv) When dredging areas near Robinson Point great care will be taken to avoid increased siltation of nearby sensitive areas.

v) Turbidity Curtains will be used around the effluent return areas. The curtains will be monitored and where necessary faulty couplings will be immediately repaired or replaced. Turbidity in the water column will be strictly monitored with the use of regular monitoring in both the project area and any sensitive receptor sites near the area

vi) Turbidity in the water column will be strictly monitored with the use of regular monitoring in both the project area and any sensitive receptor sites near the area (Chapter 5).

15.4.1.3 Terrestrial Habitat Deterioration of Dewatering Site

i) Clear only what is needed to build and repair berms since vegetation on some of the existing berm may be providing the necessary stability by their root action.

ii) The Vegetation buffer between the highway and the berms should be kept providing it would not hamper berm reinforcing activities.

iii) All drains surrounding the dewatering areas or those traversing the area will be properly rehabilitated to prevent backing up of storm water runoff of adjacent properties.

iv) The burning of the waste vegetation will not be allowed.

v) The removal of any fringing mangroves will be restricted to the coastline area proposed to be reclaimed in the master plan as part of the coastline alignment and then replanted along with other denuded areas with mangrove to restore the project's area coastline.

vi) Plant species of trees that the local resident bird population are known to utilized.

vii) When clearing vegetation all effort will be made to leave large mature trees standing.

viii) Landscaping of the area will involve only native species.

Reduced Ecosystem Connectivity/Wildlife crossings

i) Since the area is already 90% cleared, the effect of connectivity is considered very low;

ii) Habitat restoration is to be implemented as part of the area's landscaping program in areas previously reclaimed and those cleared, improving not only wildlife habitat connectivity but also the aesthetic value of the area.

Species Impacts -Species Mortality (due to increased activity

i) Ensure dredge crews are fully aware of protective status of Manatee and require their adherence to no wake zones and basic speed control in areas known for manatee sightings.

ii) Water vessels with outboard engines will be required to have propeller guards.

iii) Effective enforcement is necessary to control boat traffic and speed. The BPA should implement a no wake zone and with the help and support of the developer place signs to assist in the enforcement of the area as a no wake zone.

15.4.2 Transportation Accidents

Marine Vessels Accidents

i) BPA establish and enforce posted no wake zones, with adequate signage.

ii) The dredge ship support vessels operate in the area as if it is a no wake zone;

iii) That the dredge and pipes if any be properly lit at night to avoid accidents.

iv) Ensure that the dredge operators are aware of the shipping schedule, so that they allow free-flow of vessels accessing or exiting the Port or Harbour of Belize via the access channel that is being dredged and Grennels' Channel;

v) Constant contact with users of the area should always be maintained and notices issued. This will ensure safety of traditional users and avoid major accidents;

Vehicular Accidents (Due to increase tour buses on the road)

i. Transport Department establish and enforce posted speed limits, with adequate signage.

ii. Demand in contract with tour operators that a speed limit 55 mph not be surpassed while conducting tours. Non-compliance could result in cancellation of contract.

15.4.3 Impacts Associated with Tourism Village Construction Activities

1. Solid Waste Generation

During the construction phase of the proposed project, solid waste generation may occur mainly from two points:

a. From materials used in the construction activities

b. Solid waste generated from the day-to-day living activities of the crew within the worksite.

Mitigation:

i) Garbage bins should be strategically placed within the work camp and construction site.

ii) The bins at the construction site should be adequately designed and covered to prevent waste from becoming airborne, accessed by vermin and to minimize odour.

iii) The bins should be emptied regularly, and all material scheduled for disposal to the nearby transfer station.

2. Wastewater Generation and Disposal

With every construction worksite comes the need to provide construction workers with sanitary conveniences. The disposal of the wastewater generated at the construction campsite has the potential to have a negative impact on the ecosystem of the area despite the fact that this is intended only for the duration of the construction period.

Mitigation

i) Provide portable sanitary conveniences for the construction workers for control of

sewage waste. A ratio of approximately 20 workers per chemical toilet should be used.

ii) All toilets should be serviced regularly.

iii) All waste from the portable toilets should be placed in sealed containers for final disposal at the nearby BWS ponds with prior permission.

3. Storage of Construction Material and Equipment

Raw materials, for example sand, gravel, and cement and other materials used in the construction of the proposed development will be stored onsite. There will be a potential for dust to become air or waterborne. Stored fuels and the repair of construction equipment has the potential to leak fuels, oils etc.

Mitigation

i) Raw materials that generate dust should be covered or wet frequently to prevent them from becoming air or waterborne.

ii) Equipment should be stored on impermeable hard stands surrounded by berms to contain any accidental surface runoff from spills.

iii) Bulk storage of fuels and oils should be in clearly marked containers (tanks/drums etc.) indicating the type and quantity being stored.

iv) Fuel dispensing for generator will be properly supervised to prevent any spillage;

v) In addition, these containers should be surrounded by berms to contain the volume + 10% being stored in the event of an accidental spillage.

4. Noise Pollution

The proposed construction of the cruise and cargo port terminal and the tourism village and other related ancillary facilities will involve pile and sheet wall driving, building construction, and landscaping. It is anticipated that construction activities will take place seven (7) days per week.

Mitigation:

i) Use equipment that has low noise emissions as stated by the manufacturers.

ii) Limit night time operations of noise-generating equipment as much as possible to reduce the potential of creating a noise nuisance during the night. Other lower noise emitting activities could be programmed for later if work is to proceed late into the night.

iii) Construction workers operating equipment that generates noise should be equipped with noise protection. As a guide, workers operating equipment generating noise of 80 dBA continuously for 8 hours or more should use earplugs. Workers with more prolonged exposure to noise levels of 70 - 80 dBA should wear earmuffs.

iv) Maintain power tools in optimum condition.

v) Fit silencers or mufflers on generators.

vi) Keep power saw blades sharp.

vii) Use vibration damped blades.

5. Air Quality

Site preparation and construction has the potential to have a two-fold direct negative impact on air quality. The first impact is air pollution generated from the fugitive dust from material cut and the second is airborne dust from the storage and use of sand and cement. Fugitive dust has the potential to affect the health of construction workers, and nearby community.

Mitigation

i) Worksite sand storage site should be dampened every 4-6 hours or within reason to prevent a dust nuisance and on hotter days, this frequency should be increased.

ii) Keep cement stored in enclosed area or under tarp.

iii) Use sanders with vacuum bags.

iv) Construction workers working in dusty areas should be provided and fitted with masks.

6. Diminished Aesthetic Values

i) Ensure effective clean-up and restoration on completion of each phase/stage section constructed.

ii) Landscape the compound using native species.

7. Emergency Response

During the construction phase of the port terminals and proposed tourism village the possibility of accidental injury is high. There exists the possibility for either minor or major accidents.

Mitigation:

i) A lead person should be identified and appointed to be responsible for emergencies occurring on the site. This person should be clearly identified to the construction workers.

ii) The construction management team should have onsite first aid kits and make arrangements for a nurse and doctor from a nearby community to be on call for the construction site.

8. Social Impacts

During the construction phase, an average of over 300 tradesmen and labourers will be utilized and at peak construction an estimated 450 will be needed. This represents a welcomed employment opportunity within the study area. This has the potential to be a significant positive impact.

Mitigation

i) hire local tradesmen and labourers

ii) hire women

iii) do not hire child labour

15.5 Mitigation Plan for Operational Phase of Project

15.5.1 Transportation

During the Operational Phase, the long-term indirect impacts associated with the increase in traffic and access to the area are those that will require more long-term monitoring and the implementation of specific measures to adequately put in place the necessary required safeguards to reduce the potential impacts.

1. Marine Boating

i) BPA should establish and enforce posted no wake zones, with adequate signage.

ii) Launch a public awareness campaign targeting the tourism and tour guide sectors to assist in ensuring their support in making sure that their vessels would treat the area as a no-wake zone.

iii) The construction of the new cargo terminal may speed up the rate of accretion in the low berth facilities affecting it use requiring that maintenance dredging in this area be conducted regularly.

iv) All watercrafts will maintain a safe operating distance from other water vessels;

v) all watercrafts will be required to be visibly identifiable at a minimum distance of 100 meters (night or day) by being outfitted with flags or other high-visibility markings, safety lighting and collision warning equipment (air horns or safety flairs);

vi) all watercraft operators will be properly trained in watercraft handling & safety;

vii) All workers transported by sea will be required to wear life vest;

viii) no re-fuelling or servicing of vessels will be permitted on the project site and all vessels will be required to fuel elsewhere and to carry out all servicing of engines elsewhere except in cases of emergencies;

ix) Ensure that marine shipping lanes are properly buoyed and ensure that at night the buoys are lighted with their corresponding colour. Although the increase will be in cruise ship which do not leave the port at night, but precaution is always better than cure;

2. Terrestrial Transportation

i) The port project provides for this reality and proposes the construction of a new road leading out of the Port of Belize. It is anticipated that this new road will not only meet the expansion of the port traffic needs but also divert much of the existing traffic away for the Central American Boulevard thereby reducing traffic flow along that heavily populated area.

ii) Upgrade of Jane Usher Boulevard;

iii) Ensure that the parking facilities are close to the entry exit points into the project site itself

iv) Transport Department should establish and enforce posted speed limits, with adequate signage with the support of the developer.

v) Demand in contract with tour operators that a speed limit 55 mph not be surpassed while conducting tours. Non-compliance could result in cancellation of contract.

vi) Contractors must ensure proper maintenance of vehicles, equipment and machinery. All vehicles and equipment used for construction must be fitted with exhaust silencers and the use of "Jake Brakes," also known as compression release engine braking systems strictly forbidden in populated residential areas.

vii) Equipment for water sprinkling of roads and regular road sprinkling must be strictly monitored to reduce dust pollution.

viii) Proper lighting and signs should be placed on internal roads and parking areas and along new access road;

ix) Implement regular inspection of methods of traffic control (i.e. signage, line-marking, bollards, barricades, etc.) for proper maintenance.

x) Ensure that any potential problems that may impact sight distances at entry and exits points to the main carriage way be identified and addressed.

xi) Construct a roundabout at the junction of the new Boulevard and GPH to allow for safe access and egress.

15.5.2 Wastewater

i) Liaise with BWS in regarding the use of the effluent canal where the treated effluent will be directed

ii) Establish a water conservation program by installing water saving devices;

iii) Installed, a Sequencing Batch Reactor (SBR) for the treatment of domestic wastewater.

iv) Reduce discharge going into the environment by recycling treated effluent for irrigation purposes.

15.5.3 Solid Waste

i) Implement a green procurement policy to ensure the purchase of environmentally friendly alternatives.

ii) Promote and implement a waste separation program to separate the organics from the inorganics.

iii) Garbage bins should be strategically placed and readily accessible to tourist and workers.

iv) The bins should be emptied regularly, and all material scheduled for disposal to the nearby transfer station

v) Ensure that a central collection centre is enclosed to prevent access by pests or wildlife.

vi) Use only properly covered, animal proof containers and provide visible signs.

vii) Provide Waste Reception Facility as per Annex V- MARPOL Waste.

viii) Implement a coastline clean-up program for the collection of marine debris washed up to maintain the aesthetics of the area and prevent it from becoming an eyesore to tourist.

15.5.4 Water Resources

i) Only low flush toilets will be used.

ii) All taps will be outfitted with water saving devices.

iii) Staff will be required to not leave the tap running while cleaning.

iv) Staff will make sure that all faucets do not leak and are in good repair.

v) Cleaning and maintenance staff will be required to report immediately any leaking faucets or toilets.

vi) Only phosphate free detergent will be used.

vii) Laundromats will be encouraged reuse rinse-water in the first cycle of washing of the next load.

viii) Meters will be installed in the kitchen and Laundromat to track the consumption of water.

ix) An effective employee training program about water conservation be established.

15.5.5 Energy

i) Liaise with BEL on the design and required need for the facility

ii) Whenever possible, power lines should be placed underground

iii) Procure back-up generator with low noise emissions or put silencer on it

iv) Use recommended fuel and lubricants and develop and maintain a maintenance plan

v) Store fuel in accordance with DOE guidelines for above-ground storage tanks.

vi) Generators only to be used during black outs and emergencies.

15.5.6 Air Pollution

Although, it is expected that vehicular emissions are most likely going to increase, the impacts from these are assessed as negligible and efforts should be focused on the main air pollutants of concern. Increase in transportation will increase smoke emissions.

i) Construction vehicle exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimized by regular checks and servicing of vehicles. Any construction vehicle found to be emitting excessive smoke must be stopped from the operations for some mechanical attention before it could continue.

ii) Active earthwork areas, stockpiles and loads of soil being transported must be watered to reduce dust. In addition, when transporting loads of soil, the load must be covered. Avoid haulage of materials through major Belize City streets.

iii) All areas disturbed during construction that are not required for a specific activity must be re-vegetated.

iv) No fires will be allowed on site.

v) Limit and enforce speed limits around construction zone.

vi) Deter tour operators, guides and drivers from leaving standing vehicles with engines running, etc. by posting signage that specifically states “Do not leave vehicle idling.

15.5.7 Water Pollution

Superficial water pollution can originate from the soil removed during construction of facilities and reclamation. Given the importance of the Belize Harbour, it is important to maintain its current condition as much as possible for the species that inhabit the area, and for the enjoyment of visitors. The oils and fuels used to operate and maintain boats and other equipment has the potential to pollute surface water if inappropriately disposed and stored.

Ground water pollution during construction and operation can originate from sanitary facilities at construction sites, improper disposal of oils and grease, restaurants, bars etc., tour operations and visitors. Groundwater contamination can jeopardize the successful achievement of the project objectives. Location and design of infrastructure must consider this issue.

i) Designate and clearly demarcate an area on site for temporary waste disposal, including waste collection bins for smaller waste, and designated areas for bulkier

waste as approved by DOE. Conduct regular and timely waste transportation off site for final disposal to nearby transfer station.

ii) The records of waste disposal will be maintained as proof for proper management as designed.

iii) Whenever feasible, reuse and recycle appropriate and viable materials.

iv) Removed vegetation may best be composted on site, at a designated and managed area.

v) Erect above-ground fuel tank in bunded area and store waste oil in sealed leak-proof containers and contact DOE for disposal.

vi) Maintain spill clean-up kits and record and report spills to DOE immediately.

vii) Ensure to use onsite toilets for worker needs and service them weekly. All waste must be disposed of the BWS wastewater treatment facility with their prior consent.

viii) Machinery maintenance – implement a zero-tolerance policy for fuel, oil, hydraulic fluids spillages; ensure proper use of catchment pans during maintenance works. No servicing of vehicles is to be undertaken near watercourses.

ix) Design and implement a water quality-monitoring plan to monitor turbidity, dissolved oxygen and petroleum hydrocarbon pollutants at fixed sites upstream and downstream of terminals post-construction done on a quarterly basis and reported to DOE.

15.5.8 Noise Pollution

Noise generated during construction and during operation of the project (Bars, Port related activities, construction equipment etc.) pose little to no threat or disturbance to the workers on site, animals (wildlife) and the community.

i) Whilst construction noise is inevitable, it should be controlled as far as possible to 75 dBA in the daytime and 60 dBA in the night-time; rely in part on limited extent of noise impacts temporally, reduce impacts on touristic appreciation as much as possible.

ii) Construction - establish and adhere to low-noise policies – including not running engines of parked vehicles, maintaining low volume of music, etc.

iii) The presence of work force may create noise, which should be mitigated by ensuring that equipment is in a good state of maintenance.

iv) Staff and workers should not make excessive noise especially during late hours.

v) Equipment used in the operation of the facility must be kept in good state of maintenance so that noise is minimised.

vi) Ensure that the construction vehicles are under the control of competent personnel.

vii) Deter tour operators, guides and drivers from leaving standing vehicles with engines running, etc.

viii) Encourage low-noise behaviour at visitation sites; strongly discourage loud music, etc.

15.5.9 Illumination Pollution

Illumination pollution, also known as light pollution or photo-pollution, is excessive, misdirected or obtrusive artificial light. It is blamed for compromising health and disrupting. For many years, engineers have generally overlooked it, possibly because items such as air and water pollution have attracted much more attention from the public.

i. No spotlight/security light should be directed to the residential area but rather to be angled downwards. Keep floodlighting beam 70^{o} of vertical.

ii. Illumination of construction site must consider the possible distraction glare might have on motorists. The receiver should not receive direct illumination.

iii. Lighting system should not flicker or cause stroboscopic effects.

iv. Night-time light sources must be directed away from, conservation areas, naturally vegetated areas, as this may be the cause of ecological disturbance.

15.5.10 Potential Impacts on Hydrology

Land filling and subsequent construction will directly or indirectly impact the surface and groundwater resources. The project landfilling & construction activities have the potential to affect the hydrology of the area by polluting the sea in the area or by changing the natural drainage patterns of the area. Recommended measures to ameliorate the impacts to the hydrology of the area are summarized below.

Water is the main contributor to the wear and damage of coastlines and roads. If drainage of water along the dewatering site and new boulevard is not properly considered, the boulevard may end up acting as a dam impeding the natural flow of water. In addition, improper drainage can lead to erosion and scouring of road shoulders and the road itself and cause the deposition of soils (siltation) which may obstruct the passage of water.

i. During road construction, divert storm water to temporary, natural settling ponds.

ii. Proper drains and culverts must be put in place to ensure that the natural flow of water is not impeded.

iii. To prevent excessive siltation during near shore reclamation, the water should be diverted away from construction area and steered towards a silt trap and stormwater generated within the construction area will employ the use of check dams along the stormwater drains before discharging into the receiving environment.

iv. Ensure that the run-off from the de-watering site is directed into a settlement area and is curtained so as to reduce the sedimentation and turbidity of the area of influence.

15.5.11 Handling of Hazardous Material

Material handling is the movement, protection, storage and control of materials and products throughout the construction phase to prevent negative impacts to the environment from spills and leaks.

i. Hydrocarbon (oil, diesel, gasoline) waste as well as all hydrocarbon contaminated material must be regarded as hazardous waste and separated from general waste.

ii. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s).

iii. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. Additionally, cement and other potential environmental pollutants must be mixed on an impermeable substratum.

iv. Workers must always be made aware of the safety, health and environmental risks associated with all identified hazardous substances used and must be provided with appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.

v. Storage of flammable stocks must be in a secure area with proper fire-fighting equipment and hazard signs.

vi. Spill clean-up kits and absorbent material must be kept on site to assist in immediate clean-up of any hazardous material spill.

vii. Ensure that any contaminated site is properly remediated, or contaminated material removed and taken to a DOE approved site for remediation of contaminated material.

15.5.12 Community and Worker Welfare, Health and Safety

Good health and safety primarily protect the community and workers from the suffering caused by accidents and ill health and reduce workers' absences and sick leave. The contractor also benefits as it maintains the organisation's reputation, increases productivity, profits and reduces insurance premiums and legal costs.

i. Contractors shall adhere to the occupational health of workers by adopting the OSH Bill recommended standards. Providing workers with protective clothing, noise reduction equipment, regulating hours of work and safety procedures training among others.

ii. It is conceivable, that a portion of the spoils of dredging, resulting from the port project could be made available to communities nearest the port project like, Port Loyola, to uplift the aesthetics of the community among other benefits. Clearly, this will need to be approved by the relevant authorities and require collaboration and support from local government authorities for it to achieve the intended outcome. Priority should be considered for the establishment of new green public spaces, existing parks and playgrounds, schools and educational centres like the YMCA, and residents with low-lying properties.

iii. Ensure women are equally treated and provide with job opportunities.

iv. Close collaboration with the immigration department to issue timely work permits to foreign workers with specialized skills.

v. The project in consultation with contractors should compile a list of specialized workers needed and or employed to be given to the Labour Department to promote and or disseminate specialized career options to meet existing and future needs.

vi. Every effort must be done, whenever possible and practical to do so, to employ workers from within the community. This may enhance public goodwill, improve civic pride and reduce unemployment and poverty.

vii. The project in collaboration with the Belize City Council must ensure that sufficient and adequate commercial spaces are available for Belizeans to engage in commercial activities catering to the tourism industry emanating from the project; hair-braiding services, selling of locally made arts and craft, cultural apparels, food and beverage, tour operators among others.

viii. Contractor shall provide clean drinking water and appropriate, suitable, on-site sanitary facilities at every work site in good working condition, always kept clean. Separate male and female sanitary facilities must be provided.

ix. Maintain and regularly check tools fitted with mufflers where appropriate.

x. Maintain construction vehicles fitted with mufflers where appropriate; turn off when not in use; avoid frequent reversing.

xi. Provide, training on proper usage of PPE and ensure workers wear Personnel Protective Equipment.

xii. Ensure that all fire extinguishers located at the work site are replaced on or before their expiry dates.

xiii. Telephone numbers of emergency services shall be posted conspicuously in the office for use in emergencies. However, noting that cellular reception in the project area is limited, the use of two-way radios must also be used between headquarters, campsite and work site.

xiv. Implement a grievance mechanism to ensure that citizen complaints can be lodged and expeditiously addressed throughout the construction phase of the project. This mechanism must be led by a social practitioner working with a high degree of autonomy to safeguard the interests of citizens and serve as a liaison between the community and the project.

15.5.13 Climate Change Adaptation Measures

Infrastructure will be exposed to extreme hydro-meteorological events associated with hurricanes, and tropical storms.

1) ***Construction phase:*** Infrastructure design and material must be of high quality and standard and durable material to resist the elements.
2) ***Operational Phase:*** Ensure proper infrastructure inspection and maintenance program;

15.5.14 Public Security

Public safety concerns in the zone of influence of the project is marine transportation related and vehicular when in operation. Although the presence of security guards at gates entering or exiting the compound, encounters with aggressive parties brazenly wanting to enter the premises will remain a major issue for visitors and workers. However, the counter argument to this is that an improved port and new cruise ship terminal will also facilitate the presence of security forces and the police in the area and reduce the response time to address criminal activities and emergencies.

List of threats:

a. Increased in criminal activity.
b. Increased of visitors and undesirable guests.

Mitigation measures include:

Some recommended mitigation measures include:

i. Improved security and step-up patrols by law enforcement personnel.
ii. Support neighbourhood watch in communities.
iii. Conduct regular public safety awareness campaigns for communities and visitors.

15.6 Proposed Monitoring Program

The monitoring program has been developed not only in relation to satisfying the requirements of the ESA process, but also because of the dredging works. The parameters chosen for the monitoring program are those that have been identified primarily for the construction and operational phase of the project since upon completion, the indirect impacts during the project operational phase are those that have been assessed as having the greatest potential to impact the

study area in a positive or negative manner in the long term if appropriate measures are not implemented to address the anticipated incremental impacts associated with the improved and extended channel access.

15.6.1 Water Quality Monitoring

Water quality monitoring for dredging and pier construction and operational activities is required to provide assurance of compliance with regulatory and contract requirements and to ensure that the quality of the marine environment is not compromised especially from a project of this nature and magnitude. The project will encourage the implementation of monitoring where there is potential for adverse environmental impacts from the proposed works. The water quality monitoring program aims to effectively identify potential water pollution problems associated with project, the cause of the problems and the mechanisms to manage any identified issues.

A range of monitoring techniques is discussed in this section. A combination of field tests with probes and laboratory analysis is provided. The use of probes (in situ HACH portable samplers or YSI Professional Plus handheld multiparameter meter) for water quality analysis is a good means to undertake water quality monitoring at reasonable cost. This can be complimented with Laboratory Biochemical Analysis to test for nitrates, sulphate, phosphate, *faecal coliform, Escherichia coli (E-coli),* oil, grease and other contaminants. In the instance of turbidity monitoring during dredging and deep-sea disposal of dredged material floating buoys with turbidity sensors at varying depths will be used. Information from the sensors on turbidity a will be obtained and relayed in real time to monitoring stations.

(i) Objective of Water Quality Monitoring

The general objective of Water Quality monitoring is to ensure that the water quality in the area remains at its natural, pristine state, and threats arising during project development, construction and implementation can be promptly identified and addressed.

(ii) Sampling Sites

Table 15.1 and **Figure 15.1** provides the location of water quality sampling sites selected for the baseline study. These sites should be utilized as water quality sampling sites for the Environmental Management Plan developed for this project so as to compare results against the baseline data provided. Note: Turbidity monitoring is to be done in areas along those sections where dredging is occurring and where deep-sea disposal is being conducted.

Table 15.1. Location of water quality sampling sites.

Sample Sites	Eastings	Northings	Sample Sites	Eastings	Northings
T2	372190	1930232	EXDA	368245	1930413
AC1	372623	1930324	RL	374828	1930169
AC2	372472	1928487	DA1	372818	1932388

AC3-1	373150	1926008	SL-1	369626	1933188
AC4-2	372577	1923974	AC = Access Channel, DA = Deposition Area. RL = Reference Location, ExDA = Extra Deposition Area, T = Terminal, SA = Sensitive Area.		
SA1	371946	1922247			
SA2	373922	1921070			

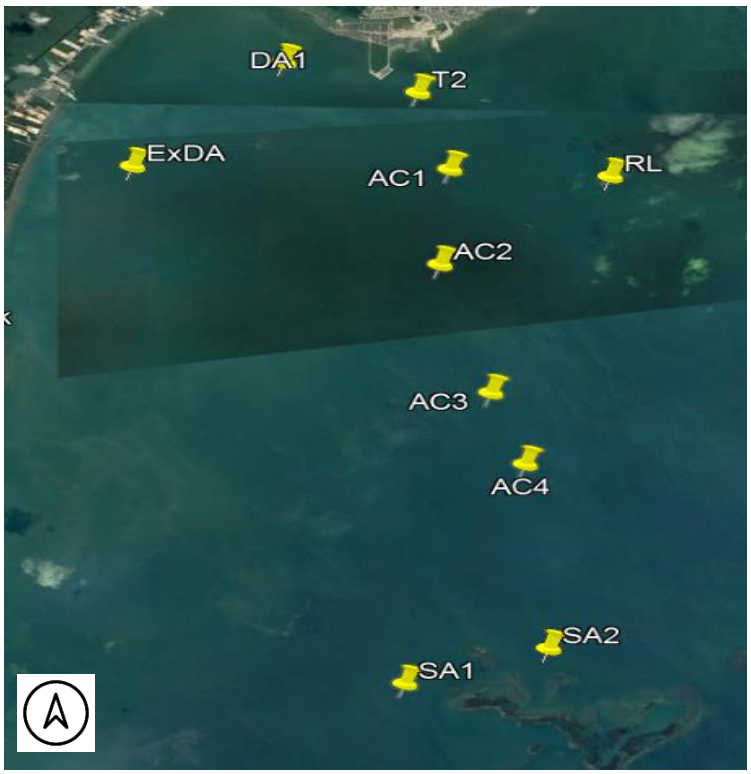


Figure 15.1: Marine sampling points.

(iii) Sampling frequency

Turbidity will be monitored in real time. While other parameters may be monitored on a monthly basis during construction and on a quarterly basis during operational phases of the project.

(iv) Monitoring Parameters

Construction monitoring samples will be analysed for:

i. pH.
ii. Total suspended solids (TSS)
iii. Turbidity (where a correlation with TSS is sought and a portable probe is available).
iv. DO
v. Temperature
vi. Salinity
vii. Nitrates and Phosphates
viii. Sulphates

ix. Oils and grease (visual assessment). If oils and grease are visually evident, a sample will be forwarded to the laboratory for analysis. Values should not exceed 10 mg/l.
x. Total *Coliform* and *E. coli* analysis.
xi. Possibly other parameters may be identified following construction activities.

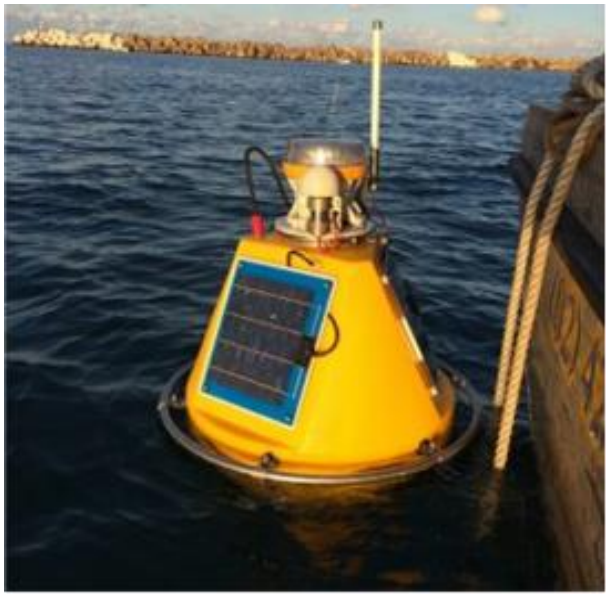


Figure 15.2: Data -Buoy for Water Quality Monitoring

(v) Turbidity Measurements as a Trigger for Site Management

Turbidity measurements should be taken at all sampling sites during dredging using probes mounted on floating buoys similar to the one in **Figure 15.2**.

Turbidity measurements have the advantage of providing site management with immediate data, while TSS may take up more time to be analysed and reported. Where routine turbidity measurements show that a sensitive marine area is being negatively impacted; additional measures can be taken to reduce its level.

Post-construction monitoring parameters will be the same as those used during the construction of the project. In this instance handheld probes may be best suited, such as a HACH multiprobe. Individual parameters that may be added include Dissolved Oxygen and Temperature and Salinity, Nitrates phosphates and chlorophyll. Other parameters may be withdrawn where it is demonstrated that it is no longer a concern.

(vi) Interpretation of Results

The monitoring program will incorporate a feedback loop to provide rapid dissemination of the results (visual, in-situ or laboratory) to the contractor to ensure problems are rectified as soon as possible. If repeated results demonstrate that the site or parts of the site has stabilised, upstream

and downstream of dredging and construction area, sampling parameters, frequencies and locations will be reviewed in order to adjust monitoring parameters and their frequencies.

(vii) Reporting and Responding to Exceeded Criteria

The program will include a process for reporting and responding to exceeding the water quality criteria and/or targets for the project that should include but not be limited to:

i. validation of result(s) showing exceeded criteria,
ii. repeated or further monitoring,
iii. investigation to determine cause and source of the exceeded criteria,
iv. review of pollution controls and/or construction activities or procedures,
v. reporting to the Contractor,
vi. reporting to the Department of the Environment,
vii. documentation of all the above.

15.6.2 Ambient Air and Noise Quality

This Ambient Air and Noise Quality Plan will monitor air and noise pollution generated as a result of the construction activities and post construction operation. The plan aims to address the control of fugitive and airborne dust emissions as well as vehicular exhausts emissions and related above normal noise generation. The sources of air and noise pollutants resulting from the project are categorized as follows:

a. ***Construction Phase*****:** Construction works include surface removal, movement of vehicles, transportation of materials, infrastructure provision and any other infrastructure activities. The major temporary air pollution is dust and vehicular emissions generated as a result of these construction works.

b. Operational Phase: The major permanent sources of air pollutants are the vehicle emission from traffic on the roads.

(i) Objectives of Ambient Air and Noise Quality Monitoring

The primary objective of this monitoring plan is to formulate a strategy for controlling, to the greatest extent practicable, fugitive or airborne dust emissions and exceeding levels of noise disturbances. This will be accomplished by identifying specific sources and activities that have the highest potential to produce or generate the disturbances. This plan describes the engineering controls necessary to minimize and control dust emissions from those sources and activities as well as the reduction of noise generated by the activities.

As a precautionary and control measure for this project, the monitoring plan will be used as a standard operating procedure (SOP). This plan will be used:

i. To eliminate origins of dust and excess noise from the project during construction activities;

ii. To monitor for dust, emission and noise produced by site activities; and

iii. To implement corrective actions as the need arises.

This plan is being prepared and submitted with the understanding that it can be modified to accommodate actual site conditions as they arise and in conjunction with all safety and health precautions.

(ii) Sampling Sites

The sampling sites for the proposed monitoring phase, for ambient environmental quality will not only be limited to the cruise ship trestle, but also the cargo area of the PoBL (Table 15.2).

Table 15.2: Ambient and Noise Sample Locations.

SITE		REMARKS	LOCATION	
ID #	**Description**		**NAD 27**	
1	Cruise Terminal	Subject to site selection (POI)	TBD	
2	Cargo Pier Head	Ships Stevedores	To be Determined (TBD)	
3	Container Yard	Ship Stevedores (POI)	TBD	
4	Jane Usher Boulevard	Main residential area (POI)	TBD	TBD
5	Near junction of Jane Usher & GPH	Main residential area (POI)	TBD	TBD
6	Southern end of Property	Wildlife	TBD	TBD
7	Esso Lagoon (reclaimed)	Main residential area	TBD	TBD
8	Cruise Ship Trestle # 2 head	Guests	TBD	TBD
9	Cruise Ship Trestle # 1 head	Guests (POI)	TBD	TBD

(iii) Sampling Frequencies

The sampling frequency for these parameters will vary but it is recommended that a sample be taken at the peak hours of each working day to get a maximum variant. Thus, air and noise samples must be taken:

i) Twice weekly, preferable during peak activity periods maximum variance may be compared to early morning reading in the first three months,
ii) Once per month at designated POI for the next 6 months then on a quarterly basis.

(iv) Monitoring Parameters

Sample parameters for dust or air borne pollutants, vehicular emissions and noise pollution include the following:

i. Air and dust pollutants – Suspended Particulate Matter **(SPM)**, Sulphur Dioxide **(SO_2)**, Carbon Monoxide (**CO)** and Nitrogen dioxides **(NO_x)**.

ii. Noise Pollution – limits will be set as those described in the Noise Levels according to the dB (A) Scale (as defined by the Second Schedule (Regulation 42) Noise Level from the Pollutions Regulations Laws of Belize).

Table 15.3 shows a sample of an Ambient Air and Noise template with file numbering system.

Table 15.3: Environmental Quality Template with File Numbering System.

Date:								
FILE	**Sample Location**	**SPM**	**SO_2**	**CO**	**NO_x**	**Noise levels dB(A)**		**Blank**
						Day	**Night**	
Industrial and Mixed Use						70	70	
Residential						55	45	
0001								
0002								
0003								
0004								
0005								
0006								

(v) Interpretation of Results

The monitoring program will incorporate a feedback loop to provide rapid dissemination of the results (visual, in-situ or laboratory) to the contractor to ensure problems are rectified as soon as possible. If repeated results demonstrate that the site or parts of the site have stabilized, then the parameters will be reviewed in order to reduce or discontinue monitoring.

(vi) Reporting and Responding to Exceeded Criteria

The program will include a process for reporting and responding to exceeding the limits set by the DOE's Pollution Regulation criteria as follows (**Table 15.4**).

Table 15.4: Regulation 6 – Concentration of Air Contaminants.

	Concentration micrograms per meter cube			
	SPM	**SO_2**	**CO**	**NO_X**
A. Industrial and Mixed Use	**500**	**120**	**5000**	**120**
B. Residential and Rural	**200**	**80**	**2000**	**80**

C.	**Sensitive**	**100**	**30**	**1000**	**30**

15.6.3 Monitoring of Indirect Impacts to Ecosystem

Monitoring of indirect impacts for post construction phase associated with increased traffic due to improved port and road conditions should be carried out by PoBL and maintain logbooks to record any Manatee Mortality -Gender and Location (coordinate), date and time.

15.6.4 PoBL's Grievance Mechanism

A grievance can be defined as an actual or perceived problem giving ground for complaint. In line with international standards, projects should provide a Grievance Mechanism which should address concerns promptly, using an understandable and transparent process that is culturally appropriate and readily accessible to all segments of the affected communities, and at no cost and without retribution.

PoBL is proactively seeking to prevent grievances through managing Project impacts and through pre-emptive community liaison activities designed to anticipate and address potential issues before they become grievances.

Notwithstanding, the Grievance Mechanism is the official process by which people affected by the Project can bring their comments, concerns and grievances to a Community Liaison Officer (CLO) appointed and hired by the PoBL management team. The Grievance Mechanism specifies: The Purpose; Scope and Target Group; Procedure; Management Structure and Tracking; and Monitoring and Reporting.

Management and Tracking of Grievances: The roll out of the Grievance Mechanism to community members will be the responsibility CLO. Explanations of the process to community members will be led by the CLO.

Specific issues to be addressed during testing and subsequent roll out of the mechanism are:

i. The Grievance Mechanism is accessible to stakeholders with low levels of formal education;

ii. The Grievance Mechanism is publicized using culturally relevant and inclusive media;

iii. The Grievance Mechanism is accessible for local, national and international stakeholders;

iv. Community members are aware that they can use the Grievance Mechanism without retribution; and

v. Grievances can be lodged without danger of retribution in practice, given that some Project affected stakeholders are reliant on informal livelihoods, and that some grievances may be lodged by workers against contractors who are their employers.

A Grievance Database System will be set up by the CLO before construction starts. This database will be designed to make it easily possible to track individual grievances, giving each

grievance a unique ID number, trigger deadlines for progress on grievance communications and resolution as specified in the grievance process. The Grievance Database should specify where grievances have been resolved and a statement of satisfaction has been signed by the complainant. Where it has not been possible to resolve grievances to the satisfaction of both parties, this should be specified in the database, and unresolved grievances should be assessed during third party monitoring.

Monitoring and Reporting of Grievances: The implementation of the Grievance Mechanism is subject to third party monitoring (e.g. DOE, BCC) to ensure that PoBL is performing effectively in its commitments to resolving community grievances. Third party monitors of the Grievance Mechanism will be provided with access to the Grievance database to audit performance. PoBL through the CLO will report on performance in closing out grievances (i.e. the number of grievances resolved within agreed time frames) as part of an annual public report. A sample Grievance Form is shown in, **Table 15.5**.

Table 15.5: Sample PoBL Grievance Form.

Contact Information					
Full Name:				◯	◯
	(First)		(Last)	Male	Female
Address:					
Phone:					
e-mail:					
Complainant Category:	◯ Resident	◯ Local Business	◯ PoBL Employee	◯ Councillor	◯ NGO/CBO
	◯ Contractor	◯ Contractor Employee		Other:_____	
If with an Agency:					
	Name of Agency			Position with Agency	
Description of Grievance (when relevant, please provide specific names, dates and locations of incidents):					
Recommendation for resolving the grievance?					
Signature			Date		

15.6.5 General Reporting Requirements

In the general context of the monitoring plan, there must be established target goals and objectives in terms of monitoring the anticipated impacts. The results of these plans must be

reported to the DOE as part of their requirement. Likewise, any adverse or potentially adverse impact must be reported immediately to the DOE. **Table 15.6** provides a template that could be used by the Project's Liaison Officer assigned to monitor compliance with the ECP and ESMP.

Table 15.6: Monitor compliance with the ECP and ESMP.

Name of Person Filling Form:_____				**Date:_____**	
Activity	**Environmental Effects**	**Mitigation Measure(s)**	**Monitoring Indicator(s)**	**Monitoring and Reporting Frequency**	**Party) responsible.**
List all activities in the ESA that received a "negative determination with conditions." ***Do not list any other activities.***	List main environmental effects that require mitigation	If mitigation measures are well-specified in the ECP quote directly from ECP If they are not well-specified in the ECP define more specifically here.	Specify indicators to (1) determine if mitigation is in place and (2) level of success. For example, visual inspections for seepage around pit latrine; sedimentation at stream crossings, etc.)	For example: "monitor weekly, and report in quarterly reports. If XXX occurs, immediately inform project manager or DOE."	**If appropriate, *separately* specify the parties responsible for mitigation, for monitoring and for reporting.**
Signature of Person completing form: _____					

CHAPTER 16: CONCLUSIONS AND RECOMMENDATIONS

A. Expected Project Benefits

This project offers an exciting opportunity to grow the Belize Cruise Tourism Industry and to secure its future well into the 21st century and beyond. In addition, the improved and upgraded port facility will greatly enhance the potential for Belize to increase its presence and footprint in international trade by giving local producers modern facilities which will give them a competitive edge. It will provide increased employment opportunities on the south side of Belize City in an area that needs it most, however the benefits will extend to the entire country and greatly improve the economic outlook for Belize going forward.

B. Adverse Impacts and Mitigation Measures

The footprint of the project falls into an area already highly disturbed from previous development at the site and from adjacent areas including Belize City proper including the frequent dredging of the mouth of the Haulover Creek. The terrestrial and marine habitats are therefore of low conservation value, however this report prescribes stringent mitigation measures to ensure they do not deteriorate further during the construction and operational phases.

The proposed dredging works will generate significant volumes of dredge spoils of which the better quality materials will readily find use on the property for land filling and as donations to the city for public use projects. For the dredge spoils of inferior quality the project proposes nearshore disposal. Although this system is not commonly applied in Belize due to the ready need on land for spoils for landfill, it is widely accepted and applied around the world including in Central America, North America and Europe, particularly in areas with low biodiversity like Sibun Bight

The Developer expects to use JDN a construction firm with worldwide dredging experience to undertake the proposed dredging works. This Company has access to the most advance dredging equipment and is familiar with applying stringent environmental mitigation during its dredging works.

Stringent mitigation measures will be deployed to ensure that the dredging operation and disposal of dredge spoils will not adversely affect the environment. The Port of Belize will work closely with the Department of the Environment and its Allied public agency partners to ensure that mitigation measures are adequately applied and errant deficiencies quickly rectified.

C. Overall Conclusions

This ESIA conclude that all identified environmental impacts can be mitigated to acceptable levels if the measures defined in the ESMP and assurances are carefully implemented and

monitored. The project is feasible from an environmental safeguards point of view and will contribute to poverty reduction through increased employment and sale of goods and services and improved conditions for foreign and domestic trade.

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August 2022

BELIZE:

FISHERIES RESOURCES (HIGH PROTECTION FOR BIODIVERSITY MARINE RESERVES) ORDER, 2022

ARRANGEMENT OF PARAGRAPHS

1. Citation.

2. Declaration of Marine Reserves.

3. Maps of Marine Reserves.

SCHEDULE I
SCHEDULE II

BELIZE:

STATUTORY INSTRUMENT

No. 69 of 2022

ORDER made by the Minister responsible for fisheries in exercise of the powers conferred upon him by section 14(1)(b) of the Fisheries Resources Act, Chapter 210 of the Substantive Laws of Belize, Revised Edition 2020, and all other powers thereunto him enabling.

(Gazetted 21st April, 2022)

1. This Order may be cited as the **Citation.**

FISHERIES RESOURCES (HIGH PROTECTION FOR BIODIVERSITY MARINE RESERVES) ORDER, 2022.

2. The areas referred to as High Protection For Biodiversity Zone 1, High Protection For Biodiversity Zone 2, High Protection For Biodiversity Zone 3, High Protection For Biodiversity Zone 4, High Protection For Biodiversity Zone 5, High Protection For Biodiversity Zone 6 and High Protection For Biodiversity Zone 7, as more fully described in Schedule I, are hereby declared to be marine reserves for the purposes of the Fisheries Resources Act. **Declaration of Marine Reserve. Schedule I.**

3. The maps of the Marine Reserves listed in paragraph 2 are set out in Schedule II. **Maps of Marine Reserves.**

SCHEDULE I
[paragraph 2]

HIGH PROTECTION FOR BIODIVERSITY ZONE 1

ALL THAT PORTION of Caribbean Sea, zoned as **High Protection For Biodiversity Zone 1** and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 398381 East, 1967488 North; thence East for approximately 3.0 nautical miles (5.5 kilometers) to a point having coordinates 403855 East, 1967488 North; thence South for approximately 7.4 nautical miles (13.8 kilometers) to a point having coordinates 403855 East, 1953711 North; thence West for approximately 3.0 nautical miles (5.5 kilometers) to a point having coordinates 398381 East, 1953711 North; thence North for approximately 7.4 nautical miles (13.8 kilometers) to the point of origin and encompassing an approximate area of 7540 Hectares (75.4 square kilometers).

HIGH PROTECTION FOR BIODIVERSITY ZONE 2

ALL THAT PORTION of the Caribbean Sea, zoned as **High Protection For Biodiversity Zone 2** and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 428221 East, 1907625 North; thence East for approximately 4.8 nautical miles (8.8 kilometers) to a point having coordinates 437020 East, 1907625 North; thence South for approximately 1.3 nautical miles (2.4 kilometers) to a point having coordinates 437020 East, 1905274 North; thence West for approximately 1.1 nautical miles (2.1 kilometers) to a point having coordinates 434923 East, 1905274 North; thence South-West for approximately 3.6 nautical miles (6.8 kilometers) to a point having coordinates 432119 East, 1899108 North; thence West for approximately 2.1 nautical miles (3.9 kilometers) to a point having coordinates 428221 East, 1899108 North; thence North

for approximately 4.6 nautical miles (8.5 kilometers) to the point of origin and encompassing an approximate area of 5,337 Hectares (53.4 square kilometers).

HIGH PROTECTION FOR BIODIVERSITY ZONE 3

ALL THAT PORTION of the Caribbean Sea, zoned as **High Protection For Biodiversity Zone 3** and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 448498 East, 1915014 North; thence East for approximately 4.9 nautical miles (9.0 kilometers) to a point having coordinates 457557 East, 1915014 North; thence South for approximately 10.5 nautical miles (19.5 kilometers) to a point having coordinates 457557 East, 1895552 North; thence West for approximately 9.6 nautical miles (17.8 kilometers) to a point having coordinates 439721 East, 1895552 North; thence North for approximately 2.2 nautical miles (4.2 kilometers) to a point, being the South-Western corner of Halfmoon Caye Natural Monument (S.I. No. 30 of 1982), having coordinates 439733 East, 1899721 North; thence East, along the Southern boundary line of Halfmoon Caye Natural Monument, for approximately 3.8 nautical miles (7.1 kilometers) to a point, being the South-Eastern point of the aforementioned reserve, having coordinates 446823 East, 1899701 North; thence North, along the Eastern boundary line of the aforesaid reserve, for approximately 3.0 nautical miles (5.5 kilometers) to a point, being the North-Eastern corner of the same said reserve, having coordinates 446837 East, 1905233 North; thence North-East for approximately 5.4 nautical miles (9.9 kilometers) to the point of origin and encompassing an approximate area of 23,011 Hectares (240.4 square kilometers).

HIGH PROTECTION FOR BIODIVERSITY ZONE 4

ALL THAT PORTION of the Caribbean Sea, zoned as **High Protection For Biodiversity Zone 4** and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 415528 East, 1880957 North; thence East for approximately 7.3 nautical miles (13.4 kilometers) to a point having coordinates 428985 East, 1880957 North; thence South for approximately 5.8 nautical miles (10.7 kilometers) to a point, being the North-Eastern point of the Glover's Reef Marine Reserve Seasonal Closure Zone (S.I. No. 137 of 2001), having coordinates 428983 East, 1870287 North; thence West for approximately 0.7 nautical miles (1.4 kilometers), along a portion of the Northern boundary line of the aforementioned zone, to a point, on the hundred-meter fathom depth contour, having coordinates 427623 East, 1870287 North; thence in a generally on a West-North-Westerly direction for approximately 7.6 nautical miles (14.0 kilometers), along the hundred-meter fathom depth contour, to a point, on the hundred-meter fathom depth contour, having coordinates 415528 East, 1872205 North; thence North for approximately 4.7 nautical miles (8.8 kilometers) to the point of origin and encompassing an approximate area of 12,034 Hectares (120.4 square kilometers).

HIGH PROTECTION FOR BIODIVERSITY ZONE 5

ALL THAT PORTION of the Caribbean Sea, zoned as **High Protection For Biodiversity Zone 5** and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 398395 East, 1839688 North; thence East for approximately 5.4 nautical miles (10.0 kilometers) to a point having coordinates 408416 East, 1839688 North; thence South for approximately 5.7 nautical miles (10.6 kilometers) to a point having coordinates 408416 East, 1829071 North; thence West for approximately 5.4 nautical miles (10.0 kilometers) to a point having coordinates 398395 East, 1829071 North; thence North for approximately 5.7 nautical miles (10.6 kilometers) to the point of origin and encompassing an approximate area of 10,639 Hectares (106.4 square kilometers).

HIGH PROTECTION FOR BIODIVERSITY ZONE 6

ALL THAT PORTION of the Caribbean Sea, zoned as **High Protection For Biodiversity Zone 6** and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point, on the South-Eastern boundary line of the Gladden Spit and Silk Cayes Marine Reserve (S. I. No. 68 of 2000), having coordinates 392574 East, 1817701 North; thence North-East for approximately 4.8 nautical miles (8.8 kilometers) to a point having coordinates 400149 East, 1813192 North; thence South-West for approximately 5.4 nautical miles (10.0 kilometers) to a point having coordinates 393165 East, 1805995 North; thence North-West for approximately 4.6 nautical miles (8.4 kilometers) to a point having coordinates 385526 East, 1809598 North; thence North-East for approximately 4.0 nautical miles (7.3 kilometers) to a point, being the most Southern point for the Gladden Spit and Silk Cayes Marine Reserve (S. I. No. 68 of 2000), having coordinates 390332 East, 1815123 North; thence further North-East, along a portion of the South-Eastern boundary line of the aforementioned Marine Reserve, for approximately 1.8 nautical miles (3.4 kilometers) to the point origin and encompassing an approximate area of 8,665 Hectares (86.6 square kilometers).

HIGH PROTECTION FOR BIODIVERSITY ZONE 7

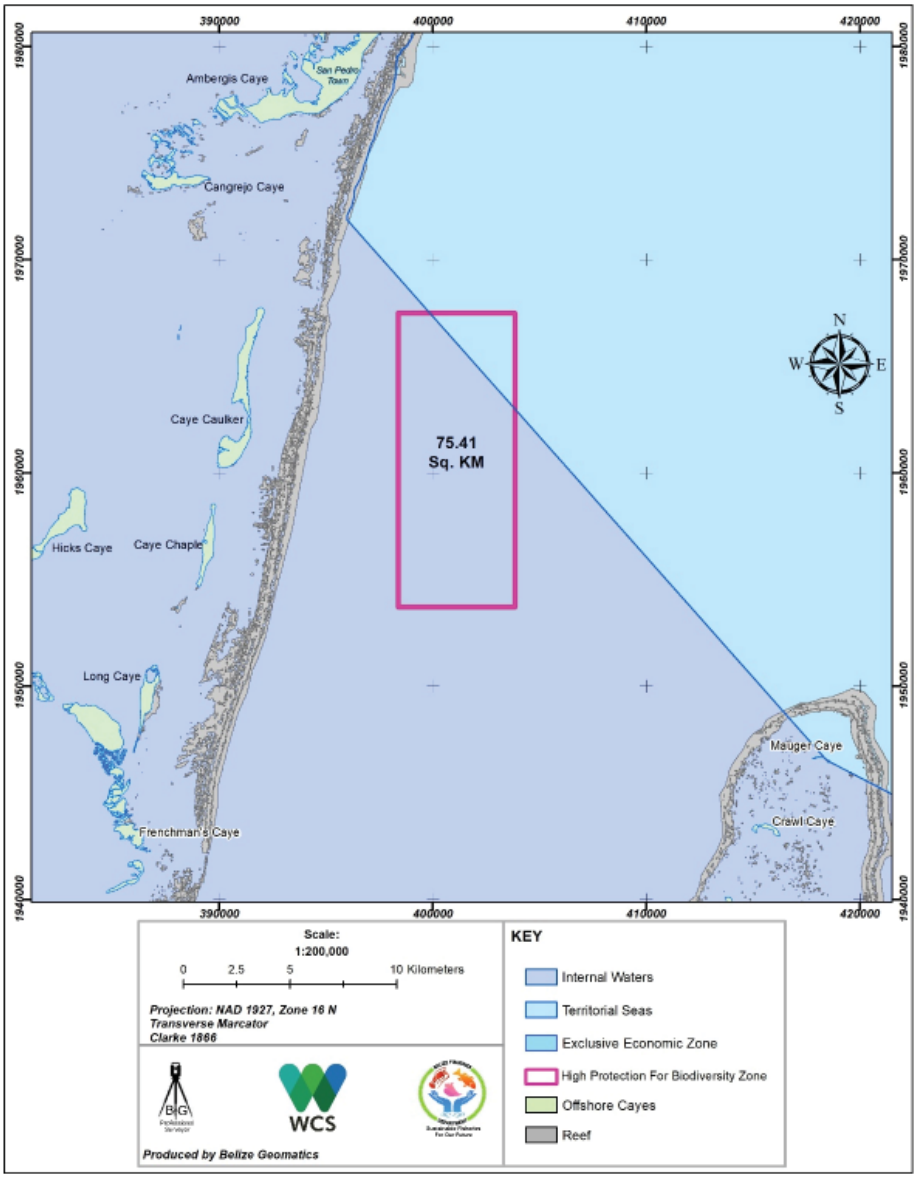
A**LL THAT PORTION** of the Caribbean Sea, zoned as **High Protection For Biodiversity Zone 7**, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in meters, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a North-Eastern point on the boundary between the Belize's Territorial Sea and Belize's Exclusive Economic Zone having approximate coordinates 434228 East, 2010726 North; thence in a generally Southern direction on the same said boundary line for approximately 138.9 nautical miles (257.3 kilometers) to a point on the same said boundary line having approximate coordinates 407424 East, 1804373 North; thence West for

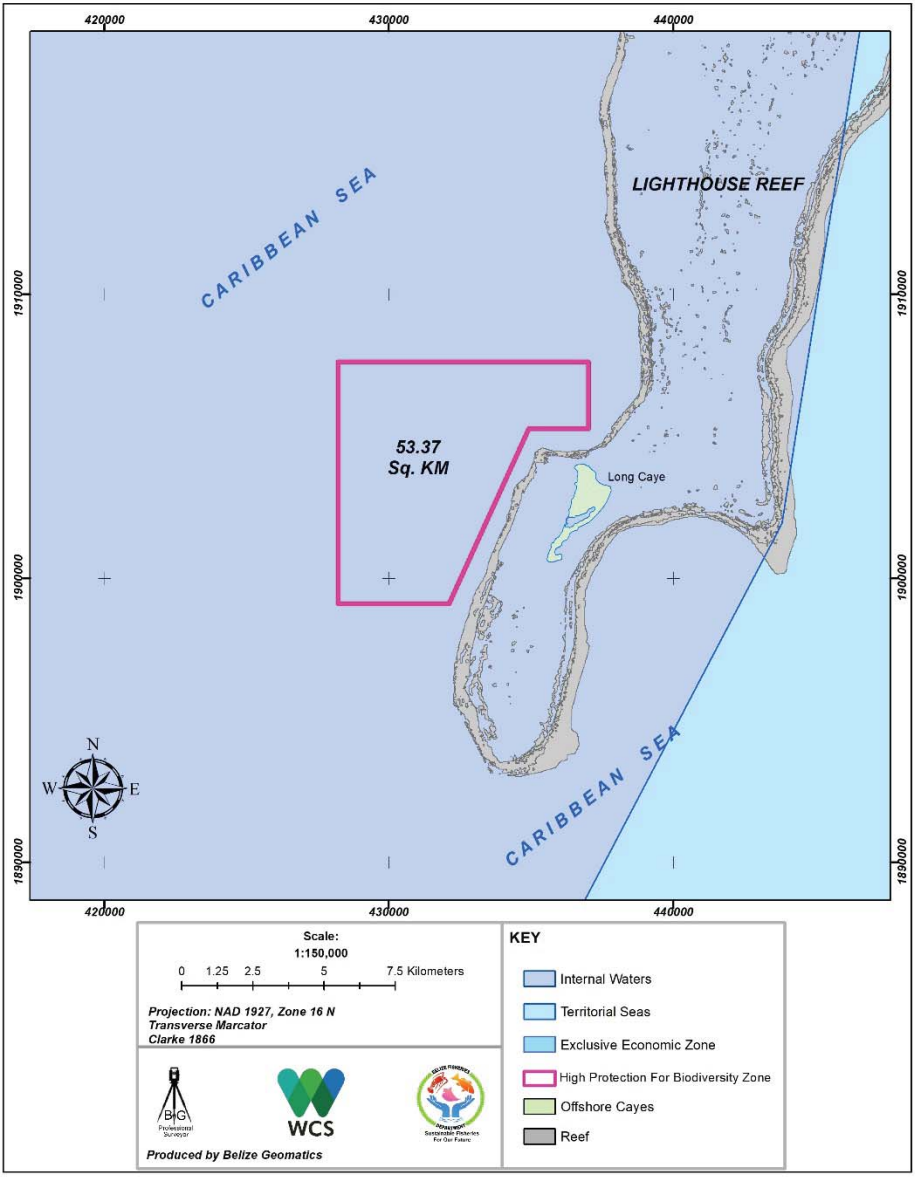
approximately 1.8 nautical miles (3.4 kilometers) to a point having coordinates 404072 East, 1804388 North; thence in a generally Northern direction, along an approximate 1.8 nautical miles offset West of the boundary line between Belize's Territorial Sea and Belize's Exclusive Economic Zone, for approximately 139.2 nautical miles (257.8 kilometers) to a point having coordinates 431814 East, 2010736 North; thence East for approximately 1.3 nautical miles (2.4 kilometers) to the point of origin and encompassing an approximate area of 62,167.8 Hectares (621.7 square kilometers).

SCHEDULE II
[paragraph 3]

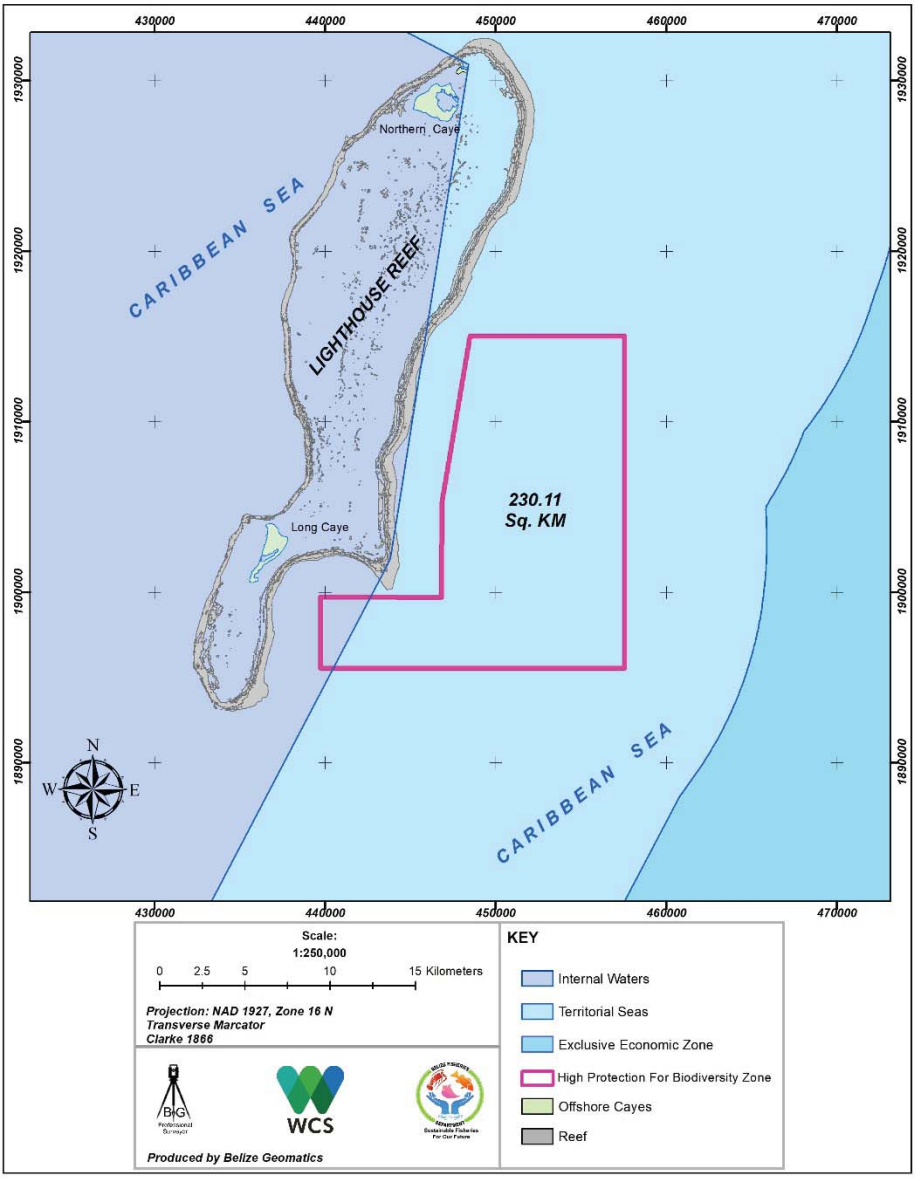
HIGH PROTECTION FOR BIODIVERSITY ZONE 1



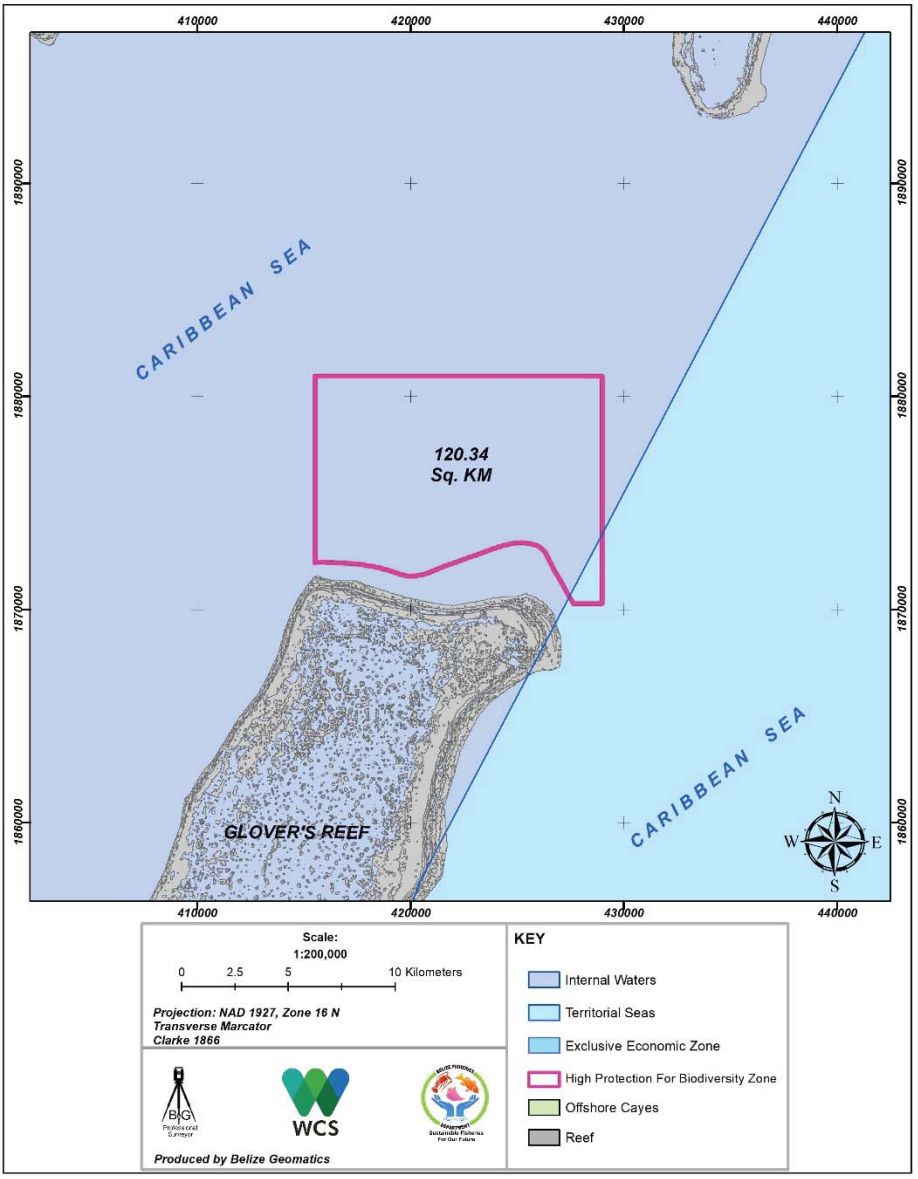
HIGH PROTECTION FOR BIODIVERSITY ZONE 2



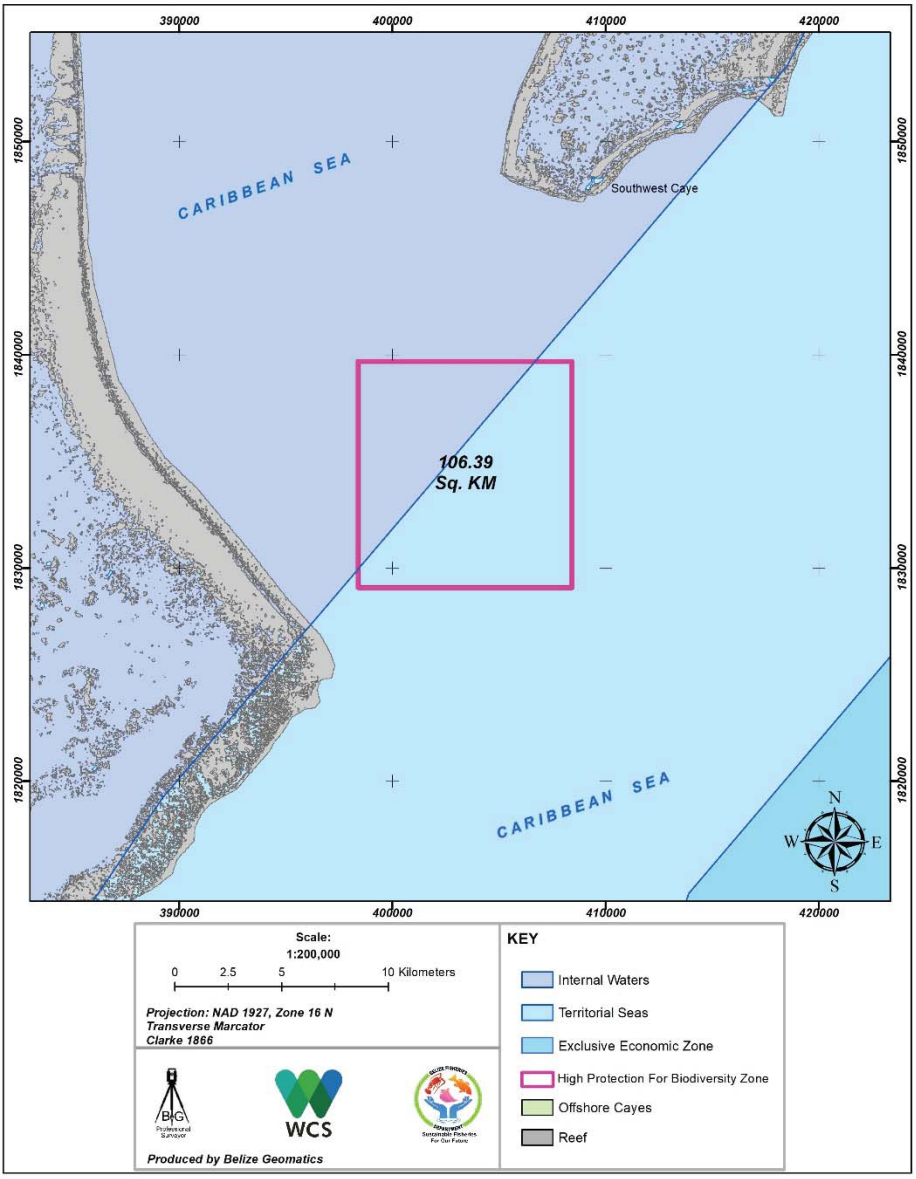
HIGH PROTECTION FOR BIODIVERSITY ZONE 3



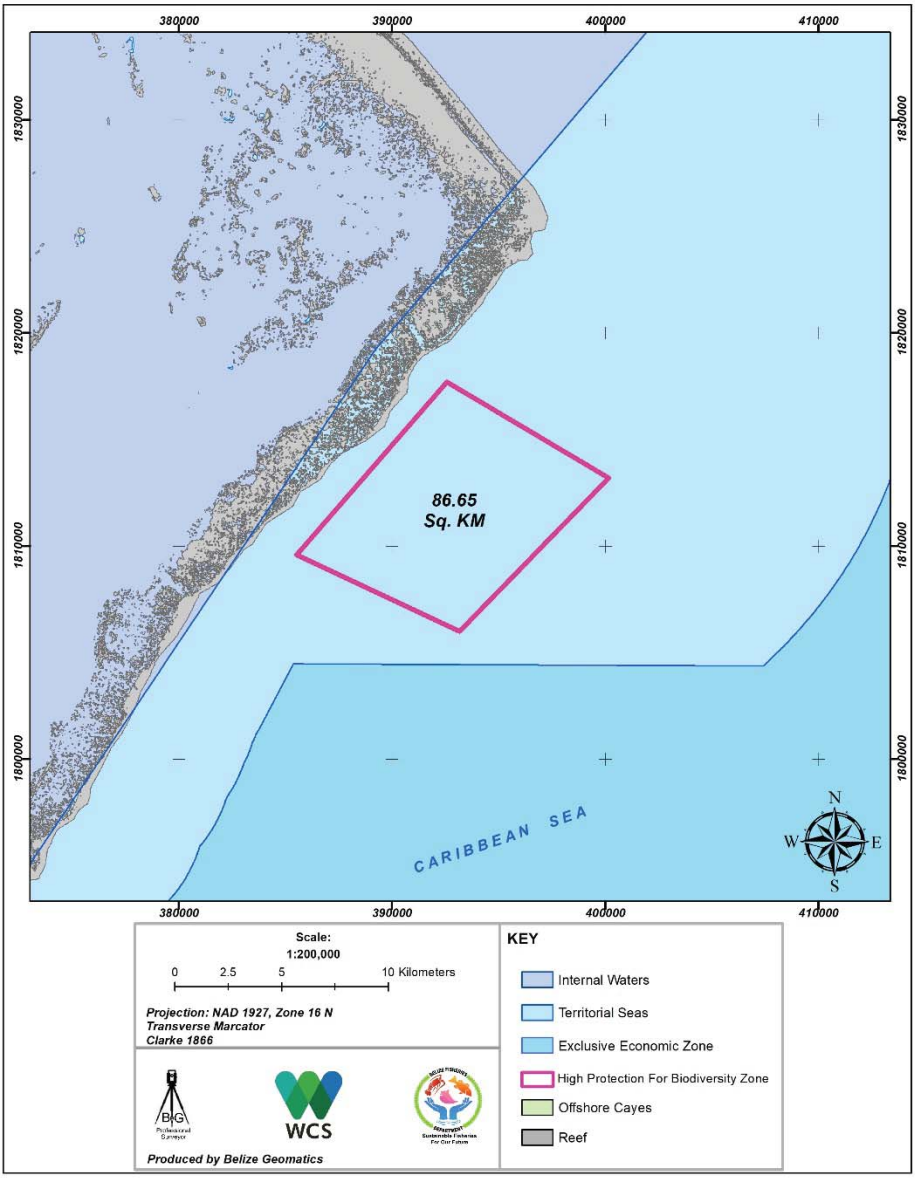
HIGH PROTECTION FOR BIODIVERSITY ZONE 4



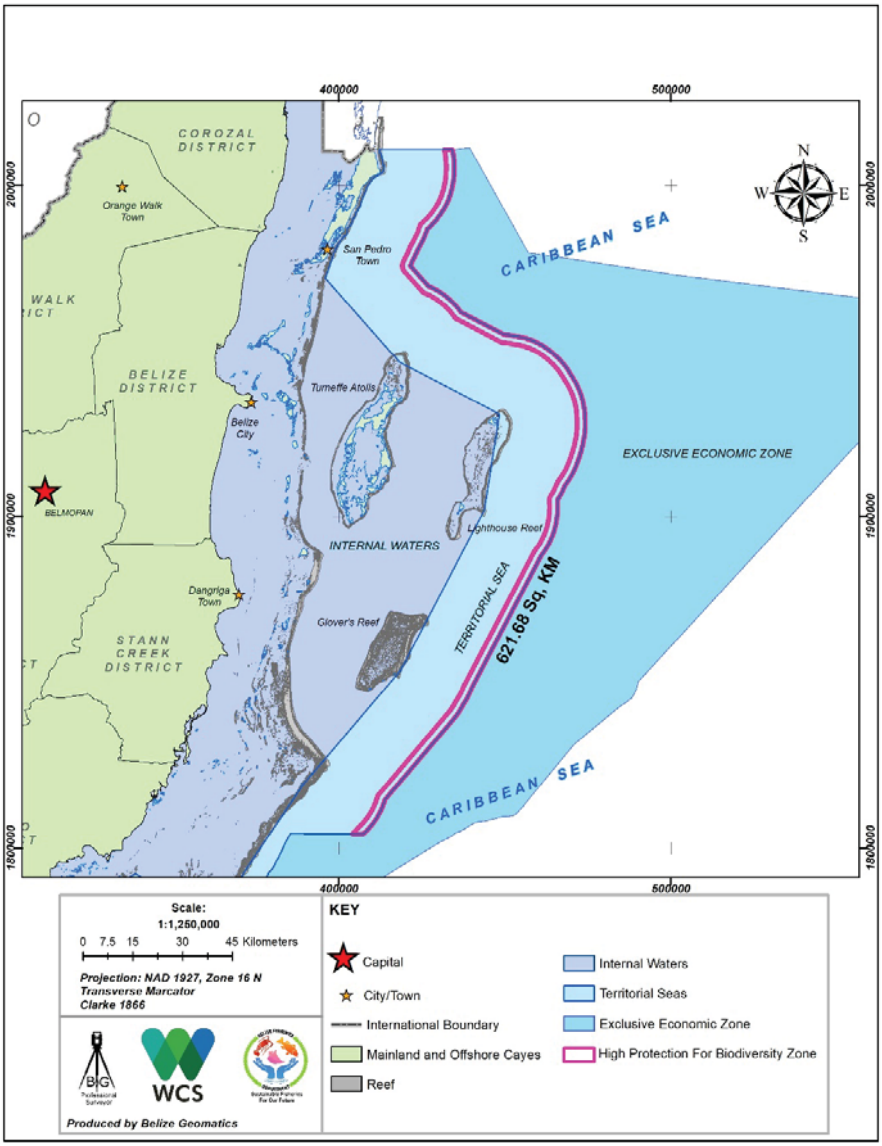
HIGH PROTECTION FOR BIODIVERSITY ZONE 5



HIGH PROTECTION FOR BIODIVERSITY ZONE 6



HIGH PROTECTION FOR BIODIVERSITY ZONE 7



MADE by the Minister responsible for fisheries this 19th day of April, 2022.

HON. ABNER PEREZ
Minister of the Blue Economy and Civil Aviation
(Minister responsible for fisheries)

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan

BELIZE:

FISHERIES (SOUTH WATER CAYE MARINE RESERVE) (AMENDMENT) ORDER, 2022

ARRANGEMENT OF PARAGRAPHS

1. Citation.

2. Repeal and replacement of Schedule.

BELIZE:

STATUTORY INSTRUMENT

No. 70 of 2022

ORDER made by the Minister responsible for fisheries in exercise of the powers conferred upon him by section 14(1)(b) of the Fisheries Resources Act, Chapter 210 of the Substantive Laws of Belize, Revised Edition 2020, and all other powers thereunto him enabling.

(Gazetted 21st April, 2022).

1. This Order may be cited as the **Citation.**

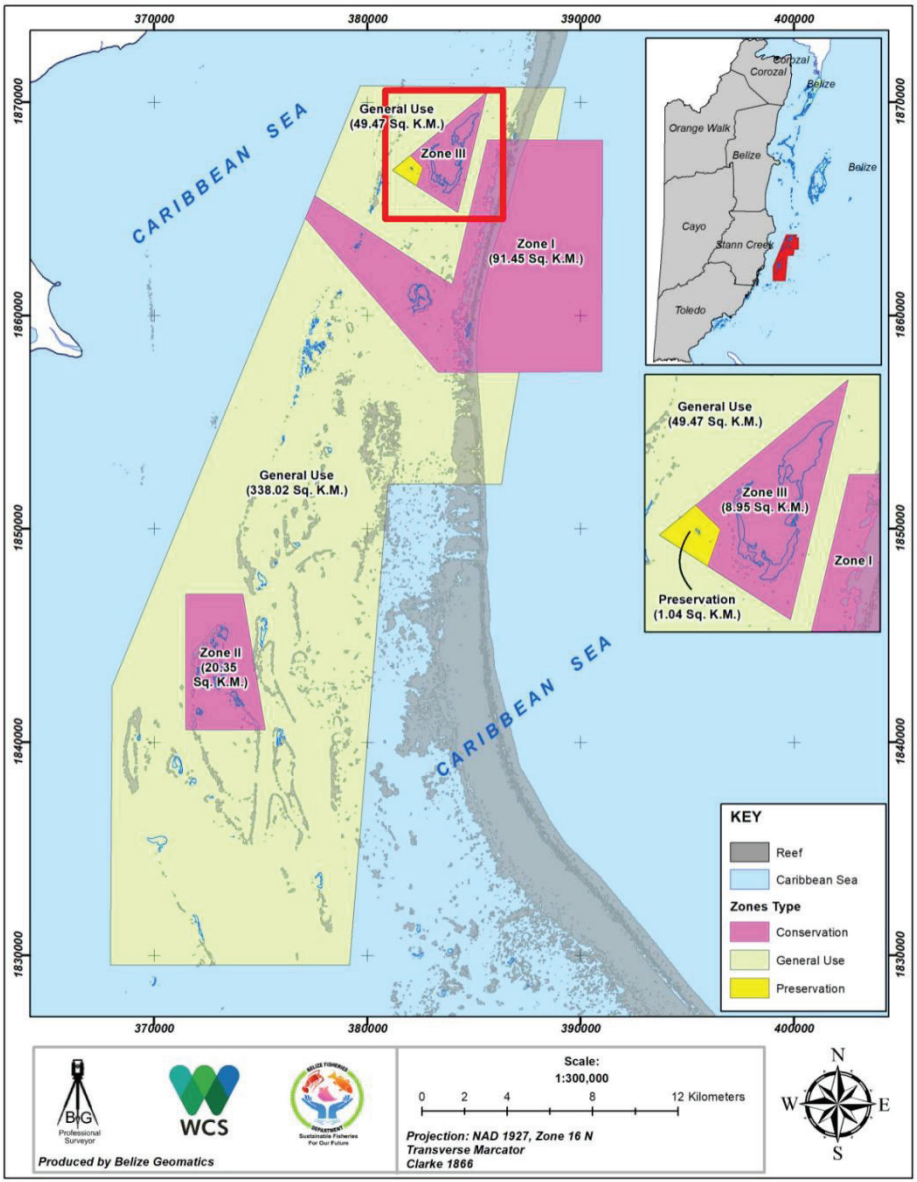
FISHERIES (SOUTH WATER CAYE MARINE RESERVE) (AMENDMENT) ORDER, 2022,

and shall be read and construed as one with the Fisheries (South Water Caye Marine Reserve) Order, 1996, which, as amended, is hereinafter referred to as the principal Order. **S.I. 118 of 1996. S.I. 51 of 2009.**

2. The Schedule of the principal Order is repealed and replaced with the following– **Repeal and replacement of Schedule.**

"SCHEDULE
[paragraph 2]

SOUTH WATER CAYE MARINE RESERVE



ALL THAT PORTION of the Caribbean Sea, named as the SOUTH WATER CAYE MARINE RESERVE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 379668 East, 1870775 North; thence East for approximately 2.3 nautical miles (4.3 kilometers) to a point having coordinates 383937 East, 1870733 North; thence further East for approximately 2.9 nautical miles (5.3 kilometres) to a point having coordinates 389290 East, 1870681 North; thence South-South-West for approximately 1.4 nautical miles (2.5 kilometres) to a point having coordinates 388888 East, 1868212 North; thence East for approximately 1.2 nautical miles (2.1 kilometres) to a point having coordinates 391030 East, 1868199 North; thence South for approximately 5.8 nautical miles (10.8 kilometres) to a point having coordinates 390985 East, 1857375 North; thence West for approximately 2.1 nautical miles (3.9 kilometres) to a point having coordinates 387120 East, 1857352 North; thence South-South-West for approximately 2.0 nautical miles (3.8 kilometres) to a point having coordinates 386513 East, 1853619 North; thence further South-South-West for approximately 0.8 nautical miles (1.5 kilometres) to a point having coordinates 386299 East, 1852080 North; thence West for approximately 2.9 nautical miles (5.3 kilometres) to a point having coordinates 380973 East, 1852121 North; thence South-South-West for approximately 12.2 nautical miles (22.6 kilometres) to a point having coordinates 379168 East, 1829535 North; thence West for approximately 6.0 nautical miles (11.2 kilometres) to a point having coordinates 367942 East, 1829542 North; thence North for approximately 7.0 nautical miles (13.0 kilometres) to a point having coordinates 368036 East, 1842611 North; thence North-East for approximately 16.4 nautical miles (30.5 kilometres) to the point of origin and encompassing an area of approximately 50,927.3 hectares (509.2 square kilometers); and comprising the following zones–

CONSERVATION ZONE I

ALL THAT PORTION of the Caribbean Sea, named as CONSERVATION ZONE I, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 385623 East, 1868230 North; thence East for approximately 2.9 nautical miles (5.4 kilometers) to a point having coordinates 391030 East, 1868199 North; thence South for approximately 5.8 nautical miles (10.8 kilometres) to a point having coordinates 390985 East, 1857375 North; thence West for approximately 4.1 nautical miles (7.6 kilometres) to a point having coordinates 383334 East, 1857330 North; thence North-West for approximately 5.2 nautical miles (9.5 kilometres) to a point having coordinates 377102 East, 1864564 North; thence North-North-East for approximately 0.6 nautical miles (1.1 kilometres) to a point having coordinates 377537 East, 1865610 North; thence South-East for approximately 4.2 nautical miles (7.7 kilometres) to a point having coordinates 383983 East, 1861423 North; thence North-North-East for approximately 3.8 nautical miles (7.0 kilometres) to the point of origin and encompassing an area of approximately 9,144.7 hectares (91.4 square kilometres).

CONSERVATION ZONE II

ALL THAT PORTION of the Caribbean Sea, named as CONSERVATION ZONE II, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 371491 East, 1846938 North; thence East for approximately 1.4 nautical miles (2.7 kilometres) to a point having coordinates 374158 East, 1846939 North; thence South-South-East for approximately 3.5 nautical miles (6.5 kilometres) to a point having coordinates 375213 East, 1840561 North; thence West for approximately 2.0 nautical miles (3.7 kilometres) to a point having coordinates 371491 East, 1840577 North; thence North for approximately 3.4 nautical miles (6.4 kilometres) to the point of origin and encompassing an approximate area of 2,064.6 hectares (20.6 square kilometres).

CONSERVATION ZONE III

ALL THAT PORTION of the Caribbean Sea, named as CONSERVATION ZONE III, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 385603 East, 1870449 North; thence South-West for approximately 3.1 nautical miles (5.8 kilometers) to a point having coordinates 384248 East, 1864825 North; thence North-West for approximately 1.2 nautical miles (2.3 kilometers) to a point having coordinates 382302 East, 1866079 North; thence North-East for approximately 0.5 nautical miles (0.9 kilometers) to a point having coordinates 382604 East, 1866940 North; thence North-West for approximately 0.4 nautical miles (0.8 kilometers) to a point having coordinates 382022 East, 1867505 North; thence North-East for approximately 2.5 nautical miles (4.6 kilometers) to the point of origin and encompassing an area of approximately 895 hectares (8.9 square kilometers).

PRESERVATION ZONE

ALL THAT PORTION of the Caribbean Sea, named as PRESERVATION ZONE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 382022 East, 1867505 North; thence North-East for approximately 0.4 nautical miles (0.8 kilometers) to a point having coordinates 382604 East, 1866940 North; thence South-West for approximately 0.5 nautical miles (0.9 kilometers) to a point having coordinates 382302 East, 1866079 North; thence North-West for approximately 0.7 nautical miles (1.3 kilometers) to a point having coordinates 381174 East, 1866807 North; thence for North-East for approximately 0.6 nautical miles (1.1 kilometers) to the point of origin and encompassing an area of approximately 103 hectares (1.0 square kilometers).

GENERAL USE ZONE I

ALL THAT PORTION of the Caribbean Sea, named as GENERAL USE ZONE I, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 379668 East, 1870775 North; thence East for approximately 2.3 nautical miles (4.3 kilometres) to a point

having coordinates 383937 East, 1870733 North; thence further East for approximately 2.9 nautical miles (5.4 kilometres) to a point having coordinates 389290 East, 1870681 North; thence South-South-East for approximately 1.4 nautical miles (2.5 kilometres) to a point having coordinates 388888 East, 1868212 North; thence West for approximately 1.8 nautical miles (3.3 kilometres) to a point having coordinates 385623 East, 1868231 North; thence South-South-West for approximately 3.8 nautical miles (7.0 kilometres) to a point having coordinates 383983 East, 1861423 North; thence North-West for approximately 4.2 nautical miles (7.7 kilometres) to a point having coordinates 377537 East, 1865610 North; thence North-East for approximately 3.0 nautical miles (5.6 kilometres) to the point of origin, having an approximate area of 4,947.3 hectares (49.5 square kilometres), noting the computed area for this zone excludes the following areas: Conservation Zone III and Preservation Zone.

GENERAL USE ZONE II

ALL THAT PORTION of the Caribbean Sea, named as GENERAL USE ZONE II, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates, in metres, within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 377103 East, 1864564 North; thence South-East for approximately 5.2 nautical miles (9.5 kilometres) to a point having coordinates 383334 East, 1857330 North; thence for approximately 2.0 nautical miles (3.8 kilometres) to a point having coordinates 387120 East, 1857352 North; thence South-South-West for approximately 2.0 nautical miles (3.8 kilometres) to a point having coordinates 386513 East, 1853619 North; thence further South-South-West for approximately 0.8 nautical miles (1.5 kilometres) to a point having coordinates 386299 East, 1852080 North; thence West for approximately 2.9 nautical miles (5.3 kilometres) to a point having coordinates 380973 East, 1852121 North; thence South-South-West for approximately 12.2 nautical miles (22.6 kilometres) to a point having coordinates 379168 East, 1829535 North; thence West for approximately 6.0 nautical miles (11.2 kilometres) to a point having coordinates 367942 East, 1829542 North; thence North for approximately 7.0 nautical miles (13.0 kilometres) to a point having coordinates 368036 East, 1842611 North; thence North-East for approximately 12.8 nautical

miles (23.7 kilometres) to the point of origin, having an approximate area of 33,801.8 hectares (338.0 square kilometres), noting the computed area for this zone excludes Conservation Zone II.".

MADE by the Minister responsible for fisheries this 19th day of April, 2022.

HON. ABNER PEREZ
Minister of the Blue Economy and Civil Aviation
(Minister responsible for fisheries)

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan, Belize, C.A.

BELIZE:

FISHERIES (TURNEFFE ATOLL MARINE RESERVE) (AMENDMENT) ORDER, 2022

ARRANGEMENT OF PARAGRAPHS

1. Citation.

2. Repeal and replacement of Schedule 1.

3. Repeal and replacement of Schedule 2.

BELIZE:

STATUTORY INSTRUMENT

No. 71 of 2022

ORDER made by the Minister responsible for fisheries in exercise of the powers conferred upon him by section 14(1)(b) of the Fisheries Resources Act, Chapter 210 of the Substantive Laws of Belize, Revised Edition 2020, and all other powers thereunto him enabling.

(Gazetted 21st April, 2022).

1. This Order may be cited as the **Citation.**

FISHERIES (TURNEFFE ATOLL MARINE RESERVE) (AMENDMENT) ORDER, 2022,

and shall be read and construed as one with the Fisheries (Turneffe Atoll Marine Reserve) Order, 2012, which is hereinafter referred to as the principal Order. **S.I. 105 of 2012.**

2. Schedule 1 of the principal Order is repealed and replaced with the following– **Repeal and replacement of Schedule 1.**

"SCHEDULE 1
[paragraph 2]

TURNEFFE ATOLL MARINE RESERVE

ALL THAT PORTION of the Caribbean Sea named the TURNEFFE ATOLL MARINE RESERVE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 411927 East, 1954800 North; thence East for approximately 7.6 nautical

miles (14.0 kilometers) to a point having coordinates 425927 East, 1954800 North; thence South for approximately 8.4 nautical miles (15.5 kilometers) to a point having coordinates 425927 East, 1939313 North; thence East for approximately 1.4 nautical miles (2.5 kilometers) to a point having coordinates 428473 East, 1939312 North; thence South for approximately 14.8 nautical miles (27.4 kilometers) to a point having coordinates 428454 East, 1911947 North; thence West for approximately 5.0 nautical miles (9.3 kilometers) to a point having coordinates 419183 East, 1911948 North; thence South-West for approximately 10.4 nautical miles (19.2 kilometers) to a point having coordinates 411264 East, 1894474 North; thence West for approximately 3.2 nautical miles (6.0 kilometers) to a point having coordinates 405264 East, 1894474 North; thence South for approximately 1.6 nautical miles (3.0 kilometers) to a point having coordinates 405264 East, 1891500 North; thence West for approximately 5.0 nautical miles (9.3 kilometers) to a point having coordinates 395924 East, 1891500 North; thence North-West for approximately 4.9 nautical miles (9.1 kilometers) to a point having coordinates 395135 East, 1900527 North; thence North-West for approximately 5.5 nautical miles (10.2 kilometers) to a point having coordinates 394245 East, 1910709 North; thence North-North-East for approximately 5.7 nautical miles (10.5 kilometers) to a point having coordinates 395312 East, 1921215 North; thence North-East for approximately 20.2 nautical miles (37.5 kilometers) to the point of origin and encompassing an approximate area of 148,981.0 hectares (1,489.8 square kilometers); and comprising of the following zones–

ZONE I: MAUGRE CAYE CONSERVATION ZONE

ALL THAT PORTION of the Caribbean Sea named as ZONE I: MAUGRE CAYE CONSERVATION ZONE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 414169 East, 1953718 North; thence East for approximately 4.4 nautical miles (8.2 kilometers) to a point having coordinates 422385 East, 1953718 North; thence South for approximately 3.1 nautical miles (5.68 kilometers) to a point having coordinates 422385 East, 1948038 North; thence West for approximately 0.3 nautical miles (0.5 kilometers) to a point having coordinates 421885 East, 1948038 North; thence North for approximately 1.6 nautical miles (3.0 kilometers) to a point having coordinates 421890 East, 1950997 North; thence West for approximately 1.7 nautical miles (3.2 kilometers) to a point having coordinates 418701 East, 1950997 north; thence South for approximately 0.9 nautical miles (1.7 kilometers) to a point having coordinates 418705 East, 1949291 North; thence East-South-East for approximately 0.7 nautical miles (1.3 kilometers) to a point having coordinates 419957 East, 1949124 North; thence South-East for approximately 0.6 nautical miles (1.1 kilometers) to a point having coordinates 420154 East, 1948038 North; thence West for approximately 3.55 nautical miles (6.57 kilometers) to a point having coordinates 413585 East, 1948038 North; thence North for approximately 2.11 nautical miles (3.90 kilometers) to a point having coordinates 413585 East, 1951938 North; thence East for approximately 0.3 nautical miles (0.6 kilometers) to a point having coordinates 414169 East, 1951938 North; thence North for approximately 1.0 nautical miles (1.8 kilometers) to the point of origin and encompassing an approximate area of 4,109.3 hectares (41.1 square kilometers).

ZONE II A: DOG FLEA CAYE AND BLACK BIRD CAYE CONSERVATION ZONE

ALL THAT PORTION of the Caribbean Sea, named as ZONE II A: DOG FLEA CAYE AND BLACKBIRD CAYE CONSERVATION ZONE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 420055 East, 1939316 North; thence East for approximately 3.2 nautical miles (5.9 kilometers) to a point having coordinates 425927 East, 1939313 North; thence further East for approximately 1.4 nautical miles (2.5 kilometers) to a point having coordinates 428473 East, 1939312 North; thence South for approximately 14.8 nautical miles (27.4 kilometers) to a point having coordinates 428454 East, 1911947 North; thence West for approximately 5.0 nautical miles (9.3 kilometers) to a point having coordinates 419183 East, 1911948 North; thence North for approximately 1.5 nautical miles (2.8 kilometers) to a point having coordinates 419182 East, 1914723 North; thence West for approximately 2.1 nautical miles (3.9 kilometers) to a point having coordinates 415322 East, 1914723 North; thence North following the high water mark along the coastline for approximately 2.2 nautical miles (4.0 kilometers) to a point having along the shoreline having coordinates 415015 East, 1917856 North; thence East for approximately 2.4 nautical miles (4.3 kilometers) to a point having coordinates 419391 East, 1917854 North; thence North for approximately 9.2 nautical miles (17.1 kilometers) to a point having coordinates 419391 East, 1934957 North; thence North-North-East for approximately 2.4 nautical miles (4.4 kilometers) to the point of origin, having an approximate area of 25,375.8 hectares (253.7 square kilometers), noting the computed area for this zone excludes the following area: Dog Flea Caye Spawning Aggregation Site.

ZONE II B: COCKROACH-GRASSY CAYE SPECIAL MANAGEMENT AREA

ALL THAT PORTION of the Caribbean Sea, named as ZONE II B: COCKROACH-GRASSY CAYE SPECIAL MANAGEMENT AREA, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 419113 East, 1934800 North; thence proceeding south at a constant 10m distance east of the reef crest to a point having coordinates 415529 East, 1929396 North; thence proceeding 0.540 nautical mile west to a point having coordinates 414529 East, 1929396 North; thence proceeding 0.540 nautical mile north to a point at the south tip of Caye Bokel, having coordinates 414529 East, 1930396 North; thence proceeding northeast following the line of the western edge of the back reef flat to a point having coordinates 416844 East, 1933602 North; thence following the high water mark on the coastline north to a point having coordinates 419147 East, 1935799 North; thence proceeding 0.540 nautical miles south to the point of origin, encompassing an approximate area of 888.0 hectares (8.9 square kilometers).

ZONE III: VINCENT'S LAGOON SPECIAL MANAGEMENT AREA

ALL THAT PORTION of the Caribbean Sea, named as Zone III: VINCENT'S LAGOON SPECIAL MANAGEMENT AREA, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 414431 East, 1937786 North; thence proceeding south along the entire perimeter of the lagoon, until the point of origin and encompassing an approximate area of 2600.6 hectares (26.0 square kilometers).

ZONE IV: CALABASH REEF CONSERVATION ZONE

ALL THAT PORTION of the Caribbean Sea, named as ZONE IV: CALABASH REEF CONSERVATION ZONE, and more fully described using the North American Datum

of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a North-Western point on the Eastern Coastline of Calabash Caye having coordinates 414154 East, 1911150 North; thence in an East-South-Easterly direction for approximately 0.7 nautical miles (1.2 kilometers) to a point having coordinates 415383 East, 1911070 North; thence South-West for approximately 1.2 nautical miles (2.2 kilometers) to a point having coordinates 413817 East, 1909464 North; thence North-West for approximately 0.3 nautical miles (0.6 kilometers) to a point on the Eastern Coastline of Calabash Caye having coordinates 413282 East, 1909694 North; thence in a generally North-Eastern direction along the Eastern Coastline of Calabash Caye, on the high watermark, for approximately 2.1 kilometers to the point of origin and encompassing an approximate area of 164.6 Hectares (1.6 square kilometers).

ZONE V: LONG BOGUE CONSERVATION ZONE

ALL THAT PORTION of the Caribbean Sea, named as ZONE V: LONG BOGUE CONSERVATION ZONE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection. Commencing at a point having coordinates 408489 East, 1911630 North; thence East for approximately 0.4 nautical miles (0.7 kilometres) to a point having coordinates 409190 East, 1911630 North; thence North-East for approximately 0.7 nautical miles (1.3 kilometres) to a point having coordinates 409674 East, 1912835 North; thence East-North-East for approximately 0.9 nautical miles (1.6 kilometres) to a point having coordinates 411272 East, 1913179 North; thence East-South-East for approximately 0.3 nautical miles (0.5 kilometres) to a point having coordinates 411778 East, 1913134 North; thence South-East for approximately 0.2

nautical miles (0.4 kilometres) to a point having coordinates 411921 East, 1912717 North; thence South-South-West for approximately 0.1 nautical miles (0.2 kilometres) to a point, on the mangrove shoreline, having coordinates 411913 East, 1912512 North; thence in a generally South-Western direction, along the mangrove shoreline, for approximately 3.6 nautical miles (6.7 kilometres) to a point, on the mangrove shoreline, having coordinates 408489 East, 1909393 North; thence North for approximately 1.2 nautical miles (2.2 kilometres) to the point of origin and encompassing an approximate area of 891.840 hectares (8.9 square kilometers).

ZONE VI: CAYE BOKEL CONSERVATION ZONE

ALL THAT PORTION of the Caribbean Sea, named as ZONE VI: CAYE BOKEL CONSERVATION ZONE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection. Commencing at a point having coordinates 395372 East, 1897817 North; thence East for approximately 3.52 nautical miles (6.52 kilometres) to a point, having coordinates 401894 East, 1897817 North; thence South for approximately 1.3 nautical miles (2.5 kilometres) to the point having coordinates 401894 East, 1895322 North; thence east for approximately 1.82 nautical miles of (3.37 kilometers) to a point having coordinates 405264 East, 1895 327 North; thence South for approximately 2.07 nautical miles (3.83 kilometres) to a point, having coordinates 405264 East, 1891500 North; thence West for approximately 5.0 nautical miles (9.34 kilometres) to a point having coordinates 395924 East, 1891500 North; thence North-West for approximately 3.42 nautical miles (6.341 kilometres) to the point of origin and encompassing an approximate area of 5,230.8 hectares (52.3 square kilometers).

ZONE VII: PRESERVATION ZONE

ALL THAT PORTION of the Caribbean Sea, named as ZONE VII: PRESERVATION ZONE, and more fully described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 401406 East, 1921977 North; thence East for approximately 0.3 nautical miles (0.6 kilometres) to a point, on the mangrove shoreline, having coordinates 401971 East, 1921977 North; thence in a generally Eastern direction along the mangrove shoreline, for approximately 2.7 nautical miles (5.1 kilometres) to a point, on the mangrove shoreline, having coordinates 405079 East, 1922388 North; thence in a generally Southern direction, mangrove shoreline, for approximately 3.7 nautical miles (6.8 kilometres) to a point, on the mangrove shoreline, having coordinates 403778 East, 1917077 North; thence North-East for approximately 0.1 nautical miles (0.2 kilometres) to a point having coordinates 403932 East, 1916899 North; South-West for approximately 0.3 nautical miles (0.5 kilometres) to a point having coordinates 403421 East, 1916707 North; thence North-West for approximately 0.2 nautical miles (0.3 kilometres) to a point having coordinates 403332 East, 1916978 North; thence West-North-West for approximately 0.2 nautical miles (0.4 kilometres) to a point having coordinates 402925 East, 1917086 North; thence West for approximately 0.8 nautical miles (1.5 kilometres) to a point having coordinates 401406 East, 1917086 North; thence North for approximately 2.6 nautical miles (4.9 kilometres) to the point of origin and encompassing an approximate area of 1,480.8 hectares (14.8 square kilometers).

ZONE VIII: GENERAL USE ZONE

ALL THAT PORTION of the Caribbean Sea, named as ZONE VIII: GENERAL USE ZONE, and more fully

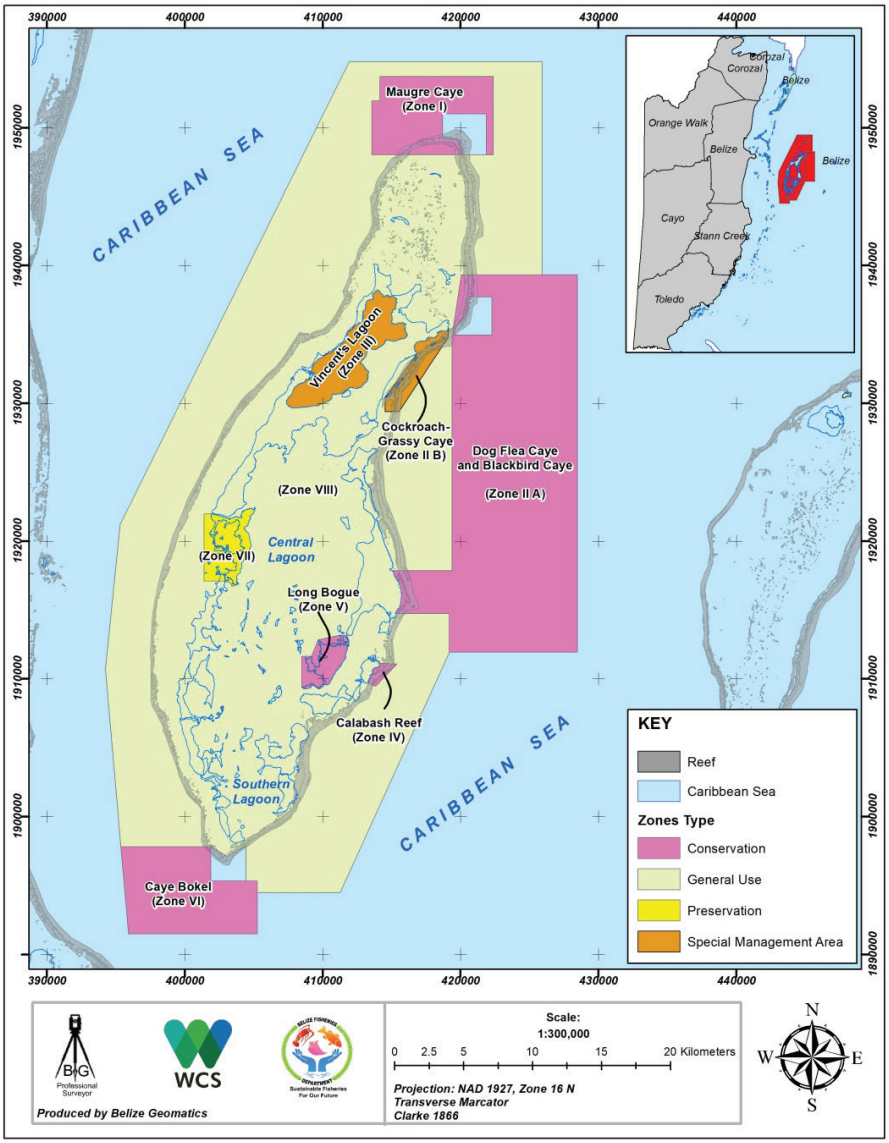
described using the North American Datum of 1927 (NAD27) and scaling all coordinates in meters within Zone 16 of the Universal Transverse Mercator (UTM) projection.

Commencing at a point having coordinates 411927 East, 1954800 North; thence East for approximately 7.6 nautical miles (14.0 kilometres) to a point having coordinates 425927 East, 1954800 North; thence South for approximately 8.4 nautical miles (15.5 kilometres) to a point having coordinates 425927 East, 1939313 North; thence West for approximately 3.2 nautical miles (5.9 kilometres) to a point having coordinates 420055 East, 1939316 North; thence South-South-West for approximately 2.4 nautical miles (4.4 kilometres) to a point having coordinates 419391 East, 1934957 North; thence South for approximately 9.2 nautical miles (17.1 kilometres) to a point having coordinates 419391 East, 1917854 North; thence West for approximately 1.2 nautical miles (2.3 kilometres) to a point having coordinates 417136 East, 1917855 North; thence South for approximately 1.7 nautical miles (3.1 kilometres) to a point having coordinates 417136 East, 1914723 North; thence East for approximately 1.1 nautical miles (2.0 kilometres) to a point having coordinates 419182 East, 1914723 North; thence South for approximately 1.5 nautical miles (2.8 kilometres) to a point having coordinates 419183 East, 1911948 North; thence South-West for approximately 10.4 nautical miles (19.2 kilometres) to a point having coordinates 411264 East, 1894474 North; thence East for approximately 3.2 nautical miles (6.0 kilometres) to a point having coordinates 405264 East, 1894474 North; thence North for approximately 2.5 nautical miles (4.6 kilometres) to a point having coordinates 405264 East, 1899074 North; thence West for approximately 1.3 nautical miles (2.5 kilometres) to a point, on the mangrove shoreline, having coordinates 402773 East, 1899074 North; thence in a generally North-Western direction, along the mangrove shoreline, for approximately 0.9 nautical miles (1.8 kilometres) to a point, on the mangrove shoreline, having coordinates 402236 East, 1900 527 North; thence West for

approximately 3.8 nautical miles (7.1 kilometres) to a point having coordinates 395135 East, 1900 527 North; thence North-North-West for approximately 5.5 nautical miles (10.2 kilometres) to a point having coordinates 394245 East, 1910 709 North; thence North-North-East for approximately 5.7 nautical miles (10.5 kilometres) to a point having coordinates 395312 East, 1921215 North; thence North-East for approximately 20.2 nautical miles (37.5 kilometres) to the point of origin, having an approximate area of 106321.1 hectares (1,063.2 square kilometers), noting the computed area for this zone excludes Zones I to VII.".

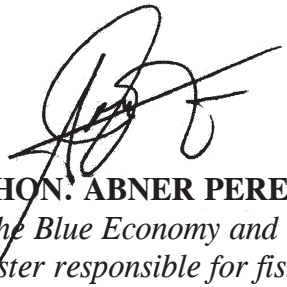
Repeal and replacement of Schedule 2.

3. Schedule 2 of the principal Order is repealed and replaced with the following–


390000
400000
410000
420000
430000
440000
1950000
1940000
1930000
1920000
1910000
1900000
1890000
CARIBBEAN SEA
CARIBBEAN SEA
Maugre Caye
(Zone I)
Vincent's Lagoon
(Zone III)
Cockroach-
Grassy Caye
(Zone II B)
Dog Flea Caye
and Blackbird Caye
(Zone II A)
(Zone VIII)
(Zone VII)
Central
Lagoon
Long Bogue
(Zone V)
Calabash Reef
(Zone IV)
Southern
Lagoon
Caye Bokel
(Zone VI)
Corozal
Corozal
Belize
Orange Walk
Belize
Belize
Cayo
Stann Creek
Toledo
KEY
Reef
Caribbean Sea
Zones Type
Conservation
General Use
Preservation
Special Management Area
BG
Professional
Surveyor
WCS
Produced by Belize Geomatics
Scale:
1:300,000
0 2.5 5 10 15 20 Kilometers
Projection: NAD 1927, Zone 16 N
Transverse Marcator
Clarke 1866
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S

”.

MADE by the Minister responsible for fisheries this 19th day of April, 2022.



HON. ABNER PEREZ
Minister of the Blue Economy and Civil Aviation
(Minister responsible for fisheries)

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan, Belize, C.A.

BELIZE:

FISHERIES RESOURCES (HIGH PROTECTION FOR BIODIVERSITY MARINE RESERVES) REGULATIONS, 2022

ARRANGEMENT OF REGULATIONS

PART I

Preliminary

1. Citation.

2. Interpretation.

PART II

Control of Zones – General Provisions

3. Zones to be clearly demarcated.

4. Rules for Zones.

5. Scientific Research Licence.

6. General penalty.

SCHEDULE

BELIZE:

STATUTORY INSTRUMENT

No. 73 of 2022

REGULATIONS made by the Minister responsible for fisheries in exercise of the powers conferred upon him by section 17 of the Fisheries Resources Act, Chapter 210 of the Substantive Laws of Belize, Revised Edition 2020, and all other power thereunto him enabling.

(Gazetted 21st April, 2022).

PART I

Preliminary

1. These Regulations may be cited as the **Citation.**

FISHERIES RESOURCES (HIGH PROTECTION FOR BIODIVERSITY MARINE RESERVES) REGULATIONS, 2022.

2. In these Regulations– **Interpretation.**

"catch and release" means the act of catching fish and then immediately releasing them back into the waters of Belize in the same state that the fish was landed;

"sport fishing" means catch and release fishing;

"Zone 1" means the area referred to as the High Protection Biodoversity Zone 1 declared a Marine Reserve by the Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order; **S.I. 69 of 2022.**

"Zone 2" means the area referred to as the High Protection Biodoversity Zone 2 declared a Marine Reserve by the **S.I. 69 of 2022.** Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order;

"Zone 3" means the area referred to as the High Protection Biodoversity Zone 3 declared a Marine Reserve by the **S.I. 69 of 2022.** Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order;

"Zone 4" means the area referred to as the High Protection Biodoversity Zone 4 declared a Marine Reserve by the **S.I. 69 of 2022.** Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order;

"Zone 5" means the area referred to as the High Protection Biodoversity Zone 5 declared a Marine Reserve by the **S.I. 69 of 2022.** Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order;

"Zone 6" means the area referred to as the High Protection Biodoversity Zone 6 declared a Marine Reserve by the **S.I. 69 of 2022.** Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order; and

"Zone 7" means the area referred to as the High Protection Biodoversity Zone 7 declared a Marine Reserve by the **S.I. 69 of 2022.** Fisheries Resources (High Protection For Biodiversity Marine Reserves) Order, 2022 and more fully described in Schedule I of that Order.

PART II

Control of Zones – General Provisions

Zones to be clearly demarcated.

3. Zone 1, Zone 2, Zone 3, Zone 4, Zone, 5, Zone 6 and Zone 7 shall be clearly demarcated by buoys or some other form of demarcation as determined by the Fisheries Administrator.

Rules for the Zones.

4. In Zone 1, Zone 2, Zone 3, Zone 4, Zone, 5, Zone 6 and Zone 7, only the following are permitted–

(a) scientific research; and

(b) sport fishing.

Scientific Research Licence. Schedule.

5.–(1) A person who is desirous of engaging in scientific research within Zone 1, Zone 2, Zone 3, Zone 4, Zone, 5, Zone 6 or Zone 7 shall apply to the Fisheries Administrator for a Scientific Research Licence in the form set out in the Schedule.

(2) The Fisheries Administrator may grant a Scientific Research Licence within fourteen days of the receipt of an application and shall communicate his decision to the applicant in writing.

(3) A person shall, upon the grant of a Scientific Research Licence, pay a licence fee of $1000.00.

(4) The Fisheries Administrator may waive or vary the fee payable by a person for a Scientific Research Licence.

General Penalty. CAP. 210.

6. 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 Resources Act.

SCHEDULE
[regulation 5]

APPLICATION FOR A SCIENTIFIC RESEARCH LICENCE

To: Fisheries Administrator
Date of application: ……
(dd/mm/yy)

Name of Applicant including title or designation: ……

Address:
Home Country: ……

Whilst in Belize: ……

Telephone No……

Name of person who is responsible for ensuring compliance with the conditions attached to the licence:
……
……
……
……

Institution with whom connection or on whose behalf the work is to be carried out: ……
……
……
……

Period during which work is to be carried ……

The following documents are to be attached to this application:

1. A list of the names and titles of persons who will be accompanying the licensee during the course of the work for whom the licensee shall be responsible.

2. A list of equipment, in triplicate, which the licensee wishes to bring into the country for scientific purposes and for which a temporary import permit is requested.

3. A detailed programme, in duplicate, of the purpose of the work or expedition including area of work.

I wish to conduct research/an investigation in Belize on my own behalf / as leader of a group of ( ) students / on the behalf of the institution named above for the following purposes:

.....
.....
.....
.....

details of which are contained in the attached pages. I will wish to collect specimens for study in Belize and will/will not wish to export these specimens for further study at the end of my stay. I will want to collect specimen of ( ) species for study and export.

Date: ..... Signature of applicant: .....
(dd/mm/yy)

MADE by the Minister responsible for fisheries this 19th day of April, 2022.

HON. ABNER PEREZ
Minister of the Blue Economy and Civil Aviation
(Minister responsible for fisheries)

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan

BELIZE:

FISHERIES (SOUTH WATER CAYE MARINE RESERVE) (AMENDMENT) REGULATIONS, 2022

ARRANGEMENT OF REGULATIONS

1. Citation.

2. Amendment of regulation 4.

3. Amendment of regulation 5.

4. Amendment of regulation 6.

BELIZE:

STATUTORY INSTRUMENT

No. 74 of 2022

REGULATIONS made by the Minister responsible for fisheries in exercise of the powers conferred upon him by sections 17 and 20 of the Fisheries Resources Act, Chapter 210 of the Substantive Laws of Belize, Revised Edition 2020, and all other power thereunto him enabling.

(Gazetted 21st April, 2022).

PART I

Preliminary

1. These Regulations may be cited as the **Citation.**

FISHERIES (SOUTH WATER CAYE MARINE RESERVE) (AMENDMENT) REGULATIONS, 2022,

and shall be read and construed as one with the Fisheries (South Water Caye Marine Reserve) Regulations, 2009, which is hereinafter referred to as the principal Regulations. **S.I. 74 of 2009.**

2. Regulation 4 of the principal Regulations is amended by repealing sub-regulation and substituting the following– **Amendment of regulation 4.**

"4.–(1) For the purposes of these Regulations and for the control of the Reserve, there shall be established within the Reserve, the following zones–

(a) Conservation Zone I;

(b) Conservation Zone II;

(c) Conservation Zone III;

(d) Preservation Zone;

(e) General Use Zone I; and

(f) General Use Zone II.".

Amendment of regulation 5.

3. Regulation 5 of the principal Regulations is amended–

(a) by repealing sub-regulation (1) and substituting the following–

"(1) General Use Zone I and General Use Zone II are restricted to fishing by licensed fishermen who currently use these Zones and a fisherman who is desirous of fishing within these Zones shall apply for a licence to fish in accordance with these Regulations.";

(b) in sub-regulation (4), by deleting the words "the General Use Zone only" and substituting the words "General Use Zone I and General Use Zone II only in"; and

(c) in sub-regulation (5) , by deleting the words "the General Use Zone" and substituting the words "General Use Zone I and General Use Zone II".

Amendment of regulation 6.

4. Regulation 6 of the principal Regulations is repealed and replaced with the following–

"Rules for Conservation Zones.

6.–(1) There shall be only non-extractive recreational activities in Conservation Zone I, Conservation Zone II and Conservation Zone III.

(2) No person shall engage in commercial, sport or subsistence fishing within Conservation Zone I, Conservation Zone II or Conservation Zone III.

(3) No person shall secure a boat to the sea bed of Conservation Zone I, Conservation Zone II, or Conservation Zone III except by means of a mooring that is officially designated for this purpose, save in the case of an emergency where life and property are endangered, or with the prior written permission of the Reserve Manager.

(4) Every diver in Conservation Zone I, Conservation Zone II or Conservation Zone III shall adhere to the following rules–

(a) divers shall register with the Reserve Manager prior to entering any of the conservation zones;

(b) charter dives shall first obtain a licence in accordance with these Regulations, before operating in any of the conservation zones and all dive boats shall fly the "divers down flag" when they have divers in the water;

(c) only certified scuba divers, or divers undergoing a training course conducted by a recognized instructor, are allowed to use scuba equipment in the Reserve;

(d) dive guides are required to explain the rules of the Reserve to a diver within the Reserve;

(e) every boat owner desirous of operating a boat in any of the conservation zone, shall first register his boat with the Fisheries Administrator in accordance with these Regulations;

(f) every operator of a motor boat shall observe the low wake zone boat way when approaching snorkelers or divers;

(g) for Scuba tours, a maximum of eight divers per licensed dive master is permitted;

(h) for snorkel tours, a maximum of eight snorkelers per licensed tour guide is permitted; and

(i) no person shall harass or in any way tamper with any fauna within any of the conservation zones.

(5) For the purpose of this Regulation, "divers down flag" means a flag with a white diagonal stripe upon a red or blue background.

(6) No person shall engage in water-skiing or jet skiing within the Conservation Zone I, Conservation Zone II or Conservation Zone III.".

MADE by the Minister responsible for fisheries this 19th day of April, 2022.

HON. ABNER PEREZ
Minister of the Blue Economy and Civil Aviation
(Minister responsible for fisheries)

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan, Belize, C.A.

BELIZE:

FISHERIES (TURNEFFE ATOLL MARINE RESERVE) (AMENDMENT) REGULATIONS, 2022

ARRANGEMENT OF REGULATIONS

1. Citation.

2. Amendment of regulation 2.

3. Repeal.

BELIZE:

STATUTORY INSTRUMENT

No. 75 of 2022

REGULATIONS made by the Minister responsible for fisheries in exercise of the powers conferred upon him by sections 17 of the Fisheries Resources Act, Chapter 210 of the Substantive Laws of Belize, Revised Edition 2020, and all other power thereunto him enabling.

(Gazetted 21st April, 2022).

PART I

Preliminary

1. These Regulations may be cited as the **Citation.**

FISHERIES (TURNEFFE ATOLL MARINE RESERVE) (AMENDMENT) REGULATIONS, 2022,

and shall be read and construed as one with the Fisheries (Turneffe Atoll Marine Reserve) Regulations, 2014, which is hereinafter referred to as the principal Regulations. **S.I. 4 of 2014.**

2. The principal Regulations are amended in regulation 2 by deleting the definition of "conservation zones" and substituting the following– **Amendment of regulation 2.**

""conservation zones" means the following zones–

(a) Zone I: Maugre Caye Conservation Zone;

(b) Zone IIA: Dog Flea Caye and Black Bird Caye Conservation Zone;

(c) Zone IV: Calabash Reef Conservation Zone;

(d) Zone V: Long Bogue Conservation Zone; and

(e) Zone VI: Caye Bokel Conservation Zone;".

S.I. 79 of 2013.

3. The Fisheries (Turneffe Atoll Marine Reserve) Regulations, 2013 are repealed.

MADE by the Minister responsible for fisheries this 19th day of April, 2022.

HON. ABNER PEREZ
Minister of the Blue Economy and Civil Aviation
(Minister responsible for fisheries)

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan, Belize, C.A.

Exhibit A: Conservation Commitments

Capitalized terms have the meaning given to them in Clause 7 or in Conservation Funding Agreement, dated November 4, 2021 (the "Agreement"), as applicable.

Clause 1. The Marine Spatial Plan

This Clause 1 sets forth Belize's obligations to complete a legally enforceable Marine Spatial Plan (MSP) and designate up to 30 percent of its Ocean in Biodiversity Protection Zones.

The MSP shall include marine conservation outcomes for biodiversity protection and denote, in reasonable detail, the permissible activities that may be lawfully carried on in any part of Belize's Ocean.

The MSP shall:

1. Expand the percentage of Belize's Ocean that is in Biodiversity Protection Zones from 15.9 percent at the signing of this Agreement to whichever is the lower of:
    a. 30 percent of Belize's Ocean, with at least 15 percentage in High Protection for Biodiversity Zones and at least 15 percentage in Medium Protection for Biodiversity Zones; or
    b. The percentage stated in the MSP.
2. Provide that all Biodiversity Protection Zones be Gazetted and submitted to the relevant international authority (e.g., the World Database on Marine Protected Areas, International Maritime Organisation, International Hydrographic Organisation);
3. contain an Implementation Plan;
4. be legally enforceable; and
5. be Implemented.

The MSP shall be completed consistent with international best practices such as in the IOC-UNESCO 2009 Guide titled "Marine Spatial Planning - A Step-by-Step Approach toward Ecosystem-based Management" and at a minimum address the following:

1. Transparent, inclusive, equitable, science-based and participatory process; and
2. A Marine Protected Area (MPA) design including ecological, economic, social and cultural criteria set forth by frameworks such as IUCN WCPA 2012 international guidebook titled "Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas", the IUCN-WCPA 2017 guidebook titled "Large-Scale Marine Protected Areas: Guidelines for Design and Management" and IUCN-WCPA 2008 technical guidebook titled "Establishing Resilient Marine Protected Area Networks – Making It Happen".

Milestone 1. No later than six (6) months after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette the commitment made by the Government on April 2, 2019[1] to expand High Protection for Biodiversity Zones to 11.6% of Belize's Ocean. Upon achievement of this Milestone, Belize will have 11.6% of its Ocean in High Protection for Biodiversity Zones and 9.0% of its Ocean under Medium Protection for Biodiversity Zones, for a total of

[1] For further information, see https://www.pressoffice.gov.bz/expansion-of-fisheries-replenishment-no-take-zones/

20.5% in Biodiversity Protection Zones and Marine Protected Areas (MPA). After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall thereafter have less than 20.5% of its Ocean in Biodiversity Protection Zones and MPAs.

Milestone 3. No later than one (1) year after signing the Agreement, the Government shall initiate the process of developing a MSP for its Ocean by: (i) designation of a lead ministry or agency for the MSP process and (ii) establishment of a MSP steering committee comprised of senior level officers or employees from governmental and non-governmental stakeholders from sectors/areas including fisheries, coastal zone management, tourism, water resources, shipping, environment, finance, academia and energy. A representative of the Nature Conservancy will be a member of the MSP steering committee. For the avoidance of doubt, the Government shall have full discretion to determine whether the governmental stakeholders participating in the MSP steering committee are Ministry or agency-level members. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall remove the designation of such lead agency or terminate the MSP steering committee prior to the achievement of Milestone 6.

Milestone 4. No later than three (3) years after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette Biodiversity Protection Zones covering a total of 25% of its Ocean. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall thereafter have less than 25% of its Ocean in Biodiversity Protection Zones.

Milestone 6. No later than five (5) years after signing the Agreement, (a) the National Assembly shall approve and the Government shall formally sign into law and Gazette Biodiversity Protection Zones covering a total of 30% of Belize's Ocean, or the percentage stated in the MSP; and (b) the MSP shall have been completed and approved by the National Assembly, signed into law, Gazetted and Implemented. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall thereafter have less than the lower of 30% and the percentage stated in the MSP of its Ocean in Biodiversity Protection Zones or Belize shall rescind the enactment of the MSP.

Milestone 8. No later than eight (8) years after signing the Agreement, Belize shall have approved Management Plans for the Biodiversity Protection Zones, and the ministry with authority over such plans shall have signed the Management Plans. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall rescind such Management Plans.

Clause 2. Other Conservation Milestones.

This Clause 2 sets forth Belize's obligations with regards to environmental commitments not addressed by the MSP.

Milestone 2. *Designation of Public Lands within the Belize Barrier Reef Reserve System ("BBRRS") as Mangrove Reserves.* No later than six (6) months after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette the designation of all remaining public lands within the BBRRS as strict mangrove reserves as outlined in Decision 43 COM 7B.21, which law shall include a permanent ban on the sale of public lands within the BBRRS. After

achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall rescind such designation or ban.

Milestone 5. *Integrated Coastal Zone Management Plan*[2] *("ICZMP").* No later than four (4) years after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette the revised Coastal Zone Management Act[3] and ICZMP[4], which ICZMP shall include a chapter on marine and coastal biodiversity offsets. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall rescind such Coastal Zone Management Act or ICZMP.

Milestone 7. *International Union for Conservation of Nature ("IUCN") Green List Areas.* No later than six (6) years after signing the Agreement, the Government shall apply to have at least three (3) formally designated marine protected areas in Belize's Ocean listed as IUCN Green List Areas (as that term is used by IUCN), and shall provide evidence of confirmation from the IUCN of receipt of the applications. After achievement of this Milestone, no Conservation Event will occur under the Agreement in respect of this Milestone.

Clause 3. General Conservation Undertakings

The purpose of this Clause 3 is to memorialize the commitments of Belize to undertake additional activities that recognize the need to balance the development of Belize's economy with the social, economic and environmental needs of a healthy and biodiverse Ocean. While these commitments are not linked to any Milestones (and, as a result, no failure to meet these commitments may result in an obligation to make any Conservation Event Payments or be subject to any penalties of any kind), Belize acknowledges its good faith intention to comply with these undertakings within the parameters of its Constitution.

(A) *Aquaculture.* Belize commits to implement a transparent, science based, socially responsible regulations consistent with international best practice for a high-value, sustainable aquaculture and mariculture industry in Belize's Ocean and waters on the landward side of the baseline of the territorial sea ("Internal Waters").

(B) *Fisheries*. Belize commits to implement a governance framework for domestic and high seas fisheries[5] consistent with transparent, science based, socially responsible international best practices[6]. This includes the management of current and new fishing activities in Belize's Ocean and vessels flagged to Belize. This governance framework would include, at a minimum, (i) compliance with all national, regional and global obligations related to fishing activities, including enhanced monitoring to address illegal, unregulated and unreported fishing activities, (ii) sustainable harvest of target species (including restrictions on gear types deemed to be unsustainable), and (iii) reducing broader environmental impacts, including bycatch of endangered, threatened and protected species and habitat destruction. The governance framework

[2] For further information, see Integrated Coastal Zone Management Plan
[3] See https://www.elaw.org/es/system/files/attachments/publicresource/Bz.cap329.pdf
[4] See Integrated Coastal Zone Management Plan
[5] Domestic and high seas policies & legislation: (Fisheries Resources Act 2020, Subsidiary regulations, Fisheries Policy Framework.
[6] See, for example, UN FAO Small-Scale Fisheries Guidelines and Marine Stewardship Council Fisheries Improvement Project Guidelines.

would advance, for example, the implementation of all actions identified in the "National Plan of Action of Belize to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated (IUU) Fishing on the High Seas" on 20th May 2014 as well as national and regional plans to address IUU.

(C) *Blue Carbon*. Recognizing the potential of blue carbon projects to support the long-term financial sustainability of marine areas formally protected for conservation, Belize commits to develop and implement a national regulatory framework for the development of blue carbon projects within the national carbon strategy. Such a framework will be completed through a consultative process that addresses, at a minimum, the following:

a. allowing for ownership of carbon offsets by co-managers, investors and/or private landowners;
b. allowing for negotiation by co-managers of benefit/profit sharing among stakeholders and/or investors participating in the carbon offset program;
c. allowing for cost recovery and profit distribution with those participating in the carbon offset program; and
d. stipulate that the remainder of the proceeds from the annual sale of offsets, outside of cost recovery and shared profits, be re-invested in the marine protected areas in which such blue carbon ecosystems are located.

(D) *Managed Access Program Evaluation*. Belize commits to complete an independent evaluation of the Managed Access Program and, where reasonably possible to do so, commence to implement the recommendations from that evaluation.

(E) Environmental Impact Assessment Regulations. Belize commits to finalizing revisions to the Environmental Impact Assessment regulations, including revisions to better support the international designations such as the BBRRS World Heritage Site listing.

(F) World Heritage Sites: Belize will meet or exceed the minimum standards for development in World Heritage Sites in accordance with the Legislative, Regulatory, and Contractual protection measures of the World Heritage Convention's Operational Guidelines dated July 10, 2019. [7]

(G) Watershed Management. Belize commits to undertaking the development of a watershed management plan to address water quality monitoring, nutrient loading and garbage disposal for at least two (2) major watersheds.

Clause 4. Milestones.

Belize shall satisfy each of the Milestones set forth in Clauses 1 & 2 above (collectively, "Milestones") and summarized in Table 1 below by the relevant Milestone date. In case of a conflict between Clauses 1 & 2 and Table 1, Clauses 1 & 2 shall control.

Clause 5. Conservation Report.

A high-ranking civil servant of Belize shall deliver a report to BIC on the one (1) year anniversary of the date of the Agreement and each year thereafter (the "Conservation Report") substantially in the form attached hereto as Appendix 1. The Conservation Report shall include: (i) a confirmation that Belize remains committed to achieving the conservation outcomes described in the Agreement; (ii) a summary of

[7] See http://whc.unesco.org/en/guidelines/

the progress made to date, including (A) a confirmation as to whether or not the expected Milestones have been achieved to date; (B) an estimate of the number of square miles (square kilometers) of Ocean protected to date; and (C) evidence demonstrating attainment of any Milestones achieved during the preceding year; and (iii) a summary (in reasonable detail) of any deficiencies in achieving the Milestones, including steps being taken to remedy those deficiencies.

Clause 6. Grace Period.

(A) Belize shall be entitled to a grace period of six (6) months for any Milestone upon delivery of a letter provided by a high-ranking civil servant of Belize to BIC that provides a summary (in reasonable detail) of any deficiencies in achieving the Milestone and the steps being taken to remedy those deficiencies.

(B) Belize may request a second six (6) month grace period for any Milestone via a letter provided by a high-ranking civil servant of Belize to BIC that provides a summary (in reasonable detail) of any deficiencies in achieving the Milestone, a justification for the delay and the steps being taken to remedy those deficiencies. BIC may request additional information from Belize and will notify Belize of the status of its evaluation of Belize's request. If BIC has not notified Belize that the request has been denied within 45 days, the request shall be deemed granted. Note that a maximum of two six-month extensions may be given for any given Milestone.

(C) For the avoidance of doubt, utilization of a grace period for any Milestone shall not extend the due date of any other Milestone.

Clause 7. Definitions.

Biodiversity Protection Zones – means High Protection for Biodiversity Zones and Medium Protection for Biodiversity Zones.

Environmental Impact Assessment Regulations – means the Environmental Impact Assessment Regulations, as amended, promulgated pursuant to the Environmental Protection Act, Chapter 328 of the Substantive Laws of Belize.

Gazetted – means under the relevant national legislation, the coordinates of a spatial area are published and legally enforceable.

High Protection for Biodiversity Zones – means Zones of the Ocean allocated for high marine protection and biodiversity goals, for representative habitats and species. High biodiversity protection zones conserve and protect the top priority areas for marine and coastal biodiversity. These zones are designated for habitats and species that may be rare, endangered, unique or with narrow distribution ranges. This zone includes breeding or spawning areas, key foraging habitat, fragile or sensitive species and habitats, and internationally significant areas. When combined, these zones provide habitats and species with long-term protection, and are sufficiently large to ensure ecological resilience and climate change adaptation. This zone category is not suitable for extraction or sea-bed alteration and is considered a 'no-take' zone in common vernacular. Examples of high protection status, depending on the objectives and allowable human activities, are: Marine Protected Areas in the IUCN categories Ia, Ib, and II.

Implementation Plan – means the plan developed during the MSP process that sets the course of future actions related to ocean management. There is no one-size-fits-all for MSP Implementation Plans and 'best practice' is still being developed globally. At a minimum, an Implementation Plan would contain all essential and necessary information for administration, operations, budgets, research and monitoring, enforcement and management of zones, building capacity and awareness, policy and legal instruments, and education. The Implementation Plan shall include the timeline for when the Gazetted Biodiversity Protection Zones will be legally enforced.

Implemented – means, with respect to the MSP, when: (i) all zones in the MSP have been signed into law and Gazetted, (ii) the Marine Spatial Plan document(s) has been signed into law by Belize and Gazetted, (iii) Belize has initiated creation of the MSP management plan(s), and (iv) Belize starts the MSP Implementation Plan.

Managed Access Program – means the rights-based fisheries regime based on a Territorial User Rights for Fisheries approach being implemented by the Belize Fisheries Department across all of Belize's territorial waters with which fishers holding commercial fishing licenses must comply.

Management Plan – means a document which sets out the management approach and goals, together with a framework for decision making, to apply in a specific MPA over a given period of time.

Marine Protected Areas (MPA) – means a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. (Source: IUCN). Examples of Marine Protected Areas include the following IUCN categories:

(a) IUCN Protected Area categories

> **Ia Strict nature reserve**: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values
>
> **Ib Wilderness area**: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition
>
> **II National park**: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities
>
> **III Natural monument or feature**: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove
>
> **IV Habitat/species management are**a: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category
>
> **V Protected landscape or seascape:** Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and

where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values

VI Protected areas with sustainable use of natural resources: Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims

(b) IUCN Other Effective area-based Conservation Measures (OECM)

A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values (CBD, 2018).

Marine Spatial Plan (MSP) – means a plan analyzing and allocating parts of three-dimensional marine spaces (or ecosystems) to specific uses or objectives in order to achieve ecological, economic, and social objectives that are specified through a political process. The marine spatial planning process includes identifying Biodiversity Protection Zones in an iterative process. The goal of having 30% of Belize's Ocean in Biodiversity Protection Zones will be part of the overall design such that the Biodiversity Protection Zones so identified will facilitate achievement of Milestone 4.

Medium Protection for Biodiversity Zones – means zones of the Ocean allocated for medium marine protection and biodiversity goals, for representative habitats and species. Sustainable uses are compatible with the biodiversity objectives in these areas. Medium biodiversity protection and sustainable use zones are proposed to conserve areas that are suitable for medium levels of biodiversity protection and are also compatible with some sustainable uses. These zones include habitats and species that have some tolerance to disturbance and human activities. These zones also include regionally and nationally significant areas. This zone category is suitable for some level of extraction and sea-bed alteration, with appropriate management and direction, depending on the objective of each designated area. Examples of medium protection status could include: Marine Protected Area IUCN categories V and VI, IUCN OECM category, and Locally Managed Marine Areas (LMMA).

Ocean – means Belize's Exclusive Economic Zone, Territorial Sea, Archipelagic Waters and/or Internal Waters as defined by the United Nations Convention for the Law of the Sea (UNCLOS), among others, in each case as defined in national legislation at the time the Agreement enters into force.

Protected Areas – means Marine Protected Areas (MPA).

Table 1

Milestone Table for the text above. In case of disagreement or inconsistency between this table and the text above, the text above will control.

Milestone Number	Milestone Summary Description	Time after signing the Agreement	% of Ocean in High Protection[1]	% of Ocean in Medium Protection[1]	Total % of Ocean in Biodiversity Protection[1]
1	Expand Biodiversity Protection Zones to 11.57% of the Ocean	6 months	Increased to 11.57%	Remains at the current 8.96%	20.53%
2	Designate Public Lands within the BBRRS as Mangrove Reserves	6 months			
3	Belize initiates MSP process	1 year			
4	Expand Biodiversity Protection Zones to 25% of the Ocean	3 years	Add 4.5% more in total across either Medium and/or High zones[1]		25%[1]
5	Implementation of ICZMP	4 years			
6	Complete Biodiversity Protection Zones, MSP signed in to law and Implemented	5 years	Add 5% more in total across either Medium and/or High zones[1]		30%[1]
7	At least 3 IUCN Green List Applications Submitted	6 years			
8	Approved Management Plans	8 years			

[1]*In all cases, is the lower of the % or the amount specified in the MSP*

BELIZE:

BLUE BONDS LOAN ACT, 2021

ARRANGEMENT OF SECTIONS

1. Short title.

2. Interpretation.

3. Validity of Government's authority.

4. Agreement to have force of law.

5. Financial provisions.

6. Exemption from taxes.

7. Exemption from registrations.

8. Closing costs.

9. Act to bind Crown.

No. 28 of 2021

I assent,

(H.E. MS. FROYLA TZALAM)
Governor-General

29th October 2021.

AN ACT to authorize the Government of Belize to enter into the Blue Loan Agreement, Conservation Funding Agreement and Ancillary Agreements for and on behalf of Belize and to give statutory effect to the terms and conditions of the Blue Loan Agreement, the Conservation Funding Agreement and Ancillary Agreements; and to provide for matters connected therewith or incidental thereto.

(Gazetted 29th October, 2021).

BE IT ENACTED, by and with the advice and consent of the House of Representatives and Senate of Belize and by the authority of the same, as follows:

1. This Act may be cited as the **Short title.**

BLUE BONDS LOAN ACT, 2021.

Interpretation.

2. In this Act–

"Agreement" means the Blue Loan Agreement to be made between Belize, Belize Blue Investment Company LLC, as Initial Lender, and Belize Blue Investment Company, LLC, as Administrative Agent, and authorized by resolution of the National Assembly;

"Ancillary Agreements" means such other agreements as may from time to time hereafter be required to give effect to or better perform obligations under, or otherwise to supplement, or to complement any legal structure or arrangement contemplated by provisions of the Agreement and the Conservation Funding Agreement, including the Direct Agreement to be made on the same date as the Agreement and the Conservation Funding Agreement;

"Belize Blue Investment Company LLC" means a Delaware, USA, limited liability company;

"Conservation Funding Agreement" means the Conservation Funding Agreement to be made between Belize and Belize Blue Investment Company, LLC and authorized by resolution of the National Assembly;

"Government" means the Government of Belize;

"Initial Lender" means the special purpose vehicle wholly owned by Blue Investments for Nature, Inc., a Delaware, USA non-profit corporation that is an affiliate of The Nature Conservancy; and

"The Nature Conservancy" means the District of Columbia, USA, non-profit corporation.

Validity of Government's authority. CAP. 15.

3. The National Assembly hereby resolves in accordance with section 7 of the Finance and Audit (Reform) Act, and for greater certainty and effect, enacts subject only to the

provisions of the Constitution of Belize, that the Government has full lawful authority to enter into the Agreement, the Conservation Funding Agreement and all Ancillary Agreements, and to make any and all payments under the Agreement, the Conservation Funding Agreement and any Ancillary Agreement in accordance with their terms notwithstanding any provision in any other law to the contrary.

Agreement to have force of law.

4. Subject to the provisions of the Constitution of Belize, all provisions of the Agreement and the Conservation Funding Agreement set out in the Schedule (with such modifications as may be approved by the Minister responsible for finance that do not otherwise increase Belize's payment obligations or conservation commitments thereunder), as well as all provisions of any Ancillary Agreement, shall have the force of law in Belize and any other law or regulation in any way inconsistent therewith shall stand repealed to the extent of any inconsistency.

Financial provisions.

5. All sums required to be paid by the Government for the purpose of meeting its obligations under the Agreement, the Conservation Funding Agreement and any Ancillary Agreement shall constitute debt charges on the Consolidated Revenue Fund and shall be–

(a) approved by an appropriation law;

(b) charged on and paid out of the Consolidated Revenue Fund;

(c) in the case of the Agreement, paid in United States Dollars; and

(d) in the case of the Conservation Funding Agreement or any Ancillary Agreement, paid in United States Dollars or Belize Dollars in accordance with its terms.

Exemption from taxes.

6. Notwithstanding anything to the contrary, the parties to the Agreement, the Conservation Funding Agreement and any Ancillary Agreement shall, in the exercise of any rights conferred, or performance of any obligations imposed, by the provisions of the Agreement, the Conservation Funding Agreement, or any Ancillary Agreement be exempted from taxes, duties or other imposts under the following Acts–

CAP. 55. *(a)* Income and Business Tax Act;

CAP. 63. *(b)* General Sales Tax Act;

CAP. 48. *(c)* Customs and Excise Duties Act;

CAP. 49. *(d)* Customs Regulations Act;

CAP. 52. *(e)* Exchange Control Regulations Act;

CAP. 64. *(f)* the Stamp Duties Act, and

CAP. 202. *(g)* the Trusts Act.

Exemptions from registrations.

7. Notwithstanding anything to the contrary, the parties to the Agreement, the Conservation Funding Agreement and any Ancillary Agreement and any other entities formed pursuant to and in furtherance of the Agreement, the Conservation Funding Agreement and any Ancillary Agreement shall be exempted from any requirement to secure any consents, effect any registrations or give any notices under the Exchange Control Regulations Act, the General Registry Act, the Trusts Act, the Companies Act or any other law, for the purpose of performing any obligations or exercising any rights under or in furtherance of the Agreement, the Conservation Funding Agreement or any Ancillary Agreement.

CAP. 52.
CAP. 327.
CAP. 202.
CAP. 250.

Closing costs.

8. Notwithstanding anything to the contrary, any closing costs, structuring fees or charges, including legal fees, financial advisory fees, agency fees, bondholder committee

fees and any other related fee, associated with the transactions in respect of the Agreement, the Conservation Funding Agreement and any Ancillary Agreement are hereby authorized for payment and shall be charged on and paid out of the Consolidated Revenue Fund.

9. This Act binds the Crown.

Act to bind Crown.

Printed in Belize by the Government Printer
#1 Power Lane, Belmopan, Belize, C.A.

Draft of October 22, 2021
CONFIDENTIAL

BLUE LOAN AGREEMENT

dated as of November [●], 2021

among

BELIZE,
as borrower

and

BELIZE BLUE INVESTMENT COMPANY, LLC,
as Initial Lender

and

BELIZE BLUE INVESTMENT COMPANY, LLC,
as Administrative Agent

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BLUE LOAN AGREEMENT, dated as of November [●], 2021 (this "**Agreement**"), by and among the sovereign democratic state of BELIZE ("**Belize**"), BELIZE BLUE INVESTMENT COMPANY, LLC, a Delaware limited liability company (the "**Initial Lender**"), and BELIZE BLUE INVESTMENT COMPANY, LLC, as Administrative Agent. Capitalized terms used herein have the meanings provided therefor in Annex A.

PRELIMINARY STATEMENTS

WHEREAS, Belize has previously issued and there remain outstanding Bonds in an aggregate capitalized principal amount of approximately U.S.$552,901,232;

WHEREAS, Belize has certain sustainable development policy objectives, including in respect of support of conservation activities focused on marine and marine-related activities;

WHEREAS, The Nature Conservancy ("**TNC**"), an Affiliate of the Initial Lender, has significant expertise, and has a long history of participating, in conservation projects, including marine and marine-related conservation projects, and in assisting in the structuring of arrangements using debt relief techniques to fund such projects;

WHEREAS, the Initial Lender is a special purpose vehicle wholly owned by Blue Investments for Nature, Inc. ("**BIN**"), an Affiliate of TNC, and was formed for the purpose of undertaking the transactions contemplated by this Agreement, the Funding Facility and the Conservation Funding Agreement;

WHEREAS, Belize and the Initial Lender have agreed to proceed with the transactions set out in this Agreement and the Conservation Funding Agreement with the objective of facilitating the following objectives: (a) the orderly development and implementation by Belize of a marine protection and spatial plan and (b) the partial relief of Belize's international debt burden;

WHEREAS, in furtherance of the foregoing, on the date hereof, (a) the Initial Lender has entered into the Funding Facility, pursuant to which the Initial Lender can draw up to a maximum of U.S.$[●], (b) the Initial Lender intends to draw the full amount available under such Funding Facility and use the proceeds of such drawing to provide the Loan, (c) the Initial Lender has obtained a Political Risk Insurance Policy from DFC and may obtain a Parametric Insurance Policy from the Parametric Insurer, and (d) the Initial Lender and certain other Persons are entering into the Conservation Funding Agreement, the Trust Agreement and the definitive documentation for the Endowment Account, and certain other ancillary documents;

WHEREAS, Belize intends to use the proceeds of the Loan to purchase and cancel the Bonds, to pay transaction fees and expenses and to fund certain reserve accounts; and

WHEREAS, the Initial Lender shall utilize certain funds paid by Belize pursuant to the Conservation Funding Agreement to provide grants to the Conservation Fund and to make deposits into the Endowment Account for purposes of funding marine and marine-related conservation activities in the Jurisdiction;

NOW, THEREFORE, the Parties agree as follows:

1. DEFINITIONS AND INTERPRETATION.

1.1 Defined Terms.

Capitalized terms used in this Agreement shall have the meanings set forth for such terms in Annex A hereto.

1.2 Interpretation.

Except as otherwise expressly provided herein, the rules of interpretation set out in Annex A hereto shall apply to this Agreement.

2. THE LOAN.

2.1 Commitment; Loan; Borrowing.

(a) Subject to the terms and conditions set forth herein (including the satisfaction of the conditions set forth in Section 3.2), the Initial Lender agrees to make a loan (the "**Loan**") to Belize on the Funding Date proposed in the Borrowing Request delivered pursuant to Section 2.2 in a principal amount equal to the Commitment.

(b) Amounts repaid in respect of the Loan may not be reborrowed.

2.2 Requests for the Borrowing.

To request the Borrowing, Belize shall deliver to the Administrative Agent a duly completed irrevocable Borrowing Request not later than [[●] New York, New York time, [●][1] before the proposed Funding Date (which notice may not be delivered until the Effective Date)]. The Borrowing Request shall specify the aggregate principal amount of the Bonds to be purchased by Belize with the proceeds of the Borrowing and the proposed Funding Date, which shall be on or around the Settlement Date. For the avoidance of doubt, there will be only one Borrowing to occur on the Funding Date.

Promptly following receipt of the Borrowing Request, the Administrative Agent shall advise the Initial Lender of the details thereof and the amount of the Loan to be made as part of the requested Borrowing.

2.3 Funding of the Loan; Evidence of Debt.

(a) Upon satisfaction of the conditions precedent specified in Section 3.2, the Initial Lender shall make the Loan, or cause the Loan to be made, available to the Administrative Agent on the date proposed in the Borrowing Request therefor by wire transfer of immediately available funds in Dollars by [●] New York, New York time into the Funding Facility Administrative Agent Account.

[1] Note to Draft: Funding timing and mechanics subject to discussion.

(b) The Administrative Agent shall instruct the Funding Facility Administrative Agent that funds so received be made available in like funds, by wire transfer of such funds to one or more accounts denominated in U.S. Dollars designated by Belize for such purpose by notice to each Lender in accordance with the instructions provided in the Borrowing Request and in the amount set out in clause (c) of this Section 2.3.

(c) On the Funding Date, the Funding Facility Administrative Agent shall, on behalf of the Administrative Agent, disburse to the accounts designated by Belize an aggregate amount equal to the Loan requested by Belize minus a 5% original issue discount. Notwithstanding the foregoing, the principal amount of the Loan owed by Belize shall be equal to 100% of the Loan requested by Belize and Belize's obligation is to repay the principal amount of the Loan, plus interest accrued thereon, which shall be calculated without regard to any original issue discount.

2.4 Termination of Commitment.

The Commitment shall automatically terminate on the earlier of (a) the Funding Date, and (b) the date that is immediately following the Settlement Deadline.

2.5 Interest.

(a) The Loan shall bear interest at a rate per annum equal to the applicable Interest Rate, which interest shall be (i) calculated in accordance with Section 2.5(c) and (ii) payable in arrears on each Scheduled Payment Date in the amount set forth next to, and payable on, the relevant Scheduled Payment Date on Schedule 2.5 (or such greater or lesser amount of interest as shall then be due in accordance with the terms of this Agreement).

(b) Notwithstanding the foregoing, if any principal of or interest on the Loan or other amount payable by Belize hereunder is not paid when due, whether at stated maturity, upon acceleration or otherwise, such overdue amount shall bear interest, after as well as before judgment, at a rate per annum equal to the Default Rate *plus* the Interest Rate.

(c) For any Interest Period, the amount of interest payable shall be calculated by multiplying the amount of the Loan outstanding on the first day of such Interest Period by the then applicable Interest Rate. All computations of interest with respect to the Loan shall be made by the Administrative Agent on the basis of a year of 360 days of twelve 30-day months. Each determination by the Administrative Agent of an interest rate hereunder shall be conclusive and binding for all purposes absent manifest error.

2.6 No Voluntary Prepayments.

Notwithstanding anything to the contrary in this Agreement, Belize may not voluntarily prepay, in whole or in part, the Loan except as expressly permitted pursuant to Section 2.12.

2.7 Repayment of the Loan; Payments Generally.

(a) Payment of Principal. Belize hereby unconditionally promises to pay in the manner set forth in clause (d), for the ratable account of the Lenders, the principal amount of the

Loan in semi-annual installments, each such installment to be in the amount as set forth next to, and payable on, the relevant Scheduled Payment Date on Schedule 2.7 (or such greater or lesser amount of the Loan as shall then be due, whether by acceleration, prepayment or otherwise).

(b) Payment in Full at Maturity. Belize shall pay to the Administrative Agent for the ratable account of the Lenders, in the manner set forth in clause (d), the entire outstanding principal amount owing to the Lenders under this Agreement on the Maturity Date, unless such principal amount is due sooner pursuant to Section 2.10 or Section 9.1.

(c) Payments Due on Non-Business Days. Anything in this Agreement to the contrary notwithstanding, any payment of principal of or interest on the Loan that is due on a date other than a Business Day shall be made on the next succeeding Business Day, provided that, if such next succeeding Business Day would fall after the Maturity Date, payment shall be made on the Business Day immediately preceding the Maturity Date.

(d) Payments Generally. Subject to Section 2.11, all payments (including prepayments) to be made by Belize under this Agreement, including on account of principal and interest, shall be made without defense, set-off or counterclaim. Except as otherwise expressly provided herein, all such payments shall be made to the Administrative Agent, for the account of the respective Lenders to which such payment is owed, at the Funding Facility Administrative Agent Account in immediately available funds in Dollars not later than 1:00 P.M. New York, New York time on the date when due. Any payment received after the foregoing deadline shall be deemed received on the next Business Day and any applicable interest shall continue to accrue. To the extent Belize makes any payments to an account of the Administrative Agent, the Administrative Agent shall promptly distribute to each applicable Lender its ratable share (or other applicable share as provided herein) of such payment in like funds as received by wire transfer to such Lender (or otherwise distribute such payment in like funds as received to the Person or Persons entitled thereto as provided herein).

(e) Excess Amount. If, on the Maturity Date, no Event of Default hereunder has occurred and is continuing, then the DSRA Amount shall be deemed to be applied as payment by Belize of outstanding principal and interest payments scheduled to be paid hereunder on the Maturity Date, which application shall satisfy Belize's obligation under this Agreement to make principal and interest payments in the amounts so deemed to be applied in accordance with the priority of payment set forth in Section 2.8. To the extent the DSRA Amount is not sufficient to cover the amount of principal and interest due on the Maturity Date, Belize shall pay the balance. To the extent that the DSRA Amount exceeds the amount of principal and interest due on the Maturity Date, the Lender shall take such action as may be necessary to cause the Person holding such funds to deposit all such funds in the Endowment Account.

(f) Acceleration. Notwithstanding anything to the contrary in this Agreement or the Funding Facility, if (i) the Loan is accelerated and becomes due and payable prior to the Maturity Date hereunder, (ii) thereafter the Lender obtains an award pursuant to an arbitration proceeding conducted in accordance with Section 16.4 that is not promptly paid in full by Belize, and (iii) all or a portion of the Endowment Account Amount and/or the DSRA Amount was applied to pay principal and interest owing under the Funding Facility, then (A) the Endowment Account Amount shall be deemed to have been applied, in accordance with the priority of payment set forth

in Section 2.8, as payment to satisfy Belize's obligation to pay principal and interest due hereunder on a dollar-for-dollar basis as of the date on which such amounts were applied to make principal and interest payments under the Funding Facility (but, for the avoidance of doubt, after the events described in clauses (i) and (ii) have occurred), (B) the DSRA Amount shall be deemed to have been applied, in accordance with the priority of payment set forth in Section 2.8, as payment to satisfy Belize's obligation to pay principal and interest due hereunder on a dollar-for-dollar basis as of the date on which such amounts were applied to make principal and interest payments under the Funding Facility (but, for the avoidance of doubt, after the events described in clauses (i) and (ii) have occurred), and (C) Belize's obligation to pay principal and interest due hereunder shall be satisfied to the extent by which the Endowment Account Amount and/or the DSRA Amount was applied to pay principal and interest on the Funding Facility; provided that, if Belize was ordered to pay less than the full amount claimed by the Lender pursuant to such arbitration proceeding, then the amount of principal and interest to which such Endowment Account Amount and DSRA Amount shall be applied shall be the principal and interest amounts owing from Belize under this Agreement that Belize is ordered to pay pursuant to the arbitration award. Notwithstanding the foregoing, in the above circumstances if and to the extent DFC acknowledges coverage under the Political Risk Insurance Policy (in whole or in part) for any non-payment by Belize, Belize's obligation to pay principal and interest due under this Agreement shall not be reduced by any portion of the Endowment Account Amount and/or the DSRA Amount that is applied to pay principal and interest owing under the Funding Facility to the extent these amounts are covered by payments made by DFC under the Political Risk Insurance Policy.

(g) Full Satisfaction. Anything in this Agreement to the contrary notwithstanding, each payment made (or deemed to be made) by, or on behalf of, Belize under this Section 2.7 into the Funding Facility Administrative Agent Account, including deemed application of amounts from the Debt Service Reserve Account or Endowment Account pursuant to clause (e) or (f) of this Section 2.7, and application of amounts from the Additional Covered Borrower Contribution Account pursuant to Section 5.7, shall, in each case, constitute full satisfaction of the amounts effectively paid or deemed to have been paid that are due and owing by Belize hereunder for the amount effectively paid or deemed to have been paid and shall fully and forever release Belize from the obligation to pay such amount notwithstanding (i) any claims or actions that any creditor of any Lender, the Issuer or any of their respective Affiliates may at any time bring, assert or take against any Lender, the Issuer or any such Affiliates to seek to invalidate, claw back, recoup, set aside, rescind, recover or otherwise require repayment of all or any portion of such amounts or any other amounts paid, or to be paid, by Belize hereunder into the Funding Facility Administrative Agent Account, (ii) the misapplication by any Person (other than Belize) of funds in the relevant accounts to payment other than as contemplated in this Section 2.7, or (iii) any failure or delay by any Lender (or any agent thereof) or the Issuer to make payments under the Funding Facility and the Issue Deed, as applicable.

2.8 Application of Payments.

(a) Unless otherwise required by the terms of this Agreement, each payment made or deemed to have been made, including pursuant to Section 2.7 and Section 5.7, under this Agreement shall be, and upon payment to the Funding Facility Administrative Agent Account shall be deemed to have been, applied by the Funding Facility Administrative Agent,

first, to the payment of all reasonable and documented out-of-pocket costs and expenses (including reasonable attorneys' fees) of the Lenders and the Administrative Agent in connection with enforcing their rights under this Agreement;

second, to then accrued, past due interest on the Loan owing to DFC (if any);

third, first, to then accrued, past due interest on the Loan owing to any Person other than DFC, and thereafter, to the other then accrued, due and owing interest on the Loan to the extent not already paid pursuant to the foregoing *second* clause and the first clause of this *third* clause;

fourth, to principal amounts then past due and owing to DFC (if any) under the Loan;

fifth, first, to principal amounts then past due and owing to any Person other than DFC under the Loan, and thereafter, to other principal amounts then due and owing under the Loan and the first clause of this *fifth* clause; and

sixth, to any other amounts then due and owing under this Agreement.

(b) In the event that the Parametric Insurance Policy Calculation Agent has, under the Parametric Insurance Policy, reported to the Administrative Agent (i) the occurrence of a Covered Catastrophic Event and (ii) the amount of the applicable Parametric Insurance Policy Limit payable to the Administrative Agent on behalf of the Lenders, then (x) the payments of principal or interest to which such insurance payment relates shall be deemed paid by Belize and (y) when received such insurance payment shall be applied to such payments as of the Scheduled Payment Date on which such payments were due or, if such Scheduled Payment Date occurs less than 10 days after the report is made by the Parametric Insurance Policy Calculation Agent, applied to payments required to be made by Belize on the next subsequent Scheduled Payment Date; provided that, (A) if payment is made under the Parametric Insurance Policy on a date that is less than 10 days before a Scheduled Payment Date, then Belize shall still be required to make payment of all amounts due on such Scheduled Payment Date and Belize shall be deemed to have made a payment towards the next Scheduled Payment Date; provided, further, that if the payment made under the Parametric Insurance Policy is for less than the amount of principal or interest due, Belize shall be responsible for payment of the difference between such payment received under the Parametric Insurance Policy and the amount due on such Scheduled Payment Date or next subsequent Scheduled Payment Date, as the case may be.

2.9 Increased Costs; Funding Facility Costs.

(a) Subject to clause (f), if any Change in Law:

(i) imposes or modifies any reserve, special deposit, compulsory loan, insurance charge or other similar assessment against assets of, deposits with or for the account of, or credit extended by, the Lender applicable to it in its capacity as a Lender of Loans under this Agreement;

(ii) imposes on any Lender any other condition, cost or expense (other than Taxes) affecting this Agreement or any Loan made by any Lender; or

(iii) subjects any Lender or the Administrative Agent to any Taxes (other than (i) those in respect of which Belize is obligated to make an Additional Payment or (ii) Excluded Taxes) on its loans, loan principal, letters of credit, commitments, or other obligations, or its deposits, reserves, other liabilities or capital attributable thereto,

and the result of any of the foregoing shall be to increase the cost to such Lender or the Administrative Agent of making or maintaining any Loan or of maintaining its obligation to make any such Loan or to reduce the amount of any sum received or receivable by such Lender or the Administrative Agent hereunder, whether of principal, interest or otherwise, then, upon request of such Lender or the Administrative Agent and subject to clause (f) below, Belize shall pay to such Lender or the Administrative Agent, as the case may be, such additional amount or amounts as will compensate such Lender or the Administrative Agent, as the case may be, for such additional costs incurred or reduction suffered.

(b) Subject to clause (f), if any Lender (other than the Initial Lender) determines that any Change in Law regarding capital or liquidity requirements affecting such Lender has or would have the effect of reducing the rate of return on such Lender's capital or on the capital of such Lender's holding company, if any, as a consequence of this Agreement or the Loans made by such Lender, to a level below that which such Lender or such Lender's holding company could have achieved but for such Change in Law (taking into consideration such Lender's policies and the policies of such Lender's holding company with respect to capital adequacy and liquidity), then from time to time Belize shall pay to such Lender such additional amount or amounts as will compensate such Lender or such Lender's holding company for any such reduction suffered.

(c) A certificate of a Lender setting forth the amount or amounts necessary to compensate such Lender, as specified in clause (a) or (b) shall be delivered to Belize and shall be conclusive absent manifest error. Belize shall pay such Lender the amount shown as due on any such certificate within 30 days after receipt thereof.

(d) If the Initial Lender is obligated to make any payments pursuant to Section [3.2] of the Funding Facility then, upon the Initial Lender's request, Belize shall pay to the Initial Lender (or the Administrative Agent on behalf of the Initial Lender) the amount or amounts required to be paid by the Initial Lender pursuant to Section [3.2] of the Funding Facility. In such case, a certificate of the Initial Lender setting forth the amount or amounts necessary to compensate the Initial Lender as specified in paragraph (d) of this Section 2.9, together with the certificate received by the Initial Lender from the Issuer pursuant to Section [3.2(c)] of the Funding Facility, shall be delivered to Belize and shall be conclusive absent manifest error or inconsistency with such certificate delivered pursuant to Section [3.2(c)] of the Funding Facility. Belize shall pay the amount shown as due on any such certificate to the Initial Lender by paying such amount to the Funding Facility Administrative Agent Account within 30 days after receipt thereof.

(e) Failure or delay on the part of any Lender to demand compensation pursuant to this Section 2.9 shall not constitute a waiver of such Lender's right to demand such compensation; provided that Belize shall not be required to compensate any Lender pursuant to

this Section for any increased costs or reductions incurred more than 180 days prior to the date that such Lender notifies Belize of the Change in Law giving rise to such increased costs or reductions and of such Lender's intention to claim compensation therefor; provided further that, if the Change in Law giving rise to such increased costs or reductions is retroactive, then the 180-day period referred to above shall be extended to include the period of retroactive effect thereof.

(f) The Initial Lender and any Person that may become a Lender hereunder shall apply this Section 2.9 in a reasonable manner specifically tailored to solely achieve its stated purpose, and no Lender shall apply this Section 2.9 with any intent of improving its economic profit in respect of the Loans as compared to its economic profit as of the Effective Date. If, absent mitigation on the part of the Lender, Belize would be required to pay any amount under this Section 2.9, then at the request of Belize, the relevant Lender shall use reasonable efforts to mitigate any additional amounts otherwise payable hereunder if, in the judgment of such Lender, such efforts (i) would eliminate or reduce amounts payable under this Section 2.9 and (ii) would not subject such Lender to any unreimbursed cost or expense and would not otherwise be disadvantageous to such Lender.

2.10 Illegality.

Notwithstanding any other provision of this Agreement, if any Lender determines that a Change in Law makes it unlawful, or any central bank or other Governmental Authority asserts that it is unlawful, for such Lender to maintain or fund the Loan or for the Issuer to maintain or fund the loans under the Funding Facility, or any Governmental Authority has imposed material restrictions on the authority of such Lender or the Issuer to purchase or sell, or to hold Dollars in New York foreign exchange markets, or the Jurisdiction, or Belize is the target of any Sanctions that makes it unlawful for such Lender to maintain or fund the Loan or for the Issuer to maintain or fund the loans under the Funding Facility, then such Lender shall promptly notify Belize (through the Administrative Agent), following which notice (a) until such Lender notifies Belize (through the Administrative Agent) that the circumstances giving rise to such suspension no longer exist, such Lender's Commitment shall be suspended, and (b) if such Lender shall so request in such notice (including as a result of receiving notice from the Issuer requiring prepayment in full of the Funding Facility pursuant to Section [2.4(b)] of the Funding Facility), through the Administrative Agent, or if such Change in Law or such restrictions shall so mandate, Belize shall immediately prepay in full, without premium or penalty, the then outstanding principal amount of the Loan, together with accrued and unpaid interest thereon, and all other amounts payable by Belize to such Lender under this Agreement, on or before such date as shall be mandated by such Change in Law or such restrictions.

2.11 Taxes.

All payments by Belize (the "**Payor**") under this Agreement (including, for avoidance of doubt, any payments made to the Funding Facility Administrative Agent Account) shall be made free and clear of, and without reduction or liability for or on account of, any present or future taxes, levies, imposts, duties, fees, assessments, charges, deductions or withholdings of any nature whatsoever, including any interest, penalties or additions to tax imposed with respect thereto or with respect to the making of payments in Dollars, such as financial transactions taxes or currency taxes, in each case, imposed by or for a government or other authority having power

to tax (hereinafter called "**Tax**") unless any withholding or deduction for or on account of Tax is required by law.

If the Payor shall be obligated by law to make any such withholding or deduction for any Tax imposed, levied, collected, assessed or withheld by or within Belize or any political subdivision or taxing authority thereof or therein, by any jurisdiction in which the Payor carries on business or by any other country or jurisdiction (or any taxing authority thereof or therein) (each, a "**Taxing Jurisdiction**"), then the Payor shall promptly (a) pay to the relevant Taxing Jurisdiction the full amount required to be deducted, withheld or otherwise paid in by the Payor (including the full amount required to be deducted or withheld from or otherwise paid by the Payor in respect of any Additional Payment required to be made pursuant to clause (b) hereof) and (b) pay to each Person entitled under this Agreement to receive the payment from which the amount referred to in clause (a) has been so deducted, withheld or otherwise payable or paid such additional amount as is necessary in order that the amount received by such Person after any required deduction, withholding or other payment of Tax (including any required deduction, withholding or other payment of Tax on or with respect to such additional amount) shall equal the amount such Person would have received had no such deduction, withholding or other payment of Tax been paid (the "**Additional Payment**").

Notwithstanding the provisions of this Section 2.11, no such Additional Payments shall be payable for or on account of "**Excluded Taxes**," which include:

(1) any Connection Income Taxes;

(2) any Tax that is imposed or withheld by reason of any Lender's failure to make a declaration of non-residence or other similar claim or comply with any reporting requirement (as notified to such Lender in writing by or on behalf of the Payor giving such Lender sufficient time to satisfy such requirements), as is required (i) by statute, treaty or regulation of Belize existing on the date hereof, or which are not substantially more onerous than those existing on the date hereof and which do not impose an unreasonable burden (in time, resources or otherwise) on such Lender or materially prejudice such Lender's legal or commercial position, or (ii) by statute, treaty or regulation in any other relevant Taxing Jurisdiction to the extent the requirements thereof are not substantially more onerous than those of Belize existing on the date hereof and which do not impose an unreasonable burden (in time, resources or otherwise) on such Lender or materially prejudice such Lender's legal or commercial position as a precondition to exemption from all or part of such Tax;

(3) any withholding Taxes imposed under FATCA; or

(4) any combination of items (1) through (3) above.

Belize shall timely pay to the relevant Taxing Jurisdiction in accordance with applicable law, or at the option of any Lender timely reimburse it for the payment of, any Stamp Taxes, except any such Stamp Taxes imposed with respect to an assignment that arises in connection with any voluntary assignment.

As soon as practicable after any payment of Taxes by Belize to a Taxing Jurisdiction pursuant to this Section 2.11, Belize shall deliver to the Administrative Agent the

original or a certified copy of a receipt issued by such Taxing Jurisdiction evidencing such payment, a copy of the return reporting such payment or other evidence of such payment reasonably satisfactory to the Administrative Agent.

Belize shall indemnify each recipient of a payment under this Agreement, within 10 days after demand therefor, for the full amount of any Taxes (including such Taxes imposed or asserted on or attributable to amounts payable under this Section) other than Taxes set forth in this Section 2.11, payable or paid by such recipient or required to be withheld or deducted from a payment to such recipient and any reasonable expenses arising therefrom or with respect thereto, whether or not such Taxes were correctly or legally imposed or asserted by the relevant Taxing Jurisdiction. A certificate as to the amount of such payment or liability delivered to Belize by the Administrative Agent or the relevant Lender shall be conclusive absent manifest error.

If any party determines, in its sole discretion exercised in good faith, that it has received a refund of any Taxes as to which it has been indemnified pursuant to this Section 2.11 (including by the payment of additional amounts pursuant to this Section 2.11), it shall pay to the indemnifying party an amount equal to such refund (but only to the extent of indemnity payments made under this Section 2.11 with respect to the Taxes giving rise to such refund), net of all out-of-pocket expenses (including Taxes) of such indemnified party and without interest (other than any interest paid by the relevant Taxing Jurisdiction with respect to such refund). Such indemnifying party, upon the request of such indemnified party, shall repay to such indemnified party the amount paid over pursuant to this paragraph (plus any penalties, interest or other charges imposed by the relevant Taxing Jurisdiction) in the event that such indemnified party is required to repay such refund to such Taxing Jurisdiction. Notwithstanding anything to the contrary in this paragraph, in no event shall the indemnified party be required to pay any amount to an indemnifying party pursuant to this paragraph (g) the payment of which would place the indemnified party in a less favorable net after-Tax position than the indemnified party would have been in if the Tax subject to indemnification and giving rise to such refund had not been deducted, withheld or otherwise imposed and the indemnification payments or additional amounts with respect to such Tax had never been paid. This Section 2.11 shall not be construed to require any indemnified party to make available its Tax returns (or any other information relating to its Taxes that it deems confidential) to the indemnifying party or any other Person.

Each party's obligations under this Section 2.11 shall survive any assignment of rights by any Lender, the repayment, satisfaction or discharge of all obligations under this Agreement and the termination of this Agreement.

If Belize is required to pay any additional amounts, other than any additional Taxes imposed, levied, collected, assessed or withheld by or within the Jurisdiction or any political subdivision or taxing authority thereof or therein, under this Section 2.11, then at the request of Belize, the relevant Lender shall use reasonable efforts to mitigate any Additional Payment (other than any Additional Payment in connection with Taxes imposed, levied, collected, assessed or withheld by or within the Jurisdiction or any political subdivision or taxing authority thereof or therein) if, in the judgment of such Lender, such efforts (i) would eliminate or reduce amounts payable pursuant Section 2.11 in the future, and (ii) would not subject such Lender to any unreimbursed cost or expense and would not otherwise be disadvantageous to such Lender. Belize

hereby agrees to pay all reasonable documented out-of-pocket costs and expenses incurred by such Lender and the Administrative Agent in connection with any such efforts.

2.12 Optional Prepayment.

If any Lender requests compensation under Section 2.9 or if Belize is required to make any Additional Payment other than in connection with any Change in Law in the Jurisdiction, or Taxes imposed, levied, collected, assessed or withheld by or within the Jurisdiction or any political subdivision or taxing authority thereof or therein, then Belize may, at its expense, upon notice to the Administrative Agent, prepay in full, without premium or penalty, the then-outstanding principal and accrued interest amount of the Loan outstanding hereunder.

2.13 Conservation Fund.

(a) The Parties agree that the initial Conservation Fund will be a nonprofit entity formed under the laws of Delaware, USA and that the Conservation Fund shall establish a representative office in the Jurisdiction.

(b) The Parties agree that (i) the Statutory Trust shall be the legal and beneficial owner of the Endowment Account prior to its transfer pursuant to the Trust Agreement and that the Conservation Fund shall have no claim or right to the Endowment Account or any finds therein, (ii) the Endowment Account shall only be transferred at such time and on such terms as expressly permitted pursuant to the Funding Facility, or if the Funding Facility has been repaid in full and the lien of the Statutory Trust Security Agreement has been released, as provided in the Trust Agreement, (iii) they are familiar with the Endowment Account policies and (iv) funds on deposit in the Endowment Account (or that in accordance with the Conservation Funding Agreement shall be deposited into the Endowment Account) shall be used by the Lenders as collateral for the Lenders' obligations under the Funding Facility and may be used by the Lenders to pay the Lenders' costs, expenses, debt-servicing obligations or other obligations owing under the Funding Facility or as otherwise expressly authorized under the Trust Agreement, provided that such costs, expenses and other obligations shall not be payable with funds on deposit in the Endowment Account other than to the extent they are necessary for the Initial Lender to perform its obligations and enforce its rights under the transaction arrangements, including obligations to the Issuer under the transaction arrangements, including pursuant to this Agreement, the Conservation Funding Agreement, the Trust Agreement, the Political Risk Insurance Policy, any Parametric Insurance Policy, the Funding Facility Loan Documents and documents governing the Conservation Fund, provided further that funds on deposit in the Endowment Account shall not be used to pay (i) any fee payable under the Management Agreement or (ii) any fee or other payment (whether for the reimbursement of expenses or otherwise) to an Affiliate of the Initial Lender.

3. CONDITIONS PRECEDENT.

3.1 Conditions Precedent to Effectiveness.

The effectiveness of this Agreement is subject to the satisfaction to the Initial Lender's satisfaction or waiver of the following conditions (the date such conditions are fulfilled or waived, the "**Effective Date**"):

(a) The Administrative Agent shall have received from each party hereto a counterpart of this Agreement, the Conservation Funding Agreement, the Direct Agreement and the Trust Agreement, each duly executed by and on behalf of Belize, the Initial Lender and the Administrative Agent, which agreements shall be in full force and effect.

(b) The Initial Lender shall have obtained a Political Risk Insurance Policy provided by the DFC in form and substance satisfactory to the Initial Lender.

(c) Prior to the execution of and after giving effect to this Agreement, the Conservation Funding Agreement and the Trust Agreement, no Default or Event of Default shall have occurred and be continuing.

(d) Each of the acknowledgments and the representations and warranties made by Belize pursuant to Section 2.13 and Section 4 of this Agreement shall be true and correct in all material respects (or, in the case of any such representation or warranty already qualified by materiality, Material Adverse Effect or similar language, in all respects) on and as of the Effective Date (or, in the case of any such representation or warranty specifically stated to have been made as of a specific date, as of such specific date).

(e) Belize shall have delivered to the Administrative Agent a Prime Minister's Certificate dated as of the Effective Date executed by the Prime Minister of Belize certifying (i) as to the incumbency of relevant person executing this Agreement, the Direct Agreement and the Conservation Funding Agreement, (ii) that Belize performed and complied with all agreements and conditions contained in this Agreement, the Conservation Funding Agreement required to be performed or complied with by it prior to or on the Effective Date and (iii) as to the satisfaction of Section 3.1(c) and Section 3.1(d).

(f) Belize shall have delivered evidence to the Administrative Agent that National Assembly of Belize has considered and enacted legislation (hereinafter referred to as the "**Legislation**") to: (i) authorize Belize to enter into this Agreement, the Conservation Funding Agreement, and the Direct Agreement and to give statutory effect to the terms and conditions of this Agreement, the Conservation Funding Agreement, and the Direct Agreement, including specifically authority to undertake any obligation to make any and all payments contemplated by the said agreements and including as well a provision to the effect that every and all obligations to make any such payments shall constitute debt charges of Belize within the meaning of Section 119 of the Belize Constitution and shall otherwise constitute charges on the Consolidated Revenue Fund of Belize; (ii) confer on the Lenders full exemption from any and all consents and registrations by any law required to perform its obligations or exercise its rights under this Agreement, the Conservation Funding Agreement, the Direct Agreement and the Trust Agreement, as well as from the provisions of the Exchange Control Regulations Act and Regulations made thereunder from time to time in respect to all payments to be made thereunder; and (iii) confer on the Lenders and parties to this Agreement, the Conservation Funding Agreement, the Direct Agreement and the Trust Agreement full exemption from any and all Taxes that are payable by the Lenders or other parties to the said agreements in the Jurisdiction in respect of this Agreement, the Conservation Funding Agreement, the Direct Agreement and the Trust Agreement including any taxes on payments to be made by Belize under this Agreement (including, for the avoidance of doubt, any payments made to the Funding Facility Administrative Agent Account), the

Conservation Funding Agreement, the Direct Agreement and the Trust Agreement and including any taxes imposed on or measured by net income (however denominated) or that are franchise Taxes or branch profits Taxes or any other taxes or similar charges imposed on the Initial Lender or other parties to the aforesaid agreements in the Jurisdiction.

3.2 Conditions Precedent to the Borrowing.

The obligation of the Initial Lender to make the Loan and disburse the proceeds thereof is subject to the satisfaction of the following conditions:

(a) The Effective Date shall have occurred and each of the Agreement, the Conservation Funding Agreement, the Direct Agreement and the Trust Agreement, shall be in full force and effect.

(b) The Administrative Agent shall have received evidence that holders of Bonds representing not less than 75% aggregate amount of all outstanding Bonds have been tendered their Bonds for repurchase and cancellation and that Belize has delivered to the Bond Trustee an irrevocable (i) cancellation instruction with respect to such Bonds and (ii) notice to redeem the non-tendered bonds on the Settlement Date.

(c) On or prior to the Funding Date, the Initial Lender shall have received sufficient funds in Dollars to make the Loan from the proceeds received under the Funding Facility.

(d) Prior to and after giving effect to the Borrowing, no Default or Event of Default shall have occurred and be continuing.

(e) Each of the acknowledgments and the representations and warranties made by Belize pursuant to Section 2.13 and Section 4 of this Agreement shall be true and correct in all material respects (or, in the case of any such representation or warranty already qualified by materiality, Material Adverse Effect or similar language, in all respects) on and as of the Effective Date (or, in the case of any such representation or warranty specifically stated to have been made as of a specific date, as of such specific date).

(f) The Legislation shall have been enacted and be in full force and effect and the Administrative Agent shall have received (i) a certificate issued by the Clerk of the National Assembly of Belize evidencing authorization of the Minister of Finance of Belize to effect the Borrowing on behalf of Belize and (ii) evidence of the Governor General's assent and publication of such Legislation in the Government's Official Gazette.

(g) The Administrative Agent shall have received a written certificate from the Director General of the Belize Tax Service Department issued to the Initial Lender confirming the circumstances in Section 3.1(f)(iii).

(h) Belize shall have delivered to the Administrative Agent a Prime Minister's Certificate dated as of the Funding Date executed by the Prime Minister of Belize certifying as to the satisfaction of Section 3.2(d), Section 3.2(e), and Section 3.2(f).

(i) The Initial Lender shall have received (i) an opinion from the Attorney General of Belize, substantially in the form attached as Exhibit C hereto and (ii) an opinion from Sullivan & Cromwell LLP, substantially in the form attached as Exhibit D hereto.[2]

(j) The Initial Lender shall not have a reasonable basis to believe that the proceeds of the Loan shall not satisfy the requirements of Section 5.6.

4. REPRESENTATIONS AND WARRANTIES.

Belize hereby represents and warrants to the Administrative Agent and the Lenders that:

4.1 Power and Authority.

Belize has the power and authority to execute and deliver this Agreement, the Conservation Funding Agreement and the Direct Agreement and to perform its obligations under the provisions hereof and thereof, including any required in connection with the obtaining of Dollars to make payments under this Agreement and any required in connection with the cancellation of Bonds as contemplated hereby.

4.2 Authorization, etc.

This Agreement, the Conservation Funding Agreement and the Direct Agreement have been duly authorized by all necessary action on the part of Belize (including any required (a) to provide the signatories thereto with the authority to execute the Agreement, the Conservation Funding Agreement and the Direct Agreement, (b) to waive sovereign immunity to the extent herein waived, or (c) in connection with the obtaining of Dollars, to make payments under this Agreement and the payment of such Dollars to Persons resident in the United States of America and any required in connection with the cancellation of Bonds as contemplated hereby), and this Agreement, the Conservation Funding Agreement and the Direct Agreement constitute legal, valid and binding obligations of Belize, enforceable against Belize in accordance with their respective terms, except as such enforceability may be limited by (i) applicable bankruptcy, insolvency, reorganization, moratorium or other similar laws affecting the enforcement of creditors' rights generally and (ii) laws of general applicability relating to or affecting creditors' rights and to general principles of equity (regardless of whether such enforceability is considered in a proceeding in equity or at law).

4.3 Disclosure.

This Agreement and any other documents, certificates or writings (other than projected or pro forma financial information) delivered to the Administrative Agent and the Lenders by or on behalf of Belize by Officials in connection with the transaction contemplated hereby, taken as a whole, do not contain any material misstatement of fact or omit to state any material fact necessary to make the statements therein, when taken as a whole, in the light of the circumstances in which they were made, not misleading; provided that, with respect to projected

[2] Note to Draft: Parties discussing the extent of reliance and related matters relating to S&C's opinion.

or pro forma financial information, Belize represents only that such information was prepared in good faith based upon assumptions believed to be reasonable at the time of preparation and delivery (it being understood that such projected information may vary from actual results and that such variances may be material). Since December 31, 2020, there is no event or circumstance known to Belize that could reasonably be expected to have a Material Adverse Effect that has not been identified in Schedule 4.3.

4.4 Compliance with Laws, Other Instruments, etc.

The execution, delivery and performance by Belize of this Agreement, the Conservation Funding Agreement and the Direct Agreement and the consummation of the transactions contemplated hereby (including the cancellation of Bonds) and thereby, will not (a) violate any provision of the Belize Constitution, (b) contravene, result in any breach of, or constitute a default in any material respect under, any indenture, mortgage, deed of trust, loan, purchase or credit agreement, lease, or any other contract, agreement, instrument or obligation or any treaties, including any negative pledge covenant included therein, to which Belize is or may be bound or affected, (c) conflict with or result in a breach of any of the terms, conditions or provisions of any consent, approval, authorization, order, judgment, decree, or ruling of any court, arbitrator, regulatory body or Governmental Authority having jurisdiction over Belize, the Government or any Agency or any of their respective properties, including any debt limitations or ceilings contained in any consent of Belize or other consent, approval or authorization referred to in Section 4.5, or (d) violate any provision of any statute, law, convention or other rule or regulation of any Governmental Authority applicable to Belize, the Government or any Agency, except in the cases of clauses (b) and (c) for those violations and defaults which individually, or in the aggregate, are not material to Belize.

4.5 Governmental Authorizations, etc.

No consent, approval or authorization of, or registration, filing or declaration with, any Governmental Authority is required in connection with the execution, delivery or performance by Belize of this Agreement, the Conservation Funding Agreement or the Direct Agreement, the obtaining of Dollars to make payments under this Agreement, the payment of such Dollars to Persons resident in the United States of America and any required in connection with the cancellation of Bonds as contemplated hereby other than the Legislation, which, from the date the Legislation is enacted in the Jurisdiction, is currently effective. No payment of any Stamp Tax in the Jurisdiction is due in connection with the execution, delivery and performance of this Agreement or the consummation of the transactions contemplated herein and therein.

4.6 Litigation.

There is no action, suit or proceeding pending or, to the knowledge of Belize, threatened against or affecting Belize, the Government or any Agency or any property of Belize, the Government or any Agency in any court, governmental agency, authority or body or any arbitrator of any kind or before or by any Governmental Authority that, individually or in the aggregate, purports to limit the legality, validity or enforceability of this Agreement.

4.7 Sanctions.

Belize represents that none of it, the Government or any Agency used, directly or knowingly indirectly, the proceeds of the Loan, or lend, contribute or otherwise make available such proceeds to any Person: (a) to fund or facilitate any activities or business of or with any Person that, at the time of such funding or facilitation, is the target of any economic sanctions administered or enforced by the U.S. Department of the Treasury's Office of Foreign Assets Control ("**OFAC**"), the United Nations Security Council, the European Union, Her Majesty's Treasury of the United Kingdom or Switzerland (collectively, "**Sanctions**") or is resident in any Sanctioned Country, unless permitted by applicable law or regulation or if an appropriate license for any such transaction was obtained from the authority administering the relevant Sanctions; or (b) in any other manner that will result in a violation of Sanctions.

4.8 *Pari Passu*.

All obligations and liabilities of Belize under this Agreement are general, direct, unconditional, unsubordinated and unsecured obligations of Belize for the payment and performance of which the full faith and credit of Belize has been pledged, which obligations and liabilities rank in right of payment at least *pari passu* with all of the other present and future unsecured and unsubordinated Public Debt.

4.9 No Immunity from Suit or Execution for Belize.

In any proceedings taken in the Jurisdiction or in the United States in relation to this Agreement or the Direct Agreement, Belize will not be entitled to claim, and will not claim, for itself or any of its revenues or other assets, immunity from suit, execution, attachment or other legal processes except for limitations on immunity waivers applicable generally to sovereigns under the laws of the United States. The waiver of immunity by Belize pursuant to Section 16.4(c) is legal, valid and binding on Belize.

4.10 No Proposed Changes in Law.

There is no pending amendment to the laws, regulations, statutes or treaties of Belize, nor any (a) of the foregoing proposed in writing by or to the Government or (b) pending legislation in the Jurisdiction, that, if it were to become effective, could reasonably be expected to have a material adverse effect on the validity or enforceability of this Agreement, the Conservation Funding Agreement or the Direct Agreement or on the ability of Belize to make payments under this Agreement in such currency as pursuant to the terms and conditions set forth herein.

4.11 No Withholding or Other Charges.

Interests paid hereunder by Belize are not subject to withholding or deduction for or on account of tax under the current laws and regulations of Belize or any political subdivision or taxing authority thereof. There is no income, stamp or other tax, levy, impost, deduction or other charges imposed or levied (whether by withholding or otherwise) by Belize or any political subdivision or taxing authority thereof or therein on or by virtue of the execution, delivery or performance by Belize of this Agreement or any of the other documents or instruments to be executed and delivered by Belize in connection herewith.

4.12 Anti-Terrorism; Anti-Money Laundering; Anti-Corruption.

(a) Belize is not designated by the Secretary of State of the United States as a State Sponsor of Terrorism pursuant to section 104(c) of the Export Control Reform Act (50 U.S.C. § 4813(c), section 40 of the Arms Export Control Act (22 U.S.C. § 2780), or section 620A of the Foreign Assistance Act of 1961 (22 U.S.C. § 2371).

(b) Belize, through the Government, has implemented, through measures adapted to its particular circumstances, the necessary laws, regulations, and regulatory and enforcement structures to implement the framework of measures recommended by the Financial Action Task Force ("**FATF**") in order to combat money laundering and terrorist financing, as well as the financing of proliferation of weapons of mass destruction as set forth in the International Standards on Combating Money Laundering and the Financing of Terrorism and Proliferation as promulgated by the FATF (the "**Anti-Money Laundering Framework**") and has not been identified by the FATF as a jurisdiction with strategic deficiencies in its Anti-Money Laundering Framework.

(c) None of Belize, the Government, its Agencies or, to the knowledge of Belize, any of the Government's or Agencies' officials working on the contemplated borrowing or any representative, agent, employee or other person with actual authority to act on behalf of Belize, the Government or its Agencies (each an "**Official**") is aware of or has taken any action to request, demand, or receive any money or thing of value from any Person to induce an Official to act or refrain from acting, to use an Official's influence with other Officials, or to confer an improper benefit upon any Person in connection with the borrowing or the subsequent use of the Proceeds, in each of the foregoing cases, in violation of any applicable domestic or transnational anti-corruption law, including, but not limited to, the Prevention of Corruption Act of Belize, the U.S. Foreign Corrupt Practices Act of 1977, and the U.K. Bribery Act 2010, each as may be amended, or similar law of any other relevant jurisdiction, or the rules or regulations thereunder (collectively, the "**Anti-Corruption Laws**").

4.13 Choice of Law.

The choice of New York law in this Agreement, the Conservation Funding Agreement and the Direct Agreement is a valid choice of law under the laws of the Jurisdiction and, accordingly, would be recognized and applied by the courts of the Jurisdiction if this Agreement or any claim hereunder is brought before any such court; provided that in any proceedings in the Jurisdiction for the enforcement of this Agreement, the Conservation Funding Agreement or the Direct Agreement a court in the Jurisdiction would apply procedural law of the Jurisdiction.

4.14 Legal Form.

This Agreement, the Conservation Funding Agreement and the Direct Agreement is in proper legal form under the laws of the Jurisdiction for the enforcement thereof in the Jurisdiction against Belize in accordance with their respective terms, and to ensure the legality, validity or enforceability of each of those documents in the Jurisdiction in accordance with their respective terms, it is not necessary that any of them be filed or recorded, except as described under

Section 4.6 herein, with any court or other authority in the Jurisdiction or that any Stamp Tax be paid in the Jurisdiction on or in respect of any of said documents.

4.15 No License or Qualification.

It is not necessary under the laws of the Jurisdiction that the Administrative Agent or Lenders be licensed, qualified or entitled to carry on business in the Jurisdiction (a) to enforce the Lenders' rights under this Agreement or (b) by virtue of holding the Loan or executing this Agreement.

4.16 Exchange Controls.

Under current laws and regulations of the Jurisdiction and each political subdivision thereof, including in particular the Legislation, all interest, principal, premium, if any, and other payments due or to be made on any Loans or otherwise pursuant to this Agreement may be freely transferred out of the Jurisdiction and may be paid in, or freely converted into, Dollars.

5. AFFIRMATIVE COVENANTS.

Until the Commitment has expired or been terminated and all payment obligations hereunder shall have been paid in full, Belize covenants and agrees with the Lenders as follows:

5.1 Information.

Belize shall deliver to the Administrative Agent:

(a) Financial and Other Information.

(i) As soon as reasonably practicable, but in any event within 180 days after the end of each fiscal year, a certificate by a Responsible Minister attaching the Annual Financial Information issued by the Central Bank for such fiscal year.

(ii) As soon as reasonably practicable, but in any event within 120 days after the end of each calendar quarter, a certificate by a Responsible Minister attaching the Quarterly Financial Information issued by the Central Bank for such quarter.

(iii) Reasonably promptly following any request therefor, such other information regarding the affairs and financial condition of Belize, or compliance with the terms of this Agreement, as the Required Lenders may reasonably request.

(b) Notice of Default or Event of Default. Promptly, and in any event within 5 days after a Responsible Minister becoming aware of the existence of any Default or Event of Default or that any Person has given any notice or taken any action with respect to a claimed default hereunder or that any Person has given any notice or taken any action with respect to a claimed default of the type referred to in Section 8(g), a written notice specifying the nature and period of existence thereof and what action Belize is taking or proposes to take with respect thereto;

(c) Notices from Governmental Authority. Promptly after publication thereof, any order, ruling, statute or other law or regulation that could reasonably be expected to have a Material Adverse Effect; and

(d) Requested Information. Upon the occurrence of an Event of Default, with reasonable promptness, information relating to the assets, properties, liabilities, revenues, expenditures or financial, economic, fiscal or political affairs or condition of Belize or relating to the ability of Belize to perform its obligations hereunder as from time to time may be reasonably requested by the Administrative Agent.

5.2 Inspection.

(a) No Default. If no Default or Event of Default then exists, Belize shall permit the representatives of the Lenders (which shall include third-party consultants and advisors) and of any Political Risk Insurance Provider, at the Lenders' or such third party's or Political Risk Insurance Provider's own expense, as applicable, and upon reasonable prior notice to Belize, to visit the principal executive office of the Government, in order to discuss with the Government's ministers or officials the affairs, finances and accounts of Belize and its Agencies that are related to this Agreement, up to four times per fiscal year (it being agreed that if such visit is at the request of DFC, then no such limit will apply) and with at least a 20-day advance notice, which request shall specify the purpose of the visit.

(b) Default. If a Default or Event of Default then exists, Belize shall permit the representatives of the Lenders and any Political Risk Insurance Provider, at Belize's expense, and upon 5-day advance notice to Belize, to visit offices of the Government to examine such records, reports and other papers, to make copies and extracts therefrom, as are relevant to this Agreement and to discuss its affairs, finances and accounts with its ministers and officials, all at such reasonable times and as often as may be reasonably requested.

5.3 Compliance with Law.

Belize shall and shall cause the Government and each of its Agencies to comply with all treaties, laws, ordinances or governmental rules or regulations to which each of them is subject, and shall obtain and maintain in effect all licenses, certificates, permits, franchises and other governmental authorizations, in each case to the extent necessary to ensure that non-compliance with such laws, ordinances or governmental rules or regulations or failures to obtain or maintain in effect such licenses, certificates, permits, franchises and other governmental authorizations would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

5.4 Governmental Authority, etc.

Belize and the Government shall at all times obtain, comply with the terms of and do all that is necessary to maintain in full force and effect all authorizations, approvals, licenses and consents required in or by the laws and regulations of the Jurisdiction to enable it lawfully to enter into and perform its obligations under this Agreement and the Direct Agreement or to ensure the legality, validity, enforceability or admissibility in evidence in the Jurisdiction of this Agreement and the Direct Agreement.

5.5 *Pari Passu*.

The Loan is a general, direct, unconditional, unsubordinated and unsecured obligation of Belize for the payment and performance of which the full faith and credit of Belize has been pledged, which obligations and liabilities rank in right of payment at least *pari passu* with all of the other present and future unsecured and unsubordinated Public Debt.

5.6 Use of Proceeds.

The proceeds of the Loan shall be used only by Belize (a) to purchase, on the Settlement Date, all Bonds tendered in the Tender Offer, and pay any consideration owed to the holders of Bonds that are tendered in connection with the Tender Offer (including accrued but unpaid past due interest outstanding) in an amount equal to U.S.$[●], (b) to redeem all Bonds that are not tendered in the Tender Offer, and pay any consideration owed to the holders of Bonds that are not tendered in connection with the Tender Offer, including payments into the Custody Account to satisfy and discharge the obligations of Belize in respect to the Bonds, in an amount equal to U.S.$[●], (c) to pay any of its costs and expenses in connection with this Agreement, the Conservation Funding Agreement, the Tender Offer and any transactions contemplated by or in connection with any of the foregoing [that have been approved by the Initial Lender and the Issuer,][3] up to a maximum amount of U.S.$10,000,000, and (d) to the extent not fully utilized in accordance with clauses (a), (b) and (c), to make a payment in accordance with Section 3.1 of the Conservation Funding Agreement.

5.7 Custody Account; Additional Covered Borrower Contribution Account.

(a) No later than 90 days following the second anniversary of the Settlement Date, Belize shall exercise all of its rights under the Custody Agreement to direct the Custodian under the Custody Agreement to transfer all amounts remaining in the Custody Account following such second anniversary that Belize may be entitled to receive pursuant to Custody Agreement in the following manner: (i) *first*, to the Initial Lender, to the account instructed by the Initial Lender, for application in accordance with Section [3.6 (Specific Payment)] of the Conservation Funding Agreement in order to satisfy Belize's obligations thereunder; and (ii) *second*, any remaining balance less any amounts due and payable to the Custodian pursuant to the Custody Agreement shall be transferred to the Additional Covered Borrower Contribution Account.

(b) Amounts on deposit in the Additional Covered Borrower Contribution Account transferred to such account pursuant to Section 5.7(a) of this Agreement or Sections 3.2(d), 3.4(b) or 3.6 of the Conservation Funding Agreement shall be applied to Belize's scheduled debt service payment obligations on each Scheduled Payment Date, in chronological order, and shall reduce such scheduled debt service payment obligations on a dollar-for-dollar basis on each such Scheduled Payment Date by the amount so deposited. For the avoidance of doubt, to the extent that the balance in the Additional Covered Borrower Contribution Account exceeds the amount of Belize's scheduled debt service payment obligations on any given Scheduled Payment Date, all excess funds shall remain in the Additional Covered Borrower Contribution Account until the immediately subsequent Scheduled Payment Date and shall be applied in accordance with this

[3] Note to Draft: Subject to ongoing discussion.

Section 5.7.

6. NEGATIVE COVENANTS.

Until the Commitment has expired or been terminated, all payments obligations hereunder shall have been paid in full, Belize covenants and agrees with the Lenders it shall not and shall cause the Government not to:

6.1 Limitation on Liens.

Except as expressly contemplated in this Agreement, the Trust Agreement or the Conservation Funding Agreement, create, incur, assume or suffer to exist any Lien, other than any Permitted Lien, on the assets or revenues of Belize to secure Public Debt, unless Belize causes such Lien to secure equally and ratably the obligations of Belize arising hereunder.

6.2 Further Assurance.

Prevent, hinder, frustrate, delay, or otherwise take any action inconsistent with the Lenders' rights under this Agreement or the rights of the Issuer or the Funding Facility Security Agent under the Direct Agreement, or cause or permit any Agency to take such actions.

6.3 Sanctions.

Use, directly or knowingly indirectly, the proceeds of the Loan, or lend, contribute or otherwise make available such proceeds to any Person: (i) to fund or facilitate any activities or business of or with any Sanctioned Person or in any Sanctioned Country, unless permitted by applicable law or regulation or if a license authorizing any such transaction shall have been obtained from the authority administering the relevant Sanctions; or (ii) in any other manner that will result in a violation of Sanctions.

6.4 Repayment of Loans.

(a) Permit any part of the funds used in repayment of the Loan (or any other amount payable pursuant to this Agreement or the Conservation Funding Agreement) to be knowingly derived from a transaction with, or proceeds from, a Sanctioned Person or Sanctioned Country.

(b) Use funds that were knowingly the subject of unlawful money laundering activities or any other activities unlawful under applicable law to make any payments to the Lenders under this Agreement or the Conservation Funding Agreement or otherwise make any payment to the Lenders hereunder that would cause it to be in violation of any applicable law.

6.5 No Proceedings

Neither Belize nor or any person acting on its behalf may, at any time, institute, or join with any other person in bringing, instituting or joining, insolvency, administration, bankruptcy, winding-up, examinership or any other similar proceedings (whether court-based or otherwise) in relation to the Initial Lender or any of its officers, shareholders, members, incorporators, corporate

service providers or directors or any of its assets.

7. LENDERS' COVENANTS.

7.1 Covenants.

Until the Commitment has expired or been terminated, all payment obligations hereunder shall have been paid in full and so long as the Initial Lender remains a party hereto, the Initial Lender covenants and agrees with Belize:

(a) be an entity whose sole activities and purpose is limited to the transactions contemplated by this Agreement, the Funding Facility, the Conservation Funding Agreement, the Political Risk Insurance Policy, the Parametric Insurance Policy, the Trust Agreement, the Management Agreement, and all other agreements entered into by the Initial Lender in connection thereby, including undertaking activities directly related to, supporting or incidental to the foregoing and the Conservation Fund (and any fund that replaces the Conservation Fund);

(b) observe all applicable entity procedures to maintain its separate existence and formalities, including: (i) maintaining minutes and records of meetings; (ii) acting on behalf of itself only pursuant to due authorization of its members and/or managers; and (iii) conducting its own business in its own name and through authorized agents pursuant to its organization documents;

(c) prepare and maintain its own full and complete books, accounting records, financial statements and other documents and records, in each case (i) separate and apart from the books, accounting records and other documents and records of any other Person, including its Affiliates, and (ii) in accordance with generally accepted accounting principles, consistently applied, and susceptible to audit;

(d) maintain internal management and accounting practices and controls sufficient to provide reasonable assurances of compliance with applicable anti-money laundering laws and Anti-Corruption Laws;

(e) transact all business with its Affiliates, including TNC, on terms no less favorable to the Initial Lender than if done on an arm's-length basis and pursuant to written, enforceable agreements; and

(f) not, without the prior written consent of Belize, (i) amend, supplement or otherwise modify, (ii) waive any right or consent to the waiver of any right or condition, (iii) take any action that requires the consent of the Initial Lender under, in each case, the Funding Facility Loan Documents, the Trust Agreement, the Management Agreement, or the Initial Lender Security Agreement, to the extent that such amendment, supplement, modification, waiver, consent or action could reasonably be expected to have a material adverse effect on any of Belize's rights, obligations or interests as the borrower under this Agreement, including, without limitation, any amendment, supplement, modification, waiver, consent or action relating to: (1) Article 3 (Yield Protection), 9.1 (Amendments and Waivers; Notices) and 9.8 (Assignments, Participation, etc.) of the Funding Facility; and (2) Sections 1 (Early Redemption) and Section 4 (Voting with respect to the Original Collateral) of the Pricing Terms and Additional Conditions of the Issue Deed.

7.2 Injunction, Specific Performance, and Other Equitable Relief.

If the Initial Lender in any way takes, attempts to take, or threatens to take any action in violation of this Section 7 or fails to take any action required by this Section 7, Belize may obtain relief against the Initial Lender or any third party by injunction, specific performance, and other appropriate equitable relief, it being stipulated and agreed by the Parties that (a) the damages of Belize from the Initial Lender's actions or omissions may at that time be difficult to ascertain and may be irreparable and (b) the Initial Lender waives any defense that Belize cannot demonstrate damage or can be made whole by the awarding of damages; provided that nothing in this Section 7.2 shall be construed as limiting or waiving the agreement of the Parties to resolve all disputes arising out, in relation to, or in connection with this Agreement through binding arbitration in accordance with Section 16.4(b). Belize waives all rights it may have to any monetary damages for a breach of any obligation under this Section 7.

8. EVENTS OF DEFAULT.

If one or more of the following events (each, an "**Event of Default**") shall have occurred and be continuing (whatever the reason for such Event of Default and whether it shall be voluntary or involuntary or be effected by operation of law or pursuant to any judgment, decree or order of any court or any order, rule or regulation of any administrative or governmental body) and written notice thereof is given by the Administrative Agent (at the instruction of the Required Lenders) to Belize:

(a) Belize fails to pay any amount of principal of or interest on the Loan, or any Additional Payments due in respect thereof, as and when the same shall become due and payable, whether at maturity, by declaration or acceleration, or otherwise, and such failure continues unremedied for a period of 30 days; provided that, for the avoidance of doubt, subject to Belize's responsibility to make any payments due on a Scheduled Payment Date occurring less than 10 days after receipt of a payment under the Parametric Insurance Policy and to cover any shortfall as provided in Section 2.8(b), in the event that the conditions set forth in Section 2.8(b) clauses (i) and (ii) are satisfied, Belize's failure to make a payment of principal and interest after a Covered Catastrophic Event with respect to Parametric Insurance Policy amounts payable in accordance with Section 2.8(b) shall not be an Event of Default; or

(b) Belize fails to make any payment due and payable pursuant to Sections [●][4] the Conservation Funding Agreement, as and when the same shall become due and payable, whether at maturity, by declaration or acceleration, or otherwise, and such failure has not been waived or otherwise modified or continues unremedied for a period of 60 days; or

(c) any representation or warranty provided in Section 4.8 or Section 4.13 is proven to have been incorrect when made or deemed made; or

(d) any other representation, warranty, certification or statement of fact (other than pursuant to Section 4.8 or Section 4.13) made or deemed made by or on behalf of Belize in this Agreement shall prove to have been incorrect in any material respect (or, in the case of any

[4] Note to Draft: Conservation Payments, Conservation Event Payments and Management Fees.

such representation or warranty under this Agreement already qualified by materiality, such representation or warranty shall prove to have been incorrect) when made or deemed made (unless cured within 60 days after written notice thereof has been provided to Belize by the Administrative Agent); or

(e) Belize, the Government or any Agency fails to duly observe or perform the covenants provided in Section 5.6, Section 6.3 or Section 6.4; or

(f) Belize fails to duly observe or perform any of the other covenants or agreements provided herein, and such failure continues for a period of 60 days after written notice thereof has been provided to Belize by the Administrative Agent, which 60-day time period shall be automatically extended solely with respect to the covenants contained in Section 5.1 to the extent the Government is diligently seeking to cure such failure; or

(g) any other Indebtedness of Belize owed to the Lenders or any of its Affiliates shall not be paid when due and any grace period applicable to such payment default shall have expired or any such Indebtedness shall become due and payable due to acceleration upon an event of default (and such acceleration shall not have been rescinded or annulled) or due to mandatory prepayment; or

(h) Belize or a court of proper jurisdiction shall declare a general suspension of payments or a moratorium on payment of Belize's Public Debt; or

(i) the validity of this Agreement shall be contested in a formal administrative, legislative or judicial proceeding by Belize, the Government or any legislative, executive or judicial body or official of Belize or the Government which is authorized in each case by law to do so and, acting alone or together with another such body or official, has the legal power and authority to declare or have this Agreement declared invalid or unenforceable, or Belize shall deny any of its obligations hereunder to the Lenders or the Administrative Agent, or any constitutional provision, treaty, convention, law, regulation, official communique, decree, ordinance or policy of the Jurisdiction, or any final decision by any court in the Jurisdiction having jurisdiction, shall purport to render any material provision of this Agreement, invalid or unenforceable or shall purport to prevent or delay the performance or observance by Belize of any of its material obligations hereunder to the Lenders or the Administrative Agent; or

(j) any constitutional provision, treaty, convention, law, regulation, ordinance, decree, consent, approval, license or other authority necessary to enable Belize to make or perform its material obligations under this Agreement or the Direct Agreement, or the validity or enforceability thereof, shall expire, be withheld, revoked, terminated or otherwise cease to remain in full force and effect, or shall be modified in a manner which adversely affects any rights or claims of the Lenders or the Administrative Agent; or

(k) Belize shall have become a Sanctioned Country or a Sanctioned Person or the Government or any of its Agencies shall have become a Sanctioned Person; or

(l) Belize or the Government shall be designated by the Secretary of State of the United States as a State Sponsor of Terrorism pursuant to section 104(c) of the Export Control Reform Act (50 U.S.C. § 4813(c), section 40 of the Arms Export Control Act (22 U.S.C. § 2780),

or section 620A of the Foreign Assistance Act of 1961 (22 U.S.C. § 2371).

9. REMEDIES ON DEFAULT, ETC.

9.1 Termination of Commitment and Acceleration of the Loan.

If any Event of Default has occurred and is continuing, the Administrative Agent may, at the written request of the Required Lenders, by written notice to Belize, (a) terminate the Commitment, and thereupon the Commitment (if not theretofore terminated) shall terminate immediately and/or (b) declare the Loan then outstanding to be immediately due and payable.

Upon the Loan becoming due and payable under this Section 9.1, the entire unpaid principal amount of the Loan, plus all accrued and unpaid interest thereon and all other amounts payable hereunder, shall all be immediately due and payable, in each and every case without presentment, demand, protest or notice of any kind, all of which are hereby waived by Belize.

9.2 Other Remedies.

If any Default or Event of Default has occurred and is continuing, and irrespective of whether the Loan has become or has been declared immediately due and payable under Section 9.1, the Administrative Agent, at the written request of the Required Lenders, at any time, may proceed to protect and enforce its rights by any action commenced pursuant to Section 16.4 for any remedy available at law or in equity, whether for the specific performance of any agreement contained herein, or for an injunction against a violation of any of the terms hereof or thereof, or in aid of the exercise of any power granted hereby or thereby or by law or otherwise.

9.3 Rescission.

At any time after the Loan has been declared due and payable pursuant to Section 9.1, the Administrative Agent, at the written request of the Required Lenders, by written notice to Belize, may rescind and annul any such declaration and its consequences. No rescission and annulment under this Section 9.3 will extend to or affect any subsequent Event of Default or Default or impair any right consequent thereon.

9.4 No Waivers or Election of Remedies, Expenses, etc.

No course of dealing and no delay on the part of the Administrative Agent or Lenders in exercising any right, power or remedy shall operate as a waiver thereof or otherwise prejudice such Administrative Agent's or Lenders' rights, powers or remedies. No right, power or remedy conferred by this Agreement, upon the Administrative Agent or the Lenders thereof shall be exclusive of any other right, power or remedy referred to herein or now or hereafter available at law, in equity, by statute or otherwise.

10. EXPENSES, ETC.

10.1 Transaction Expenses.

Belize shall pay, or cause to be paid, on demand, all reasonable and documented out-of-pocket costs and expenses (including reasonable attorneys' fees of a special counsel, local or other counsel) incurred by the Administrative Agent and the Lenders in connection with (a) the administration of, or amendments, waivers or consents under or in respect of this Agreement (whether or not such amendment, waiver or consent becomes effective), (b) enforcing or defending (or determining whether or how to enforce or defend) any rights under this Agreement or in responding to any subpoena or other legal process or informal investigative demand issued in connection with this Agreement, or by reason of being the Administrative Agent or the Lenders, and (c) any work-out or restructuring of the transaction contemplated hereby.

10.2 Survival.

The obligations of Belize under Section 2.11, Section 16.7, and this Section 10 will survive the payment or transfer of the Loan (or any portion thereof), the enforcement, amendment or waiver of any provision of this Agreement, and the termination of this Agreement.

11. ENTIRE AGREEMENT.

This Agreement and the Direct Agreement embody the entire agreement and understanding between the Lenders, Belize and the Administrative Agent and supersede all prior agreements and understandings relating to the subject matter hereof.

12. AMENDMENT AND WAIVER.

No amendment or waiver of any provision of this Agreement nor consent to any departure by Belize therefrom, shall in any event be effective unless the same shall be in writing and signed by the Required Lenders and acknowledged by the Administrative Agent and, in the case of amendments only, Belize pursuant to a resolution of the National Assembly of Belize, and then such waiver or consent or amendment shall be effective only in the specific instance and for the specific purpose for which given.

13. NOTICES.

All notices and communications provided for hereunder shall be in writing and sent (a) by telecopy if the sender on the same day sends a confirming copy of such notice by a recognized overnight delivery service (charges prepaid), (b) by a recognized overnight delivery service (with charges prepaid), or (c) via email. Any such notice must be sent:

(a) if to the Lenders, to (i) the Initial Lender, to it at 4245 Fairfax Dr., #100, Arlington VA 22203, Attn: Legal Corporate Services. Email: LegalCS@tnc.org, or at such other address as the Initial Lender shall have specified to the Administrative Agent and Belize in writing from time to time, and (ii) to any other Lender at the addresses specified in the Assignment and Assumption Agreement to which it is a party, or at such other address as such Lender shall have specified to Administrative Agent and Belize in writing from time to time, or

(b) if to Belize, to it at to the Financial Secretary of the Ministry of Finance, Sir Edney Cain Building, Belmopan City, Belize, Attention: Financial Secretary, e-mail address joseph.waight@mof.gov.bz, with a copy to Sullivan & Cromwell LLP, 125 Broad Street, New

York, New York 10004, Attention: James L. Bromley / Werner F. Ahlers, e-mail addresses bromleyj@sullcrom.com / ahlersw@sullcrom.com, or at such other address as Belize shall have specified to the Lenders and the Administrative Agent in writing from time to time, or

(c) if to the Administrative Agent, to it at 4245 Fairfax Dr., #100, Arlington VA 22203, Attn: Legal Corporate Services. Email: LegalCS@tnc.org, or at such other address as the Administrative Agent shall have specified to the Lenders and Belize in writing from time to time.

14. ASSIGNMENTS BY THE LENDERS; CERTAIN SECURITY INTERESTS.

(a) The Lenders shall not have the right to assign, dispose of, convey or otherwise transfer to any Person any portion of the Lender's rights under this Agreement without Belize's prior written consent; provided that, if an Event of Default has occurred and is continuing, Belize's prior written consent shall not be required with respect to an assignment (i) of all or any part of the Initial Lender's rights under this Agreement to the DFC (to the extent required in accordance with the Political Risk Insurance Policy), (ii) if the Blue Bonds have been redeemed in connection with an Extraordinary Redemption Event, in connection with such extraordinary redemption, of all of the Lender's rights under this Agreement to one or more Persons (to the extent permitted by applicable Law and in accordance with the Issue Deed) or (iii) an assignment by any Lender that became a Lender in accordance with the immediately foregoing clause (ii) in connection with an Extraordinary Redemption Event or at any time thereafter; and provided further that, if a Funding Facility Event of Default has occurred and is continuing, Belize's prior written consent shall not be required with respect to an assignment to the Issuer or the Funding Facility Security Agent. The parties to each assignment, other than an assignment to DFC, pursuant to this Section 14 shall execute and deliver to the Administrative Agent the Assignment and Acceptance Agreement.

(b) Prior to the redemption of the Blue Bonds in connection with an Extraordinary Redemption Event, the Lenders shall not have the right to sell participations to any Person in any portion of the Lender's rights and obligations under this Agreement (including all or a portion of the Loan at the time owing to the Lender) without Belize's prior written consent.

(c) Prior to the redemption of the Blue Bonds in connection with an Extraordinary Redemption Event, the Lenders shall not have the right to pledge or assign a security interest in all or any portion of its rights under this Agreement to any Person without Belize's prior written consent; provided that Belize's prior written consent shall not be required with respect to any pledge or assignment by the Initial Lender of a security interest in all or any portion of the Initial Lender's rights under this Agreement to (i) the DFC (to the extent in accordance with the Political Risk Insurance Policy) or (ii) the Issuer or the Funding Facility Security Agent (in each case, subject to any rights of DFC under the Political Risk Insurance Policy and under the Subordination and Release Agreement and solely to the extent provided in accordance with the Initial Lender Security Agreement or as expressly contemplated by the Direct Agreement); provided further that no pledge or assignment under this clause (c) shall release any Lender from any of its obligations hereunder or substitute any such pledgee or assignee for such Lender as a party hereto. Notwithstanding any other provision in this Agreement, if the Issuer or Funding Facility Security Agent shall become a Lender hereunder, the Issuer or the Funding Facility

Security Agent, in its capacity as Lender, may at any time create a security interest in, or pledge, all or any portion of its rights under and interest in this Agreement to or for the benefit of the holders of the Blue Bonds under the Issue Deed.

(d) Any purported assignment, disposition, conveyance, sale of participation, pledge or transfer of rights in violation of this Agreement shall be absolutely null and void and have no force or effect, and shall vest no rights in the purported beneficiary of such assignment, disposition, conveyance, sale of participation, pledge or transfer.

15. AGENCY.

15.1 Appointment and Authority.

(a) The Initial Lender, and any subsequent Lender, hereby irrevocably appoints Belize Blue Investment Company, LLC to act on its behalf as the Administrative Agent hereunder and authorizes the Administrative Agent to take such actions on its behalf and to exercise such powers as are delegated to the Administrative Agent by the terms hereof, together with such other actions and powers as are reasonably incidental thereto. Except as otherwise provided in Section 15.6(b), the provisions of this Section 15.1(a) are solely for the benefit of the Administrative Agent, the Lenders, and Belize shall not have rights as a third-party beneficiary of any of such provisions. It is understood and agreed that the use of the term "agent" herein (or any other similar term) with reference to the Administrative Agent is not intended to connote any fiduciary or other implied (or express) obligations arising under agency doctrine of any applicable law. Instead, such term is used as a matter of market custom and is intended to create or reflect only an administrative relationship between contracting parties.

(b) The Required Lenders shall have the right to instruct the Administrative Agent to take such actions on their behalf and to exercise such powers as are delegated to the Administrative Agent under this Agreement. Any action taken by the Administrative Agent or the Required Lenders in accordance with the provisions of this Agreement, and the exercise by the Administrative Agent or the Required Lenders of the powers set forth herein, together with such other actions and powers as are reasonably incidental thereto, shall be authorized and binding upon all of the Lenders.

15.2 Right as a Lender.

The Person serving as the Administrative Agent hereunder shall have the same rights and powers in its capacity as a Lender as any other Lender and may exercise the same as though it were not the Administrative Agent, and the term "Lender" or "Lenders" shall, unless otherwise expressly indicated or unless the context otherwise requires, include the Person serving as the Administrative Agent hereunder in its individual capacity. Such Person and its Affiliates may accept deposits from, lend money to, own securities of, act as the financial advisor or in any other advisory capacity for, and generally engage in any kind of business with, Belize or any Affiliate thereof as if such Person were not the Administrative Agent hereunder and without any duty to account therefor to the Lenders.

15.3 Exculpatory Provisions.

(a) The Administrative Agent shall not have any duties or obligations except for those expressly set forth herein, and its duties hereunder shall be administrative in nature. Without limiting the generality of the foregoing, the Administrative Agent:

(i) shall not be subject to any fiduciary or other implied duties, regardless of whether a Default has occurred and is continuing;

(ii) shall not have any duty to take any discretionary action or exercise any discretionary powers, except discretionary rights and powers expressly contemplated hereby that the Administrative Agent is required to exercise as directed in writing by the Required Lenders; provided that the Administrative Agent shall not be required to take any action that, in its opinion or the opinion of its counsel, may expose the Administrative Agent to liability or that is contrary to this Agreement, or applicable law; and

(iii) shall not, except as expressly set forth herein, have any duty to disclose, and shall not be liable for the failure to disclose, any information relating to Belize or any of its Affiliates that is communicated to or obtained by the Person serving as the Administrative Agent or any of its Affiliates in any capacity.

(b) The Administrative Agent shall not be liable for any action taken or not taken by it (i) with the consent or at the request of the Required Lenders, or (ii) in the absence of its own gross negligence or willful misconduct as determined by a court of competent jurisdiction by final and nonappealable judgment. The Administrative Agent shall be deemed not to have knowledge of any Default unless and until notice describing such Default is given to the Administrative Agent in writing by Belize or a Lender.

(c) The Administrative Agent shall not be responsible for or have any duty to ascertain or inquire into (i) any statement, warranty or representation made in or in connection with this Agreement, (ii) the contents of any certificate, report or other document delivered hereunder or in connection herewith, (iii) the performance or observance of any of the covenants, agreements or other terms or conditions set forth herein or the occurrence of any Default, (iv) the validity, enforceability, effectiveness or genuineness of this Agreement or any other agreement, instrument or document, or (v) the satisfaction of any condition set forth in Section 3 or elsewhere herein, other than to confirm receipt of items expressly required to be delivered to the Administrative Agent.

15.4 Reliance by Administrative Agent.

The Administrative Agent shall be entitled to rely upon, and shall not incur any liability for relying upon, any notice, request, certificate, consent, statement, instrument, document or other writing (including any electronic message, Internet or intranet website posting or other distribution) believed by it to be genuine and to have been signed, sent or otherwise authenticated by the proper Person. The Administrative Agent also may rely upon any statement made to it orally or by telephone and believed by it to have been made by the proper Person and shall not incur any liability for relying thereon. In determining compliance with any condition hereunder to the making of a Loan, that by its terms must be fulfilled to the satisfaction of a Lender, the Administrative Agent may presume that such condition is satisfactory to such Lender unless the

Administrative Agent shall have received notice to the contrary from such Lender prior to the making of such Loan. The Administrative Agent may consult with legal counsel (who may be counsel for Belize), independent accountants and other experts selected by it, and shall not be liable for any action taken or not taken by it in accordance with the advice of any such counsel, accountants or experts.

15.5 Delegation of Duties.

With the prior written consent of Belize, the Administrative Agent may perform any and all of its duties and exercise its rights and powers hereunder by or through any one or more sub-agents appointed by the Administrative Agent; provided that no consent shall be required if the sub-agent is an Affiliate of the Initial Lender; and provided further that Belize's prior written consent shall not be required if an Event of Default has occurred and is continuing. The Administrative Agent and any such sub-agent may perform any and all of its duties and exercise its rights and powers by or through their respective Affiliates. The exculpatory provisions of this Article shall apply to any such sub-agent and to the Affiliates of the Administrative Agent and any such sub-agent and shall apply to their respective activities in connection with the activities as Administrative Agent. The Administrative Agent shall not be responsible for the negligence or misconduct of any sub-agents except to the extent that a court of competent jurisdiction determines in a final and nonappealable judgment that the Administrative Agent acted with gross negligence or willful misconduct in the selection of such sub-agents.

15.6 Resignation of Administrative Agent.

(a) The Administrative Agent may at any time give notice of its resignation to the Lenders and Belize. Upon receipt of any such notice of resignation, the Required Lenders shall, with the prior written consent of Belize, have the right to appoint a successor, which shall be either an Affiliate of any Lender or a bank with an office in [●]; provided that Belize's prior written consent shall not be required (i) if an Event of Default has occurred and is continuing or (ii) a Funding Facility Event of Default has occurred and is continuing. If no such successor shall have been so appointed by the Required Lenders and shall have accepted such appointment within 30 days after the retiring Administrative Agent gives notice of its resignation (or such earlier day as shall be agreed by the Lenders) (the "**Resignation Effective Date**"), then the retiring Administrative Agent may (but shall not be obligated to), on behalf of the Lenders, with the prior written consent of Belize appoint a successor Administrative Agent meeting the qualifications set forth above; provided that Belize's prior written consent shall not be required if an Event of Default has occurred and is continuing. Whether or not a successor has been appointed, such resignation shall become effective in accordance with such notice on the Resignation Effective Date.

(b) With effect from the Resignation Effective Date (i) the retiring or removed Administrative Agent shall be discharged from its duties and obligations hereunder and (ii) except for any indemnity payments owed to the retiring or removed Administrative Agent, all payments, communications and determinations provided to be made by, to or through the Administrative Agent shall instead be made by or to each Lender directly, until such time, if any, as the Required Lenders appoint a successor Administrative Agent as provided for above. Upon the acceptance of a successor's appointment as Administrative Agent hereunder, such successor shall succeed to and become vested with all of the rights, powers, privileges and duties of the retiring or removed

Administrative Agent (other than any rights to indemnity payments owed to the retiring or removed Administrative Agent), and the retiring or removed Administrative Agent shall be discharged from all of its duties and obligations hereunder. No fees shall be payable by Belize to any Administrative Agent unless otherwise agreed between Belize and such successor. After the retiring or removed Administrative Agent's resignation or removal hereunder, the provisions of this Section 15, Section 10, and Section 16.7 shall continue in effect for the benefit of such retiring or removed Administrative Agent, its sub agents and their respective Affiliates in respect of any actions taken or omitted to be taken by any of them while the retiring or removed Administrative Agent was acting as Administrative Agent.

15.7 Non-Reliance on Agents and Other Lenders.

The Initial Lender acknowledges that it has, independently and without reliance upon the Administrative Agent, or any other Lender or any of their Affiliates and based on such documents and information as it has deemed appropriate, made its own credit analysis and decision to enter into this Agreement. The Initial Lender also acknowledges that it shall, independently and without reliance upon the Administrative Agent, or any other Lender or any of their Affiliates and based on such documents and information as it shall from time to time deem appropriate, continue to make its own decisions in taking or not taking action under or based upon this Agreement, or any related agreement or any document furnished hereunder. The Initial Lender represents and warrants that this Agreement set forth the terms of a commercial lending facility and certain other facilities set forth herein.

15.8 Erroneous Payments.

(a) Subject to clause (h), if the Administrative Agent (x) notifies a Lender or any Person who has received funds on behalf of a Lender (any such Lender or other recipient (and each of their respective successors and assigns), a "**Payment Recipient"**) that the Administrative Agent has determined in its reasonable discretion (whether or not after receipt of any notice under immediately succeeding clause (b)) that any funds (as set forth in such notice from the Administrative Agent) received by such Payment Recipient from the Administrative Agent or any of its Affiliates were erroneously or mistakenly transmitted to, or otherwise erroneously or mistakenly received by, such Payment Recipient (whether or not known to such Lender or other Payment Recipient on its behalf) (any such funds, whether transmitted or received as a payment, prepayment or repayment of principal, interest, fees, distribution or otherwise, individually and collectively, an "**Erroneous Payment**") and (y) demands in writing the return of such Erroneous Payment (or a portion thereof) (provided that without limiting any other rights or remedies (whether at law or in equity), the Administrative Agent may not make any such demand under this clause (a) with respect to an Erroneous Payment unless such demand is made within 5 Business Days of the date of receipt of such Erroneous Payment by the applicable Payment Recipient), such Erroneous Payment shall at all times remain the property of the Administrative Agent pending its return or repayment as contemplated below in this Section 15.8 and held in trust for the benefit of the Administrative Agent, and such Lender shall (or, with respect to any Payment Recipient who received such funds on its behalf, shall cause such Payment Recipient to) promptly, but in no event later than two Business Days thereafter (or such later date as the Administrative Agent may, in its sole discretion, specify in writing), return to the Administrative Agent the amount of any such Erroneous Payment (or portion thereof) as to which such a demand was made, in same day funds

(in the currency so received), together with interest thereon (except to the extent waived in writing by the Administrative Agent) in respect of each day from and including the date such Erroneous Payment (or portion thereof) was received by such Payment Recipient to the date such amount is repaid to the Administrative Agent in same day funds at a rate determined by the Administrative Agent in accordance with banking industry rules on interbank compensation from time to time in effect. A notice of the Administrative Agent to any Payment Recipient under this clause (a) shall be conclusive, absent manifest error.

(b) Without limiting immediately preceding clause (a), each Lender or any Person who has received funds on behalf of a Lender (and each of their respective successors and assigns), agrees that if it receives a payment, prepayment or repayment (whether received as a payment, prepayment or repayment of principal, interest, fees, distribution or otherwise) from the Administrative Agent (or any of its Affiliates) (x) that is in a different amount than, or on a different date from, that specified in this Agreement or in a notice of payment, prepayment or repayment sent by the Administrative Agent (or any of its Affiliates) with respect to such payment, prepayment or repayment, (y) that was not preceded or accompanied by a notice of payment, prepayment or repayment sent by the Administrative Agent (or any of its Affiliates), or (z) that such Lender or other such recipient, otherwise becomes aware was transmitted, or received, in error or by mistake (in whole or in part), then in each such case:

(i) it acknowledges and agrees that (A) in the case of immediately preceding clauses (x) or (y), an error and mistake shall be presumed to have been made (absent written confirmation from the Administrative Agent to the contrary) or (B) an error and mistake has been made (in the case of the preceding clause (z) of this Section 15.8(b)), in each case, with respect to such payment, prepayment or repayment; and

(ii) such Lender shall (and shall cause any other recipient that receives funds on its respective behalf to) promptly (and, in all events, within one Business Day of its knowledge of the occurrence of any of the circumstances described in clauses (x), (y) and (z) of this Section 15.8(b)) notify the Administrative Agent of its receipt of such payment, prepayment or repayment, the details thereof (in reasonable detail) and that it is so notifying the Administrative Agent pursuant to this Section 15.8(b).

For the avoidance of doubt, the failure to deliver a notice to the Administrative Agent pursuant to this Section 15.8(b) shall not have any effect on a Payment Recipient's obligations pursuant to Section 15.8(a) or on whether or not an Erroneous Payment has been made.

(c) Lender hereby authorizes the Administrative Agent to set off, net and apply any and all amounts at any time owing to such Lender under this Agreement, or otherwise payable or distributable by the Administrative Agent to such Lender under this Agreement with respect to any payment of principal, interest, fees or other amounts, against any amount that the Administrative Agent has demanded to be returned under Section 15.8(a).

(d)

(i) In the event that an Erroneous Payment (or portion thereof) is not

recovered by the Administrative Agent for any reason, after demand therefor in accordance with Section 15.8(a), from any Lender that has received such Erroneous Payment (or portion thereof) (and/or from any Payment Recipient who received such Erroneous Payment (or portion thereof) on its respective behalf) (such unrecovered amount, an "**Erroneous Payment Return Deficiency**"), upon the Administrative Agent's notice to such Lender at any time, then effective immediately (with the consideration therefor being acknowledged by the parties hereto), (A) such Lender shall be deemed to have assigned its Loan (but not its Commitment) with respect to which such Erroneous Payment was made (the "**Erroneous Payment Impacted Class**") in an amount equal to the Erroneous Payment Return Deficiency (or such lesser amount as the Administrative Agent may specify) (such assignment of the Loan (but not Commitments) of the Erroneous Payment Impacted Class, the "**Erroneous Payment Deficiency Assignment**") (on a cashless basis and such amount calculated at par plus any accrued and unpaid interest (with the assignment fee to be waived by the Administrative Agent in such instance)), and is hereby (together with Belize) deemed to execute and deliver an Assignment and Assumption with respect to such Erroneous Payment Deficiency Assignment, and such Lender shall deliver any Notes evidencing such Loan to Belize or the Administrative Agent (but the failure of such Person to deliver any such Notes shall not affect the effectiveness of the foregoing assignment), (B) the Administrative Agent as the assignee Lender shall be deemed to have acquired the Erroneous Payment Deficiency Assignment, (C) upon such deemed acquisition, the Administrative Agent as the assignee Lender shall become a Lender, as applicable, hereunder with respect to such Erroneous Payment Deficiency Assignment and the assigning Lender shall cease to be a Lender, as applicable, hereunder with respect to such Erroneous Payment Deficiency Assignment, excluding, for the avoidance of doubt, its obligations under the indemnification provisions of this Agreement and its applicable Commitments which shall survive as to such assigning Lender, (D) the Administrative Agent and Belize shall each be deemed to have waived any consents required under this Agreement to any such Erroneous Payment Deficiency Assignment, and (E) the Administrative Agent will reflect in the Register its ownership interest in the Loan subject to the Erroneous Payment Deficiency Assignment. For the avoidance of doubt, no Erroneous Payment Deficiency Assignment will reduce the Commitments of any Lender and such Commitments shall remain available in accordance with the terms of this Agreement.

(ii) Subject to Section 14 (including, for the avoidance of doubt, any assignment consent or approval requirements (whether from Belize or otherwise) thereunder), the Administrative Agent may, in its discretion, sell any Loans acquired pursuant to an Erroneous Payment Deficiency Assignment and, upon receipt of the proceeds of such sale, the Erroneous Payment Return Deficiency owing by any Lender shall be reduced by the net proceeds of the sale of such Loan (or portion thereof), and the Administrative Agent shall retain all other rights, remedies and claims against such Lender (and/or against any recipient that receives funds on its respective behalf). In addition, an Erroneous Payment Return Deficiency owing by any Lender (x) shall be reduced by the proceeds of prepayments or repayments of principal and interest, or other distribution in respect of principal and interest, received by the Administrative Agent on or with respect to any such Loans acquired from such Lender pursuant to an Erroneous Payment Deficiency Assignment (to the extent that any such Loans are then owned by the

Administrative Agent) and (y) may, in the sole discretion of the Administrative Agent, be reduced by any amount specified by the Administrative Agent in writing to the Lenders from time to time.

(e) The parties hereto agree that (x) irrespective of whether the Administrative Agent may be equitably subrogated, in the event that an Erroneous Payment (or portion thereof) is not recovered from any Payment Recipient that has received such Erroneous Payment (or portion thereof) for any reason, the Administrative Agent shall be subrogated to all the rights and interests of such Payment Recipient (and, in the case of any Payment Recipient who has received funds on behalf of a Lender to the rights and interests of such Lender) under this Agreement with respect to such amount (the "**Erroneous Payment Subrogation Rights**" (provided that Belize's obligations under this Agreement in respect of the Erroneous Payment Subrogation Rights shall not be duplicative of such obligations in respect of Loans that have been assigned to the Administrative Agent under an Erroneous Payment Deficiency Assignment) and (y) an Erroneous Payment shall not pay, prepay, repay, discharge or otherwise satisfy any obligations owed by Belize; provided that this Section 15.8 shall not be interpreted to increase (or accelerate the due date for), or have the effect of increasing (or accelerating the due date for), the obligations of Belize relative to the amount (and/or timing for payment) of the obligations that would have been payable had such Erroneous Payment not been made by the Administrative Agent; provided further that for the avoidance of doubt, the immediately preceding clauses (x) and (y) shall not apply to the extent any such Erroneous Payment is, and solely with respect to the amount of such Erroneous Payment that is, comprised of funds received by the Administrative Agent from Belize for the purpose of making such Erroneous Payment.

(f) To the extent permitted by applicable law, no Payment Recipient shall assert any right or claim to an Erroneous Payment, and hereby waives, and is deemed to waive, any claim, counterclaim, defense or right of set-off or recoupment with respect to any demand, claim or counterclaim by the Administrative Agent for the return of any Erroneous Payment received, including, without limitation, any defense based on "discharge for value" or any similar doctrine.

(g) Each party's obligations, agreements and waivers under this Section 15.8 shall survive the resignation of the Administrative Agent, the acceleration of the Loan and/or the repayment, satisfaction or discharge of all obligations (or any portion thereof) under this Agreement.

(h) Notwithstanding anything to the contrary contained herein or in any other document or agreement, this Section 15.8 shall have no force or effect unless and until the Blue Bonds have been redeemed in connection with an Extraordinary Redemption Event.

16. MISCELLANEOUS.

16.1 Severability.

Any provision of this Agreement that is prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof, and any such prohibition or

unenforceability in any jurisdiction shall (to the full extent permitted by law) not invalidate or render unenforceable such provision in any other jurisdiction.

16.2 Construction.

Each covenant contained herein shall be construed (absent express provision to the contrary) as being independent of each other covenant contained herein, so that compliance with any one covenant shall not (absent such an express contrary provision) be deemed to excuse compliance with any other covenant. Where any provision herein refers to action to be taken by any Person, or which such Person is prohibited from taking, such provision shall be applicable whether such action is taken directly or indirectly by such Person.

16.3 Counterparts.

This Agreement may be executed in any number of counterparts, each of which shall be an original but all of which together shall constitute one instrument. Each counterpart may consist of a number of copies hereof, each signed by less than all, but together signed by all, of the parties hereto. Counterparts may be delivered via facsimile, electronic mail (including any electronic signature covered by the U.S. federal ESIGN Act of 2000, Uniform Electronic Transactions Act, the Electronic Signatures and Records Act or other applicable law, or other transmission method), and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

16.4 Governing Law, Jurisdiction and Service of Process; Waiver of Sovereign Immunity.

(a) This Agreement shall be governed by, and construed in accordance with, the laws of the State of New York, United States, without giving effect to conflict of laws provisions to the extent that the application of the laws of any other jurisdiction would be required thereby.

(b) Any dispute arising out of, in relation to, or in connection with this Agreement shall be resolved through final and binding arbitration conducted in accordance with the Rules of Arbitration of the International Chamber of Commerce entered in force on January 1, 2021 ("**Rules**"). The Parties expressly agree pursuant to Article 30(2)(b) of the Rules that disputes between the Parties arising under this Agreement are suitable for resolution under the Expedited Procedures set forth in Article 30 and Appendix VI of the Rules (collectively, the "**Expedited Procedures**"), and in furtherance of the foregoing the Parties additionally expressly agree not to (x) contend it is inappropriate to apply, or (y) request that the Court of Arbitration of the International Chamber of Commerce examine the appropriateness of, such Expedited Procedure in any arbitration conducted pursuant to this Agreement, irrespective of the amount in dispute. The arbitration shall be conducted by three (3) arbitrators appointed in accordance with Article 12(4)-(5) of the Rules. The place of arbitration shall be New York, New York, United States. The language of the arbitration shall be English. The arbitral tribunal shall have the right to determine, in the first instance, any and all challenges to the arbitral tribunal's jurisdiction, including, without limitation, challenges to the scope, existence, and validity of this arbitration agreement. An award of the arbitral tribunal may be enforced in any court of competent jurisdiction. Belize expressly

confirms that the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (the "**Convention**") has been incorporated into the domestic laws of the Jurisdiction and agrees that: (a) it is bound by the terms of that Convention, including as a treaty obligation and (b) the Convention shall apply to any action to enforce an award issued pursuant to an arbitration conducted in accordance with this Section 16.4.

The prevailing party shall be entitled to, and the tribunal shall award, pre-award and post-award interest on any amounts awarded in an arbitration commenced under this Agreement (the "**Arbitral Award Amount**"). Such interest shall accrue, in the case of arbitrations commenced by the Lender, from the date that an Event of Default occurred and, in the case of arbitrations commenced by Belize, the date of the filing to commence an arbitration proceeding, in each case, at a rate per annum equal to 9%. Interest on the outstanding Arbitral Award Amount shall continue to accrue at a rate per annum equal to 9% until such amounts are paid in Dollars in cash in full by the award debtor. If the award creditor or any successor in interest elects to enforce the award in court, including a court in the United States, the Parties agree that any judgment rendered on the award by the court shall bear post-judgment interest at the rate agreed by the Parties under the formula above for awards rendered by the tribunal in lieu of any other post-judgment interest rate, including the post-judgment interest rate under 28 U.S.C. § 1961 until the award is fully paid in Dollars.

(c) To the extent that Belize or the Government or any of their assets may have, or may hereafter become entitled to or have attributed to them (whether or not claimed), any right of immunity (on the grounds of sovereignty or otherwise), in any jurisdiction, Belize hereby unconditionally and irrevocably waives and agrees not to assert, with respect to the Government and its revenues to the fullest extent permitted by applicable law, any such immunity from jurisdiction, from suit or arbitration, from setoff or counterclaim, from service of process upon it or any agent, from pre-judgment or pre-award attachment, from attachment upon or in aid of execution of judgment or from execution of judgment or other legal process or proceeding for the giving of any relief or for the enforcement of judgments, in any action, suit or proceeding arising out of or based on this Agreement, which may be instituted as provided by this Section 16.4; provided that such waiver of immunity constitutes only a limited and specific waiver for the purposes of this Agreement and under no circumstances shall it be interpreted as a general waiver by Belize or the Government or a waiver with respect to proceedings unrelated to this Agreement.

(d) THE PARTIES HERETO HEREBY WAIVE TRIAL BY JURY IN ANY ACTION BROUGHT ON OR WITH RESPECT TO THIS AGREEMENT OR ANY OTHER DOCUMENT EXECUTED IN CONNECTION HEREWITH OR THEREWITH.

16.5 Obligation to Make Payments in Dollars.

Any payment on account of an amount that is payable hereunder in Dollars which is made to the Funding Facility Administrative Agent Account or deemed to have been made by Belize pursuant to Section 2.7 for the account of any Lender in lawful currency of any other jurisdiction (the "**Other Currency**"), whether as a result of any judgment or order or the enforcement thereof or the realization of any security, shall constitute a discharge of Belize's obligation under this Agreement only to the extent of the amount of Dollars which such Lender could purchase in the New York foreign exchange markets with the amount of the Other Currency

in accordance with normal banking procedures at the rate of exchange prevailing on the first day (other than a Saturday) on which banks in New York are generally open for business following receipt of the payment first referred to above. If the amount of Dollars that could be so purchased is less than the amount of Dollars originally due to such Lender, Belize shall indemnify and save harmless such Lender from and against all loss or damage arising out of or as a result of such deficiency. This indemnity shall constitute an obligation separate and independent from the other obligations contained in this Agreement, shall give rise to a separate and independent cause of action, shall apply irrespective of any indulgence granted by any Lender from time to time and shall continue in full force and effect notwithstanding any judgment or order for a liquidated sum in respect of an amount due hereunder or under any judgment or order. For the avoidance of doubt, in no event shall Belize be required to pay more Dollars at the rate of exchange when payment is made than the amount of Dollars stated to be due hereunder, so that in any event Belize's obligations hereunder will be effectively maintained as Dollar obligations.

16.6 English Language.

All notices provided for in this Agreement or the Direct Agreement or made in accordance with herein or therein and all documents delivered under the terms of this Agreement shall either be in English or shall be accompanied by a certified translation into English.

This Agreement and the Direct Agreement has been prepared and signed in English and the parties hereto agree that the English version hereof and thereof (to the maximum extent permitted by applicable law) shall be the only version valid for the purpose of the interpretation and construction hereof and thereof notwithstanding the preparation of any translation into another language hereof or thereof, whether official or otherwise or whether prepared in relation to any proceedings which may be brought in the Jurisdiction or any other jurisdiction in respect hereof or thereof.

16.7 Indemnification.

Belize shall indemnify and hold harmless the Administrative Agent, the Lenders and their Affiliates and their respective directors, officers, employees, agents and advisors (each, an "**Indemnified Party**"), to the fullest extent lawful, from and against any and all losses, claims, penalties, damages, expenses or liabilities whatsoever (including, without limitation, documented fees and disbursements of counsel), incurred by or asserted or awarded against any Indemnified Party (including, without limitation, in connection with any pending or prospective investigation, litigation, proceeding or the preparation of any defense or appearing as a third-party witness in connection therewith) arising out of or relating to the execution or delivery of this Agreement and the performance by the parties hereto of their respective obligations hereunder, except to the extent that such losses, claims, penalties, damages, liabilities or expenses (or proceedings in respect thereof) (a) are determined in a final non-appealable judgment by a court of competent jurisdiction to have resulted primarily from the gross negligence, bad faith or willful misconduct of such Indemnified Party or (b) result from a dispute or claim between Indemnified Parties; provided that in any case, Belize shall not be held liable for any settlement of any such proceedings unless the Indemnified Party has previously notified and consulted with Belize in respect thereof, and Belize has provided its consent in respect of any settlement. In the case of an investigation, litigation or other proceeding to which the indemnity in this Section 16.7 applies, such indemnity shall be

effective whether or not such investigation, litigation or proceeding is brought by Belize, any of its directors, security holders or creditors, an Indemnified Party or any other Person or an Indemnified Party is otherwise a party thereto and whether or not the transactions contemplated herein are consummated.

No Indemnified Party shall have any liability (whether direct or indirect, in contract, tort or otherwise) to Belize or any of its Agencies or other Affiliates, security holders or creditors for or in connection with the services or transactions contemplated hereby, except to the extent such liability is determined in a final non-appealable judgment by a court of competent jurisdiction to have resulted primarily from such Indemnified Party's gross negligence, bad faith or willful misconduct. In no event, however, shall any Indemnified Party be liable on any theory of liability for any special, indirect, consequential or punitive damages (including, without limitation, any loss of profits, business or anticipated savings), and Belize hereby releases and holds harmless (for itself and any person claiming through it) each Indemnified Party from all such liability. No Indemnified Party shall be liable for any damages arising from the use by unauthorized persons of information or other materials sent through electronic, telecommunications or other information transmission systems that are intercepted by such persons, except to the extent such interception is due to the gross negligence, bad faith or willful misconduct of such Indemnified Person.

In addition to the foregoing and the obligations of Belize pursuant to Section 2.11, Belize shall indemnify and hold harmless the Indemnified Parties from and against any and all Taxes imposed by a Taxing Authority in Belize on or measured by net income (however denominated) or that are franchise Taxes or branch profits Taxes or any other taxes or similar charges imposed on the Indemnified Parties in Belize in each case, as a result of or otherwise in connection with the execution, delivery and performance of this Agreement (including but not limited to the Lenders' registration as a business under Belize law, the Lenders' actions with respect to any parametric or political risk insurance policy) and any connection arising from the acquisition, ownership or holding of the Loan, the enforcement of rights under the Loan or the receipt of any payment in respect thereof or under this Agreement.

The indemnity and reimbursement obligations of Belize hereunder shall be in addition to any other liability Belize may otherwise have to an Indemnified Party, shall be binding upon and inure to the benefit of any successors, assigns, heirs and personal representatives of Belize and any Indemnified Party and shall survive the enforcement, amendment or waiver of any provision of this Agreement and the termination of this Agreement.

16.8 Right of Setoff.

If an Event of Default shall have occurred and be continuing, the Administrative Agent, the Lenders and each of their Affiliates is hereby authorized at any time and from time to time, to the fullest extent permitted by applicable law, to set-off and apply any and all deposits (general or special, time or demand, provisional or final, in whatever currency) at any time held and other obligations (in whatever currency) at any time owing by any Lender or any such Affiliate to or for the credit or the account of Belize against any and all of the obligations of Belize now or hereafter existing under this Agreement to such Lender, irrespective of whether or not such Lender shall have made any demand under this Agreement and although such obligations of Belize may

be contingent or unmatured or are owed to a branch or office of such Lender different from the branch or office holding such deposit or obligated on such indebtedness. The rights of the Lenders and their Affiliates under this Section 16.8 are in addition to other rights and remedies (including other rights of setoff) that the Lenders or their Affiliates may have. The Administrative Agent agrees to notify Belize promptly after any such setoff and application; provided that the failure to give such notice shall not affect the validity of such setoff and application.

16.9 No Fiduciary Relationship.

Belize acknowledges that the Lenders do not have any fiduciary relationship with, or fiduciary duty to, Belize arising out of or in connection with this Agreement, and the relationship between Belize and the Lenders in connection herewith is solely that of debtor and creditor. Nothing contained in this Agreement shall be deemed or construed to create a partnership, tenancy-in-common, joint tenancy, joint venture or co-ownership by or between the Lenders and Belize or any other Person. The Lenders shall not in any way be responsible or liable for the debts, losses, obligations or duties of Belize or any other Person other than itself.

16.10 USA Patriot Act.

The Lenders hereby notify Belize that, pursuant to the requirements of the USA Patriot Act (Title III of Pub. L. 107-56 (signed into law October 26, 2001)) (the "**Act**"), they are required to obtain, verify and record information that identifies Belize, which information includes the name, address, tax identification number and other information regarding Belize that will allow each Lender to identify Belize in accordance with the Act.

16.11 Acknowledgment and Consent to Bail-In of Affected Financial Institutions.

Notwithstanding anything to the contrary in this Agreement or in any other agreement, arrangement or understanding among the parties hereto, each party hereto acknowledges that any liability of any Affected Financial Institution arising under this Agreement may be subject to the write-down and conversion powers of the applicable Resolution Authority and agrees and consents to, and acknowledges and agrees to be bound by:

(a) the application of any Write-Down and Conversion Powers by the applicable Resolution Authority to any such liabilities arising hereunder which may be payable to it by any party hereto that is an Affected Financial Institution; and

(b) the effects of any Bail-in Action on any such liability, including, if applicable:

(i) a reduction in full or in part or cancellation of any such liability;

(ii) a conversion of all, or a portion of, such liability into shares or other instruments of ownership in such Affected Financial Institution, its parent undertaking, or a bridge institution that may be issued to it or otherwise conferred on it, and that such shares or other instruments of ownership will be accepted by it in lieu of any rights with respect to any such liability under this Agreement; or

(iii) the variation of the terms of such liability in connection with the exercise of the write-down and conversion powers of the applicable Resolution Authority.

[*Remainder of the page intentionally left blank*]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed by their respective authorized officers as of the date first above written.

BELIZE, as borrower

By: _____
Name:
Title:

BELIZE BLUE INVESTMENT COMPANY, LLC, as Initial Lender

By: _____
Name:
Title:

BELIZE BLUE INVESTMENT COMPANY, LLC, as Administrative Agent

By: _____
Name:
Title:

ANNEX A

DEFINED TERMS AND INTERPRETATION

1. Defined Terms.

"**Act**" has the meaning set forth in Section 16.10.

"**Additional Covered Borrower Contribution Account**" means an account of the Funding Facility Administrative Agent, as notified by the Funding Facility Administrative Agent to the Administrative Agent, the Initial Lender and Belize from time to time.

"**Additional Payment**" has the meaning set forth in Section 2.11.

"**Administrative Agent**" means Belize Blue Investment Company, LLC, in its capacity as administrative agent under this Agreement, or any successor administrative agent.

"**Affected Financial Institution**" means (a) any EEA Financial Institution or (b) any UK Financial Institution.

"**Affiliate**" means, at any time, and with respect to any Person, (a) any other Person that at such time directly or indirectly through one or more intermediaries Controls, or is Controlled by, or is under common Control with, such first Person, and (b) with respect to Belize only, any Agency and (c) with respect to the Government only, any corporation of which the Government and its Agencies beneficially own or hold, in the aggregate, directly or indirectly, 10% or more of any class of voting or equity interests. As used in this definition, "**Control**" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a Person, whether through the ownership of voting securities, by contract or otherwise.

"**Agency**" means any agency or instrumentality of the Government that is (a) a legal person (corporate or otherwise) separate from the Government and (b) majority-owned or otherwise controlled by the Government (in any case directly or indirectly); provided that, so long as such agency, instrumentality or other legal person does not have the authority to govern, legislate, regulate, levy or collect taxes, fees or duties or grant licenses or permits in the Jurisdiction, it shall not be an "Agency" if it (i) operates primarily as a commercial enterprise, (ii) primarily funds itself in the ordinary course from non-governmental sources without a Government guaranty or other Government assurance of payment or (iii) provides financing substantially to the private sector.

"**Agreement**" has the meaning set forth in the preamble.

"**Annual Financial Information**" means a report published by the Central Bank covering similar topics and providing similar information as historically provided by the Central Bank in the "Annual Report & Statement of Accounts," subject to applicable laws and regulations.

"**Anti-Corruption Laws**" has the meaning set forth in Section 4.12(a).

"**Anti-Money Laundering Framework**" has the meaning set forth in Section 4.12(b).

"**Arbitral Award Amount**" has the meaning set forth in Section 16.4.

"**Assignment and Acceptance Agreement**" means an assignment and acceptance agreement entered into by an existing Lender and a new Lender in accordance with this Agreement and substantially in the form of Exhibit B.

"**Bail-In Action**" means the exercise of any Write-Down and Conversion Powers by the applicable Resolution Authority in respect of any liability of an Affected Financial Institution.

"Bail-In Legislation" means (a) with respect to any EEA Member Country implementing Article 55 of Directive 2014/59/EU of the European Parliament and of the Council of the European Union, the implementing law, regulation rule or requirement for such EEA Member Country from time to time which is described in the EU Bail-In Legislation Schedule and (b) with respect to the United Kingdom, Part I of the United Kingdom Banking Act 2009 (as amended from time to time) and any other law, regulation or rule applicable in the United Kingdom relating to the resolution of unsound or failing banks, investment firms or other financial institutions or their affiliates (other than through liquidation, administration or other insolvency proceedings).

"**Belize**" has the meaning set forth in the preamble.

"**Blue Bond Trustee**" is HSBC Bank USA, National Association, or any successor entity appointed pursuant to the terms of the Blue Bonds.

"**Blue Bonds**" means the "Notes," as defined in the Issue Deed.

"**Bond Trustee**" is The Bank of New York Mellon.

"**Bonds**" means the senior unsecured bonds issued by Belize due on February 20, 2034 with security identifiers ISIN USP16394AG62.

"**Borrowing**" means the borrowing of the Loan pursuant to Section 2.1(a).

"**Borrowing Request**" means a request by Belize for the Borrowing in accordance with Section 2.2 and substantially in the form of Exhibit A.

"**Business Day**" means any day other than a Saturday, Sunday or legal holiday on which commercial banks and foreign exchange markets are open for business in New York, New York, London, England and the capital city of the Jurisdiction.

"**Central Bank**" means the Central Bank of Belize.

"**Change in Law**" means the occurrence, after the date of this Agreement (or with respect to the Lender, if later, the date on which the Lender becomes (or became, if applicable) the Lender), of any of the following: (a) the adoption or taking effect of any law, rule, regulation or treaty, (b) any change in any law, rule, regulation or treaty or in the administration, interpretation, implementation or application thereof by any Governmental Authority, or (c) the making or issuance of any request, rules, guideline, requirement or directive (whether or not having the force of law) by any Governmental Authority; provided however, that notwithstanding anything herein

to the contrary, (i) the Dodd-Frank Wall Street Reform and Consumer Protection Act and all requests, rules, guidelines, requirements and directives thereunder or issued in connection therewith or in the implementation thereof, (ii) CRD VI and (iii) all requests, rules, guidelines, requirements and directives promulgated by the Bank for International Settlements, the Basel Committee on Banking Supervision (or any successor or similar authority) or any United States or foreign regulatory authority, in each case pursuant to Basel III, shall in each case be deemed to be a "Change in Law" regardless of the date enacted, adopted, issued or implemented.

"**Code**" means the Internal Revenue Code of 1986, as amended.

"**Commitment**" means U.S.$[●].

"**Connection Income Taxes**" means Other Connection Taxes that are imposed on or measured by net income (however denominated) or that are franchise Taxes or branch profits Taxes.

"**Conservation Fund**" means an entity (as described in Section 2.13(a)) that may be funded by the Initial Lender to, among other things, support conservation management activities in the Jurisdiction.

"**Conservation Funding Agreement**" means that certain Conservation Funding Agreement, dated as of the date hereof, between the Initial Lender and Belize.

"Convention" has the meaning set forth in Section 16.4(b).

"**Covered Catastrophic Event**" means a fortuitous natural disaster event or successive events that alone or together meet all of the parametric trigger requirements set forth in the then in-force Parametric Insurance Policy.

"**CRD VI**" has the meaning set forth in the Funding Facility.

"**Custody Account**" has the meaning set forth in the Indenture.

"**Debt Service Reserve Account**" has the meaning set forth in the Funding Facility.

"**Default**" means an event or condition, the occurrence or existence of which would, with the lapse of time or the giving of notice or both, become an Event of Default.

"**Default Rate**" means 1% per annum.

"**DFC**" means the United States International Development Finance Corporation, an agency of the United States of America.

"**Direct Agreement**" means that certain Direct Agreement, dated on or about the date hereof, entered into among Belize, the Initial Lender, the Administrative Agent, the Issuer, the Funding Facility Security Agent and the Funding Facility Administrative Agent.

"**Dollars**" and "**U.S.$**" means the lawful currency of the United States of America.

"**DSRA Amount**" means, as of any date of determination, an amount equal to excess of U.S.$[●][5]; *over* any amounts withdrawn from the Debt Service Reserve Account in accordance with this Agreement prior to such date of determination and applied to satisfy a payment obligation of Belize under this Agreement (including to pay costs and expenses incurred in connection with the enforcement of the Lenders' rights under this Agreement).

"**EEA Financial Institution**" means (a) any credit institution or investment firm established in any EEA Member Country which is subject to the supervision of an EEA Resolution Authority, (b) any entity established in an EEA Member Country which is a parent of an institution described in clause (a) of this definition, or (c) any financial institution established in an EEA Member Country which is a subsidiary of an institution described in clauses (a) or (b) of this definition and is subject to consolidated supervision with its parent.

"**EEA Member Country**" means any of the member states of the European Union, Iceland, Liechtenstein, and Norway.

"**EEA Resolution Authority**" means any public administrative authority or any person entrusted with public administrative authority of any EEA Member Country (including any delegee) having responsibility for the resolution of any EEA Financial Institution.

"**Effective Date**" means the first date on which all conditions set forth in Section 3.1 have been satisfied.

"**Endowment Account**" means an account in Dollars in the name of the Statutory Trust maintained at [The Bank of New York Mellon] under the Custody Agreement, or such other account as from time to time may be designated by BIC with Belize's prior written consent.

"**Endowment Account Amount**" means, as of any date of determination, the amount of funds withdrawn from the Endowment Account that have not been returned and deposited in the Endowment Account (other than those amounts that were so withdrawn by the Initial Lender in accordance with the Statutory Trust for the purpose of, applied towards, the payment of costs or expenses of the Initial Lender).

"**Erroneous Payment**" has the meaning assigned thereto in Section 15.8(a).

"**Erroneous Payment Deficiency Assignment**" has the meaning assigned thereto in Section 15.8(d)(i).

"**Erroneous Payment Impacted Class**" has the meaning assigned thereto in Section 15.8(d)(i).

"**Erroneous Payment Return Deficiency**" has the meaning assigned thereto in Section 15.8(d)(i).

[5] Note to Draft: Insert the amount deemed initially contributed by Belize.

"**Erroneous Payment Subrogation Rights**" has the meaning assigned to it in Section 15.8(e).

"**EU Bail-In Legislation Schedule**" means the EU Bail-In Legislation Schedule published by the Loan Market Association (or any successor person), as in effect from time to time.

"**Event of Default**" has the meaning set forth in Section 8.

"**Excluded Taxes**" has the meaning set forth in Section 2.11.

"**Expedited Procedures**" has the meaning set forth in Section 16.4(b).

"**Extraordinary Redemption Event**" has the meaning set forth in the Issue Deed.

"**FATCA**" means Sections 1471 through 1474 of the Code, as of the date of this Agreement (or any amended or successor version that is substantively comparable and not materially more onerous to comply with), any current or future regulations or official interpretations thereof, any agreements entered into pursuant to Section 1471(b)(1) of the Code and any fiscal or regulatory legislation, rules or practices adopted pursuant to any intergovernmental agreement, treaty or convention among Governmental Authorities and implementing such Sections of the Code.

"**Funding Date**" means, with respect to the Borrowing, the date on which the Funding Facility Administrative Agent makes the disbursement set forth in Section 2.3.

"**Funding Facility**" means that certain credit agreement, dated as of the date hereof, among the Issuer, the Initial Lender, the Funding Facility Administrative Agent and the Funding Facility Security Agent.

"**Funding Facility Administrative Agent**" means HSBC Bank USA, National Association, in its capacity as administrative agent under the Funding Facility, and its successors or assigns.

"**Funding Facility Administrative Agent Account**" means an account of the Funding Facility Administrative Agent, as notified by the Funding Facility Administrative Agent to the Administrative Agent, the Initial Lender and Belize from time to time; provided that, from and after an assignment of the Loan pursuant to Section 14, "Funding Facility Administrative Agent Account" shall mean the account of the Administrative Agent, as notified by the Administrative Agent to Belize from time to time.

"**Funding Facility Event of Default**" means the occurrence of an "Event of Default" as defined in the Funding Facility.

"**Funding Facility Loan Documents**" means the "Loan Documents" as defined in the Funding Facility.

"**Funding Facility Security Agent**" means HSBC Bank USA, National Association, in its capacity as security agent under the Funding Facility, and its successors or assigns.

"**Government**" means the central government of Belize, including any ministry, department or instrumentality thereof, in each case, that is not a separate legal person, corporate or otherwise, separate from the central government.

"**Governmental Authority**" means (a) the government of (i) the United States of America or any State, (ii) the Jurisdiction or (iii) any political subdivision of any of the foregoing or (b) any entity exercising executive, legislative, judicial, regulatory, taxing or administrative functions of, or pertaining to, any such government.

"**Indebtedness**" means any obligation (whether present or future, actual or contingent) for the payment or repayment of money which has been borrowed or raised (including money raised by acceptances and leasing). For the avoidance of doubt, the obligations of Belize under the Conservation Funding Agreement shall not be considered as Indebtedness.

"**Indemnified Party**" has the meaning set forth in Section 16.7.

"**Indenture**" means the Trust Indenture, dated as of March 20, 2013, between Belize and The Bank of New York Mellon, as Trustee (as modified by the First Supplemental Indenture, dated as of March 21, 2017, the Second Supplemental Indenture, dated as of August 18, 2020, the Third Supplemental Indenture, dated as of June 16, 2021 and the Fourth Supplemental Indenture, dated as of [●], 2021).

"**Initial Lender**" has the meaning set forth in the preamble.

"**Initial Lender Security Agreement**" means that certain Security Agreement, dated as of the date hereof, between the Initial Lender and the Funding Facility Security Agent.

"**Insurance Policy**" means the Political Risk Insurance Policy and the Parametric Insurance Policy.

"**Interest Calculation Date**" means every Scheduled Payment Date, which for the avoidance of doubt is not subject to the Business Day convention set forth in Section 2.7.

"**Interest Period**" means: (a) initially, the period beginning on the Funding Date and ending on the first Interest Calculation Date thereafter, and (b) thereafter, each subsequent Interest Period shall begin on the last day of the immediately preceding Interest Period and end on the next succeeding Interest Calculation Date; provided that, if any Interest Period would otherwise extend beyond the Maturity Date, such Interest Period shall be shortened to end on the Maturity Date. Determination of an Interest Period is not subject to the Business Day convention set forth in Section 2.7.

"**Interest Rate**" means for each Interest Period, the corresponding "Rate of Interest" set out in the table below for the period during which the last day of such Interest Period occurs:

Rate of Interest	Period
[3.05]% per annum	From, and including the Funding Date, to and including [11/04/2022]

[3.55]% per annum	From, but excluding [11/04/2022], to and including [11/04/2023]
[5.15]% per annum	From, but excluding [11/04/2023], to and including [11/04/2025]
[●]% per annum[6]	From, but excluding [11/04/2025]

"**Issue Deed**" means that certain issue deed, dated as of the date hereof, between the Issuer and the Blue Bond Trustee.

"**Issuer**" means Platinum Securities Cayman SPC Limited, acting on behalf of and for the account of Series 2021-01 Segregated Portfolio or any successor entity appointed pursuant to the terms of the Blue Bonds.

"**Jurisdiction**" means Belize.

"**Legislation**" has the meaning set forth in Section 3.1(f).

"**Lender**" means the Initial Lender and each other Person that from time to time becomes a party to this Agreement in accordance with Section 14 of this Agreement through, in respect of any such Person other than DFC, the execution and delivery of an Assignment and Acceptance Agreement, in each case other than any Person that ceases to be a party hereto pursuant to such an assignment.

"**Lien**" means any lien, pledge, mortgage, security interest, deed of trust, charge or other encumbrance or preferential arrangement which has the practical effect of constituting a security interest with respect to the payment of any obligations with or from the proceeds of any assets or revenues of any kind, whether in effect on the Effective Date or at any time thereafter.

"**Loan**" has the meaning set forth in Section 2.1.

"**Management Agreement**" means the Management Agreement, dated as of the date hereof, by and among the Initial Lender and TNC, without giving effect to any amendments, supplements, waivers or modifications made after the date hereof.

"**Material Adverse Effect**" means a material adverse effect on (a) the ability of Belize to perform its obligations under this Agreement or the Direct Agreement or (b) the validity or enforceability of this Agreement or the Direct Agreement.

"**Maturity Date**" means October 20, 2040.

"**Minister of Finance**" means the Minister of the Government with responsibility for finance.

[6] Note to Draft: This rate to be set such that the yield of the Blue Loan, as calculated on a 30/360 semi-annually compounded basis, and considering the OID and the application of the Covered Borrower Contribution Amount at Maturity, shall be equal to the interpolated yield of US Treasuries (based on a curve of Active US Treasuries) plus a spread of [4.30 – 4.40]%

"**OFAC**" has the meaning set forth in Section 4.7.

"**Official**" has the meaning set forth in Section 4.12(a).

"**Other Connection Taxes**" mean, with respect to any recipient, Taxes imposed as a result of a present or former connection between such recipient and the jurisdiction imposing such Tax (other than connections arising from such recipient having executed, delivered, become a party to, performed its obligations under, received payments under, received or perfected a security interest under, engaged in any other transaction pursuant to or enforced under this Agreement, or sold or assigned an interest in any loan, this Agreement).

"**Other Currency**" has the meaning set forth in Section 16.5.

"**Parametric Insurance Policy**" means any parametric insurance policy for natural disaster issued by the Parametric Insurer benefitting the Lenders and providing coverage for up to one semiannual principal and interest payment on the Loan in the event of a Covered Catastrophic Event and otherwise in form and substance satisfactory to the Required Lenders.

"**Parametric Insurance Policy Calculation Agent**" means, at any time, the entity designated as the calculation agent under the then in-force Parametric Insurance Policy.

"**Parametric Insurance Policy Limit**" means, at any time, the total amount payable under the then in-force Parametric Insurance Policy as stated therein.

"**Parametric Insurance Premium Payment**" has the meaning set forth in the Conservation Funding Agreement.

"**Parametric Insurer**" means an insurer having a rating of at least A3 from Moody's or an equivalent rating from S&P Global Ratings, A.M. Best Company Inc. or Fitch Ratings Inc.

"**Parties**" means, collectively, Belize, the Lenders and the Administrative Agent.

"**Payor**" has the meaning set forth in Section 2.11.

"**Permitted Lien**" means: (a) any Lien on property to secure Public Debt arising in the ordinary course of business to finance export, import or other trade transactions, which Public Debt matures (after giving effect to all renewals and refinancing thereof) not more than 1 year after the date on which such Public Debt was originally incurred; (b) any Lien on property to secure Public Debt incurred solely for the purpose of financing any acquisition by Belize (or, in the case of Public Debt guaranteed by Belize, the obligor in respect of such debt) of such property, and any renewal or extension of any such Lien which is limited to the original property covered thereby and which secures any renewal or extension of the original financing without any increase in the amount thereof; (c) any Lien on property arising by operation of law other than the law of the Jurisdiction (or pursuant to any agreement establishing a Lien equivalent to one which would otherwise exist under relevant local law other than the law of the Jurisdiction) in connection with Public Debt, including, without limitation, any right of set-off with respect to demand or time deposits with financial institutions and bankers' liens with respect to property held by financial institutions (in each case deposited with or delivered to such financial institutions in the ordinary

course of the depositor's activities); (d) any Lien existing on property at the time of acquisition, and any renewal or extension of any such Lien which is limited to the original property covered thereby and which secures any renewal or extension of the financing secured by such Lien at the time of such acquisition without increase in the amount thereof; (e) any Lien existing as of the Effective Date; (f) any Lien securing Public Debt incurred for the purpose of financing all or part of the costs of the acquisition, construction or development of a project, provided that (i) the holders of such Public Debt agree to limit their recourse to the assets and revenues of such project as the principal source of repayment of such Public Debt and (ii) the property over which such Lien is granted consists solely of such assets and revenues; and (g) any Lien securing Public Debt that (i) is issued by Belize in exchange for secured Indebtedness of any Agency of Belize and (ii) is in an aggregate principal amount outstanding (with debt denominated in currencies other than U.S. dollars expressed in U.S. dollars based on rates of exchange prevailing at the date such debt was incurred) that does not exceed U.S.$[●].

"**Person**" means any individual, company, corporation, firm, partnership, joint venture, association, organization, state or agency of a state or other entity, whether or not having a separate legal personality.

"**Political Risk Insurance Policy**" means the insurance policy provided by the DFC pursuant to that certain Master Contract of Insurance for the Insured Lenders, dated as of [●], between the DFC and the Initial Lender.

"**Political Risk Insurance Provider**" means the DFC (as the insurance provider of the Political Risk Insurance Policy).

"**Prime Minister's Certificate**" means a certificate of the Prime Minister of the Government whose responsibilities extend to the subject matter of such certificate.

"**property**" or "**properties**" means, unless otherwise specifically limited, real or personal property of any kind, tangible or intangible, choate or inchoate.

"**Public Debt**" means any obligation of or guarantee by Belize that is in the form of, or represented by, bonds, debentures, notes or other similar securities that are or may be quoted, listed or ordinarily purchased or sold on any stock exchange, automated trading system or over-the-counter or other securities market.

"**Quarterly Financial Information**" means a report published by the Central Bank covering similar topics and providing similar information as historically provided by the Central Bank in the "Quarterly Review," subject to applicable laws and regulations.

"**Required Lenders**" means, at any time, Lenders holding at least 75% of (a) the outstanding amount of the Loan, or (b) if no Loan is outstanding, the amount of the Commitment, as the case may be.

"**Resignation Effective Date**" has the meaning set forth in Section 15.6(a).

"**Responsible Minister**" means the Minister of Finance of Belize and any other minister of the Government designated by the Governor General in writing with responsibility for the administration of the relevant portion of this Agreement.

"**Resolution Authority**" means an EEA Resolution Authority or, with respect to any UK Financial Institution, a UK Resolution Authority.

"**Rules**" has the meaning set forth in Section 16.4(b).

"**Sanctioned Country**" means, at any time, a country, territory or geographical region which is itself the target of comprehensive economic and trade Sanctions (as of the date hereof, Cuba, Iran, North Korea, the Crimea region of Ukraine and Syria).

"**Sanctioned Person**" means any Person: (a) that is the target of any Sanctions; (b) identified on the "Specially Designated Nationals and Blocked Persons List" maintained by OFAC; (c) as applied to Persons, with its principal place of business in, organized under the laws of or resident in a Sanctioned Country; (d) as applied to governments, the government of a Sanctioned Country, the government of any political subdivision within such Sanctioned Country, or any agency or instrumentality of such governments; (e) that is, by public designation of the United Nations Security Council, the European Union, or Her Majesty's Treasury of the United Kingdom, the target of any Sanction; (f) with which any party to this Agreement is prohibited from dealing or otherwise engaging in any transaction by any Sanctions Laws; or (g) with respect to entities, any Person owned 50 percent or more in the aggregate by one or more Person or Persons described in the foregoing clauses (b) and (d) (unless ownership by such Persons would not, under applicable Sanctions, mean that the Person so owned would automatically be treated as a target of Sanctions).

"**Sanctions**" has the meaning set forth in Section 4.7.

"**Sanctions Laws**" means all laws, rules, regulations and requirements of any applicable jurisdiction (including the U.S.) concerning or relating to Sanctions.

"**Scheduled Payment Date**" means each April 20 and October 20 up to and including the Maturity Date.

"**Settlement Date**" means the date on which Belize pays the total consideration [of [U.S.$301,245,202.90][7] owed to holders of Bonds purchased in connection with the Tender Offer.

"**Settlement Deadline**" has the meaning set forth in Belize's Offer to Purchase and Consent Solicitation Statement, dated September 13, 2021, as amended, modified or supplemented from time to time, but in no case later than November 19, 2021 unless otherwise agreed by the Initial Lender.

"**Stamp Tax**" means all present or future stamp, intangibles, recording, filing, issuance, court or documentary or other tax, duty, fee or other charge of whatever nature from the execution,

[7] Note to Draft: To be confirmed.

delivery, performance, enforcement or registration of, from the receipt or perfection of a security interest under, or otherwise with respect to, this Agreement including, without limitation all duties from time to time chargeable under the Stamp Duties Act of Belize.

"**Statutory Trust**" means Belize Blue Conservation Trust, a statutory trust formed by the Initial Lender, as grantor, pursuant to the Delaware Statutory Trust Act, Delaware Code Title 12, Chapter 38, as amended, pursuant to the Trust Agreement.

"**Subordination and Release Agreement**" means that certain Subordination and Release Agreement, dated on or about the date hereof, between the BIC, the Issuer, DFC and HSBC Bank USA, National Association.

"**Tax**" has the meaning set forth in Section 2.11.

"**Taxing Jurisdiction**" has the meaning set forth in Section 2.11.

"**Tender Offer**" means the offer by Belize to purchase for cash any and all of the outstanding Bonds.

"**TNC**" has the meaning set forth in the Preliminary Statements.

"**Trust Agreement**" means that certain BIC Trust Amended and Restated Trust Agreement dated as of the date hereof, by and between Belize Blue Investment Company, LLC, as the depositor and Beneficial Owner (as defined therein), and BNY Mellon Trust of Delaware, as the Owner Trustee (as defined therein).

"**UK Financial Institution**" means any BRRD Undertaking (as such term is defined under the PRA Rulebook (as amended form time to time) promulgated by the United Kingdom Prudential Regulation Authority) or any person falling within IFPRU 11.6 of the FCA Handbook (as amended from time to time) promulgated by the United Kingdom Financial Conduct Authority, which includes certain credit institutions and investment firms, and certain affiliates of such credit institutions or investment firms.

"**UK Resolution Authority**" means the Bank of England or any other public administrative authority having responsibility for the resolution of any UK Financial Institution.

"**Write-Down and Conversion Powers**" means, (a) with respect to any EEA Resolution Authority, the write-down and conversion powers of such EEA Resolution Authority from time to time under the Bail-In Legislation for the applicable EEA Member Country, which write-down and conversion powers are described in the EU Bail-In Legislation Schedule, and (b) with respect to the United Kingdom, any powers of the applicable Resolution Authority under the Bail-In Legislation to cancel, reduce, modify or change the form of a liability of any UK Financial Institution or any contract or instrument under which that liability arises, to convert all or part of that liability into shares, securities or obligations of that person or any other person, to provide that any such contract or instrument is to have effect as if a right had been exercised under it or to suspend any obligation in respect of that liability or any of the powers under that Bail-In Legislation that are related to or ancillary to any of those powers.

2. Interpretation.

The definitions of terms herein shall apply equally to the singular and plural forms of the terms defined. Whenever the context may require, any pronoun shall include the corresponding masculine, feminine and neuter forms. The words "include," "includes" and "including" shall be deemed to be followed by the phrase "without limitation." The word "will" shall be construed to have the same meaning and effect as the word "shall." Unless the context requires otherwise, (a) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, supplemented or otherwise modified (subject to any restrictions on such amendments, supplements or modifications set forth herein), (b) any reference herein to any Person shall be construed to include such Person's successors and permitted assigns, (c) the words "herein," "hereof" and "hereunder," and words of similar import, shall be construed to refer to this Agreement in its entirety and not to any particular provision hereof, (d) all references herein to Sections, Schedules, Exhibits and Annexes shall be construed to refer to Sections of and Schedules, Exhibits and Annexes to, this Agreement, (e) any reference to any law or regulation herein shall, unless otherwise specified, refer to such law or regulation as amended, modified or supplemented from time to time, and (f) the words "asset" and "property" shall be construed to have the same meaning and effect and to refer to any and all tangible and intangible assets and properties, including cash, securities, accounts and contract rights.

SCHEDULE 2.5
PAYMENT OF INTEREST[8]

SCHEDULE 2.7
REPAYMENT OF PRINCIPAL[9]

SCHEDULE 4.3
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EXHIBIT A

FORM OF BORROWING REQUEST

EXHIBIT B

FORM OF ASSIGNMENT AND ACCEPTANCE AGREEMENT

EXHIBIT C

FORM OF OPINION OF THE ATTORNEY GENERAL OF BELIZE

EXHIBIT D

FORM OF OPINION OF SULLIVAN & CROMWELL LLP

[8] Note to Draft: Insert Schedule [2.6] Payment of Interest from Platinum Loan Agreement

[9] Note to Draft: Insert Schedule [2.5] Repayment of Principal from Platinum Loan Agreement

Draft of 10/22/2021
Confidential

CONSERVATION FUNDING AGREEMENT

dated as of November [●], 2021

between

BELIZE

and

BELIZE BLUE INVESTMENT COMPANY, LLC

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Exhibit A Conservation Commitments Annex

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This CONSERVATION FUNDING AGREEMENT, dated as of November [●], 2021 (this "**Agreement**"), by and between the sovereign democratic state of BELIZE ("**Belize**") and BELIZE BLUE INVESTMENT COMPANY, LLC, a Delaware limited liability company ("**BIC**").

PRELIMINARY STATEMENTS:

WHEREAS, Belize, as borrower, has entered into that certain Blue Loan Agreement, dated the date hereof (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "**Loan Agreement**"), with BIC, as initial lender, and BIC, as administrative agent, pursuant to which BIC will, subject to the terms and conditions set forth in the Loan Agreement, provide a loan (the "**Loan**") to Belize to, *inter alia*, acquire, redeem and cancel all of Belize's outstanding U.S. Dollar Bonds due 2034; and

WHEREAS, it is a condition precedent to the obligations of BIC to make the Loan under the Loan Agreement that Belize enter into this Agreement to, *inter alia*, undertake the implementation of the conservation commitments (each such commitment, a "**Conservation Commitment**") specified in Exhibit A (the "**Conservation Commitments Annex**"), to fund the Endowment Account, to make the Conservation Payments (as defined below) and to pay the Management Fee Reimbursement Amount (as defined below).

NOW, THEREFORE, in consideration of the Loan Agreement and the extension of credit thereunder and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

ARTICLE 1. DEFINITIONS AND INTERPRETATION

1.1 Definitions.

As used in this Agreement, the following terms have the respective meanings set forth below:

"**Additional Covered Borrower Contribution Account**" has the meaning set forth in the Loan Agreement.

"**Additional Payment**" has the meaning set forth in Section 14.8(b).

"**Affiliate**" means, at any time, and with respect to any Person, any other Person that at such time directly or indirectly through one or more intermediaries Controls, or is Controlled by, or is under common Control with, such first Person. For the avoidance of doubt, the Conservation Fund shall not be deemed an Affiliate of Belize. As used in this definition, "**Control**" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a Person, whether through the ownership of voting securities, by contract or otherwise.

"**Agency**" means any agency or instrumentality of the Government that is (a) a legal person (corporate or otherwise) separate from the Government and (b) majority-owned or otherwise controlled by the Government (in any case directly or indirectly); provided that, so long

as such agency, instrumentality or other legal person does not have the authority to govern, legislate, regulate, levy or collect taxes, fees or duties or grant licenses or permits in the Jurisdiction, it shall not be an "Agency" if it (i) operates primarily as a commercial enterprise, (ii) primarily funds itself in the ordinary course from non-governmental sources without a Government guaranty or other Government assurance of payment or (iii) provides financing substantially to the private sector.

"**Agreement**" has the meaning ascribed thereto in the preamble.

"**Anti-Money Laundering Framework**" has the meaning ascribed thereto in Section 4.11(b).

"**Appropriation Act**" means a bill providing for the issue from the Consolidated Revenue Fund of the sums necessary to meet certain expenditures and the appropriation of those sums for the purposes specified therein.

"**Arbitral Award Amount**" has the meaning ascribed thereto in Section 14.5(c).

"**BBRRS**" has the meaning set forth in Section 4.16.

"**Base Conservation Event Payment Amount**" means, for any date of determination, the aggregate amount equal to U.S.$250,000 for each Payment Date on which at least one Conservation Event remains outstanding (uncured and unwaived).

"**Belize**" has the meaning set forth in the preamble.

"**Belize Dollar Account**" means an account in Belize Dollars in the name of BIC to be maintained at a bank licensed under the laws of Belize and designated by BIC.

"**Belize Dollar Equivalent Amount**" means the amount of Belize Dollars that would allow BIC to purchase in the New York, New York foreign exchange markets an amount in Dollars that is equal to the applicable Conservation Payment, in accordance with normal banking procedures at the rate of exchange prevailing on the date of the payment of the applicable Conservation Payment in Belize Dollars.

"**Belize Dollars**" means the lawful currency of Belize.

"**Belize Network of NGOs**" means the unincorporated association of non-governmental organizations that operate in all sectors in Belize (or the successor to such association), which, as of the Effective Date, includes as its members Belize Audubon Society, Association of Protected Areas Management Organization, Belize Bird Rescue, Belize Coalition to Save Our Natural Heritage, Belize Council for the Visually Impaired, Belize Emergency Response Team, Belize Hotel Association, Belize Tourism Industry Association, Ecology Project International, Friends for Conservation and Development, Friends of Swallow Caye, Hand in Hand Ministries, Haven House, Help Age Belize, Humana People to People Belize, Monkey Bay Wildlife Sanctuary, National Garifuna Council, Oceana, Sarstoon Temash Institute for Indigenous Management, Sarteneja Alliance for Conservation and Development, Spouse of Caricom Leaders Action Network and The Scout Association of Belize.

"**BIC**" has the meaning set forth in the preamble and its successors and permitted assigns pursuant to the terms of this Agreement.

"**BIC Account**" means the account in Dollars in the name of BIC at The Bank of New York Mellon or such other account in Dollars that BIC may specify to Belize from time to time with reasonable advance notice.

"**BIC Insolvency Condition**" means BIC (i) being the subject of a voluntary or involuntary bankruptcy or insolvency proceeding, (ii) having a receiver, conservator, trustee, administrator, custodian or assignee for the benefit of creditors or similar Person charged with the reorganization or liquidation of its business appointed, (iii) having taken any action in furtherance of, or indicating its consent to, approval of, or acquiescence in, any such proceeding or appointment, (iv) having had any order for relief in such proceeding entered and in effect in respect thereof, (v) being wound-up, liquidated or dissolved, or (vi) having had any order for the attachment, seizure, foreclosure, sale or enforcement of any lien or encumbrance entered and in effect in respect of any material asset owned by BIC.

"**BIC Payment Suspension Condition**" means one or more of the following conditions: (i) a BIC Insolvency Condition, (ii) BIC ceasing to be a direct or indirect wholly owned subsidiary of TNC, or (iii) BIC having not yet paid all amounts previously received in the Belize Dollar Account to the Conservation Fund (net of bank and escrow fees) in accordance with Section 3.2; provided that the condition in clause (iii) shall not be met if either (x) an Interference Condition has occurred and is continuing or (y) for so long as BIC continues to withhold all of the amounts previously received in the Belize Dollar Account in respect of up to four (and no more than four) Conservation Payments because the Conservation Fund has been designated a Non-Compliant Conservation Fund Entity and a replacement Conservation Fund has not been designated pursuant to Section 6.3.

"**Borrowing Date**" has the meaning set forth in the Credit Agreement, dated as of the date hereof, between Platinum Securities Cayman SPC Limited (acting in respect of Series 2021-01 Segregated Portfolio), as lender, HSBC Bank USA, National Association, as administrative agent and security agent and BIC, as borrower, without giving effect to any amendments, supplements, waivers or modifications made after the date hereof.

"**Business Day**" means any day other than a Saturday, Sunday or legal holiday on which commercial banks and foreign exchange markets are open for business in New York, New York and Belmopan, Belize.

"**CCRIF**" means the Caribbean Catastrophe Risk Insurance Facility and includes the Segregated Portfolio Company comprising the facility, or any successor thereof, with whom Belize has entered into CCRIF Policies.

"**CCRIF Policies**" means (i) the Parametric Insurance Contract, dated June 1, 2020, between Belize and CCRIF SPC to insure against risks of earthquakes and tropical cyclones, (ii) the Parametric Insurance Contract, dated June 1, 2020, between Belize and CCRIF SPC to insure against risks of excess rainfall and (iii) any successor policy to the contracts referenced in clauses (i) and (ii), in each case including any documents incorporated by reference therein and

any attachments, annexes, appendices or supplements thereto (including but not limited to the applicable coverage summary and associated loss curve data spreadsheet), as such CCRIF Policy may be amended or supplemented from time to time.

"**Connection Income Taxes**" means Other Connection Taxes that are imposed on or measured by net income (however denominated) or that are franchise Taxes or branch profits Taxes.

"**Conservation Commitments**" has the meaning set forth in the preliminary statements.

"**Conservation Commitments Annex**" has the meaning set forth in the preliminary statements.

"**Conservation Event**" means (i) the failure by Belize to achieve a Conservation Milestone prior to the expiration of the applicable grace period set forth in the Conservation Commitments Annex, as such period may be extended by BIC in its discretion, and (ii) in respect of each Conservation Milestone, the occurrence of any of the circumstances specified in Exhibit A as resulting in a Conservation Event in respect of such Conservation Milestone following its achievement.

"**Conservation Event Payment**" has the meaning set forth in Section 3.4(a).

"**Conservation Event Payment Account**" means an account in Dollars in the name of the Statutory Trust maintained at The Bank of New York Mellon under the Custody Agreement, or such other account as from time to time may be designated by BIC with Belize's prior written consent.

"**Conservation Event Payment Amount**" means, with respect to each Payment Date, the Base Conservation Event Payment Amount plus an amount equal to the number of Conservation Events that have occurred and are continuing as of such Payment Date times U.S.$50,000.

"**Conservation Fund**" means, at any given time, (i) unless replaced pursuant to Section 6.3, the initial entity to be funded by BIC satisfying all the requirements described in Exhibit B, or (ii) any Qualifying Conservation Entity that has replaced the previous Conservation Fund pursuant to Section 6.3.

"**Conservation Milestones**" has the meaning set forth in the Conservation Commitment Annex.

"**Conservation Payment**" means, with respect to each Payment Date, the payment in the amount set forth in the Payment Schedule for such Payment Date. For the avoidance of doubt, Conservation Payments include Conservation Payments that become Deferred Payments.

"**Consolidated Revenue Fund**" means the fund comprising all revenues or other moneys raised or received by Belize (not being revenues or other moneys payable under the

Constitution of Belize or any other law into some other public fund established for a specific purpose) as provided for by section 114(1) of the Constitution of Belize.

"**Convention**" has the meaning set forth in Section 14.5(b).

"**Custody Account**" has the meaning set forth in the Custody Agreement.

"**Custody Agreement**" means that certain Custody Agreement dated as of the date hereof between the Statutory Trust and The Bank of New York Mellon.

"**Deferred Payments**" has the meaning set forth in Section 3.5(a).

"**Debt Service Reserve Account**" has the meaning set forth in the Loan Agreement.

"**DFC**" means the U.S. International Development Finance Corporation.

"**Dollars**" and "**U.S.$**" means the lawful currency of the United States of America.

"**Effective Date**" has the meaning set forth in Section 14.11(a).

"**EIAs**" has the meaning set forth in Section 4.16.

"**End Date**" means the Initial End Date or, if the same has been extended pursuant to Section 3.5, the Extended End Date.

"**Endowment Account**" means an account in Dollars in the name of the Statutory Trust maintained at The Bank of New York Mellon under the Custody Agreement, or such other account as from time to time may be designated by BIC with Belize's prior written consent.

"**Endowment Shortfall Amount**" means the amount of funds withdrawn from the Endowment Account and applied to satisfy BIC's payment obligations pursuant to the Platinum Loan Agreement in excess of the amount that Belize is ordered to pay pursuant to an arbitration award issued under an arbitration proceeding commenced under the Loan Agreement.

"**Environmental Impact Assessment Regulations**" means the Environmental Impact Assessment Regulations, as amended, promulgated pursuant to the Environmental Protection Act, Chapter 328 of the Substantive Laws of Belize.

"**Event**" means any Earthquake Event, Tropical Cyclone Event or Covered Area Rainfall Event (each as defined in the CCRIF Policies).

"**Expedited Procedure**" has the meaning set forth in Section 14.5(b).

"**Extended End Date**" has the meaning set forth in Section 3.5(c).

"**FATF**" has the meaning set forth in Section 4.11(b).

"**Government**" means the central government of Belize, including any ministry, department or instrumentality thereof, in each case, that is not a separate legal person, corporate or otherwise, separate from the central government.

"**Governmental Authority**" means (a) the government of (i) the United States of America or any State thereof, (ii) Belize or (iii) any political subdivision of any of the foregoing or (b) any entity exercising executive, legislative, judicial, regulatory, taxing or administrative functions of, or pertaining to, any such government.

"**Jurisdiction**" means Belize.

"**Indemnified Party**" has the meaning set forth in Section 14.9(a).

"**Initial Conservation Fund**" has the meaning set forth in Section 5.1(a).

"**Initial End Date**" means November [*day of signing*], 2041.

"**Interference Condition**" means the continuation without cure for a period of thirty (30) days of a breach by Belize in any material respect of its obligations under Section 5.1(c).

"**Legislation**" means legislation to (among other things): (a) authorize Belize to enter into this Agreement and to make all payments contemplated hereunder, including that all such payments are duly charged on the Consolidated Revenue Fund and shall be further authorized through Appropriation Acts duly passed for the periods in which the payments are due, (b) confer on BIC a full exemption from the provisions of any law from time to time requiring any registration of this Agreement as well as from the Belize Exchange Control Regulations Act (as revised in 2011 or as may be subsequently amended or supplemented) and regulations made thereunder from time to time in respect to the payments to be made hereunder, and (c) confer on BIC a full exemption from any and all Taxes including exemption from taxes that are both (x) payable by BIC in Belize in respect of the payments to be made to it by Belize under this Agreement and the Loan Agreement and (y) imposed on or measured by net income (however denominated) or that are franchise Taxes or branch profits Taxes or any other taxes or similar charges imposed on BIC in Belize.

"**Loan**" has the meaning set forth in the preliminary statements.

"**Loan Agreement"** has the meaning set forth in the preliminary statements.

"**Management Agreement**" means the Management Agreement, dated as of the date hereof, by and among BIC and TNC, without giving effect to any amendments, supplements, waivers or modifications made after the date hereof to which Belize has not consented in writing.

"**Management Fee Reimbursement Amount**" means the amount equal to U.S.$143,880, which is the quarterly fee payable by BIC to TNC pursuant to the Management Agreement.

"**Marine Environment Information**" means information reasonably satisfactory to BIC (including in report form, if required by DFC) regarding the marine environment of Belize

as necessary to enable BIC to satisfy its obligations under the Political Risk Insurance Policy (as defined in the Loan Agreement) and as reasonably necessary to monitor Belize's compliance with the Conservation Commitments.

"Non-Compliant Conservation Fund Entity" has the meaning set forth in Section 6.3.

"**OFAC**" means the U.S. Department of the Treasury's Office of Foreign Assets Control.

"**Official**" has the meaning set forth in Section 4.11(c).

"**Other Connection Taxes**" means, with respect to any recipient, Taxes imposed as a result of a present or former connection between such recipient and the jurisdiction imposing such Tax (other than connections arising from such recipient having executed, delivered, become a party to, performed its obligations under, received payments under, received or perfected a security interest under, engaged in any other transaction pursuant to or enforced this Agreement, or sold or assigned an interest in this Agreement).

"**Other Currency**" has the meaning set forth in Section 14.6.

"**Parametric Coverage Period**" has the meaning set forth in Section 3.2(c).

"**Parametric Insurance Policy**" means the insurance policy issued by the Parametric Insurer benefitting BIC, as lender under the Loan Agreement, and providing coverage for up to one (1) semiannual principal and interest payment on the Loan in the event of an Event and otherwise in form and substance satisfactory to BIC.

"**Parametric Insurance Premium Payments**" has the meaning set forth in Section 3.2(b).

"**Parametric Insurer**" means an insurer having a rating of at least A3 from S&P Global Ratings, A.M. Best Company Inc. or Fitch Ratings Inc.

"**Parties**" means, collectively, Belize and BIC.

"**Payment Date**" means February 4, May 4, August 4 and November 4 of each calendar year or, if such date is not a Business Day, the immediately succeeding Business Day.

"**Payment Schedule**" means the payment schedule attached hereto as Exhibit C.

"**Payor**" has the meaning set forth in Section 14.8(a).

"**Person**" means any individual, company, corporation, firm, partnership, joint venture, association, organization, state or agency of a state or other entity, whether or not having a separate legal personality.

"**Public Debt**" means any obligation of or guarantee by Belize that is in the form of, or represented by, bonds, debentures, notes or other similar securities that are or may be quoted, listed or ordinarily purchased or sold on any stock exchange, automated trading system or over-the-counter or other securities market.

"**Qualifying Bank**" means any bank licensed under the laws of Belize, not controlled by Belize or any Agency thereof.

"**Qualifying Conservation Entity**" means, in respect of any replacement of the Conservation Fund pursuant to Section 6.3, an entity that meets, at the time of such replacement, all of the requirements set forth in Exhibit B; provided that, during the continuance of an Interference Condition, such entity is not required to meet the requirement set forth in clause (l) of Exhibit B.

"**Qualifying Conservation Payment Escrow Account**" means an escrow account in the name of BIC for the benefit of the Conservation Fund at a Qualifying Bank in Belize under an escrow agreement in customary form and substance for purposes of ensuring the Conservation Fund's right to receive proceeds from such escrow account.

"**Replacement Event**" has the meaning set forth in Section 6.3(a).

"**Risk/Reward Ratio Condition**" means, in respect of any potential insurance policy that BIC is considering acquiring as a Parametric Insurance Policy, the condition that the applicable Parametric Insurance Premium Payment would cover at least 50% of the applicable coupon.

"**Rules**" has the meaning set forth in Section 14.5(b).

"**Sanctioned Country**" means, at any time, a country, territory or geographical region which is itself the target of comprehensive economic and trade Sanctions (as of the date hereof, Cuba, Iran, North Korea, the Crimea region of Ukraine and Syria).

"**Sanctions**" has the meaning set forth in Section 4.6.

"**Sanctions Laws**" means all laws, rules, regulations and requirements of any applicable jurisdiction (including the U.S.) concerning or relating to Sanctions.

"**Specified Payment**" has the meaning set forth in Section 3.6(a).

"**Stamp Tax**" means all present or future stamp duty, intangibles, recording, filing, issuance, court or documentary or other tax, duty, fee or other charge of whatever nature from the execution, delivery, performance, enforcement or registration of, from the receipt or perfection of a security interest under, or otherwise with respect to, this Agreement.

"**Statutory Trust**" means the Belize Blue Conservation Trust, a statutory trust formed by BIC, as grantor, pursuant to the Delaware Statutory Trust Act, Delaware Code Title 12, Chapter 38, as amended, pursuant to the Trust Agreement.

"**Tax**" has the meaning set forth in Section 14.8(a).

"**Taxing Jurisdiction**" has the meaning set forth in Section 14.8(b).

"**Termination Event**" has the meaning set forth in Section 7.1.

"**Termination Payment**" has the meaning set forth in Section 7.2(a).

"**TNC**" means The Nature Conservancy.

"**Treasury Rate**" means the yield calculated by the linear interpolation of the yields, as reported in Federal Reserve Statistical Release H.15 Selected Interest Rates under the heading U.S. Government Securities/Treasury Constant Maturities for the week ending prior to the End Date, of U.S. Treasury constant maturities with maturity dates (one longer and one shorter) most nearly approximating the End Date. In the event Release H.15 is no longer published, BIC shall select a reasonably comparable publication to determine the Treasury Rate.

"**Trust Agreement**" means that certain Belize Blue Conservation Trust Amended and Restated Trust Agreement dated as of the date hereof, by and between Belize Blue Investment Company, LLC, as the depositor and Beneficial Owner (as defined therein), and BNY Mellon Trust of Delaware, as the Owner Trustee (as defined therein).

"**Trust Agreement Management Fee**" means the amount set forth as a "Statutory Trust Fee" in the Payment Schedule, which is the annual fee payable by BIC to BNY Mellon Trust of Delaware, pursuant to the Trust Agreement.

"**Trust Agreement Termination Fee**" means the termination fee set forth in item C.4 of the Payment Schedule.

1.2 Principles of Interpretation.

The definitions of terms herein shall apply equally to the singular and plural forms of the terms defined. Whenever the context may require, any pronoun shall include the corresponding masculine, feminine and neuter forms. The words "include," "includes" and "including" shall be deemed to be followed by the phrase "without limitation." The word "will" shall be construed to have the same meaning and effect as the word "shall." Unless the context requires otherwise (a) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, supplemented or otherwise modified (subject to any restrictions on such amendments, supplements or modifications set forth herein); (b) any reference herein to any Person shall be construed to include such Person's successors and permitted assigns; (c) the words "herein," "hereof" and "hereunder," and words of similar import, shall be construed to refer to this Agreement in its entirety and not to any particular provision hereof; (d) all references herein to Sections, Schedules, Exhibits and Annexes shall be construed to refer to Sections of and Schedules, Exhibits and Annexes to, this Agreement; (e) any reference to any law or regulation herein shall, unless otherwise specified, refer to such law or regulation as amended, modified or supplemented from time to time; and (f) the words "asset" and "property" shall be construed to have the same

meaning and effect and to refer to any and all tangible and intangible assets and properties, including cash, securities, accounts and contract rights.

ARTICLE 2. CONSERVATION COMMITMENTS

2.1 Conservation Commitments.

Belize shall, and shall cause the Government and each of its Agencies, as applicable, to, timely comply with each of the Conservation Commitments.

2.2 Conservation Commitments Reporting and Other Information.

(a) Belize shall deliver to BIC an annual conservation report, substantially in the form of Exhibit D hereto, no later than the date that is the one (1)-year anniversary of this Agreement and annually thereafter, and as otherwise specified in clause 5 of the Conservation Commitment Annex.

(b) As soon as available but in any event before June 15 of each year, Belize shall provide to BIC a reasonable estimate of the number of ocean square miles under legal protection in Belize in such detail to BIC's reasonable satisfaction.

(c) Promptly upon BIC's request, furnish to BIC the Marine Environment Information available to Belize and use reasonable efforts to obtain and furnish to BIC any Marine Environment Information that is not then available to Belize.

2.3 Inspection.

Belize shall permit, and shall cause the Government and its Agencies to permit, the representatives of BIC (which, at BIC's discretion, may include third-party consultants and advisors) and representatives of DFC to visit the sites at which the Conservation Commitments are being implemented and to inspect and discuss the progress thereof with the Government's or the Agencies' officials; provided that any such visits shall (i) occur as often as may be reasonably requested in writing by BIC and on no less than ten (10) Business Days' advance notice, (iii) unless otherwise agreed, occur during normal business hours, (iv) be conducted in a manner that does not unreasonably disrupt the implementation of the Conservation Commitments, (v) comply with applicable security and safety policies and requirements, and (vi) with respect to employees or representatives of third-parties that are not Affiliates of BIC (including consultants and advisor to BIC), be subject to, upon Belize's request, Belize's receipt of a waiver releasing Belize of any claims that may arise in connection with such visit to Belize's reasonable satisfaction. Each party shall bear its own expenses in connection with such visits and inspections.

ARTICLE 3. FUNDING OF ENDOWMENT ACCOUNT, CONSERVATION PAYMENTS AND CONSERVATION EVENT PAYMENTS

3.1 Funding of Endowment Account.

(a) On the Borrowing Date, Belize shall deposit, or cause BIC or any other Person to deposit, the amount of U.S.$23,450,000 in immediately available funds into the

Endowment Account. Except as provided in clause (b) of this Section 3.1, Belize shall have no obligation under this Agreement to pay any additional amounts in Dollars into the Endowment Account.

(b) In the event that any amounts are disbursed from the Endowment Account in accordance with Section 2.7 of the Loan Agreement and the Trust Agreement and are applied to satisfy an equal amount of Belize's payment obligations pursuant to the Loan Agreement, Belize shall, within thirty (30) days after such amounts have been applied to satisfy Belize's obligations under the Loan Agreement in accordance with Section 2.7 of the Loan Agreement, deposit into the Endowment Account in Dollars an amount equal to (i) the amount taken from the Endowment Account and so applied *plus* (ii) the Endowment Shortfall Amount, if any. Such deposit shall be made without defense, setoff or counterclaim.

3.2 Conservation Payments, Parametric Insurance Premium Payments and Trust Agreement Management Fee.

(a) Belize shall make the applicable Conservation Payment to BIC on each Payment Date, beginning on the date specified in the Payment Schedule and ending on the End Date, without defense, setoff or counterclaim; provided that (i) if no Termination Event or BIC Payment Suspension Condition has occurred and is continuing, Belize shall make the applicable Conservation Payment into the Belize Dollar Account in immediately available funds in Belize Dollars, (ii) if no Termination Event has occurred and is continuing and a BIC Payment Suspension Condition has occurred and is continuing, then (A) unless the Conservation Fund has been designated as a Non-Compliant Conservation Fund Entity pursuant to Section 6.3, Belize shall instead make the applicable Conservation Payment to the Conservation Fund in immediately available funds in Belize Dollars and (B) otherwise, Belize shall not be required to make such payment unless and until a Qualifying Conservation Payment Escrow Account has been established, at which time Belize shall make all Conservation Payments that accrued but have not been paid pursuant to this sub-clause (B) to such Qualifying Conservation Payment Escrow Account in immediately available funds in Belize Dollars, and (iii) if a Termination Event has occurred and is continuing, Belize shall make the applicable Conservation Payment into an account of the Statutory Trust specified in writing by BIC in immediately available funds in Dollars. In the event that Belize makes any Conservation Payment to BIC in the Belize Dollar Account pursuant to this Section 3.2, then BIC shall pay all such amounts received in the Belize Dollar Account to the Conservation Fund in immediately available funds in Belize Dollars within thirty (30) days; provided that, if, at such time, the Conservation Fund (x) has been designated as a Non-Compliant Conservation Fund Entity pursuant to Section 6.3 or (y) in case of the Initial Conservation Fund, has not opened its first bank account in Belize for the purposes of receiving such amounts, then, in either such case, BIC may withhold such amounts in trust for the Conservation Fund or its future replacement and disburse such amounts as soon as reasonably practicable upon, in the case of clause (x), designation of a replacement Conservation Fund with an open bank account in Belize for the purposes of receiving such amounts pursuant to Section 6.3 or, in the case of clause (y), the Conservation Fund opening such an account.

(b) On February 15 of each calendar year, commencing on February 15, 2022 and ending on February 15, 2040, Belize shall pay to BIC the amount specified for such date in the Payment Schedule (the "**Parametric Insurance Premium Payments**"), without defense, setoff or counterclaim. All Parametric Insurance Premium Payments shall be paid in Dollars. Belize's obligation to pay the Parametric Insurance Premium Payments is not subject to any deferral pursuant to Section 3.5 or otherwise.

(c) To the extent Belize makes the Parametric Insurance Premium Payment for a particular February 15 pursuant to Section 3.2(b), BIC shall use commercially reasonable efforts to renew the Parametric Insurance Policy then in place, or obtain a new, Parametric Insurance Policy providing coverage for the lower of the two (2) coupon payments on the Loan in the upcoming Parametric Coverage Period, subject to (i) the amount of the premium for such policy not exceeding the Parametric Insurance Premium Payment received on such February 15, (ii) there being market availability of such insurance on commercially reasonable terms, (iii) the Parametric Insurance Policy satisfying the Risk/Reward Ratio Condition and (iv) no Default or Event of Default (as each is defined in the Loan Agreement) having occurred and being continuing under the Loan Agreement at such time. BIC shall undertake commercially reasonable efforts to contract Parametric Insurance Policies with a coverage period for each applicable year from May 1 through April 30 of the following year (the "**Parametric Coverage Period**").

(d) If, in any year, either (i) no Parametric Insurance Policy is purchased or renewed pursuant to Section 3.2(c) by April 15 of the calendar year in which Belize made the applicable Parametric Insurance Premium Payments to BIC pursuant to Section 3.2(b) or (ii) a Parametric Insurance Policy is purchased or renewed prior to such date and the amount of the premium paid by BIC on such policy is less than the Parametric Insurance Premium Payment so paid by Belize pursuant Section 3.2(b), then BIC shall promptly (and in any event no later than May 1 of such calendar year) pay, in the case of clause (i), the Parametric Insurance Premium Payment paid by Belize for such year or, in the case of clause (ii), the amount by which the Parametric Insurance Premium Payment received by BIC from Belize exceeds the amount actually paid to purchase or renew the applicable Parametric Insurance Policy, to (x) the Additional Covered Borrower Contribution Account or (y) Belize at an account in New York, New York, the United States of America as specified, in the event that Belize has fully satisfied its payment obligations under the Loan Agreement, by Belize.

(e) On August 4 of each calendar year, commencing on August 4, 2022 and ending on August 4, 2041, Belize shall pay to BIC an amount equal to the Trust Agreement Management Fee without defense, setoff or counterclaim; provided that, if this Agreement is extended pursuant to Section 3.5, such payments shall be made until (i) August 4 of the year of the Extended End Date, if such date falls on a date after August 4 or (ii) the Extended End Date, if such date falls on a date prior to August 4. Belize shall pay the Trust Agreement Termination Fee on the date that is the later of the End Date and the Extended End Date. The Trust Agreement Management Fee and Trust Agreement Termination Fee shall be paid in Dollars. Belize's obligation to pay the Trust Agreement Management Fee and the Trust Agreement Termination Fee is not subject to any deferral pursuant to Section 3.5 or otherwise.

3.3 Management Fee and Reimbursement Amount.

Except as provided in Section 3.6 hereof, Belize shall pay into the BIC Account an amount in immediately available funds in Dollars equal to the Management Fee Reimbursement Amount on each Payment Date, beginning on the date that is three months after the Effective Date and ending on the End Date, without defense, setoff or counterclaim.

3.4 Conservation Event Payments; Remedies in Respect of Conservation Commitments Annex.

(a) If, on a Payment Date, one (1) or more Conservation Events has occurred, is continuing and has not been waived by BIC, then Belize shall pay to the Conservation Event Payment Account on such date an amount in immediately available funds in Dollars equal to the Conservation Event Payment Amount (such payment, a "**Conservation Event Payment**"). Belize shall make each Conservation Event Payment into the Conservation Event Payment Account without defense, setoff or counterclaim. In accordance with the Trust Agreement, the Statutory Trust will hold all Conservation Event Payment Amounts paid by Belize hereunder in the Conservation Event Payment Account for application as provided below.

(b) No later than ten (10) Business Days from the later of (i) the date on which one or more Conservation Milestones underlying one (1) or more Conservation Events that was or were previously continuing has been cured and (ii) BIC shall have received a certificate from Belize certifying the achievement of such Conservation Milestone together with the evidence reasonably demonstrating such cure, BIC shall direct the Statutory Trust to transfer to the Additional Covered Borrower Contribution Account the amount equal to the sum of all Conservation Event Payments previously paid by Belize in respect of such Conservation Event that would not have been payable if only the number of Conservation Events, if any, that remain continuing would have been continuing as of such Payment Dates; provided that, in the event and to the extent that, as of any date of determination, the amount equal to the sum of (x) the amount in the Debt Service Reserve Account and (y) the amount in the Additional Covered Borrower Contribution Account exceeds the amount corresponding to Belize's outstanding payment obligations under the Loan Agreement, then BIC shall direct the Statutory Trust to transfer any excess amount to Belize at an account specified in writing by Belize; provided, further, that, for the avoidance of doubt, BIC shall only be required to direct the Statutory Trust to transfer the Base Conservation Event Payment Amount pursuant to this Section 3.4(b) and any interest earned in respect of any Conservation Event Payments after all Conservation Events have been cured and the conditions in clause (ii) have been satisfied with respect to all such Conservation Events. Notwithstanding anything in this Section 3.4(b) or otherwise in this Agreement to the contrary, BIC shall not be required to transfer any Conservation Event Payments previously paid by Belize to Belize or to the Additional Covered Borrower Contribution Account following the occurrence of a Termination Event and termination by BIC of this Agreement pursuant to Section 7.2(a). Notwithstanding the foregoing sentence, the amounts held in the Conservation Event Payment Account on the End Date or on the date on which this Agreement is terminated, as the case may be, shall be transferred as an endowment for the Conservation Fund subject to and in accordance with the terms of the

Trust Agreement, and BIC and Belize shall take all actions required under the Trust Agreement to effect such transfer.

(c) Notwithstanding anything in this Agreement to the contrary, Section 14.12 shall not apply to Belize's obligations under Section 2.1 or the undertakings set forth in the Conservation Commitments Annex (including the Conservation Commitments) and Belize shall not have any liability under any provision of this Agreement (including Section 14.9) in respect of such obligations or undertakings other than the Conservation Event Payments to the extent required pursuant to this Section 3.4, which shall be the sole and exclusive remedy under this Agreement with respect to claims arising out of or relating to such obligations or undertakings.

3.5 Deferral upon Parametric Insurance Coverage Event.

(a) In the event of a payment under the Parametric Insurance Policy to BIC by the Parametric Insurer in connection with principal and/or interest due and payable under the Loan Agreement, the Conservation Payments payable on the next two (2) Payment Dates pursuant to Section 3.2 and the Conservation Event Payments (if any) due on the next two (2) Payment Dates pursuant to Section 3.4 (collectively, the "**Deferred Payments**") shall be deferred as provided below in clause (c) of this Section 3.5.

(b) If an Event occurs and (i) BIC does not maintain a Parametric Insurance Policy at the time such Event occurs, (ii) Belize maintains the CCRIF Policies in full force and effect at such time, (iii) such Event occurs prior to the End Date, (iv) in respect thereof a Policy Payment (as defined in the CCRIF Policies) under the primary trigger has been received by Belize in respect of such Event and (v) CCRIF has issued a written report received by BIC confirming that such Event is an Insured Event (as defined in the CCRIF Policies), Belize shall have the right, by delivering written notice to BIC (including a description in reasonable detail of the Event and satisfaction of other conditions set forth in this clause (b)), to defer the Deferred Payments.

(c) As a result of a deferral pursuant to subsection (a) or granted after a request by Belize pursuant to subsection (b) in each case of this Section 3.5, (i) the Initial End Date shall be extended by six (6) months (such extended date, the "**Extended End Date**") and (ii) the Deferred Payments originally due on the first Payment Date following the occurrence of the Event shall become due and payable on the date that is three months after the Initial End Date, the Deferred Payments due on the second Payment Date following the occurrence of the Event shall become due and payable on the date that is six (6) months after the Initial End Date; provided that each Deferred Payment shall be subject to the provisions set forth in Sections 3.2 and 3.4, as applicable.

3.6 Specified Payment.

(a) Belize shall irrevocably direct the Custodian (as defined in the Custody Agreement) to, no later than thirty (30) months after the date of this Agreement, pay (x) to BIC (such payment to BIC, the "**Specified Payment**") an amount equal to the lower of (i) the present value of all outstanding future management fees under the Management

Agreement computed using a discount rate equal to the Treasury Rate and (ii) the amount then outstanding in the Custody Account less any amounts due and payable to the Custodian pursuant to the Custody Agreement, and (y) to the Additional Covered Borrower Contribution Account the amount, if positive, then outstanding in the Custody Account less the amount to be paid pursuant to clause (x) and any amounts due and payable to the Custodian pursuant to the Custody Agreement. If the Specified Payment is the full amount set forth in clause (x)(i) of the preceding sentence, then Belize shall have satisfied and discharged in full its obligations to make any payments in the future under Section 3.3 of this Agreement. If the Specified Payment is less than the amount set forth in clause (x)(i), such payment shall be applied to satisfy and discharge Belize's obligations to make payments under Section 3.3 of this Agreement in respect of each Payment Date following such payment pursuant to this Section 3.6(a), in chronological order; provided that the amount that shall satisfy and discharge such obligations to make such future payments shall be equal to the present value of such payments computed using a discount rate equal to the Treasury Rate.

(b) The Specified Payment shall be made without defense, setoff or counterclaim in immediately available funds not later than 2:00 p.m. New York, New York time at the BIC Account (or such other account specified in writing by BIC) in Dollars.

3.7 Payments Generally.

(a) Notwithstanding anything in this Agreement to the contrary, any payment that is due on a date other than a Business Day shall be made on the immediately succeeding Business Day.

(b) If any payment required to be made under this Agreement shall not be paid in full on the Payment Date on which it is due, Belize shall pay a late charge at a rate of the Interest Rate (as defined in the Loan Agreement) then applicable under the Loan Agreement plus 1% per annum (or the maximum amount permitted by law, whichever is lower) of the full unpaid amount of such payment.

(c) Any payment required to be made hereunder in Dollars shall be made not later than 2:00 p.m. New York, New York time on the date when due. Any payment required to be made hereunder in Belize Dollars shall be made not later than 10:00 a.m. New York, New York time on the date when due and, if the applicable amount so payable is denominated in Dollars hereunder, the amount payable in Belize Dollars shall be equal to the Belize Dollar Equivalent Amount of the applicable Dollar amount as at the date such amount is paid.

ARTICLE 4. REPRESENTATIONS AND WARRANTIES

Belize hereby represents and warrants on the date hereof and on the Effective Date that:

4.1 Power and Authority.

Belize has the power and authority to execute and deliver this Agreement and to perform its obligations under the provisions hereof, including Belize's obligations in connection with the obtaining of Dollars to make payments under this Agreement and the appointment of representatives to serve as board members of the Conservation Fund.

4.2 Authorization, etc.

This Agreement has been duly authorized by all necessary action on the part of Belize (including any action required (a) to provide the signatories hereto with the authority to execute the Agreement, (b) to waive sovereign immunity to the extent herein waived, and (c) in connection with the obtaining of Dollars to make payments under this Agreement and the payment of such Dollars to Persons resident in the United States of America), and this Agreement constitutes the legal, valid and binding obligation of Belize, enforceable against Belize in accordance with its terms, except as such enforceability may be limited by (i) applicable bankruptcy, insolvency, reorganization, moratorium or other similar laws affecting the enforcement of creditors' rights generally and (ii) laws of general applicability relating to or affecting creditors' rights and to general principles of equity (regardless of whether such enforceability is considered in a proceeding in equity or at law). The Legislation has been enacted and is in full force and effect.

4.3 Compliance with Laws, Other Instruments.

The execution, delivery and performance by Belize of this Agreement and the consummation of the transactions contemplated hereby will not (a) violate any provisions of the Belize Constitution, (b) contravene, result in any breach of, or constitute a default in any material respect under, any indenture, mortgage, deed of trust, loan, purchase or credit agreement, lease, or any other contract, agreement, instrument or obligation or any treaties, including any negative pledge covenant included therein, to which Belize is or may be bound or affected, (c) conflict with or result in a breach of any of the terms, conditions or provisions of any consent, approval, authorization, order, judgment, decree or ruling of any court, arbitrator, regulatory body or Governmental Authority having jurisdiction over Belize, the Government or any Agency or over any of their respective properties, including any debt limitations or ceilings contained in any consent of Belize or other consent, approval or authorization referred in Section 4.4, or (d) violate any provision of any statute, law, convention or other rule or regulation of any Governmental Authority applicable to Belize, the Government or any Agency, except in the cases of clauses (b) and (c) for those violations and defaults which individually, or in the aggregate, are not material to Belize.

4.4 Governmental Authorizations, etc.

No consent, approval or authorization of, or registration, filing or declaration with, any Governmental Authority is required in connection with the execution, delivery or performance by Belize of this Agreement, the obtaining of Dollars to make payments under this Agreement, or the payment of such Dollars to Persons resident in the United States of America. No payment of

any Stamp Tax in the Jurisdiction is due in connection with the execution, delivery and performance of this Agreement or the consummation of the transactions contemplated herein.

4.5 Litigation.

There is no action, suit or proceeding pending or, to the knowledge of Belize, threatened against or affecting Belize, the Government or any Agency or any property of Belize, the Government or any Agency in any court, governmental agency, authority or body or any arbitrator of any kind or before or by any Governmental Authority that, individually or in the aggregate, purports to limit the legality, validity or enforceability of this Agreement.

4.6 Sanctions.

Belize represents that none of it, the Government or any Agency used, directly or knowingly indirectly, the proceeds of the Loan, or lend, contribute or otherwise make available such proceeds to any Person: (a) to fund or facilitate any activities or business of or with any Person that, at the time of such funding or facilitation, is the target of any economic sanctions administered or enforced by the U.S. Department of the Treasury's Office of Foreign Assets Control ("**OFAC**"), the United Nations Security Council, the European Union, Her Majesty's Treasury of the United Kingdom or Switzerland (collectively, "**Sanctions**") or is resident in any Sanctioned Country, unless permitted by applicable law or regulation or if an appropriate license for any such transaction was obtained from the authority administering the relevant Sanctions; or (b) in any other manner that will result in a violation of Sanctions.

4.7 *Pari Passu*.

All obligations and liabilities of Belize under this Agreement are general, direct, unconditional, unsubordinated and unsecured obligations of Belize for the payment and performance of which the full faith and credit of Belize has been pledged, which obligations and liabilities rank in right of payment at least *pari passu* with all of the other present and future unsecured and unsubordinated Public Debt.

4.8 No Immunity from Suit or Execution for Belize.

In any proceedings taken in the Jurisdiction or in the United States in relation to this Agreement, Belize will not be entitled to claim, and will not claim, for itself or any of its revenues, immunity from suit, execution, attachment or other legal processes except for limitations on immunity waivers applicable generally to sovereigns under the laws of the United States. The waiver of immunity by Belize pursuant to Section 14.5 is legal, valid and binding on Belize.

4.9 No Proposed Changes in Law.

There is no pending amendment to the laws, regulations, statutes or treaties of Belize, nor any (a) of the foregoing proposed in writing by or to the Government or (b) pending legislation in the Jurisdiction, that, if it were to become effective, could reasonably be expected to have a material adverse effect on the validity or enforceability of this Agreement, the ability of Belize to make payments under this Agreement in such currency as pursuant to the terms and

conditions set forth herein and/or to comply with the terms set forth in the Conservation Commitments Annex.

4.10 No Withholding or Other Charges.

Payments made hereunder by Belize are not subject to withholding or deduction for or on account of tax under the current laws and regulations of Belize or any political subdivision or taxing authority thereof. There is no income, stamp or other tax, levy, impost, deduction or other charges imposed or levied (whether by withholding or otherwise) by Belize or any political subdivision or taxing authority thereof or therein on or by virtue of the execution, delivery or performance by Belize of this Agreement or any of the other documents or instruments to be executed and delivered by Belize in connection herewith.

4.11 Anti-Terrorism; Anti-Money Laundering; Anti-Corruption.

(a) Belize is not designated by the Secretary of State of the United States as a State Sponsor of Terrorism pursuant to section 104(c) of the Export Control Reform Act (50 U.S.C. § 4813(c), section 40 of the Arms Export Control Act (22 U.S.C. § 2780), or section 620A of the Foreign Assistance Act of 1961 (22 U.S.C. § 2371).

(b) Belize, through the Government, has implemented, through measures adapted to its particular circumstances, the necessary laws, regulations, and regulatory and enforcement structures to implement the framework of measures recommended by the Financial Action Task Force ("**FATF**") in order to combat money laundering and terrorist financing, as well as the financing of proliferation of weapons of mass destruction as set forth in the International Standards on Combating Money Laundering and the Financing of Terrorism and Proliferation as promulgated by the FATF (the "**Anti-Money Laundering Framework**") and has not been identified by the FATF as a jurisdiction with strategic deficiencies in its Anti-Money Laundering Framework.

(c) None of Belize, the Government, its Agencies or, to the knowledge of Belize, any of the Government's or Agencies' officials working on the contemplated borrowing under the Loan Agreement or the transactions contemplated hereby or any representative, agent, employee or other person with actual authority to act on behalf of Belize, the Government or its Agencies (each, an "**Official**") is aware of or has taken any action to request, demand or receive any money or thing of value from any Person to induce an Official to act or refrain from acting, to use an Official's influence with other Officials, or to confer an improper benefit upon any Person in connection with the borrowing or the subsequent use of the Proceeds (as defined in the Loan Agreement), in each of the foregoing cases, in violation of any applicable domestic or transnational anti-corruption law, including, but not limited to, the Prevention of Corruption Act of Belize, the U.S. Foreign Corrupt Practices Act of 1977, and the U.K. Bribery Act 2010, each as may be amended, or similar law of any other relevant jurisdiction, or the rules or regulations thereunder.

4.12 Choice of Law.

The choice of New York law in this Agreement is a valid choice of law under the laws of the Jurisdiction and, accordingly, would be recognized and applied by the courts of the Jurisdiction if this Agreement or any claim hereunder is brought before any such court; provided that, in any proceedings in the Jurisdiction for the enforcement of this Agreement, a court in the Jurisdiction would apply procedural law of the Jurisdiction.

4.13 Legal Form.

This Agreement is in proper legal form under the laws of the Jurisdiction for the enforcement thereof in the Jurisdiction against Belize in accordance with its terms, and to ensure the legality, validity or enforceability of this Agreement in the Jurisdiction in accordance with its terms, it is not necessary that it be filed or recorded, except as described under Section 4.4 herein, with any court or other authority in the Jurisdiction or that any Stamp Tax be paid in the Jurisdiction on or in respect of any of said documents.

4.14 No License or Qualification.

It is not necessary under the laws of the Jurisdiction that BIC be licensed, qualified or entitled to carry on business in the Jurisdiction (a) to enforce its rights under this Agreement, (b) by virtue of executing this Agreement, or (c) by virtue of performance by BIC of this Agreement.

4.15 Exchange Controls.

Under current laws and regulations of the Jurisdiction and each political subdivision thereof, all payments to be made pursuant to this Agreement may be freely transferred out of the Jurisdiction and may be paid in, or freely converted into, Dollars.

4.16 No Projects Affecting the Conservation Commitments.

From November 12, 2020 through the Effective Date, the Government has not approved (i) any Environmental Impact Assessments ("**EIAs**") or Environmental Compliance Plans for any new projects within the Belize Barrier Reef Reserve System (the "**BBRRS**"); (ii) any transfer of public lands within the BBRRS; or (iii) any development projects or EIAs for major development projects (including, but not limited to, cruise ports) that are inconsistent with Belizean law or regulations.

ARTICLE 5. ADDITIONAL COVENANTS OF THE PARTIES

5.1 Additional Covenants of Belize.

Belize hereby covenants that until this Agreement has terminated in accordance with Section 14.11:

(a) Belize shall appoint representatives to fill the seats on the board of the Conservation Fund that are reserved for representatives of Belize, including appointing, or

causing the appointment of, a representative from the Ministry of Blue Economy & Civil Aviation of Belize as the inaugural chairperson of the board of the initial Conservation Fund (such Conservation Fund, the "**Initial Conservation Fund**"); it being understood, that the appointment of the chairperson of the board of the Initial Conservation Fund other than the inaugural chairperson shall be made by the board of the Initial Conservation Fund.

(b) Belize shall, and shall cause each of its Agencies to, use any grant it may receive from the Conservation Fund to supplement funds allocated by Belize in its budget or otherwise for conservation activities, including those set forth in the Conservation Commitments Annex. In order to receive any such grant, Belize or the applicable Agency may be required at the request of the Conservation Fund to demonstrate to the satisfaction of the Conservation Fund that any such amounts being received from the Conservation Fund shall not in any way reduce Belize's conservation expenditures as a direct result of receipt of a grant from the Conservation Fund through submission to the Conservation Fund of supporting materials such as relevant audited accounts and any other relevant conservation strategy documentation that might demonstrate any such amount shall be a supplement and not a replacement for Belize's conservation expenditure.

(c) Belize shall not, and shall cause the Government of Belize and its Agencies not to:

(i) appoint, or cause to be appointed, in each case directly or indirectly, representatives of Belize on the board of the Conservation Fund that are subject to or targeted by any Sanctions (or that otherwise do not comply with the requirements to be a member of the board of the Conservation Fund) or that, once appointed, constitute 50% or more of the board members of the Conservation Fund;

(ii) control the Conservation Fund;

(iii) unreasonably withhold or delay any governmental approvals necessary or advisable for the Conservation Fund to operate without undue hindrance in Belize;

(iv) unreasonably withhold or delay the granting of, or rescind, the nonprofit and tax-free status of the Conservation Fund under the laws of Belize;

(v) stipulate, or cause to be effected, such revisions to the governance and operations of the Conservation Fund (or laws that would govern the operations of the Conservation Fund) or take or fail to take any other action such that the Conservation Fund is no longer able to operate effectively as an entity independent from Belize or its Agencies consistent with the requirements of Exhibit B; or

(vi) approve (i) any EIAs for any new development projects within the BBRRS until updates to the Environmental Impact Assessment Regulations, as contemplated in Clause 3(E) of Exhibit A, have been finalized, adopted as laws and become fully effective; (ii) any transfer of public lands in the BBRRS prior to the completion of Milestone 3; or (iii) any major development projects (including, but not limited to, cruise

ports) that are inconsistent with Belizean law or such updates to the Environmental Impact Assessment Regulations.

5.2 No Proceedings

Neither Belize nor or any person acting on its behalf may, at any time, institute, or join with any other person in bringing, instituting or joining, insolvency, administration, bankruptcy, winding-up, examinership or any other similar proceedings (whether court-based or otherwise) in relation to BIC or any of its officers, shareholders, members, incorporators, corporate service providers or directors or any of its assets.

5.3 Additional Covenants of BIC.

BIC shall not make any payments to a Conservation Fund that has been designated as a Non-Compliant Conservation Fund Entity pursuant to Section 6.3.

ARTICLE 6. CONSERVATION FUND AND ENDOWMENT ACCOUNT

6.1 Endowment Account Funds.

Pursuant to this Agreement, the amounts held in the Endowment Account on the End Date shall be transferred as an endowment for the Conservation Fund subject to and in accordance with the terms of the Trust Agreement, and BIC and Belize shall take all actions required under the Trust Agreement to effect such transfer.

6.2 Acknowledgments and Representations and Warranties of the Parties with Respect to the Conservation Fund and the Endowment Account.

Each of Belize and BIC acknowledges and agrees that:

(a) Belize will be eligible to apply to the Conservation Fund for grants and that neither Belize nor any of its Agencies shall be entitled to receive any other type of funds or funding from the Conservation Fund other than those amounts that Belize may receive as a result of taxes, nominal registration or similar fees or other statutory charges that are generally applicable to not-for-profit or charitable entities and not explicitly or de facto targeted for application to the Conservation Fund;

(b) the Initial Conservation Fund shall be a nonprofit entity formed under the laws of Delaware that satisfies all the requirements set forth in Exhibit B except as otherwise provided herein and that the Initial Conservation Fund shall establish a representative office in Belize;

(c) such Party will at all times be familiar with the laws and internal regulations that govern or will govern the Conservation Fund and its operations;

(d) funds on deposit in the Endowment Account may be used by the Statutory Trust (a) as collateral for BIC's indebtedness under the Loan Agreement or (b) to pay

amounts due and payable by Belize under this Agreement or the Loan Agreement only to the extent permitted by the Trust Agreement;

(e) the Conservation Fund is expected to enter into a Foreign Enterprise Support Agreement (as defined in the Political Risk Insurance Policy) with DFC; and

(f) such Party shall use reasonable efforts to identify appropriate persons to be appointed as its representatives to the Conservation Fund in line with the requirements to be a member of the board of the Conservation Fund.

6.3 Replacement of the Conservation Fund.

(a) If one or more of the following events (each, a "**Replacement Event**") shall have occurred and be continuing, then BIC and Belize shall have the rights set forth in Section 6.3(b) below:

(i) an Interference Condition is continuing;

(ii) BIC has determined that the Conservation Fund is in breach or otherwise has failed to comply with any agreement to which BIC and such entity are a party or any undertaking by such entity for the benefit of BIC or DFC; or

(iii) the Conservation Fund fails to satisfy any of the requirements set forth in Exhibit B applicable to such entity or otherwise breaches any of its organizational documents in any material respect.

(b) If any Replacement Event has occurred and is continuing, then BIC may designate, by delivery of notice to Belize, the Conservation Fund as a "Non-Compliant Conservation Fund Entity." If, and only if, a Replacement Event under Section 6.3(a)(iii) has occurred and is continuing, then Belize may designate, by delivery of notice to BIC, the Conservation Fund as a Non-Compliant Conservation Fund Entity.

(c) If the Conservation Fund is designated as a Non-Compliant Conservation Fund Entity, as soon as practicable thereafter, and after good-faith consultations with the Government and the Belize Network of NGOs, BIC may select, by delivery of notice to Belize, a Qualifying Conservation Entity to replace the Conservation Fund. Such selected Qualifying Conservation Entity shall replace the Conservation Fund for all purposes under this Agreement unless, within 30 days of BIC notifying Belize of its selection of a Qualifying Conservation Entity, each of the Belize Network of NGOs and the Government objects in writing to BIC to the replacement of the Conservation Fund with such Qualifying Conservation Entity.

ARTICLE 7. TERMINATION EVENTS

7.1 Termination Events.

If one or more of the following events (each, a "**Termination Event**") shall have occurred and be continuing (whatever the reason for such Termination Event and whether it shall

be voluntary or involuntary or be effected by operation of law or pursuant to any judgment, decree or order of any court or any order, rule or regulation of any administrative or governmental body), BIC shall have the right to exercise the remedies set forth in Section 7.2 below:

(a) Belize fails to make any payment due and payable pursuant to this Agreement, as and when the same shall become due and payable, and such failure continues unremedied for a period of thirty (30) days;

(b) Belize or any Agency fails to duly observe or perform in any material respect any of the other covenants or agreements provided herein, except for those covenants and agreements set forth in Section 2.1, and such failure continues for a period of sixty (60) days after BIC has delivered notice thereof to Belize;

(c) the Loan under the Loan Agreement shall become due and payable due to acceleration (and such acceleration shall not have been rescinded or annulled), or Belize shall have failed to pay the Loan under the Loan Agreement in full on the maturity date;

(d) Belize or a court of proper jurisdiction shall declare a general suspension of payments or a moratorium on payment of Belize's Public Debt;

(e) the validity of this Agreement shall be contested in a formal administrative, legislative or judicial proceeding by Belize, the Government or any executive, legislative, or judicial body or official of Belize which is authorized in each case by law to do so and, acting alone or together with another such body or official, has the legal power and authority to declare this Agreement invalid or unenforceable, or Belize shall deny any of its obligations hereunder to BIC, or any constitutional provision, treaty, convention, law, regulation, official communique, decree, ordinance or policy of the Jurisdiction, or any final decision by any court in the Jurisdiction having jurisdiction, shall purport to render any material provision of this Agreement, invalid or unenforceable or shall purport to prevent or delay the performance or observance by Belize of any of its material obligations hereunder to BIC;

(f) Belize shall deny any of its obligations hereunder to BIC, or any constitutional provision, treaty, convention, law, regulation, official communique, decree, ordinance or policy of Belize, or any final decision by any court in Belize having jurisdiction, shall purport to render any material provision of this Agreement, invalid or unenforceable or shall purport to prevent or delay the performance or observance by Belize of any of its material obligations hereunder;

(g) any constitutional provision, treaty, convention, law, regulation, ordinance, decree, consent, approval, license or other authority necessary to enable Belize to, direct or indirectly, make or perform its material obligations under this Agreement, or the validity or enforceability thereof, shall expire, be withheld, revoked, terminated or otherwise cease to remain in full force and effect, or shall be modified in a manner which adversely affects any rights or claims of BIC;

(h) Belize, the Government or any Agency fails to duly observe or perform the covenants provided in Section 5.6, Section 6.3 or Section 6.4 of the Loan Agreement;

(i) Belize shall have become a Sanctioned Country or a Sanctioned Person or the Government or any of its Agencies shall have become a Sanctioned Person; or

(j) Belize or the Government shall be designated by the Secretary of State of the United States as a State Sponsor of Terrorism pursuant to section 104(c) of the Export Control Reform Act (50 U.S.C. § 4813(c), section 40 of the Arms Export Control Act (22 U.S.C. § 2780), or section 620A of the Foreign Assistance Act of 1961 (22 U.S.C. § 2371).

7.2 Remedies.

(a) If any Termination Event has occurred and is continuing, BIC may, at any time at its option, by written notice to Belize, terminate this Agreement, and thereupon (i) this Agreement shall terminate immediately and (ii) Belize shall immediately pay in Dollars in immediately available funds to the Conservation Fund an amount equal to the present value of the aggregate amount of all Conservation Payments that are required to be made by Belize and that have not been made by Belize until the End Date computed using a discount rate equal to the Treasury Rate (the "**Termination Payment**"). Besides the written notice delivered by BIC notifying the termination of this Agreement, no presentment, demand, protest or notice of any kind (all of which are hereby waived by Belize) shall be required for the Termination Payment to be immediately due and payable.

(b) If any Termination Event has occurred and is continuing, and irrespective of whether this Agreement has been terminated pursuant to Section 7.2(a), BIC, at any time, may proceed to protect and enforce its rights by any action commenced pursuant to Section 14.5 for any remedy available at law or in equity, whether for the specific performance of any agreement contained herein, or for an injunction against a violation of any of the terms hereof or thereof, or in aid of the exercise of any power granted hereby or thereby or by law or otherwise.

(c) No course of dealing, and no delay on the part of BIC in exercising any right, power or remedy shall operate as a waiver thereof or otherwise prejudice BIC's rights, powers or remedies. No right, power or remedy conferred by this Agreement upon BIC hereof shall be exclusive of any other right, power or remedy referred to herein or therein or now or hereafter available at law, in equity, by statute or otherwise. Without limiting the obligations of Belize under ARTICLE 8, Belize will pay to BIC on demand such further amount as shall be sufficient to cover all costs and expenses of BIC incurred in any enforcement under this Section 7.2, including, without limitation, reasonable attorneys' fees, expenses and disbursements.

ARTICLE 8. EXPENSES.

Belize will pay, or cause to be paid, on demand, (a) all costs and expenses (including reasonable attorneys' fees of a special, local or other counsel) incurred by BIC in connection with enforcing or defending any obligations of Belize pursuant to this Agreement or in

responding to any subpoena or other legal process or informal investigative demand issued in connection with this Agreement, and (b) all costs and expenses, including financial advisors' fees, incurred in connection with the insolvency of Belize or in connection with any workout restructuring of this Agreement.

ARTICLE 9. SURVIVAL

Section 7.2 (to the extent the Agreement is terminated pursuant to BIC's exercise of remedies thereunder), the last sentence of Section 3.4(b), Section 6.1, ARTICLE 9 and ARTICLE 14 will survive the enforcement, amendment or waiver of any provision of this Agreement and the termination of this Agreement.

ARTICLE 10. ENTIRE AGREEMENT

This Agreement embodies the entire agreement and understanding between BIC and Belize and shall supersede all prior agreements and understandings relating to the subject matter hereof.

ARTICLE 11. AMENDMENT AND WAIVER

No amendment or waiver of any provision of this Agreement, nor consent to any departure by Belize therefrom, shall in any event be effective unless the same shall be in writing and signed by BIC and, in the case of amendments only, Belize, and such waiver or consent shall be effective only in the specific instance and for the specific purpose for which given.

ARTICLE 12. NOTICES

All notices and communications provided for hereunder shall be in writing and sent (a) by a recognized overnight delivery service (with charges prepaid), or (b) via email. Any such notice must be sent:

(a) if to BIC, to it at 4245 Fairfax Dr., #100, Arlington VA 22203, Attn: Legal Corporate Services. Email: LegalCS@tnc.org, or at such other address as BIC shall have specified to Belize in writing from time to time, or

(b) if to Belize, to the Financial Secretary of the Ministry of Finance, Sir Edney Cain Building, Belmopan City, Belize, Attention: Financial Secretary, e-mail address joseph.waight@mof.gov.bz, with a copy to Sullivan & Cromwell LLP, 125 Broad Street, New York, New York 10004, Attention: James L. Bromley / Werner F. Ahlers, facsimile number (212) 558-3588, e-mail addresses bromleyj@sullcrom.com / ahlersw@sullcrom.com, or at such other address as Belize shall have specified to BIC in writing from time to time.

ARTICLE 13. ASSIGNMENTS; CERTAIN PLEDGES

(a) BIC shall have the right at any time, without the consent of Belize, to assign to one (1) or more Affiliates of TNC all or any portion of BIC's rights and obligations under this Agreement.

(b) BIC may at any time pledge or assign a security interest in all or any portion of its rights under this Agreement to any Person; provided that no such pledge or assignment shall release BIC from any of its obligations hereunder or substitute any such pledgee or assignee for BIC as a party hereto.

(c) Belize may not assign or otherwise transfer any of its rights or obligations hereunder without the prior written consent of BIC. Any assignment made without the consent of BIC is void. No assignee will acquire any rights or obligations by reason of an assignment made without the consent of BIC.

(d) Any purported assignment, disposition, conveyance, pledge or transfer of rights in violation of this Agreement shall be absolutely null and void and have no force or effect, and shall vest no rights in the purported beneficiary of such assignment, disposition, conveyance, sale of participation, pledge or transfer.

ARTICLE 14. MISCELLANEOUS

14.1 Successors and Assigns.

All terms, provisions, covenants and other agreements contained in this Agreement, by or on behalf of any of the Parties hereto, shall bind, inure to the benefit of and be enforceable against their respective successors, assigns and transferees whether so expressed or not. Nothing in this Agreement, expressed or implied, shall be construed to confer upon any Person (other than the parties hereto and their respective successors and assigns permitted hereby) any legal or equitable right, remedy or claim under or by reason of this Agreement.

14.2 Severability.

Any provision of this Agreement that is prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof, and any such prohibition or unenforceability in any jurisdiction shall (to the full extent permitted by law) not invalidate or render unenforceable such provision in any other jurisdiction.

14.3 Construction.

Each covenant contained herein shall be construed (absent express provision to the contrary) as being independent of each other covenant contained herein, so that compliance with any one (1) covenant shall not (absent such an express contrary provision) be deemed to excuse compliance with any other covenant. Where any provision herein refers to action to be taken by any Person, or which such Person is prohibited from taking, such provision shall be applicable whether such action is taken directly or indirectly by such Person.

14.4 Counterparts.

This Agreement may be executed in any number of counterparts, each of which shall be an original but all of which together shall constitute one (1) instrument. Each counterpart may consist of a number of copies hereof, each signed by less than all, but together signed by all,

of the Parties hereto. Counterparts may be delivered via facsimile, electronic mail (including any electronic signature covered by the U.S. federal ESIGN Act of 2000, Uniform Electronic Transactions Act, the Electronic Signatures and Records Act or other applicable law, or other transmission method), and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

14.5 Governing Law, Jurisdiction and Service of Process; Waiver of Sovereign Immunity.

(a) This Agreement shall be governed by, and construed in accordance with, the laws of the State of New York, United States, without giving effect to conflict of laws provisions to the extent that the application of the laws of any other jurisdiction would be required thereby.

(b) Any dispute arising out of, in relation to, or in connection with this Agreement shall be resolved through binding arbitration conducted in accordance with the Rules of Arbitration of the International Chamber of Commerce that entered in force on January 1, 2021 ("**Rules**"). The Parties expressly agree pursuant to Article 30(2)(b) of the Rules that disputes between the Parties arising under this Agreement are suitable for resolution under the Expedited Procedures set forth in Article 30 and Appendix VI of the Rules (collectively, the "**Expedited Procedures**"), and in furtherance of the foregoing, the Parties additionally expressly agree not to (x) contend it is inappropriate to apply, or (y) request that the Court of Arbitration of the International Chamber of Commerce examine the appropriateness of, such Expedited Procedure in any arbitration conducted pursuant to this Agreement, irrespective of the amount in dispute. The arbitration shall be conducted by three (3) arbitrators appointed in accordance with Article 12(4)-(5) of the Rules. The place of arbitration shall be New York, New York, United States. The language of the arbitration shall be English. The arbitrator shall have the right to determine, in the first instance, any and all challenges to the arbitrator's jurisdiction, including, without limitation, challenges to the scope, existence and validity of this arbitration agreement. An award of the arbitrator may be enforced in any court of competent jurisdiction. Belize expressly confirms that the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (the "**Convention**") has been incorporated into the domestic laws of the Jurisdiction and agrees that: (a) it is bound by the terms of that Convention, including as a treaty obligation and (b) the Convention shall apply to any action to enforce an award issued pursuant to an arbitration conducted in accordance with this Section 14.5.

(c) The prevailing party shall be entitled to, and the tribunal shall award, pre-award and post-award interest on any amounts awarded in an arbitration commenced under this Agreement (the "**Arbitral Award Amount**"). Such interest shall accrue, in the case of arbitrations commenced by BIC, from the date that an Event of Default occurred and, in the case of arbitrations commenced by Belize, from the date of the filing to commence an arbitration proceeding, in each case, at a rate per annum equal to 9%. Interest on the outstanding Arbitral Award Amount shall continue to accrue at a rate per annum equal to 9% until such amounts are paid in Dollars in cash in full by the award debtor. If the award creditor or any successor in interest elects to enforce the award in court, including a court in the United States, the Parties agree that any judgment rendered on the award by the court

shall bear post-judgment interest at the rate agreed by the Parties under the formula above for awards rendered by the tribunal in lieu of any other post-judgment interest rate, including the post-judgment interest rate under 28 U.S.C. § 1961 until the award is fully paid in Dollars.

(d) To the extent that Belize or the Government or any of their assets may have, or may hereafter become entitled to or have attributed to them (whether or not claimed), any right of immunity (on the grounds of sovereignty or otherwise), in any jurisdiction, Belize hereby unconditionally and irrevocably waives and agrees not to assert, with respect to the Government and its revenues, to the fullest extent permitted by applicable law, any such immunity from jurisdiction, from suit or arbitration, from setoff or counterclaim, from service of process upon it or any agent, from pre-judgment or pre-award attachment, from attachment upon or in aid of execution of judgment or from execution of judgment or other legal process or proceeding for the giving of any relief or for the enforcement of judgments, in any action, suit or proceeding arising out of or based on this Agreement, which may be instituted as provided by this Section 14.5; provided that such waiver of immunity constitutes only a limited and specific waiver for the purposes of this Agreement and under no circumstances shall it be interpreted as a general waiver by Belize or the Government or a waiver with respect to proceedings unrelated to this Agreement.

(e) THE PARTIES HERETO HEREBY WAIVE TRIAL BY JURY IN ANY ACTION BROUGHT ON OR WITH RESPECT TO THIS AGREEMENT OR ANY OTHER DOCUMENT EXECUTED IN CONNECTION HEREWITH OR THEREWITH.

14.6 Obligation to Make Payments in Dollars.

Any payment on account of an amount that is payable hereunder in Dollars which is made to or for the account of BIC in lawful currency of any other jurisdiction (the "**Other Currency**"), whether as a result of any judgment or order or the enforcement thereof or the realization of any security or the liquidation of assets belonging to Belize, shall constitute a discharge of Belize's obligation under this Agreement only to the extent of the amount of Dollars which BIC could purchase in the New York foreign exchange markets with the amount of the Other Currency in accordance with normal banking procedures at the rate of exchange prevailing on the first day (other than a Saturday) on which banks in New York are generally open for business following receipt of the payment first referred to above. If the amount of Dollars that could be so purchased is less than the amount of Dollars originally due to BIC, Belize shall indemnify and save harmless BIC from and against all loss or damage arising out of or as a result of such deficiency. This indemnity shall constitute an obligation separate and independent from the other obligations contained in this Agreement, shall give rise to a separate and independent cause of action, shall apply irrespective of any indulgence granted by BIC from time to time and shall continue in full force and effect notwithstanding any judgment or order for a liquidated sum in respect of an amount due hereunder or under any judgment or order. For the avoidance of doubt, in no event shall Belize be required to pay more Dollars at the rate of exchange when payment is made than the amount of Dollars stated to be due hereunder, so that in any event Belize's obligations hereunder will be effectively maintained as Dollar obligations.

14.7 English Language.

All notices provided for in this Agreement or made in accordance with this Agreement and all documents delivered under the terms of this Agreement shall either be in English or shall be accompanied by a certified translation into English.

This Agreement has been prepared and signed in English and the parties hereto agree that the English version hereof and thereof (to the maximum extent permitted by applicable law) shall be the only version valid for the purpose of the interpretation and construction hereof and thereof notwithstanding the preparation of any translation into another language hereof or thereof, whether official or otherwise or whether prepared in relation to any proceedings which may be brought in Belize or any other jurisdiction in respect hereof or thereof.

14.8 Taxes.

(a) All payments by Belize (the "**Payor**") under this Agreement shall be made free and clear of, and without reduction or liability for or on account of, any present or future taxes, levies, imposts, duties, fees, assessments, charges, deductions or withholdings of any nature whatsoever, including any interest, penalties or additions to tax imposed with respect thereto or with respect to the making of payments in Dollars, such as financial transactions taxes or currency taxes, in each case, imposed by or for a government or other authority having power to tax (hereinafter, "**Tax**") unless any withholding or deduction for or on account of Tax is required by law.

(b) If the Payor shall be obligated by law to make any such withholding or deduction for any Tax imposed, levied, collected, assessed or withheld by or within Belize or any political subdivision or taxing authority thereof or therein, by any jurisdiction in which the Payor carries on business or by any other country or jurisdiction (or any taxing authority thereof or therein) (each, a "**Taxing Jurisdiction**"), then the Payor will promptly (i) pay to the relevant Taxing Jurisdiction the full amount required to be deducted, withheld or otherwise paid in by the Payor (including the full amount required to be deducted or withheld from or otherwise paid by the Payor in respect of any Additional Payment required to be made pursuant to clause (ii) hereof) and (ii) pay to each Person entitled under this Agreement to receive the payment from which the amount referred to in clause (i) has been so deducted, withheld or otherwise payable or paid such additional amount as is necessary in order that the amount received by such Person after any required deduction, withholding or other payment of Tax (including any required deduction, withholding or other payment of Tax on or with respect to such additional amount) shall equal the amount such Person would have received had no such deduction, withholding or other payment of Tax been paid (the "**Additional Payment**").

(c) Notwithstanding the provisions of this Section 14.8, no such Additional Payments shall be payable for or on account of any Connection Income Taxes or any Tax that is imposed or withheld by reason of BIC's failure to make a declaration of non-residence or other similar claim, or comply with any reporting requirement (as notified to BIC in writing by or on behalf of the Payor giving BIC sufficient time to satisfy such requirements), as is required (i) by statute, treaty or regulation of Belize existing on the

date hereof, or which are not substantially more onerous than those existing on the date hereof and which do not impose an unreasonable burden (in time, resources or otherwise) on BIC or materially prejudice BIC's legal or commercial position, or (ii) by statute, treaty or regulation in any other relevant Taxing Jurisdiction to the extent the requirements thereof are not substantially more onerous than those of Belize existing on the date hereof and which do not impose an unreasonable burden (in time, resources or otherwise) on BIC or materially prejudice BIC's legal or commercial position as a precondition to exemption from all or part of such Tax.

(d) Belize shall timely pay to the relevant Taxing Jurisdiction in accordance with applicable law, or at the option of BIC timely reimburse BIC for the payment of, any Stamp Taxes, except any such Stamp Taxes imposed with respect to an assignment that arises in connection with any voluntary assignment.

(e) As soon as practicable after any payment of Taxes by Belize to a Taxing Jurisdiction pursuant to this Section 14.8, Belize shall deliver to BIC the original or a certified copy of a receipt issued by such Taxing Jurisdiction evidencing such payment, a copy of the return reporting such payment or other evidence of such payment reasonably satisfactory to BIC.

(f) Belize shall indemnify each recipient of a payment under this Agreement, within ten (10) days after demand therefor, for the full amount of any Taxes (including such Taxes imposed or asserted on or attributable to amounts payable under this Section 14.8) other than Taxes set forth in Section 14.8(c) above, payable or paid by such recipient or required to be withheld or deducted from a payment to such recipient and any reasonable expenses arising therefrom or with respect thereto, whether or not such Taxes were correctly or legally imposed or asserted by the relevant Taxing Jurisdiction. A certificate as to the amount of such payment or liability delivered to Belize by BIC shall be conclusive absent manifest error.

(g) If any party determines, in its sole discretion exercised in good faith, that it has received a refund of any Taxes as to which it has been indemnified pursuant to this Section 14.8 (including by the payment of additional amounts pursuant to this Section 14.8), it shall pay to the indemnifying party an amount equal to such refund (but only to the extent of indemnity payments made under this Section 14.8 with respect to the Taxes giving rise to such refund), net of all out-of-pocket expenses (including Taxes) of such indemnified party and without interest (other than any interest paid by the relevant Taxing Jurisdiction with respect to such refund). Such indemnifying party, upon the request of such indemnified party, shall repay to such indemnified party the amount paid over pursuant to this paragraph (plus any penalties, interest or other charges imposed by the relevant Taxing Jurisdiction) in the event that such indemnified party is required to repay such refund to such Taxing Jurisdiction. Notwithstanding anything to the contrary in this paragraph, in no event will the indemnified party be required to pay any amount to an indemnifying party pursuant to this Section 14.8(g) the payment of which would place the indemnified party in a less favorable net after-Tax position than the indemnified party would have been in if the Tax subject to indemnification and giving rise to such refund had not been deducted, withheld or otherwise imposed, and the indemnification payments or

additional amounts with respect to such Tax had never been paid. This Section 14.8 shall not be construed to require any indemnified party to make available its Tax returns (or any other information relating to its Taxes that it deems confidential) to the indemnifying party or any other Person.

(h) Each Party's obligations under this Section 14.8 shall survive any assignment of rights by BIC, the enforcement, amendment or waiver of any provision of this Agreement and the termination of this Agreement.

14.9 Indemnification.

(a) Belize shall indemnify and hold harmless BIC and its Affiliates and their respective directors, officers, employees, agents and advisors (each, an "**Indemnified Party**"), to the fullest extent lawful, from and against any and all losses, claims, penalties, damages, expenses or liabilities whatsoever (including, without limitation, documented fees and disbursements of counsel), incurred by or asserted or awarded against any Indemnified Party (including, without limitation, in connection with any pending or prospective investigation, litigation or proceeding or the preparation of any defense or appearing as a third-party witness in connection therewith) arising out of or relating to Belize's breach of any of the terms of, or any of the representations or warranties given pursuant to, this Agreement, except to the extent that such losses, claims, penalties, damages, liabilities or expenses (or proceedings in respect thereof) (a) are determined in a final non-appealable judgment by a court of competent jurisdiction to have resulted primarily from the gross negligence, bad faith or willful misconduct of such Indemnified Party or (b) result from a dispute or claim between Indemnified Parties; provided that, in any case, Belize shall not be held liable for any settlement of any such proceedings unless the Indemnified Party has previously notified and consulted with Belize in respect thereof, and Belize has provided its consent in respect of any settlement. In the case of an investigation, litigation or other proceeding to which the indemnity in this Section 14.9 applies, such indemnity shall be effective whether or not such investigation, litigation or proceeding is brought by Belize, any of its directors, security holders or creditors, an Indemnified Party or any other Person or an Indemnified Party is otherwise a party thereto and whether or not the transactions contemplated herein are consummated.

(b) In addition to but without duplication of the foregoing and the obligations of Belize pursuant to Section 14.8, Belize shall indemnify and hold harmless the Indemnified Parties from and against any and all Taxes imposed by a Taxing Jurisdiction in Belize on or measured by net income (however denominated) or that are franchise Taxes or branch profits Taxes or any other taxes or similar charges imposed on the Indemnified Parties in Belize in each case, solely as a result of or otherwise in connection with the execution, delivery and performance of this Agreement (including but not limited to BIC's registration as a business under Belize law, BIC's actions with respect to any parametric or political risk insurance policy, and any monitoring of the Conservation Commitments), or the receipt of any payment under this Agreement.

(c) No Indemnified Party shall have any liability (whether direct or indirect, in contract, tort or otherwise) to Belize or any of its Agencies or other affiliates, security

holders or creditors for or in connection with the services or transactions contemplated hereby, except to the extent such liability is determined in a final non-appealable judgment by a court of competent jurisdiction to have resulted primarily from such Indemnified Party's gross negligence, bad faith or willful misconduct. In no event, however, shall any Indemnified Party be liable on any theory of liability for any special, indirect, consequential or punitive damages (including, without limitation, any loss of profits, business or anticipated savings), and Belize hereby releases and holds harmless (for itself and any person claiming through it) each Indemnified Party from all such liability. No Indemnified Party shall be liable for any damages arising from the use by unauthorized persons of information or other materials sent through electronic, telecommunications or other information transmission systems that are intercepted by such persons, except to the extent such interception is due to the gross negligence, bad faith or willful misconduct of such Indemnified Party.

(d) The indemnity and reimbursement obligations of Belize hereunder shall be in addition to any other liability Belize may otherwise have to an Indemnified Party, shall be binding upon and inure to the benefit of any successors, assigns, heirs and personal representatives of Belize and any Indemnified Party and shall survive the enforcement, amendment or waiver of any provision of this Agreement and the termination of this Agreement.

14.10 Right of Setoff.

If a Termination Event shall have occurred and be continuing, BIC and each of its Affiliates are hereby authorized at any time and from time to time, to the fullest extent permitted by applicable law, to setoff and apply any and all deposits (general or special, time or demand, provisional or final, in whatever currency) at any time held and other obligations (in whatever currency) at any time owing by BIC or any such Affiliate to or for the credit or the account of Belize against any and all of the obligations of Belize now or hereafter existing under this Agreement to BIC, irrespective of whether or not BIC shall have made any demand under this Agreement and although such obligations of Belize may be contingent or unmatured or are owed to a branch or office of BIC different from the branch or office holding such deposit or obligated on such indebtedness. The rights of BIC and its Affiliates under this Section 14.10 are in addition to other rights and remedies (including other rights of setoff) that BIC or its Affiliates may have. BIC agrees to notify Belize promptly after any such setoff and application; provided that the failure to give such notice shall not affect the validity of such setoff and application.

14.11 Effectiveness and Termination.

(a) This Agreement shall become effective on the date (the "**Effective Date**") that this Agreement shall have been duly executed by Belize and BIC.

(b) This Agreement shall automatically terminate if the Commitment (as defined in the Loan Agreement) terminates pursuant to Section 2.4 of the Loan Agreement prior to the occurrence of the disbursement of the Loan in accordance with Section 2.3(c) of the Loan Agreement.

(c) Belize shall not have the right to terminate this Agreement prior to the End Date by paying the Termination Payment or otherwise.

(d) Except as otherwise specified in ARTICLE 9, this Agreement shall terminate and all of the obligations of the Parties shall be of no further force or effect, (i) upon the later of the End Date and the date on which Belize pays all amounts due and owing under this Agreement, or (ii) upon termination of this Agreement pursuant to Section 7.2(a) or (iii) if BIC ceases to be a wholly owned direct or indirect subsidiary of TNC or (iv) if this Agreement terminates pursuant to Section 14.11(b).

14.12 Specific Performance.

Each Party hereby irrevocably waives, to the extent that it may do so under applicable law, any defense based on the adequacy of a remedy at law which may be asserted as a bar to the remedy of specific performance in any action brought against such Party for specific performance. Notwithstanding anything in this Agreement to the contrary, each Party may obtain relief against the other Party or any third-party by injunction, specific performance and other appropriate equitable relief.

[*Signature Pages Follow*]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed and delivered as of the day and year first above written.

BELIZE

By: _____
Name: Joseph Waight
Title: Financial Secretary

[*Signature Page to the Conservation Funding Agreement*]

BELIZE BLUE INVESTMENT COMPANY, LLC

By: _____
Name:
Title:

[*Signature Page to the Conservation Funding Agreement*]

FINAL VERSION

Annex A: Conservation Commitments

Capitalized terms have the meaning given to them in Clause 7 or in Conservation Funding Agreement, dated November [•], 2021 (the "Agreement"), as applicable.

Clause 1. The Marine Spatial Plan

This Clause 1 sets forth Belize's obligations to complete a legally enforceable Marine Spatial Plan (MSP) and designate up to 30 percent of its Ocean in Biodiversity Protection Zones.

The MSP shall include marine conservation outcomes for biodiversity protection and denote, in reasonable detail, the permissible activities that may be lawfully carried on in any part of Belize's Ocean.

The MSP shall:

1. Expand the percentage of Belize's Ocean that is in Biodiversity Protection Zones from 15.9 percent at the signing of this Agreement to whichever is the lower of:
    a. 30 percent of Belize's Ocean, with at least 15 percentage in High Protection for Biodiversity Zones and at least 15 percentage in Medium Protection for Biodiversity Zones; or
    b. The percentage stated in the MSP.
2. Provide that all Biodiversity Protection Zones be Gazetted and submitted to the relevant international authority (e.g., the World Database on Marine Protected Areas, International Maritime Organisation, International Hydrographic Organisation);
3. contain an Implementation Plan;
4. be legally enforceable; and
5. be Implemented.

The MSP shall be completed consistent with international best practices such as in the IOC-UNESCO 2009 Guide titled "Marine Spatial Planning - A Step-by-Step Approach toward Ecosystem-based Management" and at a minimum address the following:

1. Transparent, inclusive, equitable, science-based and participatory process; and
2. A Marine Protected Area (MPA) design including ecological, economic, social and cultural criteria set forth by frameworks such as IUCN WCPA 2012 international guidebook titled "Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas", the IUCN-WCPA 2017 guidebook titled "Large-Scale Marine Protected Areas: Guidelines for Design and Management" and IUCN-WCPA 2008 technical guidebook titled "Establishing Resilient Marine Protected Area Networks – Making It Happen".

Milestone 1. No later than six (6) months after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette the commitment made by the

Government on April 2, 2019[1] to expand High Protection for Biodiversity Zones to 11.6% of Belize's Ocean. Upon achievement of this Milestone, Belize will have 11.6% of its Ocean in High Protection for Biodiversity Zones and 9.0% of its Ocean under Medium Protection for Biodiversity Zones, for a total of 20.5% in Biodiversity Protection Zones and Marine Protected Areas (MPA). After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall thereafter have less than 20.5% of its Ocean in Biodiversity Protection Zones and MPAs.

Milestone 3. No later than one (1) year after signing the Agreement, the Government shall initiate the process of developing a MSP for its Ocean by: (i) designation of a lead ministry or agency for the MSP process and (ii) establishment of a MSP steering committee comprised of senior level officers or employees from governmental and non-governmental stakeholders from sectors/areas including fisheries, coastal zone management, tourism, water resources, shipping, environment, finance, academia and energy. A representative of the Nature Conservancy will be a member of the MSP steering committee. For the avoidance of doubt, the Government shall have full discretion to determine whether the governmental stakeholders participating in the MSP steering committee are Ministry or agency-level members. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall remove the designation of such lead agency or terminate the MSP steering committee prior to the achievement of Milestone 6.

Milestone 4. No later than three (3) years after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette Biodiversity Protection Zones covering a total of 25% of its Ocean. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall thereafter have less than 25% of its Ocean in Biodiversity Protection Zones.

Milestone 6. No later than five (5) years after signing the Agreement, (a) the National Assembly shall approve and the Government shall formally sign into law and Gazette Biodiversity Protection Zones covering a total of 30% of Belize's Ocean, or the percentage stated in the MSP; and (b) the MSP shall have been completed and approved by the National Assembly, signed into law, Gazetted and Implemented. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall thereafter have less than the lower of 30% and the percentage stated in the MSP of its Ocean in Biodiversity Protection Zones or Belize shall rescind the enactment of the MSP.

Milestone 8. No later than eight (8) years after signing the Agreement, Belize shall have approved Management Plans for the Biodiversity Protection Zones, and the ministry with authority over such plans shall have signed the Management Plans. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall rescind such Management Plans.

Clause 2. Other Conservation Milestones.

This Clause 2 sets forth Belize's obligations with regards to environmental commitments not addressed by the MSP.

[1] For further information, see https://www.pressoffice.gov.bz/expansion-of-fisheries-replenishment-no-take-zones/

Milestone 2. *Designation of Public Lands within the Belize Barrier Reef Reserve System ("BBRRS") as Mangrove Reserves.* No later than six (6) months after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette the designation of all remaining public lands within the BBRRS as strict mangrove reserves as outlined in Decision 43 COM 7B.21, which law shall include a permanent ban on the sale of public lands within the BBRRS. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall rescind such designation or ban.

Milestone 5. *Integrated Coastal Zone Management Plan*[2] *("ICZMP").* No later than four (4) years after signing the Agreement, the National Assembly shall approve and the Government shall formally sign into law and Gazette the revised Coastal Zone Management Act[3] and ICZMP[4], which ICZMP shall include a chapter on marine and coastal biodiversity offsets. After achievement of this Milestone, a Conservation Event will occur under the Agreement in respect of this Milestone if and only if Belize shall rescind such Coastal Zone Management Act or ICZMP.

Milestone 7. *International Union for Conservation of Nature ("IUCN") Green List Areas.* No later than six (6) years after signing the Agreement, the Government shall apply to have at least three (3) formally designated marine protected areas in Belize's Ocean listed as IUCN Green List Areas (as that term is used by IUCN), and shall provide evidence of confirmation from the IUCN of receipt of the applications. After achievement of this Milestone, no Conservation Event will occur under the Agreement in respect of this Milestone.

Clause 3. General Conservation Undertakings

The purpose of this Clause 3 is to memorialize the commitments of Belize to undertake additional activities that recognize the need to balance the development of Belize's economy with the social, economic and environmental needs of a healthy and biodiverse Ocean. While these commitments are not linked to any Milestones (and, as a result, no failure to meet these commitments may result in an obligation to make any Conservation Event Payments or be subject to any penalties of any kind), Belize acknowledges its good faith intention to comply with these undertakings within the parameters of its Constitution.

(A) *Aquaculture.* Belize commits to implement a transparent, science based, socially responsible regulations consistent with international best practice for a high-value, sustainable aquaculture and mariculture industry in Belize's Ocean and waters on the landward side of the baseline of the territorial sea ("Internal Waters").

(B) *Fisheries*. Belize commits to implement a governance framework for domestic and high seas fisheries[5] consistent with transparent, science based, socially responsible international best practices[6]. This includes the management of current and new fishing activities in Belize's Ocean

[2] For further information, see Integrated Coastal Zone Management Plan
[3] See https://www.elaw.org/es/system/files/attachments/publicresource/Bz.cap329.pdf
[4] See Integrated Coastal Zone Management Plan
[5] Domestic and high seas policies & legislation: (Fisheries Resources Act 2020, Subsidiary regulations, Fisheries Policy Framework.
[6] See, for example, UN FAO Small-Scale Fisheries Guidelines and Marine Stewardship Council Fisheries Improvement Project Guidelines.

and vessels flagged to Belize. This governance framework would include, at a minimum, (i) compliance with all national, regional and global obligations related to fishing activities, including enhanced monitoring to address illegal, unregulated and unreported fishing activities, (ii) sustainable harvest of target species (including restrictions on gear types deemed to be unsustainable), and (iii) reducing broader environmental impacts, including bycatch of endangered, threatened and protected species and habitat destruction. The governance framework would advance, for example, the implementation of all actions identified in the "National Plan of Action of Belize to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated (IUU) Fishing on the High Seas" on 20th May 2014 as well as national and regional plans to address IUU.

(C) *Blue Carbon*. Recognizing the potential of blue carbon projects to support the long-term financial sustainability of marine areas formally protected for conservation, Belize commits to develop and implement a national regulatory framework for the development of blue carbon projects within the national carbon strategy. Such a framework will be completed through a consultative process that addresses, at a minimum, the following:

a. allowing for ownership of carbon offsets by co-managers, investors and/or private landowners;
b. allowing for negotiation by co-managers of benefit/profit sharing among stakeholders and/or investors participating in the carbon offset program;
c. allowing for cost recovery and profit distribution with those participating in the carbon offset program; and
d. stipulate that the remainder of the proceeds from the annual sale of offsets, outside of cost recovery and shared profits, be re-invested in the marine protected areas in which such blue carbon ecosystems are located.

(D) *Managed Access Program Evaluation*. Belize commits to complete an independent evaluation of the Managed Access Program and, where reasonably possible to do so, commence to implement the recommendations from that evaluation.

(E) Environmental Impact Assessment Regulations. Belize commits to finalizing revisions to the Environmental Impact Assessment regulations, including revisions to better support the international designations such as the BBRRS World Heritage Site listing.

(F) World Heritage Sites: Belize will meet or exceed the minimum standards for development in World Heritage Sites in accordance with the Legislative, Regulatory, and Contractual protection measures of the World Heritage Convention's Operational Guidelines dated July 10, 2019. [7]

(G) Watershed Management. Belize commits to undertaking the development of a watershed management plan to address water quality monitoring, nutrient loading and garbage disposal for at least two (2) major watersheds.

Clause 4. Milestones.

Belize shall satisfy each of the Milestones set forth in Clauses 1 & 2 above (collectively, "Milestones") and summarized in Table 1 below by the relevant Milestone date. In case of a conflict between Clauses 1 & 2 and Table 1, Clauses 1 & 2 shall control.

[7] See http://whc.unesco.org/en/guidelines/

Clause 5. Conservation Report.

A high-ranking civil servant of Belize shall deliver a report to BIC on the one (1) year anniversary of the date of the Agreement and each year thereafter (the "Conservation Report") substantially in the form attached hereto as Appendix 1. The Conservation Report shall include: (i) a confirmation that Belize remains committed to achieving the conservation outcomes described in the Agreement; (ii) a summary of the progress made to date, including (A) a confirmation as to whether or not the expected Milestones have been achieved to date; (B) an estimate of the number of square miles (square kilometers) of Ocean protected to date; and (C) evidence demonstrating attainment of any Milestones achieved during the preceding year; and (iii) a summary (in reasonable detail) of any deficiencies in achieving the Milestones, including steps being taken to remedy those deficiencies.

Clause 6. Grace Period.

(A) Belize shall be entitled to a grace period of six (6) months for any Milestone upon delivery of a letter provided by a high-ranking civil servant of Belize to BIC that provides a summary (in reasonable detail) of any deficiencies in achieving the Milestone and the steps being taken to remedy those deficiencies.

(B) Belize may request a second six (6) month grace period for any Milestone via a letter provided by a high-ranking civil servant of Belize to BIC that provides a summary (in reasonable detail) of any deficiencies in achieving the Milestone, a justification for the delay and the steps being taken to remedy those deficiencies. BIC may request additional information from Belize and will notify Belize of the status of its evaluation of Belize's request. If BIC has not notified Belize that the request has been denied within 45 days, the request shall be deemed granted. Note that a maximum of two six-month extensions may be given for any given Milestone.

(C) For the avoidance of doubt, utilization of a grace period for any Milestone shall not extend the due date of any other Milestone.

Clause 7. Definitions.

Biodiversity Protection Zones – means High Protection for Biodiversity Zones and Medium Protection for Biodiversity Zones.

Environmental Impact Assessment Regulations – means the Environmental Impact Assessment Regulations, as amended, promulgated pursuant to the Environmental Protection Act, Chapter 328 of the Substantive Laws of Belize.

Gazetted – means under the relevant national legislation, the coordinates of a spatial area are published and legally enforceable.

High Protection for Biodiversity Zones – means Zones of the Ocean allocated for high marine protection and biodiversity goals, for representative habitats and species. High biodiversity protection zones conserve and protect the top priority areas for marine and coastal biodiversity. These zones are designated for habitats and species that may be rare, endangered, unique or with narrow distribution ranges. This zone includes breeding or spawning areas, key foraging habitat, fragile or sensitive species

and habitats, and internationally significant areas. When combined, these zones provide habitats and species with long-term protection, and are sufficiently large to ensure ecological resilience and climate change adaptation. This zone category is not suitable for extraction or sea-bed alteration and is considered a 'no-take' zone in common vernacular. Examples of high protection status, depending on the objectives and allowable human activities, are: Marine Protected Areas in the IUCN categories Ia, Ib, and II.

Implementation Plan – means the plan developed during the MSP process that sets the course of future actions related to ocean management. There is no one-size-fits-all for MSP Implementation Plans and 'best practice' is still being developed globally. At a minimum, an Implementation Plan would contain all essential and necessary information for administration, operations, budgets, research and monitoring, enforcement and management of zones, building capacity and awareness, policy and legal instruments, and education. The Implementation Plan shall include the timeline for when the Gazetted Biodiversity Protection Zones will be legally enforced.

Implemented – means, with respect to the MSP, when: (i) all zones in the MSP have been signed into law and Gazetted, (ii) the Marine Spatial Plan document(s) has been signed into law by Belize and Gazetted, (iii) Belize has initiated creation of the MSP management plan(s), and (iv) Belize starts the MSP Implementation Plan.

Managed Access Program – means the rights-based fisheries regime based on a Territorial User Rights for Fisheries approach being implemented by the Belize Fisheries Department across all of Belize's territorial waters with which fishers holding commercial fishing licenses must comply.

Management Plan – means a document which sets out the management approach and goals, together with a framework for decision making, to apply in a specific MPA over a given period of time.

Marine Protected Areas (MPA) – means a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. (Source: IUCN). Examples of Marine Protected Areas include the following IUCN categories:

(a) IUCN Protected Area categories

Ia Strict nature reserve: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values

Ib Wilderness area: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition

II National park: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities

III Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove

IV Habitat/species management area: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category

V Protected landscape or seascape: Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values

VI Protected areas with sustainable use of natural resources: Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims

(b) IUCN Other Effective area-based Conservation Measures (OECM)

A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values (CBD, 2018).

Marine Spatial Plan (MSP) - means a plan analyzing and allocating parts of three-dimensional marine spaces (or ecosystems) to specific uses or objectives in order to achieve ecological, economic, and social objectives that are specified through a political process. The marine spatial planning process includes identifying Biodiversity Protection Zones in an iterative process. The goal of having 30% of Belize's Ocean in Biodiversity Protection Zones will be part of the overall design such that the Biodiversity Protection Zones so identified will facilitate achievement of Milestone 4.

Medium Protection for Biodiversity Zones – means zones of the Ocean allocated for medium marine protection and biodiversity goals, for representative habitats and species. Sustainable uses are compatible with the biodiversity objectives in these areas. Medium biodiversity protection and sustainable use zones are proposed to conserve areas that are suitable for medium levels of biodiversity protection and are also compatible with some sustainable uses. These zones include habitats and species that have some tolerance to disturbance and human activities. These zones also include regionally and nationally significant areas. This zone category is suitable for some level of extraction and sea-bed alteration, with appropriate management and direction, depending on the objective of each designated area. Examples of medium protection status could include: Marine Protected Area IUCN categories V and VI, IUCN OECM category, and Locally Managed Marine Areas (LMMA).

Ocean – means Belize's Exclusive Economic Zone, Territorial Sea, Archipelagic Waters and/or Internal Waters as defined by the United Nations Convention for the Law of the Sea (UNCLOS), among others, in each case as defined in national legislation at the time the Agreement enters into force.

Protected Areas - means Marine Protected Areas (MPA).

Table 1

Milestone Table for the text above. In case of disagreement or inconsistency between this table and the text above, the text above will control.

Milestone Number	Milestone Summary Description	Time after signing the Agreement	% of Ocean in High Protection[1]	% of Ocean in Medium Protection[1]	Total % of Ocean in Biodiversity Protection[1]
1	Expand Biodiversity Protection Zones to 11.57% of the Ocean	6 months	Increased to 11.57%	Remains at the current 8.96%	20.53%
2	Designate Public Lands within the BBRRS as Mangrove Reserves	6 months			
3	Belize initiates MSP process	1 year			
4	Expand Biodiversity Protection Zones to 25% of the Ocean	3 years	Add 4.5% more in total across either Medium and/or High zones[1]		25%[1]
5	Implementation of ICZMP	4 years			
6	Complete Biodiversity Protection Zones, MSP signed in to law and Implemented	5 years	Add 5% more in total across either Medium and/or High zones[1]		30%[1]
7	At least 3 IUCN Green List Applications Submitted	6 years			
8	Approved Management Plans	8 years			

[1] *In all cases, is the lower of the % or the amount specified in the MSP*

FINAL VERSION

EXHIBIT B
CONSERVATION FUND TERMS

1. The Conservation Fund shall:

(a) Be an entity devoted to support conservation activities in Belize focused on marine and marine-related activities.

(b) Be designed to accommodate a blended finance approach for its capitalization, including funding derived from sustainable financing for conservation transactions such as a debt conversion, and public and private grants from national and international sources.

(c) Be an entity that is legally independent from the Parties to this Agreement, notwithstanding that the Parties may have a role in the senior governance functions of the Conservation Fund.

(d) Have a board of directors (or equivalent) that is appointed by appointing members (or equivalent) that at all times is non-government by majority of number and voting rights.

(e) Have a board of directors (or equivalent) that has broad representation from key stakeholder groups involved in conservation activities in Belize.

(f) Have a staff team that is based in Belize that includes, at a minimum, a senior leader of the Conservation Fund, such as an executive director or chief executive officer.

(g) Operate a competitive grants award program that:

a. is fully documented in an appropriately detailed grants award program manual approved by the board of the Conservation Fund and reviewed by the board on a regular basis;
b. operates regularly;
c. is open for application for funding from both government and non-government actors; and
d. has as its focus funding priorities projects, partners and activities that support the achievement of the Conservation Commitments associated with this Agreement and other marine conservation priorities determined by its board (or equivalent).

(h) Establish and maintain a consistent track record of supporting marine and marine-related activities effectively and implementing robust governance practices in alignment with its governing legal documents and, in the case of an entity that may be designated as the Conservation Fund pursuant to Section 6.3 of the Agreement, present a multi-year strategy

for how it will support marine and marine-related activities effectively and implement robust governance practices in connection thereto.

(i) Not use in excess of 20 per cent of its aggregate payments in a given year from BIC and Belize for general and administrative expenses .

(j) Following receipt of any payment from BIC or Belize made pursuant to the Agreement, other than as required to fund general and administrative expenses subject to the limit set forth in clause (i) above, (x) unless a Super-Majority of the board of the Conservation Fund determines in the circumstances that it is not reasonable to do so, commit the full amount of such payment as grants to third parties in accordance with the requirements of this Exhibit B no later than the first anniversary of the Conservation Fund's receipt of such payment and, (y) following the End Date, unless a Super-Majority of the board of the Conservation Fund determines in the circumstances that it is not reasonable to do so, commit as grants to third parties a minimum amount per calendar year equal to the greater of 5% of the amounts received pursuant to the Agreement on or around the End Date and the amount the Conservation Fund disbursed as grants in the twelve months prior to the End Date; provided that any such "Super-Majority" of the board includes the affirmative vote of at least one director (or equivalent) designated by the Government.

(k) Maintain at all times (x) Belize as one of its members (or equivalent) and (y) organizational documents (which, at the time it is first designated as the Conservation Fund are in a form reasonably acceptable to Belize) that (A) require that the Conservation Fund comply with all of the requirements in this Exhibit B and (B) do not permit any waiver or amendment of such requirements without Belize's consent; provided that the requirements set forth below in clause (l) shall not apply to any Conservation Fund being designated pursuant to Section 6.3 as a result of an Interference Condition. In the case of any Conservation Fund being designated pursuant to Section 6.3 as a result of an Interference Condition, the rights and authority of Belize as a member (or equivalent) may be limited to those necessary to ensure that the Conservation Fund will always undertake its activities in accordance with the requirements of this Exhibit.

(l) Grant the Government the right to designate a number of the members of the board of directors (or equivalent) that is equal to one fewer than a majority of directors (or equivalent).

(m) In any calendar year, disburse an amount equal to at least 40 per cent of the funds received from BIC and Belize in such year to technical assistance programs and activities dedicated to supporting the Government and its Agencies in implementing the Conservation Commitments and related marine and marine-related conservation efforts; provided that

the requirement to so disburse 40 percent of such funds shall apply in respect of such calendar year to the extent that (x) the Government and its Agencies have submitted to the Conservation Fund requests for such funding in writing on or before the date falling three months prior to the date on which the applicable allocation of funds are expected to be made by the Conservation Fund and (y) such requests are accompanied by supporting information with sufficient detail providing reasonable assurances that the allocated funds will be used directly to support the Government and its Agencies in implementing the Conservation Commitments and related marine and marine-related conservation efforts; provided further that the requirements in the foregoing proviso shall apply only to the extent that the Conservation Fund has provided the Government with advance notice of the date the applicable allocation will be made and such notice is reasonably sufficient to enable the Government to prepare the applicable requests and supporting information. For the avoidance of doubt, to the extent such requirements apply in accordance with the last proviso of the foregoing sentence, it will be at the discretion of the Conservation Fund whether or not to award the allocation, in full or in part, contemplated by this clause (m) if conditions (x) or (y) are not met.