Environmental Impact Assessment

Coral Gardens Dune Replenishment
PR 16651

TCI BLUE LTD
Strata Plan 36
Providenciales, Turks and Caicos Islands

December 2024

A Geosyntec Company
APPLIED TECHNOLOGY AND MANAGEMENT
2056 VISTA PARKWAY, SUITE 280
WEST PALM BEACH, FLORIDA 33411
561-659-0041

Table of Contents

List of Appendices

List of Tables

List of Figures

List of Photos

1.0 Introduction and Overview

This study is focused on shore stabilization alternatives for a developed parcel in the Bight Settlement. The existing development includes a beach side commercial facility and adjacent developed property. The site has a history of impacts from high sea and wave events. The applicant is proposing the development of a stabilized shoreline involving dune core armoring, dune replenishment and revegetation with native plant species to provide additional protection to existing infrastructure. The Department of Planning (DoP) has required that an Environmental Impact Assessment (EIA) be conducted for the proposed development (PR16651).

A team of consultants experienced in local flora and fauna was assembled to conduct the assessment and submit an EIA to the Director of Planning and DECR. The consultants were provided with a Terms of Reference (ToR) and have conducted baseline studies of the site and surrounding areas, evaluated the environmental impacts, recommended mitigation measures, and proposed management plans.

The proposed project is located along the Bight Settlement on Providenciales, on Grace Bay Beach along the seaward boundary of the Coral Gardens Resort. The Bight Settlement presently includes access to the beach and marine environment of Grace Bay Beach, which serves and the landward boundary to the Princess Alexandra Land and Sea National Park. This EIA is undertaken to assess the likely and potential impacts of the current design plan, identify and discuss viable alternatives to the proposal, and provide additional information regarding means and methods of construction, project minimization and mitigation opportunities and propose a project-specific Environmental Management Plan (EMP) to address identified issues.

1.1 Reference Page

Ownership Contact:	EIA Study Lead:
Alanzo Barnett, TCI BLUE LTD. Strata Manager Proprietor Strata Plan #36, Coral Gardens Providenciales, Turks & Caicos Islands Mobile: +1 649 331-0286 +1 649 332-0122	Michael Jenkins, PhD, PE Senior Principal 2056 Vista Parkway, Suite 280 West Palm Beach, FL USA 33411 Direct: +1 561 472 2144 Cell: +1 561 351 8213 E: Mjenkins@appliedtm.com

Study Location:

The study location for this project is located within block number 60812, parcel 57. The site is located at the end of Penns Road and comprises 292.35 linear feet of shoreline fronting west Grace Bay in the Bight Settlement. The DoP issued a ToR (PR 16651) for the proposed project for the construction of a fortified dune across the seaward property line. The dune will be fortified with boulders as one complete segment that will be covered with beach quality sand and revegetated with native dune species.

Submittal Version:

Version 1. Submittal to the Department of Planning; December 2024

1.2 Non-Technical Summary

The proposed project is located in the Bight Settlement, Providenciales, on the west end of Grace Bay along the shoreline of the Coral Gardens Resort. The Bight Settlement includes several public beach accesses to the beach and marine environment of Grace Bay Beach, which is adjacent to the Princess Alexandra Land and Sea National Park. The beach is utilized by the public via the public beach accesses as well as the resort clientele from a on property beach access. The project site is adjacent to and seaward of the resort property.

Beach width along the subject property is limited and the upland property is regularly impacted by high water and wave events. In particular, the cafe facility has been inundated by wave events on several occasions resulting in water damage to the facility. These events have further eroded and receded the remaining dune feature along the property.

The project will restore and enhance the existing beach dune to provide shoreline stabilization and additional storm protection to the resort and cafe. The existing landscape within the project footprint will be replaced with native species in all areas where vegetation has been damaged by machinery or removed for the installation of the new dune.

This project aims to fortify the dune with a stabilizing structure in order to provide additional protection to the upland property but also to create natural dune habitat that currently does not exist. Sand dunes provide natural coastal protection against storm surge and high waves and can prevent or reduce coastal flooding and structural damage. Dunes act as a natural buffer that absorbs impacts from high winds or waves during storm events.

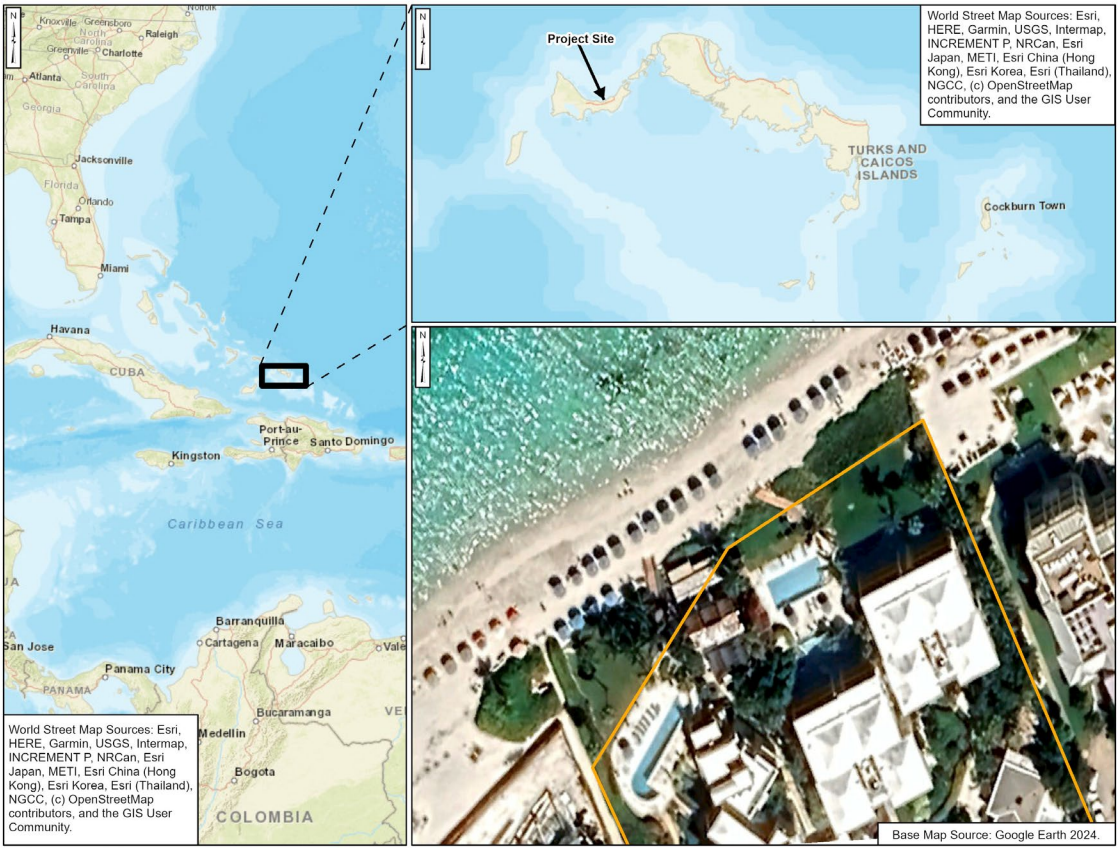

Figure 1-1. Location Map of Project

1.3 Project Description

The project consists of the following main construction elements:

1. Removal of the seaward extent of existing (mostly invasive) vegetation along the dune line

2. Temporary excavation of sand within the dune (project) footprint

3. Construction of a limestone rock dune core structure utilizing locally sourced rocks

4. Replacement of excavated dune sand over the dune core structure

5. Replanting of the dune footprint with appropriate native dune vegetation

6. Construction of dune overwalks over the new dune structure

Project drawings are provided in Appendix D.

The construction of the fortified dune will be done in three phases, beginning with the central portion of the property, then the east segment, and then the west segment.

1.4 Aims and Objectives of the Assessment

The Outline Development Permission approval for this project (PR 16651) includes the requirement for an Environmental Impact Assessment (EIA) study of the proposed action. Given that the project is within the active beach, coastal zone and is adjacent to the national park, there are sufficient environmental concerns to warrant further study. A Terms of Reference (TOR) for the study has been provided by the DECR and serves as a basis for the study. In general, the study aims to assess the current condition of the site to identify extant environmental condition and any species of particular concern. Based on this assessment an evaluation of impacts from the project has been developed and further consideration has been provided regarding opportunities to improve the overall project including consideration of opportunities to reduce project impacts and risk.

Figure 1-2. Aerial Image of the Project Property.

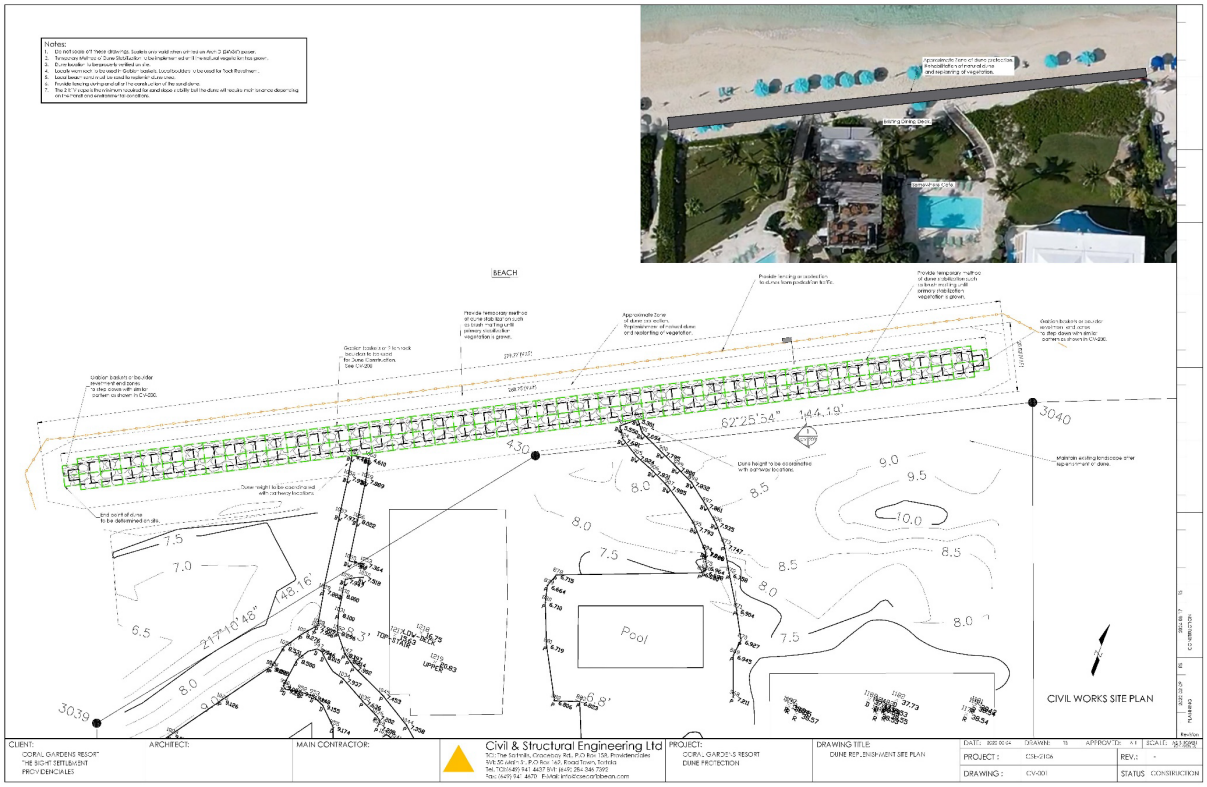

Figure 1-3. Site Plan Showing Overall Development.

1.5 Overview of the EIA

This EIA was developed to address the requirements identified within the ToR provided by the DoP and the Department of Environmental and Coastal Resources (DECR). The intent of this study is to assess impacts of the planned development, take baseline environmental inventory and identify any species or habitat of concern, identify terrestrial and marine areas that may be impacted, and propose a strategy (proactive and reactive) to address any identified impacts.

Both marine and terrestrial impacts are potential concerns of this development. In particular, the study requires an assessment of the proposed excavation of the dune line (transition from resort property and the beach) along the Coral Gardens Resort property.

1.6 Impact Assessment Methods/Analyses

Site-specific field studies were carried out to compile baseline data on the marine, coastal, and terrestrial environments, and the built and natural environments. Qualitative methods and

processes have been used in data analyses. Photographic documentation has been collected to provide a record of the environmental conditions at the time of the assessment.

Desk studies and other literary research were carried out, including but not limited to research of the Ordinances, Regulations, Codes, and Plans for Providenciales and the wider TCI.

To determine floral and faunal species that could be affected by the project, both a literature search and field surveys were completed, as described hereafter.

1.6.1 Literature Search

The literature search involved querying the publicly accessible databases used by the Government of the Turks and Caicos Islands (TCIG) for information pertinent to the site, including lists of terrestrial and aquatic flora and fauna that are designated as Endangered, Threatened and/or Endemic. The search included querying protected species lists maintained by international conservation organizations to which the Turks and Caicos Islands are signatories, including the International Union for the Conservation of Nature (IUCN) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

1.6.2 Field Surveys – Methods

The field assessments involved visual inspections of terrestrial and marine areas within the footprint of the proposed project and in adjacent marine areas that could be potentially affected by secondary impacts caused by the proposed project.

The landside assessment involved direct visual observation of conditions in the property boundary lines. The majority of these observations were focused within the footprint of the proposed dune replenishment and vegetation enhancement. The entirety of the terrestrial environment consisted of landscape species or invasive species, with the exception of a small area of sea oats that were planted in an area that appeared to be an attempt to reestablish the dune after erosion took out most of the dune in 2018.

Although no construction activities are proposed seaward of the mean high-water line, pursuant to the ToR for the proposed project, the marine assessment involved direct visual observation of conditions extending from the water's edge to a minimum of 300 feet (ft) from shore.

2.0 Baseline Studies

2.1 Historical Overview of the Site and Existing Development

The site of the proposed project is located along the Bight Settlement on Providenciales, on Grace Bay Beach behind the Coral Gardens Resort. The Bight is one of three historical settlements areas of Providenciales. The other historical settlement areas were Blue Hills (the Capital) and Five Cays. The Bight Settlement includes public access to the beach and marine environment of Grace Bay Beach, which is within the Princess Alexandra Land and Sea National Park.

The Coral Garden's reef is a marine resource located directly seaward of the Coral Gardens Resort and is part of the Princess Alexandra Land and Sea National Park. The reef can be distinguished by the buoys that outline the area and prevent snorkelers from disturbing the habitat. Coral reefs are well known for the delicate habitat they provide for wildlife and are understood to be an integral part of the diverse mix of attractions that anchors the region's tourism and real-estate-driven economy.

In review of historic imagery, the shore and dune line in the project vicinity has exhibited a recessionary trend since at least 2003 (Figure 2-1). The dune line has receded on the order of 30 feet landward resulting in the loss of the primary dune profile and landward migration of the active beach into the built environment. The beach profile has receded a similar distance and current beach widths are on the order of 80 feet as measured from the dune scarp to the approximate MHW location. This represents a compressed beach profile in comparison to more stable beaches on the northern shore of Providenciales.

Two hurricanes in 2017, Irma and Maria, altered the previous dune structure. The dune structure was severely eroded due to hurricane related storm surge and wave conditions. In its current state, the property is subject to wave runup into the dune line and café during both strong winter storms and tropical cyclone events. Photo 2-1, which was taken in March 2018, is representative of storm conditions which impact both the dune line and cafe.

Figure 2-1. Site Conditions circa 2003. Note approximate 30-foot-wide vegetated dune fronting the café and property.

Photo 2-1. Dune at Coral Gardens Looking East during high sea erosional event. Date of Photo: March 4, 2018

2.2 Biological Environmental Baseline Assessment

To gather data that represents the pre-established baseline environment, field surveys for the terrestrial and nearshore marine environment were conducted during the week of May 15th, 2024. These assessments were conducted on Grace Bay Beach behind the Coral Gardens Resort at the Somewhere Café and Lounge. The investigations were conducted by staff of Applied Technology and Management (ATM), a firm that has extensive experience in coastal and terrestrial ecosystems in TCI, the Bahamas, the Caribbean, and the southeastern United Staes. The assessments were performed in compliance with the ToR that had been issues by the TCIG's DoP. The data collected from the assessments will be used to evaluate both the potential direct and indirect environmental impacts of the proposed project.

The environmental surveys included qualitative assessments for both the terrestrial and marine existing onsite habitats as well as the flora and fauna present. Due to the limited biodiversity and presence of terrestrial species that was observed during the field survey, a previous review was

referenced to appropriately characterize the probability of species presence in the area. The data was retained from a separate field survey conducted for an ATM project during the week of March 6th, 2023, about 280 meters (m) northeast of the proposed project site. Literature research was additionally collected to accurately validate and document onsite conditions, including floral/fungal and faunal communities.

The literature research involved querying the databases used by the TCIG for informational pertinent to the site, including lists of terrestrial and aquatic flora and fauna that are designated as Endangered, Threatened, and/or Endemic. It also included querying protected species lists maintained by international organizations to which TCI is signatory, including the IUCN and CITES.

The primary aim of these assessments is to accurately document floral and fauna communities present on the site and to apply standard scientific principles to assess the qualitative conditions of the property. The results of the field investigation and research will be used to determine the potential environmental impacts of the project. The spatial scope of the assessment area was to include all landside areas and nearshore marine areas of the subject property that could be affected by the proposed project. This scope will help determine the extent of what kind of direct and/or indirect impacts there could be, as well as any short-term or long-term impacts to these environments.

2.2.1 Baseline Terrestrial Environment

The baseline terrestrial assessment (including areas that are cleared, bulldozed, and disturbed/damaged) includes a qualitative description of the terrestrial ecological assets (habitats, fauna; flora and fungi; rare, threatened, and endangered species) to be directly and indirectly impacted by the project.

The baseline field survey for the terrestrial environment was conducted during the week of May 15th, 2024. At that time, no construction of the project had been initiated. The landside assessment involved direct visual observations of conditions in the following areas:

- Within the footprint of the proposed dune replenishment and fortification, and
- In the surrounding upland areas where invasive vegetation will be removed.

Lists of flora and fauna observed and identified during the site assessment are provided in Appendix J.

Figure 2-3 shows the different habitats/species of the upland and description of the marine environments encountered during the assessment.

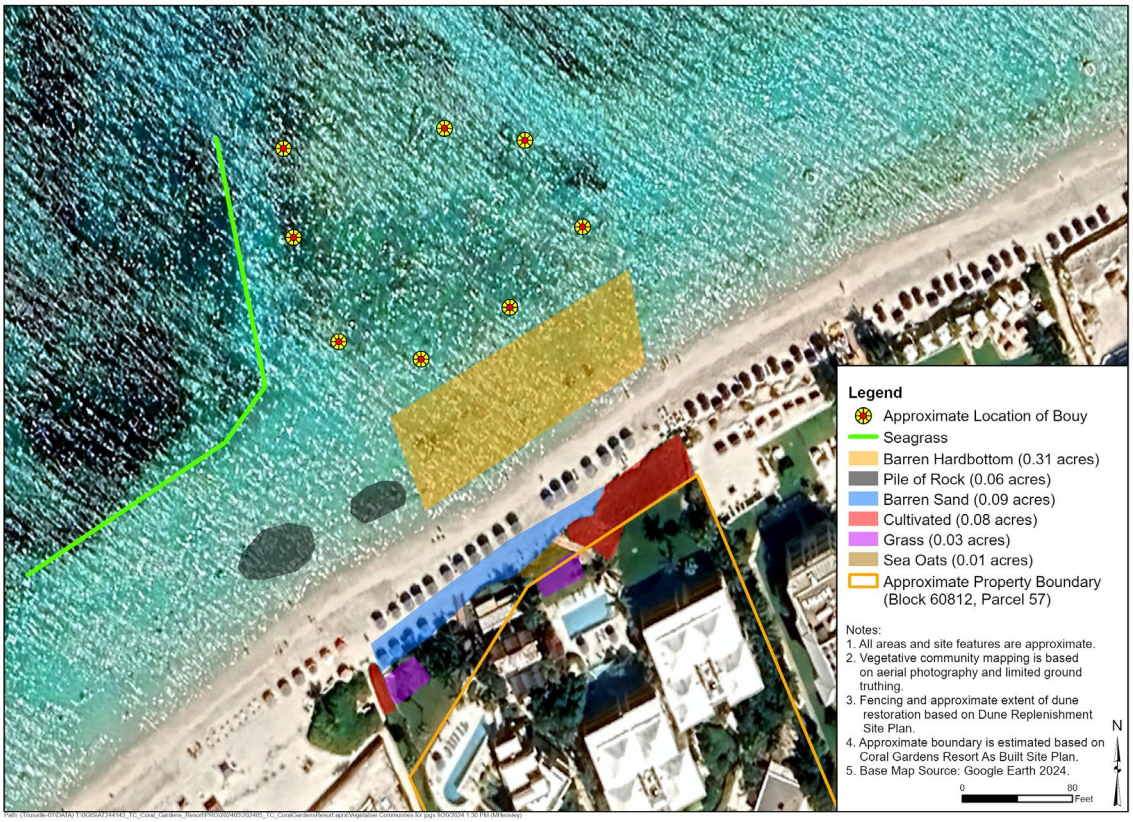

Figure 2-2. Identified Fractured Habitats.

2.2.1.1 Habitats

No quantification of upland vegetation was conducted due to the invasive vegetative species that were predominant on the site. Only qualitative data was collected during the assessment due to the lack of native species. A description of each community present on the site follows.

Unvegetated Sandy Beach

The northernmost boundary of the project (i.e., the shoreline on Grace Bay) was a narrow, sandy, unvegetated beach that was mostly less then approximately 1.5 m (about 5 ft) in width. This habitat is considered naturally less biodiverse that other habitats and is beneficial as a natural shield for sea level rise/coastal resiliency.

No migratory shorebirds were observed during the assessment, although typically this habitat may be used by species including sanderlings (*Calidris alba*), ruddy turnstones (*Areneria*

interpres), sandpipers (*Scolopacidae*), plovers (*Charadriidae*), and oystercatchers (*Haematopus palliatus*), which are well documented to be occasionally present and/or forage in this habitat. Wilson's plovers (*Charadrius wilsonia*) have been known to nest on open sandy beaches in other areas of Grace Bay, but the stretch of beach on the subject property appeared to be too subject to erosion and heavily used by beachgoers to be suitable for nesting by this species.

Laughing gulls (*Larus atricilla*) and least terns (*Sterna antillarum*) could also use this habitat and nearshore areas, but none were observed and no evidence of nesting of these species was noted.

Marine turtles are also known to nest on sandy beaches. No data was found that indicates that this area is known for sea turtle nesting, and in its current, eroded condition, it is unlikely that it would be suitable for turtle nesting.

The beach width is too narrow to support sufficient habitat for a multitude of species, and it is subject to erosion. The upper limit of this community transitioned into the resort landscaping due to the lack of a significant dune.

Photo 2-2. West View Behind Somewhere Cafe. Date of Photo: May 16, 2024

Landscaping

Landward of the sandy beach, most of the subject property consisted of an invasive-dominated landscaped resort property. The qualitative assessment was based on the nearly total absence of native plant species and the abundance of invasive, non-native plants that were out-competing native species. Although most of the area is inhabited by non-native, cultivated landscaping vegetation, there is a small amount of dune vegetation planted to stabilize the dune.

The current non-native vegetation generally consists of cultivated landscape species such as fever root (*Ruelia tuberosa*), autograph tree (*Clusia rosea*), Chinese banyan (*Ficus microcarpa*), and coconut palms (*Cocos nucifera*). A large portion of the proposed site area contains the DECR-listed invasive species, white ink berry (*Scaevola taccada),* as well as a manicured lawn consisting of St. Augustine grass (*Stenotaphrum secundatum*). White ink berry (*Scaevola taccada*) is an invasive species that is well known for displacing native plants, which often results in altered habitats for nesting birds and potentially breeding reptiles.

The small portion of native plant species present consisted only of sea oats (*Uniola paniculata*) intermixed with the more dominant invasive species noted above. The resort uses dune walk-over structures that keeps guests from trampling the vegetation in the dunes.

No birds were observed in this habitat at the time of observation. However, this kind of habitat does not preclude the possibility of some bird species utilizing the site. In essence, while the removal and management of invasive vegetation is crucial for maintaining native biodiversity, exotic vegetation, despite its intrusive characteristics, can offer habitat structure and food for both native and non-native fauna. The overall habitat quality for bird usage is low and is further reduced by the extend of regular human activity on the site and vicinity.

Bahama mockingbirds (*Mimus gundlachii*), northern mockingbirds (*Mimus polyglottos*), Eurasian collared doves (*Streptopelia decaocto*), rock pigeons (*Columba livia*), bananaquits (*Coereba flaveola*), Bahama woodstars (*Nesoplox evelynae*) and mourning doves (*Zenaida macroura*) are species that would commonly be found in this type of habitat. In addition to the potential presence, it is possible that these species could nest during breeding seasons in the low-lying shrubbery or coconut palms (*Coco nucifera*).

A southern Bahamas anole (*Anolis scriptus scriptus)* was observed utilizing this habitat, although no presence of any other reptiles was noted during the onsite assessment. This specific habitat

could potentially support other species such as well, such as the Turks and Caicos curly-tailed lizard (*Leiocephalus psammodromus*) and the northern curly-tailed lizard (*Leiocephalus carinatus)*.

Photo 2-3. Existing Dune with Invasive *Scaevola taccada.* Date of Photo: May 16, 2024

2.2.1.2 Rare, Threatened, and Endangered Species

The results from the literature search utilized *The Schedules,* a ten-page undated list of flora and fauna that are designated as protected because they are endemic, rare, and endangered (Appendix F). This list was received from the DECR and was used as the primary reference list for notable flora and fauna that could potentially be present on the site. The list is not specific to the project area, or even Providenciales, but is applicable to all areas in the TCI.

A query of the database maintained by the IUCN revealed the potential presence of 1,663 terrestrial, freshwater, and marine floral and faunal species that occur in the TCI and designated in descending order of vulnerability, as Critically Endangered, Endangered, Near Threatened,

Vulnerable, Least Concern, and Data Deficient. The IUCN database does not allow for filtering by island, so the list (Appendix G) is for all TCI.

Although the IUCN list includes many species that exist in habitats that are not present on the subject property (e.g., mangrove forests, coral reefs, etc.) or within the potential sphere of influence of the proposed project, it does include many species of terrestrial and marine flora and fauna that have the potential to be affected by the proposed activities. Species that were observed on the subject site and/or within the sphere of influence of the project have been highlighted in Appendices J and K.

The Turks and Caicos Islands are not registered as a party to the CITES, but a search of its database of listed species was conducted for this project because to Turks and Caicos Islands are a dependent territory of a signatory party and the DECR has been determined by CITES to be an "authority competent to issue comparable documentation" and "A scientific institution capable of advising that an export is not detrimental to the survival of the species concerned." Similar to the IUCN and DECR's *The Schedules*, the CITES database does not allow for filtering by island, so the list (Appendix H) is for all the Turks and Caicos Islands. It identifies numerous species of flora and fauna that have the potential to be affected by the proposed activities.

There was no indication of bird presence (including evidence of nesting or breeding) observed at the time of the field survey. A sufficient habitat structure is critical for birds because it provides essential resources for their survival and reproduction. A lack of sufficient habitat structure limits these resources, ultimately impacting bird populations and biodiversity in the area. However, the presence of additional species in this kind of habitat does not preclude the possibility of some bird species being present. In essence, while the habitat might be generally insufficient, specific conditions or adaptations can still support the presence of certain bird species.

The beach portions of the property does potentially support sea turtle nesting activity. Present usage of the beach has not been quantified. In general, the quality of habitat provided for nesting is poor given the limited beach width, level of human activity (including lighting and beach chairs) and adjacent coastal development extending into and beyond the natural dune line.

Baseline Marine Environment

Visual inspections of underwater conditions were conducted adjacent to and immediately seaward of the property's shoreline on May 15th, 2024. The project does not propose to make any changes to the marine environment (i.e., no docks, piers, boat channels, dredging, etc.) and all activity will occur above the Mean High Water. The marine assessment was limited to a qualitative assessment, and no benthic plots were assessed.

The qualitative assessment was conducted within the defined location as shown in Figure 2-2. Within this area, the marine habitats and ecosystems as well as observed flora and fauna were observed and noted. The cumulative list of the marine flora and fauna identified is included in Appendix K.

It is noted that the marine surveys were conducted in the shoreline vicinity landward of the delineated Coral Gardens Reef Area. This area is delineated by buoys and entrance is prohibited in order to protect noted hard coral species including species designated as threatened and endangered. No specific survey was conducted in this area but it is acknowledged that the area is of particular concern relative to the benthic communities (and in particular listed corals) present in this area.

There was significant reef/hardbottom with hard corals and macroalgae landward of the delineated protected area. Surrounding these reef features were beds of submerged aquatic vegetation (SAV), including seagrasses of varying densities (sparse to dense).

The assessment area was found to include approximately 178 m (about 580 ft) of primarily northwest-facing water frontage in the central portion of Grace Bay, part of the Princess Alexandra National Park.

Four epibenthic communities present in the assessment area are described in the following sections.

2.2.1.3 Marine Habitats and Ecosystems

The following major marine habitats were observed within the immediate project vicinity.

Barren Sand with Rubble

This habitat consists of mostly barren sand with various pieces of limestone rubble scattered throughout the area (Photo 2-4). This was present just waterward of the mean high-water line,

with the majority of the rubble located along the northeast and southwest regions of the property. This sandy environment was observed in the central portion of the assessment area, but only slightly before the rubble pile habitat begins.

This habitat is highly dynamic; therefore, the sediment is likely to be continually moved around by prevailing waves and nearshore currents. This dynamic sediment environment prevents the establishment and long-term survival of most epibenthic resources.

Although one individual blue tang (*Acanthurus coeruleus*) was observed swimming through this area, this species prefers habitats such as rocky bottoms and shallow coral reefs. This community type is well documented as preferred habitat for other fishes that are typically associated with sandy bottoms (e.g., stingrays, jawfish, etc.).

Photo 2-4. Barren Sand with Scattered Rubble.
Date of Photo: May 15, 2024

Rubble Piles & Broken Pavement

Substrate consisting of mostly continuous rubble piles and broken pavement was present in the central portion of the assessment area, just waterward of the barren sand area. The barren sand

area surrounded the rubble pile and broken pavement area on both the northeast and southwest sides.

This marine system is also a highly dynamic area where the sand is regularly moving. Similarly to the barren sand habitat, the significantly low abundance of epilithic marine life (i.e., algae, corals, sponges, etc.) suggests that the area is too dynamic to support establishment and long-term survival of complex benthic communities.

A few fish species were observed swimming through this area. such as a juvenile schoolmaster snapper (*Lutjannus apodus*), mojarra family (Gerreidae Family), juvenile slippery dick wrasse (*Halichoeres bivittatus*), and juvenile parrotfish family (Labridae family). Given that the majority of the fauna species observed were juveniles, it is common for this age group to venture outside of their typical nutrient-rich habitats in search of less competitive habitats.

Photo 2-5. Rubble Piles in the Nearshore. Date of Photo: May 15, 2024

Photo 2-6. "Pavement" along the Nearshore.
Date of Photo: May 15, 2024

Reef with Scattered Corals

As the assessment extended farther offshore, a hardbottom reef feature was observed, commonly known as the Coral Gardens Reef. This reef area is located in the center section of the assessment area, seaward of the rubble piles and broken pavement. This habitat showed an increase abundance of epilithic life, which gives rise to the increased species richness and diversity. Macroalgae, sponges, epifauna (small mobile organism living on the surface of marine structures), and scattered corals were present in this habitat.

The reef showed limited areas of macroalgae presence throughout nearshore sections of the reef. The species identified consisted of watercress algae (*Halimeda opuntia*), coralline algae (*Corallinaceae* family), and brown algae (*Rosenvingea sanctae-crucis)*. These macroalgae were observed sparsely throughout the rest of the reef.

The observed abundance of sponges, epifauna, and scattered corals was limited in the central, most-nearshore section and increased towards the more seaward and northeast section. The following sponges were identified throughout this section dark volcano sponge (*Calyx podatypa*), brown encrusting octopus sponge (*Ectyoplasia ferox*), fire sponge (*Tedania ignis*), orange sieve encrusting sponge (*Diplastrella* sp.), orange lumpy encrusting sponge (*Scopalina ruetzleri*), lavendar rope sponge (*Niphates erecta*), and black ball sponge (*Ircinia strobilina*).

Hard (stony) corals were observed throughout the reef system, although scattered the presence of corals was consistent. Species of corals observed within the assessment area consisted of mustard hill coral (*Porites astreoides*), massive starlet coral (*Siderastrea siderea*), symmetrical brain coral (*Diploria strigosa*), and knobby brain coral (*Diploria clivosa*). The qualitative assessment showed possible indication of previous coral loss as well as symptoms of coral stress, though no specific, identifiable presentation of disease. While limited physical presentation of active stress was evident on isolated corals, the level was not atypical of anticipated levels particularly given the nearshore location and time of year.

Limited bioeroders were observed during the assessment. These were identified as the rock boring urchin (*Echinometra lucunter lucunter*), yellow fanworm (*Notaulax occidentalis*), and the brown fanworm (*Notaulax nudicollis*). No substantial bioerosion was observed at the time of the assessment.

Fish encountered in this habitat were a mix of juvenile and adult reef-fishes, including blue tangs, juvenile snappers, sergeant majors, slippery dick wrasses, damselfishes, and parrotfishes.

Photo 2-7. Typical Reef, Scattered Coral on Barren Rock.
Date of Photo: May 15, 2024

Photo 2-8. Barren Rock with Fish.
Date of Photo: May 15, 2024

Photo 2-9. Symmetrical Brain Coral.
Date of Photo: May 15, 2024

Photo 2-10. Typical Reef Photo, Barren Rock with Scattered Coral.
Photo: May 15, 2024

Photo 2-11. Mustard Hill Coral with evidence of tissue loss (right).
Date of Photo: May 15, 2024

Seagrass Bed

Adjacent to and offshore of the feature known as Coral Garden Reef is a large continuous seagrass bed of varying densities. Turtle grass (*Thalassia testudinum*) was the most abundant species present, but manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*) were also present (Photo 2-12).

Dead seagrass blades and *Sargassum* (a brown algae) were suspended in the water currents just above the bottom at various locations in the nearshore portions of the assessment area.

Although the edges of the SAV bed were eroded in some areas and partially covered with sand in others, the central portions were in good condition and healthy.

It is noted that, at the time of the field investigation, *Sargassum* was not present along the beach landward of the mean high water line within the project area. Pelagic *Sargassum*, a non-rooted drift algae that gets transported by winds and waves, has become an increasingly common problem in the Caribbean in recent years and has been noted to occur in this area.

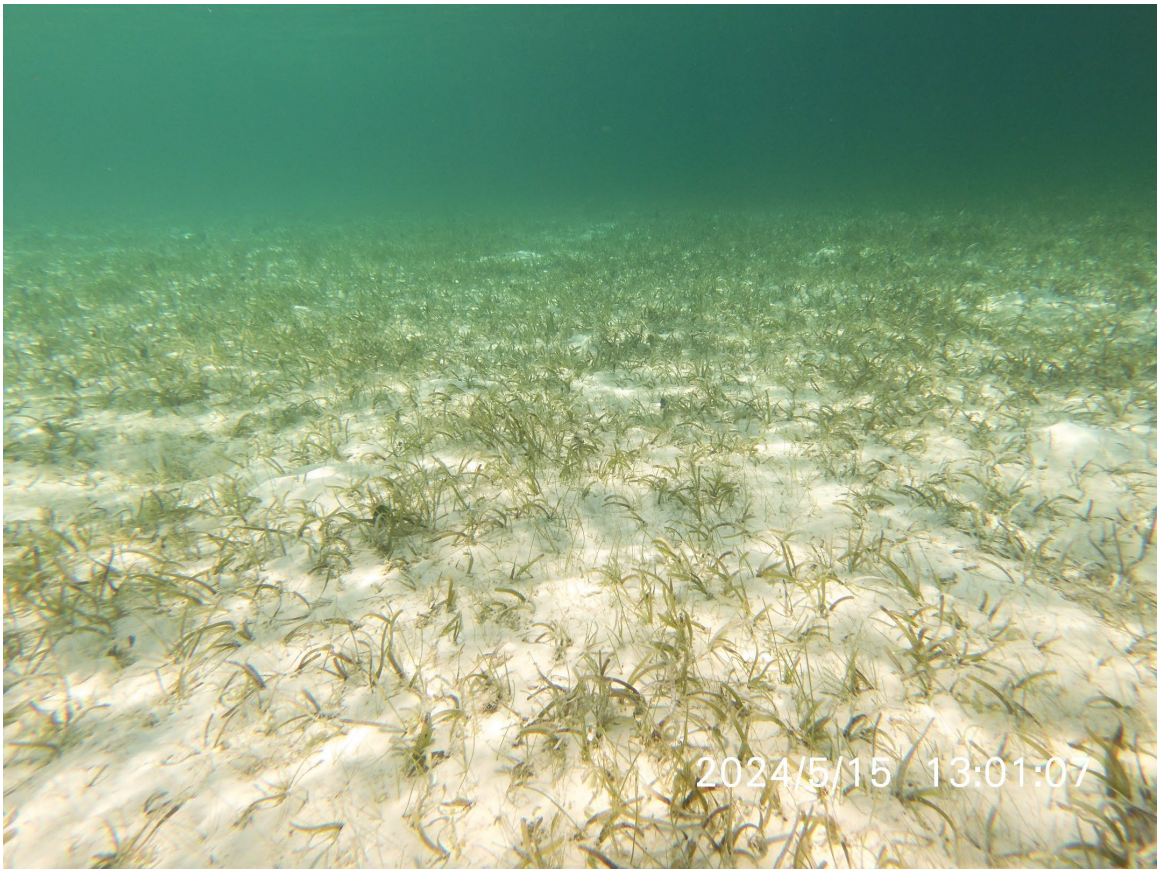

Photo 2-12. Moderately Dense Seagrass Bed Adjacent to Coral Gardens Reef.
Date of Photo: May 15, 2024

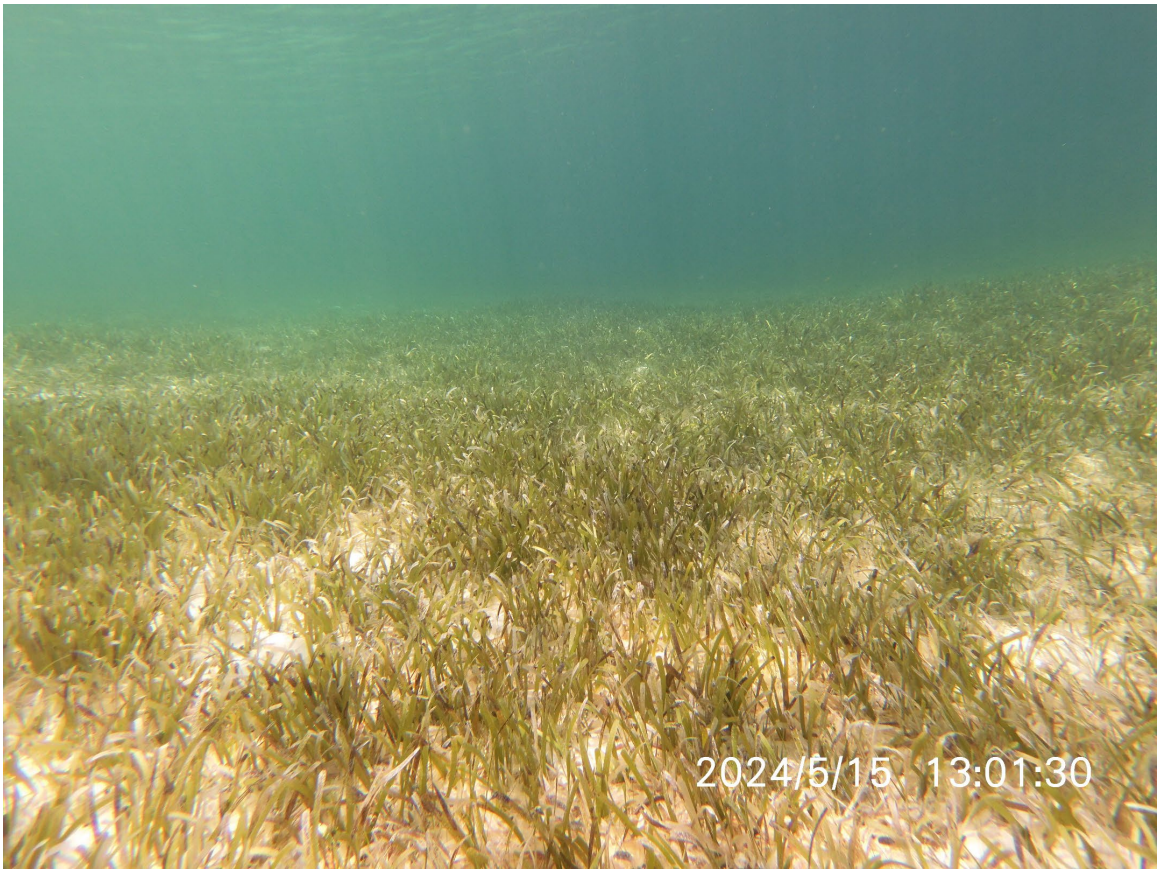

Photo 2-13. Dense Seagrass Bed Adjacent to Coral Gardens Reef.
Date of Photo: May 15, 2024

Healthy seagrass beds are critical habitat for many marine species. They provide shelter for juvenile fishes, sea pens (*Pinna carnea*), sea stars, conch, macro algae, and other marine life.

2.2.1.4 Sargassum Invasion

No significant accumulation of Sargassum was observed at the time of the field investigations. However, the site is subject to Sargassum accumulation given its northerly exposure to the sea and prevailing trade winds. The site does not exhibit a particular concern regarding Sargassum accumulation as it is an open beach and the risk is consistent with the regional exposure risk for the northern shorelines of Providenciales.

2.3 Physical Environmental Baseline Assessment

2.3.1 Topography

The topography of the Turks and Caicos Islands is generally very low-lying. Higher terrain for each island is normally near the outside (seaside) of each island. Areas near the Caicos Bank are

lower in elevation, with many sections of North Caicos, East Caicos, and Middle Caicos being low-lying swamp/marsh areas. The highest points in the country are Blue Mountain on Providenciales and Flamingo Hill on East Caicos, each with a height of approximately 48 m.

The topography of the site is generally low lying, with minimal protection of the upland property due to the loss the dune from storm damage in 2018. Topography is consistent with neighbouring properties and does not include a seawall. The Andaz property and Grace Too Villas in the immediate vicinity have installed seawalls to protect the upland properties.

2.3.2 Bathymetry for Site Shoreline

Caicos Islands (Providenciales, North Caicos, West Caicos, Middle Caicos, East Caicos) are located on the Caicos Bank. This area is shallow, with depths between 2 m and 4 m. The Turks Islands are located to the east of the Caicos Islands. The joint state has a deep underwater canyon called the Turks Island Passage (34 km long) between the set of islands.

The overall bathymetry of the area is quite varied. From the land to the reef that surrounds most of the Caicos Islands, the water depths are shallow, with an average depth of 2.5 m. However, just outside of the reef is a steep drop off. Water depths outside of the reef quickly drop to 20 m. The reefs provide good protection for coastal areas in the state and help to provide defense against larger waves and swells. This helps to counteract the overall low topography of the islands. It is important to note that there is no proposed construction or anticipated change for the shoreline that would significantly alter the current bathymetry.

2.3.3 Geology

The Turks and Caicos Banks, like the Bahamas, are interpreted to overlie continental crust that was rifted from the North American continental land mass after it separated from northwest Africa during the break-up of Pangea in the Triassic (Pindell, 1993). The Triassic sedimentary and volcanic section and earlier continental crust are interpreted to be buried beneath a cover of Jurassic, Cretaceous and Tertiary carbonate sediments.

Remains from the continental drift are buried under hundreds of metres of limestone rock that has been formed by the decomposition of skeletal remains from marine organisms and precipitation of calcium carbonate material. Precipitation is the process in which, under the right conditions, dissolved minerals in the sea water are deposited to form small particles called ooids. Ooids then cement together to form oolite rock, which makes up most of the Turks and Caicos Islands area.

Additional rock was formed by the fossilized remains of plankton, algae, coral, shellfish, and the waste pellets of flat fish.

Caves are present on all the islands. These are formed when slightly acidic water dissolves the limestone. The caves on Middle Caicos form the largest cave network in the Bahamian archipelago. These caves are ideal habitats for wildlife and were used by the Lucayans (original inhabitants), for whom they had religious significance. There was a guano industry for a short while, where bat droppings were collected for use in the production of fertilizer.

The porous nature of the limestone means it does not hold water well. As a result, fresh water is difficult to find and occurs where rainwater has accumulated and floats on the denser saltwater table. There are several natural wells on the Turks and Caicos Islands, but locals mainly rely on collecting rainwater. Recently, this has been done through collecting rain runoff from the roofs into large storage tanks.

The material within the project site is dominated by Pleistocene Limestone landward of the highwater mark. Seaward of the vegetation line, the limestone continues into the water, where it becomes covered in unconsolidated Holocene Sands. The limestone formation is characterized by a mature, thin layer of hard brown crust/soil that appears in isolated patches around the site. Well-compacted limestone underlies the soil. Weathered limestone outcroppings are found along the entirety of the site.

The geology of the development site is predominantly composed of Pleistocene Limestone and Holocene Sands.

2.3.4 Hydrology

Construction of the dune and placement of sand over the fortification structure of the dune will occur above the mean high water line posing a de minimis risk to site hydrology.

2.3.5 Mineral Analyses

The sediment present on a coast may be used to provide insight when assessing the coastal processes and is an important component of the aesthetics and comfort of the beach or coastal zone. Samples collected and analysed in a previous report (Smith Warner International, 2018), indicate that the beach material is predominately poorly graded sand, composed on average of 97 percent sand, and less than 3 percent silt and clay, which coincides with observations made

during site visits. These results were used in beach response modelling to identify sediment transport patterns.

2.3.6 Climate and Meteorology

The climate of the Turks and Caicos Islands is semi-arid and tropical, with a year-round average temperature of 78.9 degrees Fahrenheit (°F) and an average rainfall of 30.0 inches. The wettest months tend to occur in late summer and early autumn and the driest months occur in the winter. On average, rainfall is relatively low (20 inches per year) and occurs mostly from August to December. Hurricanes and tropical storms may occur, typically between July and November, and can directly impact the amount of rainfall.

2.4 Baseline Aesthetics

The current aesthetics of the shoreline consist of a sandy barren beach followed by the upland resort property. The existing dune feature only exists on the east end of the property and is heavily vegetated with invasive *Scaevola tacadda*. Along the central and western portion of the property, the beach intersects the Somewhere Café and the resort property, with no dune feature present.

Figure 2-3. Coral Gardens Resort, Centre, Showing Neighbouring Properties.

2.5 Baseline Coastal Processes and Dynamics

2.5.1 Currents and Tides

Tides in this region are semi-diurnal, with two high and two low tides per day. A tide range of 1.8 ft (0.55 m) between mean higher high water (MHHW) and mean lower low water (MLLW) values (ATM, 2012) have been observed along this area of Grace Bay. This is in line with the U.S. National Oceanic and Atmospheric Administration (NOAA) tide predictions for Hawk's Nest Anchorage, Grand Turk (1988), which reports a mean tide range of 2.1 ft and a spring range of 2.6 ft. The site can also be subject to potential storm surge due to tropical storm systems that could produce higher water levels. Surge potential in this region is limited and typically less than a 1 m for most storm events.

Seasonal wind patterns drive the directionality and magnitude of the typical wave conditions. The Trade Winds dominate this region, with winds that originate primarily from the eastern quadrants. Summer months experience more southerly winds, and winter months experience more northerly winds. Typical wave patterns follow these trends, with the highest frequency of origin from the east.

2.5.2 Sediment Transport

Significant sand transport within this area would be typically associated with major storm events and would likely result in sand pushed landward from surge and increased waves and runup. The active beach transport zone under normal conditions is limited to approximately 30 to 50 ft from the current shoreline position (as evidenced by a distinct transition to seagrass at this distance). This corresponds to depths on the order of 3 to 4 ft, suggesting a depth of closure for typical conditions on this order. Generally, the sediment transport of material along the shore is from east to west, as is observed in the accretion of sand along the eastern side of sand structures along the coast, although no structures are located within the project area. Sediment transport within the project can also be wind driven given that the predominant wind direction is from the east for the majority of the year (Figure 2-4).

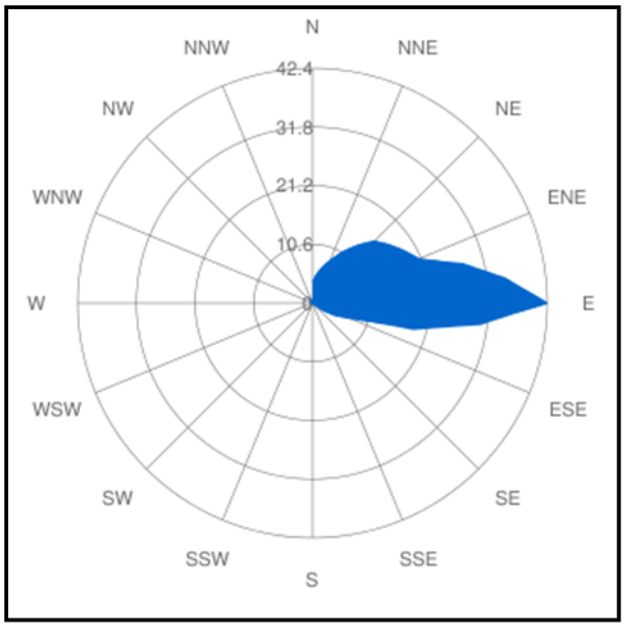

Figure 2-4. Annual Predominant Wave Direction.
Source: https://wisuki.com/statistics/936/long-bay

2.5.3 Erosion and Accretion

In review of historical imagery for the property, the shoreline width has exhibited a long-term recession since at least 2003. The average rate of recession is on the order of one foot per year, though likely is strongly correlated with major storm/wave events. The property is located on a slight sandy headland that is located seaward of the coral gardens reef. Wave reduction associated with the reef has likely contributed to this feature, though with long term sea level rise and the reduction in overall reef heath this feature is likely pro grading landward. Shoreline change appears to be largely cross-shore in nature, as the beach berm, while variable appears to be persistent on the property and not adversely impacted by longshore transport processes.

2.5.4 Coastal Dynamics.

No sand or infrastructure (e.g., groynes, jetties, docks, piers, etc.) projects are proposed seaward of the existing dune footprint. Direct impacts to coastal dynamics are expected to be non-existent. Boardwalks are proposed to be elevated above the coastal dunes to provide access to the beach and allow for coastal processes to take place.

2.6 Water Quality

Baseline water quality testing was conducted to document existing water quality conditions prior to project construction. A sample of sea water collected within the project area was tested to

determine conductivity and concentrations of iron, nitrate and nitrite, sulphate and sulphide, phosphorus, total dissolved solids, pH, salinity, fecal coliform, total coliform, and *E. coli*. The results are provided in Appendix E. The sample is representative of sea water, however, the laboratory compares to drinking water standards. The results did not reveal any measured constituents of concern, including constituents indicative of nutrification from upland (terrestrial) sources. Turbidity was not measured at this time. No work will be conducted below mean high water.

In review of existing conditions, the potential for introduction of upland constituents into the nearshore environment is evident on the property. In particular, upland development encroaches into the active beach. This includes the café footprint and adjacent landscaping which includes invasive species and sod. Stormwater runoff from the property occurs onto the beach and into the nearshore.

2.7 Social-Economic

Since the Covid-19 pandemic, the TCI economy has been rapidly expanding. With the assistance from the Caribbean Public Health Agency (CARPHA) and the Pan American Health Organization (PAHO) and human resource assistance from Cuba in the form of medical professionals, the Turks and Caicos Islands "did exceptionally well" (Hon. Shaun Malcolm, Minister for Health and Human Services Briefing, 24th March 2023). TCI removed all Covid-19 travel restrictions 1st April 2023.

> *Building on the record breaking first half of the year, Q3, historically our slowest quarter, gained a whopping 319% over Q3 last year ($158,905,323 vs. $37,891,750), with year-to-date sales volume up over 150% over the first three quarters of last year ($496,710,829 vs. $198,330,657). These numbers represent historic events, of course, and with Canada and other countries now open for travel, we expect a strong fourth quarter with the caveat that all this great sales volume is resulting in constriction of inventory.*[1]

At the 2023 Turks and Caicos Islands Economic Empowerment Conference, which was held at the TCI Beaches Resort, 24-25th March 2023, the Hon. Premier of the TCI indicated that following

[1] TURKS & CAICOS REAL ESTATE MARKET REPORT 3rd QUARTER COMPARISON 2021, Sotheby International Realty

the Covid-19 pandemic, the TCI is currently experiencing a nominal economic growth rate of 13 percent. The TCI has done very well with the opportunities presented to it. The TCI debt/borrowing ratio is less than 1 percent, and TCI has a debt of less than a million dollars. He further stated that the Islands Gross Domestic Product (GDP) was expected to increase by 5 percent in 2023. The Premier estimated the population of the Turks and Caicos Islands to be 49,300 persons.

At the 2023 Economic Empowerment Conference (2023), the Hon. Premier highlighted that, despite all the success, the following are serious concerns.

- The unemployment rate is currently at 7 percent.
- The Islands' GDP is expanding but GDP per capita is stagnant (meaning "we are expanding in terms of labour, but salaries and wages remain the same").
- Despite all the investment and economic growth within the Islands, there is a group of people with an entirely different economic reality within the TCI society.

The Hon. Premier pointed to the future and stressed the following.

- Strategies must be put in place to sustain growth and to remain resilient.
- Comprehensive stakeholder engagement must be the way forward.
- The natural environment must be protected. Everything in the TCI is linked to the natural environment – tourism, construction, real estate, commerce, attorneys, etc.
- The TCIG will be investing heavily in infrastructure (waste management, security, lighting, roads). Half a billion dollars will be spent over the next ten years and will have no impact on the TCIG recurrent revenue. The TCIG has huge reserves.
- Spending in renewable energy will be increased.
- Linkages to the tourism/hotel industry will continue to be developed. The Orange Economy was referred to as an example[2].
- The vulnerable will be subsidized rather than being exposed to growing poverty.
- Social cohesion and economic justice must be fostered.
- The TCI economic balance will be strengthen.
- Sustainability requires proactivity.

[2] https://investincolombia.com.co/en/articles-and-assets/articles/what-is-the-orange-economy

2.7.1 Demographics

The TCIG's Fiscal and Strategic Policy Statement (FSPS) 2023/24-2026/27, prepared by the Ministry of Finance, Investment and Trade, predicts that in 2022 and 2023, the construction industry is anticipated to maintain its excellent performance.

> *The actions of enterprises and private persons are expected to drive this sector's growth, which is anticipated to be four percent on average between 2022 and 2025. The Government's new and ongoing capital programmes, which concentrate on infrastructural development, improved physical working conditions, and community-based initiatives, will likely help the construction industry maintain its good performance. Foreign direct investment in tourism-related and other projects and a rise in domestic private-sector investments are also anticipated to boost building activity further.*

The Vision 2040, The Framework Document, and Medium-Term Development Strategy establish the targeted outcomes and align with the Sustainable Development Goals (SDGs). It indicates that in the medium-term, the Government's key focuses are the following:

1. Human Capital Development,
2. Inflation and Cost of Living Containment,
3. Destination Management Reform.
4. Public Sector Reform,
5. Preservation and Enhancement of National Security,
6. Population & Migration Policy Reform,
7. Primary Sector Development,
8. Housing & Crown Land Management Reform, and
9. Critical Infrastructure (Re)Development.

Turks and Caicos Islands 2019 Tourism Statistics Report also shows that the Turks and Caicos Islands welcomed a total of 1,598,557 Visitor Arrivals for 2019. A 9 percent increase of arrivals overall to our shores when compared to the previous year's record-breaking figures. This trend has continued.

Sometime ago The Turks and Caicos Islands Government, through the Ministry of Immigration, Citizenship, Labour and Employment Services announced the commencement of a consultancy for the development of a National Population Policy to be carried out by Kairi Consultants Ltd, of

Trinidad and Tobago. The policy is intended to direct the actions to be taken explicitly and implicitly by the relevant authorities to predict, delay and manage imbalances between demographic changes alongside the social, economic, environmental and political objectives of the Government by contributing to the sustainable development of the Turks and Caicos Islands and the eradication of poverty; increased and improved availability and accessibility of high quality social services; the attainment of gender equity, equality, women empowerment, social justice, youth development and development for all individuals; harmonious interrelationships between population, resource utilization and the environment; and development of the education, skills development and the job placement of citizens.

In commenting, the Minister of Immigration, Citizenship, Labour, and Employment Service at that time stated; “That an effective population policy is critical in its own right for maximizing the positive outcome for all Turks & Caicos Islands citizens and the long term development efforts that will guide our country’s growth.” The publication of the National Population Policy is still outstanding.

All the preamble points to an anticipated massive further increase in population to support this record setting growth and expansion of development and infrastructure.

The Economic Commission for Latin America and the Caribbean (ECLAC) reported on 20th July 2016 that the Turks and Caicos Islands has one of the fastest growing populations in the Caribbean (ECLAC, 2016).

ECLAC worked in collaboration with the Statistics Department of the Turks and Caicos Government to develop the population projections and provided training to the staff of the Statistics Department in the methods and software used to produce the projections.

ECLAC reported that the population of the Turks and Caicos Islands could reach 55,498 people by the year 2027 – compared with 32,199 in 2012 – according to the medium projection in a joint report by the ECLAC subregional headquarters for the Caribbean and the Statistics Department of the Turks and Caicos Government (ECLAC, 2016).

Net migration accounts for 68 percent of this projected increase, with natural change (births less deaths) accounting for the remaining 32 percent. Immigration of people from neighbouring countries seeking employment created by the development of tourism has been the main driver

of population growth in the Turks and Caicos Islands since 1980 when the population was just 7,413.

Citizens of the Turks and Caicos Islands, formerly called Belongers, constitute a declining proportion of the population. They represented 69 percent of the total in 1990, falling to 37 percent in 2012 and, if current trends continue, could represent less than a quarter of the population by 2027.

The Turks and Caicos Islands currently have one of the youngest populations in the Caribbean. This is partly because immigrants tend to be younger, working age people. In 2012, the most populous age group was persons between 25 and 44 years (comprising 39 percent of the population). However, the population is ageing; by 2027, the most populous age group will be those between 35 and 54 years (again, 39 percent of the total). The proportion of persons aged over 65 will remain relatively low, increasing from 3.5 percent to 7 percent over this period, but continuing to increase rapidly after 2027.

The projections are based on census data, vital statistics, and assumptions about future patterns of fertility, mortality and international migration. Population projections are used by policymakers and planners to analyse population trends and their implications for social and economic development including the future demand for resources and services.

2.7.2 Employment: Labor and Skills Demand at Construction and Operation

The project's construction labour requirements include only a limited number of labourers and professionals. Labourers include equipment operators and manual labourers. Professionals include engineers, and environmental scientists employed for obtaining development permissions. where practicable, labour will be locally sourced, with a high percentage of Belonger participation where possible. Due to the limited nature of labour requirements, no negative impacts are anticipated, and payment of fees and wages to locally based persons represent a minor, net positive economic benefits. The positive economic benefits associated with local labour will be temporary and limited.

The project will support the ongoing operation of the resort and café which provide existing economic benefit to the area.

2.7.3 Safety/Security Concerns Within the Community

The applicant and operator will work in consultation with the Royal Turks and Caicos Islands Police Force to ensure compliance with the laws of the Turks and Caicos Islands. Additionally, a local security firm will be employed fulltime to ensure safety and security in and around the property during construction phases of the development.

2.7.4 Economic Impact: Short-Term and Long-Term

During construction and operation, wherever possible, for both skilled and unskilled labour, every effort and priority will be given to the recruitment of citizens of the Turks and Caicos Islands.

3.0 Legislative and Regulative Context

3.1 TCI National Physical Sustainable Development Plan 2020

The purpose of the National Physical Sustainable Development Plan (NPSDP) is to strike a balance between both environmental sustainability and human development. The environment is the jewel of the TCI. Everyone should aim to protect the natural wonder that exists while promoting resilient human development.

Physical Planning and Development - Turks and Caicos Islands (gov.tc)

3.2 Physical Planning Ordinance and subsidiary legislations.

Section 34 (1) of the Physical Planning Ordinance of the Turks and Caicos Islands (1989) authorizes the Physical Planning Board, while considering an application, to consider a number of factors to make a proper decision on the application. These factors include, among other factors:

- The impact of the proposed development on the ecology of the island where it is to take place;
- The impact of the proposed development on the natural or built environment and the uses of the adjacent land; and
- The benefits likely to accrue to and the disadvantages that may be imposed on the economic, social and welfare facilities, including prospects of employment and the effect on the infrastructure of the islands as a result of the proposed development.

3.3 Turks and Caicos Islands Development Manual

All relevant planning standards for the proposed development have been complied with, including the following.

- Site coverage does not exceed 60 percent.
- The aesthetics will maintain a natural appearance.
- The garbage storage facility shall be fully enclosed and of a suitable height to prevent scavenging by feral animals.
- Upon completion of the development, the entire site will be revegetated and landscaped with native vegetation.

- Prior to development, the site was disturbed, with buildings already existing and the area denuded of the native vegetation. It is currently used as a staging area for the existing development under construction.
- All other relevant planning standards provided within the TCI Development Manual, 2014, will be followed.
- Various meetings and communications culminated in the issuance of the ToR, which outlines areas to be addressed and forms the basis for this EIA. A planning application for consideration of Outline Development Permission will be submitted to the DoP for determination by the Planning Board. Amongst other conditions, an EIA is anticipated to be a required condition.
- Pursuant to Section 7.3 of the Development Manual, the proposed development is a type for which an EIA is required, as stated in Condition 15, of the Grant of Outline Development Permission. After the EIA, a detailed planning application will be submitted for consideration of Detailed Development Permission and Building Permit. Only upon receipt of the Building Permit will construction commence, strictly in accordance with the terms and conditions.

3.4 TCI Building Code

The proposed development will be conducted in strict compliance with provisions of the TCI Building Code. Other mechanical, electrical and plumbing engineers have been retained to ensure compliance and the integrity of means of escape, fire safety, structural design, use of building materials, water and sanitary requirements, stairways and balconies, environmental health, etc.

Upon completion of the development, an Occupancy Certificate (Completion Certification) will be required from the Director of Planning prior to operation of the facility.

3.5 National Parks Ordinance

The parcels for development are not located within the boundaries of a Sanctuary, Nature Reserve, Historic Site, or National Park. There is no evidence of any of the protected areas within the confines of the parcels or any documented sites of special scientific or ecological interests.

3.6 Coast Protection Ordinance

The Coastal Protection Ordinance precludes the extraction or mining of any material from the coast without prior governmental authorization. In terms of the ordinance, the term “coast” refers

to land bordering the sea bounded by the mean low tide elevation. As the project occurs within the coastal environment, portions of this ordinance are relevant to the project, in particular, to project construction activities and in-water operations. Extraction of material from the coast is proposed to re-grade the shoreline.

3.7 Mineral (Exploration and Exploitation) Ordinance.

The Mineral Protection Ordinance establishes the need for approvals and the payment of royalties for the exploitation of any mineral resource within the Turks and Caicos Islands. This ordinance is potentially relevant to the project due to the nearshore excavation of material to re-grade the beach topography and the use of this material as general fill on the upland. Provisions of this ordinance would govern such operations including the potential need for a dredge license and the payment of royalties for use of excavated material from below the mean high water line as general fill on the adjacent upland property. Beach-compatible material will be sourced from an appropriate commercial source for dune construction. This ordinance may have relevance to the need for appropriate licenses and the payment of royalties for the commercial source if the source is within the Turks and Caicos.

3.8 Marine Pollution Ordinance

No marine vessels or ships will be used in the construction of the development. There will be no discharge or dumping of oils, waste or other pollutants into the coastal or marine environment.

The proposed construction and operation of the development is not anticipated to significantly cause environmental harm or negative environmental impact, whether: a) means of livelihood for persons; b) damage to mangroves, coral reefs or beaches; c) damage to the marine environment; d) tourist attractions or the health and wellbeing of citizens and residents.

Containers for collection and storage of solid waste will be provided on the site, within the confines of the parcel boundaries. During construction, portable latrine(s) will be provided and maintained onsite by one of the local sanitary companies for liquid waste disposal. The contractor will be required to maintain acceptable environmental health and safety standards during construction. Containers of oils and other similar effluent will be collected, bagged, and disposed of separately at the public landfill facility. There will be zero tolerance for depositing of any garbage, rubbish, litter, or derelict article that could eventually make its way into the coastal or marine environment. This includes any broken bottles or other glass.

Solid waste debris is often problematic on construction sites and of particular concern when working in nearby coastal environments due to the increased incidence of debris either blowing or floating away. Waste is not aesthetically pleasing when it washes up on the shores and it can injure and kill marine organisms if they ingest it or are inadvertently trapped in the wastes.

All waste generated during construction, whether from daily food and beverage consumption of those working at the site or construction waste will be containerized and disposed of at the public landfill site daily. A lidded refuse bin with clear instructions for immediate disposal will be provided and easily accessible to workers. Inspections will be made at the end of the day to ensure that no waste remains on the jobsite.

3.9 Fisheries Protection Ordinance

Fishing activities or the taking of marine products from the ocean are not associated with the proposed development, however, it is acknowledged that the intent of this ordinance includes the protection of marine habitats that support fisheries. The proposed development includes construction in and near the active beach which has a strong influence on adjacent marine environments.

3.10 Wild Bird Protection Ordinance

Under the Wild Bird Protection Ordinance, it is prohibited to willfully kill or wound a wild bird. It is also prohibited to remove or destroy a nest or egg. If there are any located within the site, permission from the Governor in writing is required to remove or relocate them. Rare and endangered birds are exempt [Wild Birds Protection (gov.tc)].

3.11 International Treaties and Conventions

The DECR plays a key role in implementing the treaties and conventions adopted by the TCIG. The TCIG adheres to the following Charters and Conventions:

- Environmental Charter: (described in Section 3-14)
- Convention on Biological Diversity (CBD): which focuses on conserving biological diversity and sustainable use of its components.
- Ramsar Convention: which focuses on the conservation of wetland.

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): which ensures that international trade in wild animals and plants does not threaten their survival.

3.12 Turks and Caicos Islands Vision 2040

The TCI Vision 2040 is a long-term plan to achieve developed country status. Its goal is to create a diverse economy with a high standard of living, while simultaneously protecting the natural resources. TCI relies heavily on tourism, which requires a healthy management of ecosystems and aquatic resources.

Turk and Caicos Islands Vision 2040 Public Consultation Document (fliphtml5.com)

3.13 Turks and Caicos Islands Environment Charter 2001

In 1999, the United Kingdom Government issued a paper that recognized that responsibility for environmental issues in the UK Overseas Territories rested with the local governments, with support from the UK Government. This concept was embodied in the Environment Charters. The Turks and Caicos Charter was signed by the UK Minister for the Overseas Territories on 26 September 2001. The Charter outlines guiding principles designed to integrate environmental conservation into all sectors of policy planning and policy implementation as well as a set of mutual commitments between the UK Government and the TCIG. A Strategy for Action to Implement the Environmental Charter of the Turks & Caicos Islands was developed to help implement these guiding principles, and the UK Government is helping build capacity to support this integration.

Key Initiatives of the Charter are as Follows:

- To recognize that all people need a healthy environment for their well-being and livelihoods and that all can help to conserve and sustain it.
- To use our natural resources wisely, being fair to present and future generations.
- To identify environmental opportunities, costs and risks in all policies and strategies.
- To seek expert advice and consult openly with interested parties on decisions affecting the environment.
- To aim for solutions which benefit both the environment and development.
- To contribute towards the protection and improvement of the global environment.

- To safeguard and restore native species, habitats and landscape features, and control or eradicate invasive species.
- To encourage activities and technologies that benefit the environment.
- To control pollution, with the polluter paying for the prevention or remedies.
- To study and celebrate our environmental heritage as a treasure to share with our children.

3.14 Turks and Caicos Islands Climate Change Charter 2022

Small island states, such as the Turks and Caicos Islands, have characteristics that make them especially vulnerable to the effects of climate change, such as sea level rise and extreme meteorological events (Hurricanes – Extreme Winds and Floods). The Turks and Caicos Islands is characterized by fragile terrestrial, marine, and coastal ecosystems and a high biological diversity. Economic activities in the Turks and Caicos Islands involve direct exploitation of the natural resources such as coastal and marine ecosystems for tourism. Tourism is the major and most rapidly growing sector, the engine of economic growth and development.

The following are the strengths that attract tourists and investors to the Turks and Caicos Islands (A Strategic Plan for 1998-2001 Tourism inti the 21st Century, August 1998, Turks and Caicos Tourist Board):

- The pristine natural environment [The Beaches, The Sea (Diving), Sun, Sand].
- Safe destination.
- Proximity to the USA.
- The US dollar as currency.
- The language – English.
- Excellent air transportation.
- Modern communications.
- The brand.

Global climate change can have a direct catastrophic impact on TCI's natural capital mentioned earlier, from natural hazards such as hurricanes and sea level rise, and heavily expose other environmental vulnerabilities faced by these Islands. When examined, the Turks and Caicos Islands are very vulnerable for the following reasons:

- Key economic sectors dependent solely on limited natural resources (example – tourism and fishing).
- 100 percent import economy – especially of strategic imports such as food and fuel.
- Susceptibility to economic fluctuations and events of the US economy.
- High energy costs.
- Serious vulnerability to extreme climate events.
- Increasing pressures on coastal and marine environments and resources.
- Small domestic markets.
- Limited economic diversification possibilities.
- Inability to influence international prices.
- Uncertainties of supply or Imports.
- Shifting rainfall patterns and hurricanes.

During 22 April 2022, the Hon. Minister for Tourism, Environment, Fisheries and Marine Affairs, Culture and Heritage, Agriculture, Religious Affairs and Gaming signed the Turks and Caicos Islands Climate Change Charter. Other signatories were Fortis TCI, Provo Water Company Ltd., Turks and Caicos Hotel and Tourism Association, and Turks and Caicos Reef Fund. This was to acknowledge that each has an important role to play in addressing climate change amongst other important obligations.

Keynote speaker at the event, Deputy Premier of Bermuda, Walter Roban, stated that he was encouraged by the regional conversation around the impacts of climate change and that the Turks and Caicos Island's Climate Change Charter had not only set the standard but was one that he would take back to Bermuda to inform the drafting of their own Charter. "It is important that the same work you have put into attracting development, you put into environmental protection. That the same enthusiasm with which you craft proposals for international development, you must put the same energy into environmental investment and protection, internally and internationally. This is the new philosophy that we must pursue," said Roban. He continued to motivate for robust environmental policy that would enhance and not hinder the livelihoods of the Caribbean region, including green energy solutions, improved air quality and effective land management. "We, we the Caribbean, must become the strong voices in the campaign for Climate Action. We must become our own advocates in the global fight against Climate Change," said Roban. (The Sun Newspaper, TCI., Monday, 2 May 2022).

The close relationship between tourism, the Islands' key economic sector, and the natural resource base demands strategic sustainable management. It is the prime reason for climate change adaptation being integrated into the planning and design processes of the proposed hotel development. Sea-level rise accelerated beach erosion, degradation of coral reefs and the loss of the heritage landscape along the coasts, making the Islands less attractive to tourists. Increases in the frequency and/or intensity of hurricanes strongly affect the tourism industry. The examination of all the following factors has been carried out and is continuing with the design processes of the proposed development for implementation during construction and operation.

- The height of the finished ground floor levels for all the buildings above the mean sea level must far exceed the minimum allowable requirements provided in the TCI Building Code to avoid inundation of flood waters that may be caused by rising sea levels.
- The minimum allowable building setback distances measured from the vegetation line to the furthest projection of all buildings must be strictly complied with. This will allow for fluctuations in the shoreline that may be caused by erosions during storms.
- The building technologies to be used in the construction must be certified for use by a qualified and experienced structural engineer. Mr. Peter Kerrigan, of CSE, a reputable local structural engineering firm in the Turks and Caicos Islands has been employed to ensure the aforementioned and ensure compliance with the TCI Building Code.
- Improving energy efficiency is a key factor. Energy in the Turks and Caicos Islands is produced mainly through burning fossil fuels products such as gas and diesel oil. Diesel is used in the generators at the electricity supply plant. Liquefied petroleum gas (LPG) is used for cooking, while gasoline (petrol) and diesel oil are used for transportation. These account overwhelmingly for the total carbon dioxide emissions in the Islands. The TCI Climate Charter encourages the transfer of technology and cooperation to reduce greenhouse gas emissions, especially from energy, transport, industry, and waste management, which together produce nearly all greenhouse gas emissions attributable to human activity.
- The building technology used in the exterior and interior walls and cladding must ensure efficient use of energy and climate resilience.
- Conservation.
- Utilization of energy-efficient appliances and utilities.
- Use of renewable energy sources.

- Recycling of waste.
- Established effective systems of waste collection.
- Effective and efficient wastewater treatment system.
- Water conservation.
- Recycling of grey water.
- Low-flush toilets.
- Relieve anthropogenic stresses on nearby reef systems.
- Work with the DECR regarding environmental protection and management within the Princess Alexandra National Park.
- Efficient and effective air-conditioning systems in the buildings for cooling.

During 11 April 2022, Americas Environment reported that sea level has risen by 5 inches (12 centimeters) since 2010 in the coastal areas of the US southern and southeastern states, according to a study. Given the closeness to the Turks and Caicos Islands, this must be taken seriously and planned for.

In principle, this development is consistent with the requirements of these commitments.

4.0 Project Description and Construction and Operation and Alternatives

4.1 Description of the Proposed Project

The proposed project involves the excavation of the transitional dune area between the Coral Gardens Resort Property and the beach to install fortification structures (limestone rock dune core) overlain with dune sand to strengthen the dune to prevent erosion and protect the upland property. The structures will be covered with beach-compatible sand and revegetated with native dune plants. The sand should be placed at a thickness to allow for the establishment of and success (survivability) of the new native vegetation.

The construction of the fortified dune will be done in three phases, beginning with the central portion of the property, then the east segment, and then the west segment.

4.2 Project Justification

High sea and water level conditions have previously impacted the property at Coral Gardens Resort, partly due to being located on a slight, receding bump-out of the shoreline relative to the rest of the Bight shoreline of Grace Bay. During these periods of damaging seas, the shoreline and property has experienced significant damage and erosion. The project would reinforce the dune system with a protective core (limestone boulders.) which will increase protection to the upland from these episodic events. The reinforced dune would be covered with beach-compatible sand and be revegetated with native plant species to help create a more natural habitat for native fauna.

While the installation of coastal structures is not ideal, it is justified to protect existing upland development as is the case for this property. Further, given the long-term dune recession observed on this site, this action is justified as a reasonable accommodation to long term increases in sea level and associated impacts from episodic elevated sea and wave events.

4.3 Effects on Erosion or Accretion

The project will reduce the potential for wave and surge impacts to upland development on the property. The project has the potential to impact the beach system, however, this potential can be minimized through a siting of the structure along the existing line of development across this and adjacent properties as is recommended in this study. The issues observed on this property

are primarily cross shore in nature and associated with specific high-water level and sea events. Under typical conditions the structure should not play an active role in sand transport along the beach and should not be a major inhibitor to the natural longshore transport of sand along this beach segment.

4.4 Coastal Engineering Plans

Preliminary engineering drawings have been produced to visualize the reinforced dune structure. The placement of dune is recommended to be sited in line with the line of development along this and neighbouring properties. The reinforced dune core will be approximately 270 ft in length. The full dune length will be approximately 280 ft in length. The total width of the structure will be 20 ft.

4.5 Coastal/Beach Development and Management

The aim of a coastal or beach management plan is “to maintain or improve the conditions of a beach as recreational resource and means of coast protection while providing facilities that meet the demands of those who use the beach (Bird, 1996). The objective will be to continually develop the plan as problems are found, addressed, and procedures developed to ensure no reoccurrences.

A beach profile station has been established on this property as part of this study. This station will allow for a site specific evaluation of beach morphology over time and in concert with other regional stations will contribute to the overall assessment of the regional beach system.

4.6 Source and Quality of Beach Sand and Fill

The material will be beach quality, having an approximate mean grain size of 0.25 millimetres and contains approximately 3 percent silt. The colour of the beach material will be compatible and very closely match the colour of the existing beach. The material will be sourced locally on island. Prior to placement, sufficient testing of the material will be conducted to verify grain size, colour and silt content. The results of the testing will be provided to the DoP and DECR prior to placement.

4.7 Solid Waste Management During Construction and Operation

All waste generated during construction, whether from daily food and beverage consumption by those working at the site or construction waste, will be containerized and disposed of at the public landfill site daily. A lidded refuse bin with clear instructions for immediate disposal will be provided

and easily accessible to workers. Inspections will be made at the end of the day by the contractor to ensure that no waste remains on the jobsite, including near the shoreline. Solid waste debris is often problematic on construction sites and of particular concern when working close to the marine environment due to the increased incidence of debris either blowing or floating away. Not only is waste not aesthetically pleasing washing up on the shores but it can injure and kill marine organisms if they ingest it or are inadvertently trapped in the wastes.

4.8 Surface Runoff Management/ Storm Water Runoff and Treatment

Current conditions on the site allow for surface water to runoff from the upland development onto the beach. The proposed project will implement a dune feature that will address this current condition. The dune grade will prevent flow from the upland onto the beach and allow for surface water infiltration at the upland dune landward boundary.

4.9 Traffic Flow and Safety

Construction activities will have an effect on Penns Road while equipment and materials are delivered to the site. A proper Maintenance of Traffic (MOT) should be developed and approved prior to commencement of construction. All workers should be provided a copy to identify proper traffic routes for large trucks and equipment and parking for daily workers. Proper signage should be placed along the route as notification for the other vehicles. If needed, flagmen should be used to direct traffic around the construction site.

Additionally, public access to the beach at Penn's Road will be limited or possibly closed during construction. The public access will need to be used as access for equipment to the beach. Construction access will only be used in the mornings and evenings for the equipment. At all other times, the equipment will be stored in a designated area on the Coral Gardens Resort parking lot.

4.10 Water and Electrical Demand and Source

The project will not create any additional demand on water or electrical resources during either the construction or operational phases of the project.

4.11 Landscaping

No formal landscape plan has been developed at this point but it is recommended that the invasive species along the dune be removed. After the dune has been constructed, it should be replanted

with native species such as sea oats (*Uniola paniculata*), panic grass (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), prickly pear cactus (*Opuntia stricta*), and beach iva (*Iva imbricata*). These species have adapted to extreme coastal conditions, help establish dune systems, and limit coastal erosion.

4.12 Construction Phase Activities

4.12.1 Construction Methods and Program

The project will be constructed in three phases: The first phase will install the central section of the reinforced dune between the beach access points. The next phase will be the west segment, between the public beach access and the westernmost beach access for Coral Gardens Resort. The last phase will be constructed from the easternmost beach access for Coral Gardens Resort and the property line to the east. Construction should create a single structure, with no gaps between segments. Modification to the beach accesses/stairs will need to be made to accomplish this.

To accomplish the final reinforced dune as designed, any existing vegetation within the footprint of the construction will be removed. The dune footprint will be excavated to the desired design elevation. Reinforcement through use of limestone boulders or gabion structures will be placed in the centre of the footprint and packed/arranged tightly. After, the whole structure will be covered in beach-compatible material.

4.12.2 Site Security and Hoarding

A secure perimeter fence will be maintained around active construction sites, with additional perimeters around the storage areas. All landside equipment will be stored off the beach, within the designated construction storage area in the parking lot of the Coral Gardens Resort.

4.12.3 Sources of Sand for Beach Nourishment

The excavated beach sand removed for the placement of the reinforced dune core will be utilised for covering the core. If needed, additional beach-compatible sand will be sourced locally and tested to ensure beach compatibility. Test results will be reported to DECR and the DoP prior to use in the dune.

4.12.4 Source of Rock for Coastal Works

Limestone boulders or gabion structure material will be sourced locally on island. Specification of material to be used will be provided to TCIG upon decision of type of core being used.

4.12.5 Storage of Materials and Equipment

All excavated material will be stored within the project footprint. All equipment and materials (machinery and core materials) will be stored in the designated construction storage area in the Coral Gardens Resort parking lot.

4.12.6 Beach Traffic Impact and Restaurant Impact and Safety

Beach traffic seaward of the security fencing should remain unimpeded. Restaurant traffic will be diverted through the resort's front entrance. Public beach access will be limited during times of moving equipment to and from the beach. Personnel should be used at each end of the public beach access to prevent pedestrian use while machinery is being moved.

4.12.7 Temporary Sanitary Facilities

All solid waste generated by the construction will be handled by environmentally sustainable collection and disposal. During construction, contractors will provide enough portable toilets for the number of employees onsite, and facilities will be maintained by established, on-island resources.

4.12.8 Access and Staging

Access to the construction site will need to utilize the public beach access to transport equipment and materials. Safety measure will be taken to prevent pedestrian use at the same time as moving equipment. Restricted access to the public beach access is not expected to be long term. Staging will occur in the Coral Gardens Resort parking lot.

4.12.9 Mineral (Sand) Placement and Distribution

Material used for the core and sand for coverage of the dune will be placed mechanically with appropriate equipment (bulldozer, excavator, etc.). Smaller handheld equipment will be used to fill gaps and holes around the core structure to prevent settling after construction. Settling can cause holes and/or depressions in the dune.

4.12.10 How the New Sand Will Be Protected from Erosion During Swells, including Temporary Stability Measures

A dune core is proposed to provide fundamental stability to the primary dune system. This stability will be further realised through appropriate vegetation of the sand overtopping the structure. Exposure of the dune core may occur during major storm events, however, the structure will reduce losses of sand and vegetation from the structure face landward. Natural recovery of the

beach in front of the structure is anticipated to occur post storm event and if necessary sand cover over the dune face may be supplemented with additional sand if needed. The relative volume of sand required for this type of restoration should be nominal and far less than the costs of site recovery and restoration if the structure is not implemented.

4.12.11 Solid Waste Management during Construction

All solid waste generated by the construction will be handled by environmentally sustainable collection and disposal. Construction materials debris will be stockpiled during construction activity in the parking lot, containerized, and disposed of at a suitable landfill facility or other destinations with recycling capabilities. This will be the contractor's responsibility. Regular observation by the Owner's representative will be conducted to ensure compliance with contractual requirements for waste management.

4.12.12 Liquid Waste Management during Construction

In addition to solid waste during construction, liquid waste will need waste management. This includes the handling of machine oils and other fluids often associated with machinery. TCI does not have facilities to dispose of or process toxic and/or hazardous liquid waste.

The contractor will be contractually required to develop a hazardous waste management plan for review and approval by the Owner. This will include the identification of potentially hazardous liquid waste on the site, and means and methods of use, storage, and disposal. The Owner's representative shall conduct regular observations of the project site to ensure compliance with the approved management plan.

4.12.13 Control of Air, Dust, Water and Noise Pollution

The activities that are associated with the project will most likely cause noise and air pollution during the construction phase of the project. Heavy equipment used for construction would be the main source of noise pollution. A measure to reduce noise pollution is to ensure that all equipment shall be required to be in good working order and have appropriately installed exhaust systems. Any equipment that is in non-compliance shall be either fixed immediately or removed from the site.

Exhaust is a form of air pollution created from the combustion engines of heavy machinery. Depending on the model and year of the heavy equipment being used, there are products to help

reduce exhaust pollution. Using a diesel exhaust fluid (DEF) to reduce air pollution is recommended, if applicable.

4.12.14 Control/Storage of Fuels and Other Dangerous Substances

Hazardous fluid materials associated with the project include fuel, lubricating oil, and hydraulic fluids. These materials will be stored in approved containers in the parking lot storage area. If an accidental land spill occurs, excavation will be used to collect the contaminated soil. This contaminated soil will be trucked and disposed of in an approved landfill. Fuelling will take place within the storage area in the parking lot where emergency protocol and procedures are able to be followed. NO FUELING OR CHANGING OF ANY MACHINE LIQUIDS WILL OCCUR ON THE BEACH. Regulations related to the handling, storage, and disposal of hazardous wastes have not been approved under the Public and Environmental Health Ordinance. Careful handling and following protocol will be carried out for best management practices (BMPs), and an emergency mitigation plan is in place in case an accident occurs.

Non-compatible chemicals (i.e., acids and bases) will be segregated to prevent mixing in the event of a spill. Employees are to read information on labels and safety data sheet (SDS). Storage areas are to be kept clean, with aisles kept clear. Instructions on signs must be obeyed. Appropriate personal protection clothing must be worn, if necessary.

4.12.15 Emergency Mitigation Plan

Potential hazards in the Turks and Caicos Islands can occur due to natural and anthropogenic causes. Potential emergencies associated with the project include accidental spillages of hazardous materials and fuel in terrestrial and marine environments, tropical cyclones, and other unforeseen natural and manmade events. The Turks and Caicos Islands' geography, small economic structures, and limited resources make the country particularly vulnerable to potential disasters and emergencies. Effective planning helps to reduce potential impacts. In the case of the project, the threat of emergencies is small and can be largely avoided with conscientious planning.

This plan outlines strategies to avoid and mitigate spills of hazardous materials on land and in the marine environment. The following are events that can require emergency and mitigation responses:

- Hurricanes and tropical storms

- Noxious liquid spill
- Public safety issues

Successful emergency management may require the participation of key government agencies, including:

- The Turks and Caicos Islands Fire Department
- The Department of Disaster Management and Emergencies (DDME)
- Environmental Health
- Department of Environment and Coastal Resources (DECR)
- Maritime Affairs
- The Ports Authority
- The Turks and Caicos Islands National Healthcare Agency

Success also depends on financial resources, administration, and trained personnel for implementation. Any emergency mitigation plan should be seen as a "living" document, in that revision and review should take place, incorporating newly available information, changing circumstances, and lessons learned.

Any pollution incident that poses a threat to the natural environment should be reported immediately to DECR, the Department of Environmental Health, DDME, and Maritime Affairs. Spill mitigation materials should be immediately available to the construction crew, including booms and absorbent materials. The turbidity curtains, which should be in place throughout the construction process, will help to avoid and reduce impacts from potential spills. However, the emergency mitigation plan should remain in place in the event that a spill occurs, and the turbidity curtains fail.

The following are the roles and responsibilities are assigned to the various project principles:

Project management/monitoring team – Pre-, during-, and post-construction mitigation, contract administration, and oversight ensures that work is compliant with the mitigation measures outlined in the EMP. The Project Manager ensures that the necessary equipment, manpower and resources are available to provide an effective and immediate response to an emergency or hazard and to alert relevant authorities immediately. The Project Manager should also ensure that construction crews are adequately trained to discharge disaster management responsibilities

and/or arrange for additional assistance, if required. All staff members should be informed of emergency procedures, and applicable signage and information should be posted at key locations. If a spill occurs that enters the Princess Alexandra Land and Sea National Park, a preliminary quantitative biological monitoring of benthic assets is recommended.

Project Contractor – Pre-, during-, and post-construction operations are to be conducted in accordance with the recommended monitoring and mitigation measures in the EMP to ensure that siltation, spills, and pollution are avoided, reduced, restored, and offset, where required. All solid wastes generated are to be disposed of daily, and any solid wastes with the potential to become airborne are not to be permitted in coastal areas. Fuelling, if required, is to take place outside of the coastal zone. No replacement of hydraulic or machine fluids is to take place onsite. Silt curtains shall be employed throughout all construction activities. The silt curtains shall also be capable of capturing any floating debris. Spills of construction equipment fluids or other hazardous materials shall be immediately contained onsite and disposed of in an environmentally safe manner as soon as possible. Equipment and machinery shall be serviced, maintained, and washed offsite, away from the marine environment.

Hurricane/tropical storm response measures – The following procedures are to be taken in the event of a weather statement regarding hurricanes and tropical storms.

- In the event of a tropical storm/hurricane watch, construction can proceed to within 24 hours of expected landfall. No construction activities should take place under an active tropical storm/hurricane watch at the time of predicted landfall. All equipment should be removed from the site, and all other materials secured within 24 hours of predicted landfall so that they cannot become windborne.
- In the event of a tropical storm/hurricane warning, all construction activities should cease once the warning has been issued. All equipment should be removed from site to a secure area until the storm has passed. Any materials onsite that have the potential to become windborne should be removed to a secure location. No construction activities should take place until warnings have been lifted.
- Spill response measures – The following procedures are to be taken in the event of a spill of hazardous materials:

- Recording of the actions and decisions taken during an accident should be undertaken to ensure lessons are learned. Any improvements shall be enforced in response to improved technologies, capabilities, etc.
- All relevant factors are to be immediately assessed, including the nature, amount, location, wind and current directions and speeds, areas potentially affected, and resources needed and available.
- Priorities are to be established and response initiated, based on most-critical factors first. The employment of chemical dispersants/oil herders is to be used only under the approval of DECR. Response shall include reduction of impacts in sensitive areas, via the removal of the pollutant in all affected areas.
- Contaminated materials shall be recovered and disposed of on land at the Providenciales landfill. DECR shall oversee and dictate the clean-up strategy and risk assessment.
- Prevailing weather conditions and hazardous material types will determine the equipment and methods to be used.
- Biological and other environmental values, accessibility, and ability to utilize such equipment shall be considerations in selecting the clean-up method.
- Any solid materials, such as tar balls, will be put into plastic bags and disposed of at the PLS landfill.
- Response shall also include during- and post-incident biological monitoring to determine the effectiveness of the response.

Reporting Information Requirements for Hazardous Materials Management (HAZMAT) – measures for reporting shall include the following:

- Name of person reporting
- Date and time of incident
- Nature of incident (leak, explosion, spill, fire, etc.)
- Location and source of incident
- Details of injuries and fatalities, causes of injuries, treatments applied
- Identification of material(s) released (if known), manufacturer, label information, characteristics, physical state (e.g., gas, liquid, solid), etc.
- Amount of material released/duration of release

- Affected resources (e.g., air, water, land) and amount of materials released, including a description of direction, height, colour, odour, plumes, vapor, etc., including wind, current speeds, and directions
- Local weather conditions
- Response personnel

Public safety response – In the event of a public safety incident of any magnitude, emergency medical assistance is to be sought immediately. Note, it is preferable to have someone within the construction/management team who is familiar with and can administer first aid. If emergency medical assistance cannot be reached in a timely manner, then affected persons should be transported, if feasible, to Grace Bay Medical Centre (the nearest medical facility). In the case of a public safety incident, documentation is critical. The following information should be recorded:

- Time and date of the incident
- Description of the incident/injury
- Name(s) of affected persons
- Actions taken
- Names and contact information of witnesses to the incident

Follow-up with witnesses may be necessary if legal proceedings are initiated.

Water quality management – In addition to previous measures, no washing down of equipment rear the water shall take place during construction.

Emergency plan testing and review – This plan will be reviewed and updated as necessary as further information becomes available that may influence plan implementation and emergency operations. If an incident should occur prior to review, then the review is to take place immediately following the incident to adjust the plan as needed, incorporating lessons learned.

4.13 Social-Economic Impacts

The proposed project is anticipated to have a net zero impact on the local socio-economic environment. The proposed project will provide protection to the upland property and potentially the nearshore reef by limiting erosion of the dune and beach.

4.13.1 Demographic

The proposed project will add protection to the upland property and will add native habitat which will benefit local fauna. The project may also increase incentive for neighbouring properties to select this design over the installation of seawalls to provide protection to their properties.

4.13.2 Employment

The project's labour requirements include a limited number of labourers and professionals. Labourers include equipment operators and manual labourers. Professionals include engineers, and environmental scientists employed for obtaining development permissions and development of the project plans. Where practicable, labour will be locally sourced, with a high percentage of Belonger participation where possible. Due to the limited nature of labour requirements, minimal negative impacts are anticipated, and payment of fees and wages to locally based persons represent a minor net positive economic benefit. The positive economic benefits associated with local labour will be temporary.

4.13.3 Safety/Security Concerns within the Community

The reinforced dune will provide protection the Coral Gardens Resort and create a more natural habitat for local fauna. During construction, use of the adjacent public beach access will be minimally impeded by use as a construction access for project equipment and materials.

4.13.4 Issues Raised in the Public Consultation

Comments and issues raised during the public consultation will be incorporated into this EIA once the meeting has been held and responses to comments are provided.

4.14 Impact to Terrain

The terrain within the project footprint will be impacted during construction and throughout the lifetimes of the structures. Excavation of the dune footprint for the installation of the reinforced core material will be a primary impact to the upland ground. Additionally, heavy equipment traversing the beach access and the upland beach for the construction of the dune will have minor impact to the terrain.

4.15 Potential Alternatives

The intent of this project is to provide additional protection to the existing upland development from high water and wave events. Possible alternatives for consideration are as follows:

1. Status Quo

The property could remain in its current state. Periodic impacts from storm events would continue resulting in long term loss of the remaining dune feature and additional impacts to the café. It is likely that these impacts will increase over time and would long term require an economic decision regarding the viability of the café.

2. Manged Retreat

The current development at risk could be abandoned or moved to an alternative upland location. This would essentially result in the loss of the café as business and site amenity as there is no ability on site to move the existing facility of footprint landward.

3. Beach and Dune Nourishment

The long-term shore and dune recession trend could be countered by a regional nourishment program to expand and maintain the beach and dune system. This would require a large, scale regional commitment and resources beyond this individual property.

4. Coastal Armouring Alternatives

Alternative types of coastal armouring could be considered for the site including a structural wall or geotube. These alternatives would provide similar performance to the preferred structural alternative. A structural wall would reduce the project footprint at a greater cost and potential for wave reflection further increasing impacts to the beach. A geotube core to the dune would not provide the same level of long term performance as the proposed rock structure.

<u>Alternatives Evaluation</u>

In consideration of alternatives, the preferred alternative provides a reasonable corrective action to addresses the project intent and other alternatives do not adequately address the concern or are not preferred due to cost, ability to implement or other non-determinative factors.

5.0 Impact Assessment

5.1 Impact Identification

For most projects, overlaying the proposed development onto the results of landside and marine investigations reveals the extent to which a project would have direct, indirect, or secondary impacts on landside vegetative communities, intertidal communities, and nearshore sub-tidal marine areas.

5.2 Description of Impact

5.2.1 Potential Impact to the Biotic Environment

Overlaying the proposed project plans onto the landside habitats revealed the extent of the direct impacts to the landside vegetative communities. The results of that analysis revealed that 0.06 acres of barren beach, 0.03 acres of cultivated/landscaped habitat, and 0.00007 acres of sea oats are within the project footprint and will be directly impacted

Because no structures (piers, docks, boat slips, etc.) are proposed to be constructed waterward of the mean high-water line, no direct impacts are expected to the marine environment.

Table 5-1. Potential Impacts to the Biotic Environment

Community Type	Existing Size (Acres)	Direct Impact (Acres)	Comments
Terrestrial			
Barren Sand	0.09	0.06	Minimal impact as the habitat is barren.
Cultivated/Landscape	0.08	0.03	Minimal impact as the habitat mostly exotic invasive species.
Grass	0.03	-	No impacts
Sea Oats	0.01	0.00007	Minimal impact as the replanted dune will include an increase in this species.
Marine			
Barren Hardbottom	0.31	-	No impacts
Rock Piles	0.06	-	No impacts
Seagrass	-	-	No impacts

Notes
1. Limits to reef and seagrass is not calculated as it is extensive.
2. Habitats not fully defined due to extensive landscape and invasive species, could not identify as Sand Strand Habitat.
3. No construction into the marine environment, thus no impact.

Direct, Indirect and Secondary Impacts to the Sandy, Unvegetated Beach

As the project is located primarily on the unvegetated beach, there will be direct impacts from the use of heavy machinery for excavation of the dune area for the placement of the stabilizing dune core and the sand placement on top of the core structure.

Although "seaweed" (actually *Sargassum*, dead blades of seagrass and other flotsam and/or jetsam) had not accumulated in large quantities during or immediately prior to the May 2024 site investigation conducted for this EIA, seaweed piling up on beaches in the tropics has been an increasing problem in recent years, particularly when winds and ocean currents deposit these materials on beaches in large quantities. While this may not be a problem on beaches adjacent to undeveloped tracts (and may actually be beneficial for natural recycling of nutrients and when amphipods, small crabs, and other marine organisms provide prey for foraging shorebirds), it can be objectionable when it accumulates in large amounts on beaches that are used by property owners and vacationers.

Beach management techniques to address this problem certainly vary based on the extent of the problem on a day-to-day, week-to-week, and/or seasonal basis. For minimal or relatively light build-ups, taking no action may be appropriate. When build-ups get to be objectionable, addressing them may be as simple as a deploying an individual or two with a rake and hauling the material offsite for disposal (or composting). When build-up is heavy, a small army of laborers (rakers, baggers, hole diggers) and equipment (e.g., tractors fitted with rakes) may be necessary to deal with the problem. It is recommended that a beach management plan be developed in advance of unit occupancy, to be prepared when, sooner or later, this problem arises (refer to Section 6, Mitigation and Monitoring).

Direct, Indirect and Secondary Impacts to the Cultivated/Landscape Community

The existing vegetative community within this habitat is dominated by the invasive white ink berry (*Scaevola taccada*) and other cultivated landscape species. Replacement of these undesirable species with site-appropriate dune vegetation (e.g., sea oats, bay tansy, dune sunflower, etc.), will result in the project providing a net positive benefit in the area closest to the beach. There is small amount of sea oat vegetation already present that will be slightly impacted by construction, however, the recommended planting would be innately mitigated. Impacts in other areas will also result in the removal of invasive pest plants.

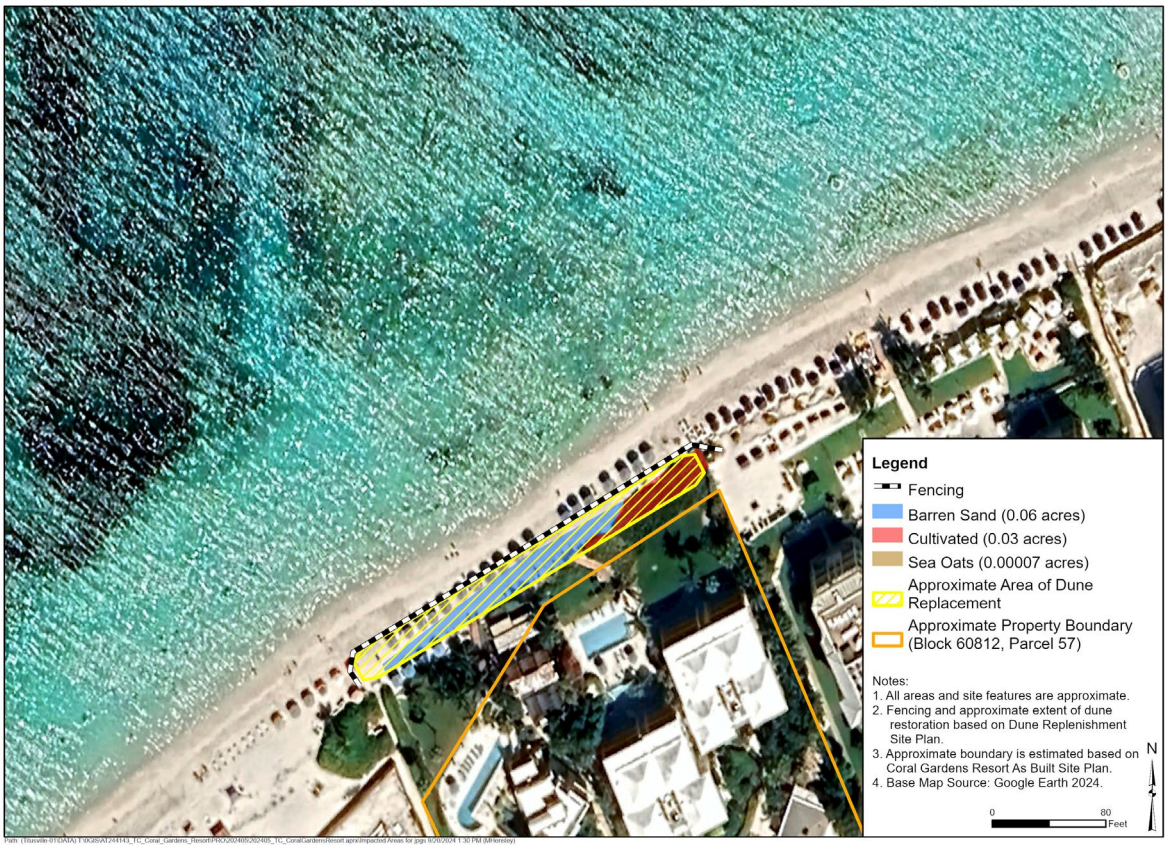

Figure 5-1. Impacted Areas

5.2.2 Potential Impact to Coastal Environment and Processes

There is no proposed development of the coast or changes to the shoreline proposed in the project plans. No impacts to the coastal environment or coastal processes are expected from this development.

5.2.3 Potential Impact of Added Lighting

There will be no impact from added lighting for this project. All construction will be conducted during daytime hours per government ordinances. No additional lighting is proposed for this project.

5.2.4 Potential Impact to Species Identified as Endemic, Near-Endemic, Rare, Threatened, or Endangered (by Either IUCN or CITES Listing)

There will be no direct impacts to any listed species. The project site does not contain any species identified as endemic, near-endemic, rare, threatened, or endangered by any listing. The marine environment contains some listed species, however, impacts to these species will be unlikely.

The only danger to the marine environment would result from construction debris entering the environment, which is unlikely if protocols are followed.

5.2.5 Potential Impact to Geological Environment

There are no anticipated geological impacts. The project area surficial substrate is primarily sandy with occasional limestone outcrops. There are no known karstic features in the project vicinity.

5.2.6 Potential Impacts to the Aesthetic and Other Built Environment

The aesthetic impacts are anticipated to be positive and will include removal of exotic vegetation and planting of native dune plants. The project is designed to be aesthetically pleasing from all vantage points and will conform to established building standards for the area.

5.2.7 Water Quality and Noise Pollution

The perceived potential impacts to groundwater quality would derive from accidental fuel or other construction vehicle/equipment liquid spill. There are no anticipated impacts from the minimal excavation needed to place the dune core structure.

5.2.8 Ecosystem and Economic Analyses

The Coral Gardens Reef is location immediately offshore of the project site. The coastal marine environment, in particular, the coral reef ecosystems in the Turks and Caicos Islands, is a vulnerable environmental resource that provide significant economic goods and services to the economy. The proposed project will stabilize the shoreline and help reduce erosion of the beach and upland environments. Continued erosion could have damaging effects on this delicate reef feature.

5.2.9 Socio-Economic Impact

The proposed project will create a minor economic opportunity during construction. The Developer will use its best efforts to promote employment, for TCI Belongers. Construction staff is anticipated to be made up of individuals who have long-term residence status in TCI, whether that is by virtue of having Permanent Residency Certificates with the right to work and/or Naturalisation.

5.2.9.1 Public Beach Access

The project site is adjacent to a public beach access at the end of Penns Road. The beach access is the likely access needed for construction equipment. Access to the public beach access will be impacted during times when equipment is being moved to and from the beach. It should be noted that any damage to the beach access caused by the Contractor will be repaired by the Owner. The public beach access will be restored to its condition or better.

5.2.9.2 Potential Impact to Neighbouring Developments, Businesses and Residential Houses

The potential impacts to neighbouring developments and residential houses include:

1. The restriction of the public beach access at Forbes Road during construction, and
2. Increased noise pollution during construction phase.

5.2.9.3 Potential Climate Change Impacts

The need for this project is directly related to climate change impacts as it is a result of storm damage, which this site had not previously experienced. The project is designed to mitigate for the increase storm intensities and frequency. The proposed dune structure should be of sufficient elevation to protect for a 100-year storm.

5.3 Impact Assessment

Overall, this study did not identify any flora, fauna, habitats or environmental issues that preclude the development as proposed. Minor issues were identified relative to impacts and the need to minimize their potential through design modifications, proper BMPs and means and methods of construction. These are addressed through proposed EMP measures (Table 6-1).

5.4 Derivation of Significance

It is important to acknowledge that the project area has already been impacted by a range of prior activities and development. Storm impacts to this development have occurred and represent an ongoing and likely increasing risk to the property without corrective action. The proposed project is a reasonable response to address the storm impact risks to upland development. While coastal armouring is not an ideal solution, it is a reasonable response that balances the need to protect existing upland development in a manner which minimizes the real and potential impacts to the environment and coastal system.

While implementation of this specific project represents a minor modification to the existing property, it does establish a precedent for coastal management of existing, developed properties within the area but also reinforces the need for greater consideration of coastal risk for new coastal developments. In principle, coastal armouring should be an alternative of last resort to protect existing, vulnerable development. New development should be sited and constructed with sufficient safeguards to preclude the need for further coastal armouring. This project further supports the need for long term data collection of beach profile data (which has been initiated with this study) to support long term coastal management initiatives.

In consideration of alternatives, the preferred alternative provides a reasonable corrective action to addresses the project intent and other alternatives do not adequately address the concern or are not preferred due to effectiveness, cost, ability to implement or other non-determinative factors.

6.0 Avoidance, Minimization, Mitigation and Monitoring

This project has been evaluated relative to project impacts and the adoption of Avoidance, Minimization, Mitigation and Monitoring strategies to reduce the magnitude and risk of adverse project impacts. A summary discussion of each strategy is provided in the following:

Avoidance

This project is proposed as an adaption strategy to provide additional wave and storm protection to an existing, developed coastal property. As the development is pre-existing, opportunities to avoid impacts are limited and in terms of the property from the dune line landward have already occurred.

Minimization

Opportunities for minimization of project impacts are evident and are proposed as follows:

Refinements in project design. The ODP design was not specific regarding the design of the dune core structure and refenced either a rock boulder or gabion type structure. The use of a gabion structure is not recommended as these types of structures tend to deteriorate over time resulting in a reduction in structure stability, the dispersal of stones held by the gabion and the creation of extensive small gabion debris material. Use of sufficiently large, interlocking local armor stones is the preferred structural alternative.

Refinements in project planform. The ODP design includes gaps in the structure at existing beach access points. These gaps would allow flanking of the structures by storm surge and waves significantly reducing the effectiveness of the structure. A consistent structure across the entirety of the property is recommended with dune overwalks installed over the new dune feature at the existing beach access points. This will allow the installation of a consistent, vegetated dune feature across the entirety of the property.

Landward Shift in dune core orientation to be coincident with the existing line of development along this and adjacent properties. A landward shift of the structure into the frontal face of the existing dune scarp is recommended. This will improve the overall performance of the structure and reduce the impact of the structure to the beach berm. This will also allow for the integration of the structure into adjacent developed parcels to reduce the potential for structure boundary impacts. While this landward shift will require greater vegetation clearing, the majority of the

impacted plants are invasive and would be best replaced by native dune appropriate vegetation over the new constructed dune line.

Installation of a transitional dune feature to reduce upland surface runoff onto the beach. The revised design as proposed will create a fortified dune feature between the upland development and beach reducing direct surface water runoff from the developed/landscaped property onto the beach. The structure will further reduce the risk of wave and water incursion into the café and the return of any potential constituents or debris associated with this impact onto the beach and into the nearshore.

Mitigation

Increase in upland property storm protection and resiliency. The project will increase storm protection and the resiliency of the existing development. This represents a mitigative measure relative to storm risk and further represents an adaptive accommodation to long term trends associated with climate change.

Removal of existing invasive dune vegetation and replacement with native, dune appropriate vegetation. Replacement of vegetation within the project footprint with native vegetation will increase the stability and habitat function of the dune. The vegetated dune will serve as a physical boundary between the active beach system and the developed upland.

Monitoring

Establishment of beach profile monitoring. Establishment of a beach profile station at the property is provides a basis for long term monitoring of beach morphology on the site and taken in concert with the establishment of other profile stations in the region provides a basis for long term management of the coastal system.

Vegetation monitoring. Performance monitoring of the restored dune native vegetation is proposed to ensure long term vegetative success.

Additional monitoring associated with construction is proposed in the following section.

6.1 Proposed Actions and Schedule to Mitigate Against Any Environmental Impact

Potential activities that could be considered to minimize and/or offset ecological impacts could include the following:

1. Pro-actively planning to enhance plant abundance and biodiversity by planting site-appropriate native vegetation in the landscape plan for the project;
2. Ensuring that field monitoring is conducted to avoid impacts to nesting birds during land clearing;
3. Removing all pest plants from the site and implementing a monitoring programme to prevent their re-establishment;
4. Considering development of educational materials notifying future residents of the presence of notable plant species and that the collection and transport of endemic, endangered and/or threatened species, including marine species, is prohibited;
5. Ensuring coordination with the landscape team to ensure that no ornamental species that are on the list of invasive plants are introduced onto the property;
6. Notify DECR if nesting marine turtles, nesting birds (e.g., nighthawks on coastal rock, plovers on sandy beaches), or piping plovers are observed within coastal portions of the property and implement appropriate countermeasures (e.g., prohibition on unleashed dogs) to eliminate or minimize adverse impacts on these resources;
7. Conduct periodic beach clean-ups to remove flotsam, jetsam and/or other solid waste or debris that may accumulate on the shore; and
8. Resist beach management initiatives that would mechanically remove naturally occurring tidal wrack (e.g., seaweed) from the beach, as it harbors prey for foraging shorebirds and is beneficial to the localized ecology, except when situations warrant more aggressive management.

6.1.1 Impacts to terrestrial and Marine Life

No impacts to marine life are anticipated because no construction is being conducted seaward of the mean high-water line. Secondary impacts will be mitigated for by proper cleanliness of the site, use of trash bin, daily removal of construction debris from the beach, and generally following BMPs.

6.1.2 Impacts of Noise and Light

During construction, the noise levels may increase because of the use of heavy machinery. Work will be conducted during approved hours of operation as allowed by local ordinances and laws.

6.1.3 Impacts of Incursion of Invasive Species of Flora and Fauna

As the project footprint will be cleared of vegetation for the excavation and placement of reinforced core material, it is recommended that all invasive species be removed from adjacent areas near the dune to prevent the spread of these species from re-entering the dune habitat. Invasive species should not be included in any new landscaping. Management of the dune landscape during the grow-in period is recommended to reduce the potential for the reestablishment of non-native and invasive species with the project boundaries.

6.1.4 Impacts to Resettled Wildlife

Given the fractured nature of habitat on the site, resident terrestrial fauna is limited. The site is not well positioned to support use by resident or migratory birds in its current state, however, it may become more suitable following project implementation.

6.2 Proposed Actions to Mitigate Against Noise Pollution

For this project, noise concerns are primarily associated with project construction. Work will conform to accepted standards for construction and adherence to all laws and ordinances pertaining to noise. This will include restrictions on construction activities to daytime only during weekdays. Work on Saturdays may occur if time constraints require it and is permissible. No noise-generating work will be conducted on Sundays.

All equipment onsite will be in proper working order, including the installation of appropriate mufflers.

6.3 Storm Surge Analysis and Mitigation Plan for Sea Level Rises

In general, storm surge values are limited for the region and are generally on the order of 1 m or less for typical hurricane conditions. Tide gauge data collected during the passing of Hurricane Frances (a direct major hurricane impact) on September 1 and 2, 2004, recorded a rise in sea level of only 1.5 ft from storm surge. Similar surge magnitudes have been reported in the area for historic storm impacts. Hurricanes Irma (Category 5) and Maria (Category 3) in 2017 had a devastating impact on the Turks and Caicos Islands largely due to wind and rain.

The project should have a core elevation and finished dune elevation that should meet or exceed the anticipated 100-year storm surge level for this area (including sea level rise).

The project will not result in an appreciable change in storm surge magnitude, although the increased elevation of the reinforced dune will reduce the ability of surge to enter the property.

6.4 Building Around, or Rescue and Removal of Rare, Threatened, and Endangered Species of Plants, where Possible

There were no rare, threatened, or endangered species of plants observed during the site assessment. There will be no need to avoid, salvage or relocate any species for the proposed project.

6.5 Removal and Continued Control of Invasive Coastal Species That Threaten Dune Formation and Stability

It is required that all invasive species within the project footprint, and recommended for the entire resort property, be removed and replaced with native plants species. This includes, in particular, *Scaevola taccada.* This includes the public beach access that will be utilized by the contractor for equipment access to the beach.

6.6 Landscaping/Replanting Plan Utilizing Native Species

It is recommended that the project team work with professionals who are knowledgeable about plant species that are native to the Turks and Caicos Islands and that 100 percent of the plants be native species. There are no species within the existing habitats that require salvaging or relocation.

If locally available, examples of recommended dune plants to be included in the landscape plan are, but not limited to:

- Sea oats (*Uniola paniculata*)
- Railroad vine (*Ipomoea pes-caprae*)
- Bay tansy (*Ambrosia hispida*)
- Coastal iresine (*Iresine flavescens*)
- Bay lavender (*Tourneforita gnaphalodes*)
- Common prickly pear (*Opuntia stricta*)
- Sea grape (*Coccoloba uvifera*)

6.7 Proposed Techniques and Models to Mitigate Against Light Pollution, including Impacts on Nesting Sea Turtles and Migratory Birds

There is no intent or plan to change or alter the lighting within the proposed project. No mitigation is required for this project.

Marine turtles are known to nest on sandy beaches, however, there is no data that indicates that this area is known for sea turtle nesting. The shallow depth of sand overlaying the rock substrate appeared too thin for successful nesting of marine turtles, and no evidence of nesting was observed.

6.8 Proposed Climate Change Mitigation Both Locally within Turks And Caicos Islands and Globally

The proposed project will increase the level of protection for the dune, beach, and upland property.

TCI contributes less than 1 percent of global greenhouse gas emissions. But being a combination of small islands, the country is especially vulnerable to sea level rise and stronger, more frequent storms. Hurricane Ivan in 2004 destroyed 90 percent of hotel stock on the island, costing about $900 million in United States dollars. Projects such as this one can increase the islands coastal resiliency in the event of hurricanes and storms

Climate Change (gov.tc)

6.9 Financial Resources for Mitigation

All financial resources for the mitigation of the project are the responsibility of the Owner. Proposed measures do not represent a significant financial burden, and the risk associated with the proposed measures are relatively low.

6.10 Environmental Monitoring and Financial Requirements

Environmental monitoring prior to, during, and post-construction will be the responsibility of the Owner.

6.11 Public Consultation/Social Listening/Monitoring

Engagement with the DoP and DECR are ongoing and will continue through the review process regarding this study. A public consultation, if deemed necessary, will be held upon receipt and resolution of comments from the DoP and DECR regarding the EIA. The public consultation will

be added as an appendix to this study. Comments that result in significant revision to the document will be implemented and an amended document will be issued, if appropriate.

6.12 Environmental Management Plan (EMP)

6.12.1 Summary of the Potential Impacts and Recommended Mitigation Measures

Table 6-1. Potential Impacts and Mitigation Measures

Resource	Potential Impacts	Overall Significance	Proposed Management	Schedule	Cost
Upland Resources	Increased noise pollution during construction.	Low	Use of BMPs and obeying local laws and ordinances regarding working hours.	Construction	Low
	Damage to public access from use for equipment access.	Moderate	Use of BMPs during construction.	Moderate	Moderate
Marine Resources	Wind-blown construction debris entering the nearshore.	Low	Use of BMPs during construction, using trash bins, daily removal of trash, properly securing construction material.	Low	Low

6.12.2 Statement of Their Compliance with Relevant Standards

Statements of compliance are provided in Appendix M.

6.12.3 Allocation of Resources and Responsibilities for Plan Implementation

The applicant is committed to being responsible and capable of allocating whatever resources are deemed necessary to ensure compliance with the requirements of the office of the Director of Planning.

6.12.4 Schedule of the Actions To Be Taken

Recommended actions identified within this study are limited and are associated with construction tasks. This project does not require the salvaging of any native species or the relocation of motile species as none are present within the project footprint. Issues primarily identified in this study are associated with project design and construction elements.

6.12.5 Programme for Surveillance, Monitoring and Auditing

A program for proper oversight is proposed and is primarily focused on construction tasks which represent the primary phase of concern. These are discussed in detail within other sections of this document. Monitoring of the revegetated dune should be conducted to assess survivability of the plantings. If success of some species does not appear to be achieved, these should be replaced with species that appear to be successful and thriving.

6.12.6 Contingency Plan When Impacts Are Greater Than Expected

The applicant has the resources and/or contingencies available to mitigation any impacts that may be associated with the proposed development.

It is acknowledged that unanticipated issues may arise during construction, and these are best addressed though further coordination with relevant authorities as the need arises. In principle, this will be addressed through the conditions of the Detailed Planning Permission (DPP) approval, which are binding on the applicant.

7.0 Recommendations and Conclusions

It is important to acknowledge that the project area has already been impacted by a range of prior activities and development. Storm impacts to this development have occurred and represent an ongoing and likely increasing risk to the property without corrective action. The proposed project is a reasonable response to address the storm impact risks to upland development. While coastal armouring is not an ideal solution, it is a reasonable response that balances the need to protect existing upland development in a manner which minimizes the real and potential impacts to the environment and coastal system.

While implementation of this specific project represents a minor modification to the existing property, it does establish a precedent for coastal management of existing, developed properties within the area but also reinforces the need for greater consideration of coastal risk for new coastal developments. In principle, coastal armouring should be an alternative of last resort to protect existing, vulnerable development. New development should be sited and constructed with sufficient safeguards to preclude the need for further coastal armouring. This project further supports the need for long term data collection of beach profile data (which has been initiated with this study) to support long term coastal management initiatives.

Recommendations

In review of site conditions and the project design as presented in the Outline Development Permission approval, the following recommendations are provided:

Refinements in project design. The ODP design was not specific regarding the design of the dune core structure and refenced either a rock boulder or gabion type structure. The use of a gabion structure is not recommended as these types of structures tend to deteriorate over time resulting in a reduction in structure stability, the dispersal of stones held by the gabion and the creation of extensive small gabion debris material. Use of sufficiently large, interlocking local armour stones is the preferred structural alternative.

Refinements in project planform. The ODP design includes gaps in the structure at existing beach access points. These gaps would allow flanking of the structures by storm surge and waves significantly reducing the effectiveness of the structure. A consistent structure across the entirety of the property is recommended with dune overwalks installed over the new dune feature at the

existing beach access points. This will allow the installation of a consistent, vegetated dune feature across the entirety of the property.

Landward Shift in dune core orientation to be coincident with the existing line of development along this and adjacent properties. A landward shift of the structure into the frontal face of the existing dune scarp is recommended. This will improve the overall performance of the structure and reduce the impact of the structure to the beach berm. This will also allow for the integration of the structure into adjacent developed parcels to reduce the potential for structure boundary impacts. While this landward shift will require greater vegetation clearing, the majority of the impacted plants are invasive and would be best replaced by native dune appropriate vegetation over the new constructed dune line.

8.0 Statement of Understanding of Environment Charter (2001) and Climate Change Charter (2022)

8.1 Statement of Understanding of Terms of Environment Charter 2001

This project will follow the guiding principles of the Turks and Caicos Islands. The Environmental Charter (2001) and Climate Change Charter are both importantly highlighted in this EIS. The applicant is fully aware of the importance of both Charters and has made commitments to cooperate, participate and mitigate as delineated in this study. Under the Environmental Charter, the applicant fully endorses the concept that the polluter is ultimately responsible for corrective action.

8.2 Statement of Understanding of Terms of Climate Change Charter 2022

The project acknowledges issues associated with climate change and will adopt a design methodology that will address these concerns as addressed within this study.

8.3 Proponent's Declaration of Intent to Guide the Development by the Recommendations of the EIA Consultant, including the Terms of the Environmental Management Plan, with Updated Declaration Following Response to Public or TCIG Commentary Requesting or Requiring Alterations to any Part of the EIA.

A formal acknowledgement signed by the owner is provided as an appendix to this document.

9.0 References

Areces-Mallea, A.E., A.S. Weakley, X. Li, R.G. Sayre, J.D. Parrish, C.V. Tipton, and Timothy Boucher. 1999. A Guide to Caribbean Vegetation Types: Preliminary Classification System and Descriptions. The Nature Conservancy, Arlington, VA.

Bradley, P. The Birds of the Turks and Caicos Islands- The Official Checklist. 24 pp.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 2023. List of Species, all Appendices. Downloaded on 3 April 2023.

Correll, D.S. and H.B. Correll. 1982. Flora of the Bahama Archipelago. Straus and Cramer, Germany.

Currie, D., J. M. Wunderle Jr., E. Freid, D.N. Ewert and D.J. Lodge. 2019. The Natural History of the Bahamas. Comstock Publishing, Cornell University Press, Ithaca and London. 454 pp.

Economic Commission for Latin America and the Caribbean (ECLAC). 2016. The Development of Population Projections for the Turks and Caicos Islands 2012-2027. United Nations.

Government of the Turks and Caicos Islands. 2019. Turks and Caicos Islands Government Undertakes a National Population Policy. https://www.gov.tc/press/1574-turks-and-caicos-islands-government-undertakes-a-national-population-policy.

Ground, R. 2001. The Birds of the Turks and Caicos Islands. Turks and Caicos National Trust, Publisher. Hong Kong. 94 pp.

Hallett, B. 2006. Birds of the Bahamas and the Turks & Caicos Islands. Macmillan Publishers. 245 pp.

International Union for the Conservation of Nature (IUCN) 2023. The IUCN Red List of Threatened Species. <http://www.iucnredlist.org>. Downloaded on 3 April 2023.

Littler, D.S. and M.M. Littler. 2000. Caribbean Reef Plants – and Identification Guide to the Reef Plants of the Caribbean, Bahamas, Florida and Gulf of Mexico. Offshore Graphics, Inc. Washington, D.C. 542 pp.

Littler, D.S., M.M. Littler, K.E. Bucher and J.N. Norris. 1989. Marine Plants of the Caribbean – A Field Guide from Florida to Brazil. Airlife Publishing, Ltd. Shrewsbury, England. 263 pp.

McNary Wood, K. 2003. Flowers of the Bahamas and the Turks and Caicos Islands. Macmillan-Caribbean. Oxford.

Meteoblue. 2023. Historical Modeled Climate Data for Providenciales, TCI [2009-2021]. Downloaded 2023.

Nellis, D.W. 1994. Seashore Plants of South Florida and the Caribbean. Pineapple Press, Inc. Sarasota, Florida, 160 pp.

Raffaele, H.A. and J.W. Wiley. 2014. Wildlife of the Caribbean. 304 pp.

Sotheby International Realty. 2021. Turks & Caicos Real Estate Market Report. 3rd Quarter Comparison.

White, A.W. 1998. A Birders Guide to The Bahama Islands (Including the Turks and Caicos Islands). American Birding Association.