



Escape to Barbuda

Preliminary Environmental Appraisal Report

Prepared by Maya Blue Ltd for Kelly Construction Inc.

Submitted on behalf of BCL/BOA Architects

MAYA
BLUE

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A.1. Introduction

A.1.1. Purpose of the Report

The report has been prepared on behalf of Brisbane & Associates, for Kelly Construction and has included outcomes from team workshops which forged a holistic approach to the design masterplan development. The environmental parameters were important considerations to the development of the design masterplan. Physical and natural attributes of the site, inclusive of habitats and vegetational assemblages, were the starting point for layout. This report outlines the approach undertaken to provide this environmental framework to inform and shape the design masterplan.

A Preliminary Environmental Appraisal (PEA) is a rapid assessment of the physical, biological and sociocultural attributes associated with or influencing the development footprint. The PEA provides a high-level environmental context for consideration in the development of design, layout and the selection of core engineering systems to enable a sustainable development masterplan proposal that embodies environmental considerations for resilience.

The key objectives of a PEA are to:

- Identify and define the **environmental baseline** and context for the development footprint;
- identify any physical, ecological and sociocultural **constraints**;
- evaluate the **design intent** and engineering systems to be utilized;
- identify any **mitigation measures** that may need to be applied/incorporated into design;
- identify opportunities for the **enhancement and resilience enabling of the development** incorporating natural preexisting attributes.

The PEA was undertaken by means of a charette approach with the design team to enable opportunities for appropriate and proactive design modification with information from the physical attributes, ecology and vegetational assemblages and socio-cultural construct.

The early incorporation of these environmental and socio-cultural attributes shaped the development concept design masterplan so that the design reflects an environmentally enhanced development footprint that retains and integrates as practically possible, important physical and biological characteristics, with a sympathetic site layout and positioning of infrastructure, road and pathways to retain local biodiversity and visual integrity, protecting any sensitive habitats whilst enabling a climate resilient footprint, within the context of the proposed development intent regarding operations.

The primary audience for a PEA is the client or developer and relevant members of the project team, such as the architect, planning consultant, and landscape architect. It informs a planning application for an approval in principle but does not replace any need for an Environmental Impact Assessment that the local Regulatory Authority may require.

A.2. The Preliminary Environmental Appraisal

A.2.1. Outline

The Preliminary Environmental Appraisal (PEA) comprises 4 aspects:

- Outline of the **environmental baseline** of the proposed development footprint;
- an **environmental appraisal** of the development design and proposed operational component;
- outline of **mitigation strategies** to alleviate impacts identified;
- the identification of opportunities for **environmental enhancement** inclusive of the preservation of key attributes of characteristic habitats of the development footprint.

A brief outline of these aspects and methodology are outlined below:

A.2.2. Environmental Baseline Assessment

A.2.2.1 Methodology

The environmental baseline assessment will identify and describe the key physical, biological characteristics of the proposed development footprint and highlight any protected species and sensitive habitats associated with the site footprint. It will also identify any sociocultural attributes associated with the site footprint including any land use designations. Physical, ecological and sociocultural constraints that may exist for the development footprint will also be identified. This assessment will also include the legislative framework and governance that would apply to such development works in Barbuda. The baseline assessment comprises a desk study, previous knowledge of environmental attributes, habitats and constraints and a walkover survey, undertaken by proxy field personnel due to the constraints on travel imposed by the COVID-19 pandemic.

A.2.3. Appraisal Process

A.2.3.1 Methodology

The environmental appraisal of the proposed development components will employ an environmental appraisal matrix, adapted from the Leopold method of qualitative environmental assessment. This process evaluates the potential impacts of the proposed development intent and development area of influence, on known environmental receptors. The outcome from this process is the identification of any sensitive environmental aspects that may be impacted by the design intent and the outline of appropriate modifications to the design and layout that, if adopted could abate or mitigate such potential impacts. This is an important aspect of the PEA which enables a more holistic approach to design, site layout and selection of engineering systems and utilities to create a development that is both sustainable and resilient. The appraisal key is outlined below:

	Impact * (denoted as I) <i>Short (<1 year)/medium (1-5 years)/long term> 5 years</i>
	Aspect/activity perceived to have neutral impact on this environmental attribute of proposed development footprint; May present opportunity for enhancement
	Aspect/activity may have short-term negative impact on this environmental attribute of proposed development footprint
	Aspect/activity may have medium-term negative impact on this environmental attribute of proposed development footprint; may leave residual impact
	Aspect/activity may have long-term and permanent negative and undesirable impact on this environmental attribute of proposed development footprint

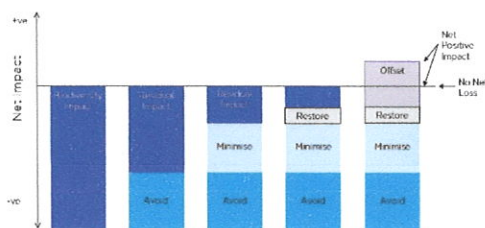
Environmental Appraisal key

This process is undertaken with the design team so that potential environmental impacts can be removed or reduced through design modification and considerations and opportunities for enhancement identified early in the design process.

A.2.4. Mitigation Strategies

A.2.4.1 Methodology

The mitigation hierarchy



Following the appraisal process is the identification of opportunities for mitigation and the development of a mitigation strategy which is incorporated into the design. This is to ensure that the development is as integrated as best possible into the natural environment and landscape. This holistic approach to design enables integration of the development on a functional level – maintaining important ecosystem services such as drainage and sediment retention, storm protection and aesthetics. The mitigation strategy will

help to shape the design and layout of the proposed development. It will apply the mitigation hierarchy approach so as to *avoid*, *'minimize'*, *'restore'* and *'offset'* any identified potential impact of the development intent. Early incorporation of these attributes into the design and layout plans enable a development footprint that is sustainable and robust.

A.2.5 Environmental Enhancement of Design Masterplan

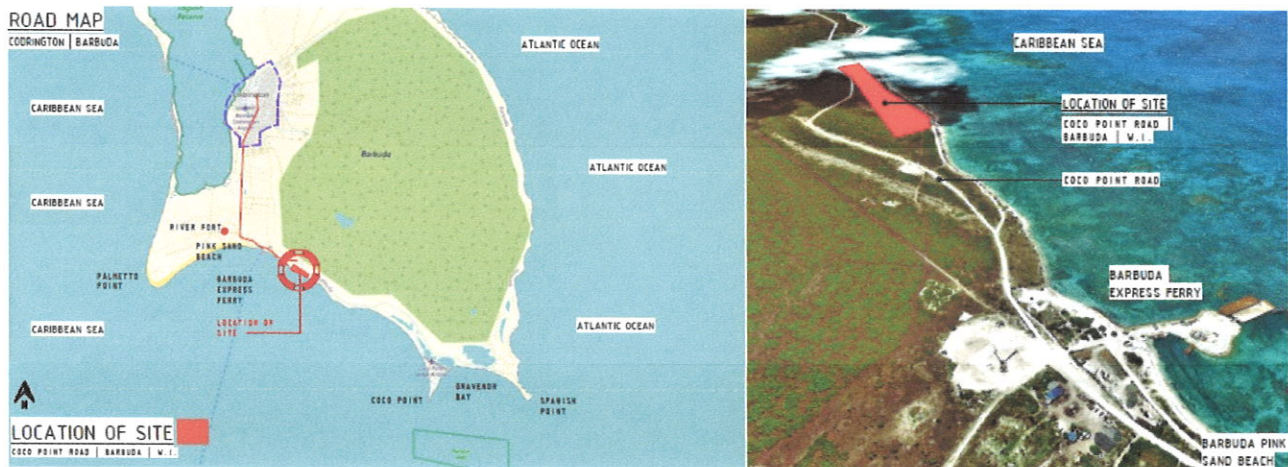
A.2.5.1 Methodology

The early undertaking of the PEA facilitates early identification of opportunities to incorporate environmental considerations into the design concept and layout plans. This approach often enables a more robust development that demonstrates a sympathetic use of space within the environmental and sociocultural framework to create an aesthetically engaging development. This is enabled by applying a charette approach to working which enables the team to evaluate each development aspect regarding the existing physical, biological and sociocultural framework of the development footprint.

A.3. Outline of Development

A.3.1. Location Plan

located to the south of Barbuda. The developers were seeking to develop a project on the pristine island of Barbuda since 2015.



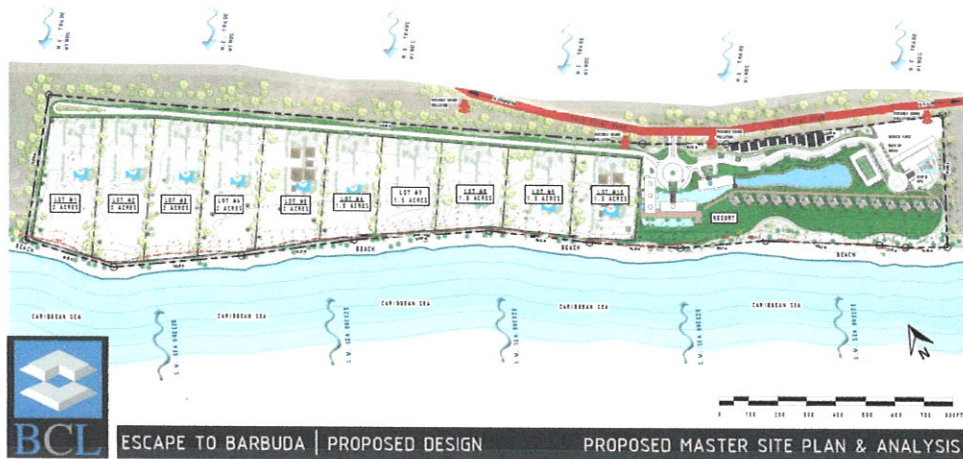
Proposed location of the Escape to Barbuda development, south Barbuda (figures- BOA)

A.3.2. Development Concept and outline

The Escape to Barbuda project is a 15 Room Boutique Hotel to be developed within a footprint of 30 acres of coastal land with approximately 38,750 sq.ft (3,600 sq.m) of building interior space and 22,600 sq.ft (2,100 sq.m) of outdoor building space (including swimming pool and deck). The Hotel will therefore account for total building area of approximately 61,000 sq.ft (5,700) in area.

The Escape to Barbuda Concept focuses on the creation of a sustainable, energy efficient development which offers a boutique family friendly hotel development with 15 cottages, a conference facility, restaurant, gym and spa, central pool and children's play area. It will also include a jogging trail and 10 villa land lots for sale and for high end residential construction.

The development aims to be exemplar regarding sustainable build with a focus on use of material, with a layout and climate resilience by design. The development will be partially powered by renewable energy with the use of reverse osmosis to enable water resources for the whole development with water efficient systems installed at every level. The development moves away from the traditional septic tank system and has applied a series of digesters for an environmentally sound approach to the management of liquid waste discharge.



Escape to Barbuda Proposed Development Concept (drawing by BOA)

The aspects to be evaluated in this Preliminary Environmental Appraisal include:

- Site location
- Planning development framework
- Natural and physical environment
- Socio-cultural context
- Infrastructure and layout
- Drainage features
- Engineering systems and utilities to be employed
- Coastal processes

A.4. Legislative and Planning Framework

A.4.1. Antigua and Barbuda Legislation

The laws of Antigua and Barbuda pertinent to the proposed development regarding its environmental interface are as follows:

Antigua and Barbuda Legislation

Environmental Protection and Management Act 2019
Barbuda Land (Amendment) Act 2018
Plant Protection Act 2012
Physical Planning Act 2003
Barbuda Land Act 2007
The Fisheries Act, 2006
The National Solid Waste Management Authority Act, 2005
The Environmental Protection Levy Act, 2002
Importation Prohibition (Epidemic Diseases) 1998
National Parks Act 1984
Marine Areas (Preservation and Enhancement) Act 1972
The Beach Control Act (1959)
Beach Protection Act (1957)
National Sustainable Island Resource Plan 2012

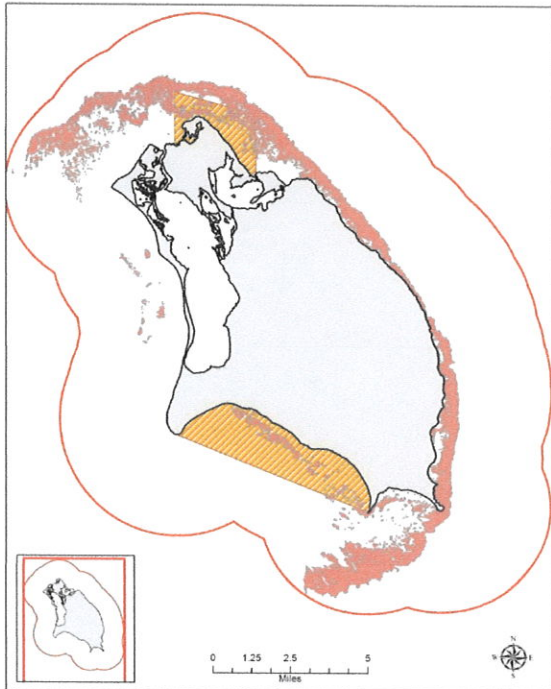
Barbuda Specific Acts and Regulations

The Barbuda Land Act (Amended) 2018
The Barbuda Land Act 2007
The Barbuda (Fisheries) Regulations, 2014
Barbuda (Coastal Zoning and Management) Regulations, 2014

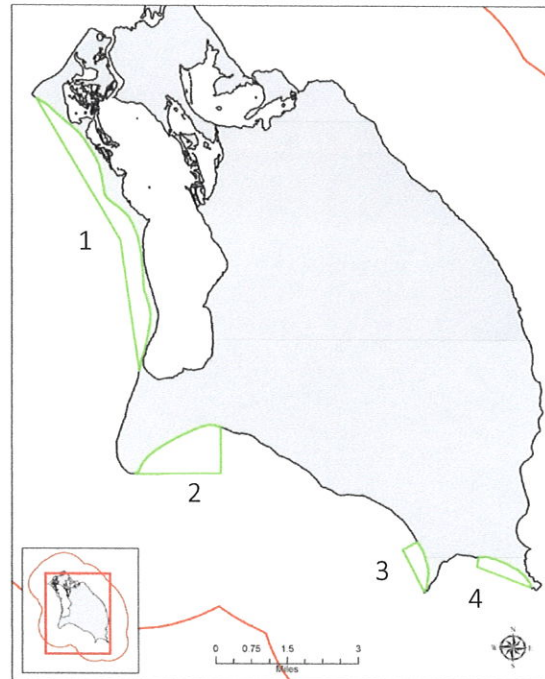
A.4.1.1 Physical Planning Act 2003

There are several statutory provisions and regulations and guidelines that govern lease holdings, land use zoning and development activities in Barbuda. The Physical Planning Act 2003 outlines the primary responsibility for planning, development control and designation of permitted development of land rests with the development Control Authority (DCA), as established in Section III of the Act, which also defines the authority's role and functions of the members of the Board of this Authority. All proposed major developments in Barbuda are required to obtain Planning Approval in Principle from the DCA which will outline any further requirements or studies prior to commencement of any development works.

A.4.1.2 Barbuda (Coastal Zoning and Management) Regulations 2004



Hatched area - Waters landward of a line between Palmetto Point and Coco Point ; Red line indicates areas currently within 20m of a coral reef



Designated anchoring and mooring zones

The development is coastal and will therefore be subject to the Barbuda (Coastal Zoning and Management) Regulations 2004, which outlines the no-net areas for fishing and designated mooring areas. Waters of Barbuda designated as anchoring and mooring zones are limited to the following 4 areas:

1. **Low Bay Anchoring and Mooring Zone** including all waters within the marked areas with geographical coordinates 17.6951° N and 61.8856° W
2. **River Hollow Anchoring and Mooring Zone** including all waters within the marked areas with geographical coordinates 17.5876° N and 61.8147° W
3. **Coco Point Anchoring and Mooring Zone** including all waters within the marked areas with geographical coordinates 17.5584° N and 61.7697° W
4. **White Bay Anchoring and Mooring Zone** including all waters within the marked areas with geographical coordinates 61.5537° N and 61.7510° W

A.4.1.3 Protected Areas and Special Designations

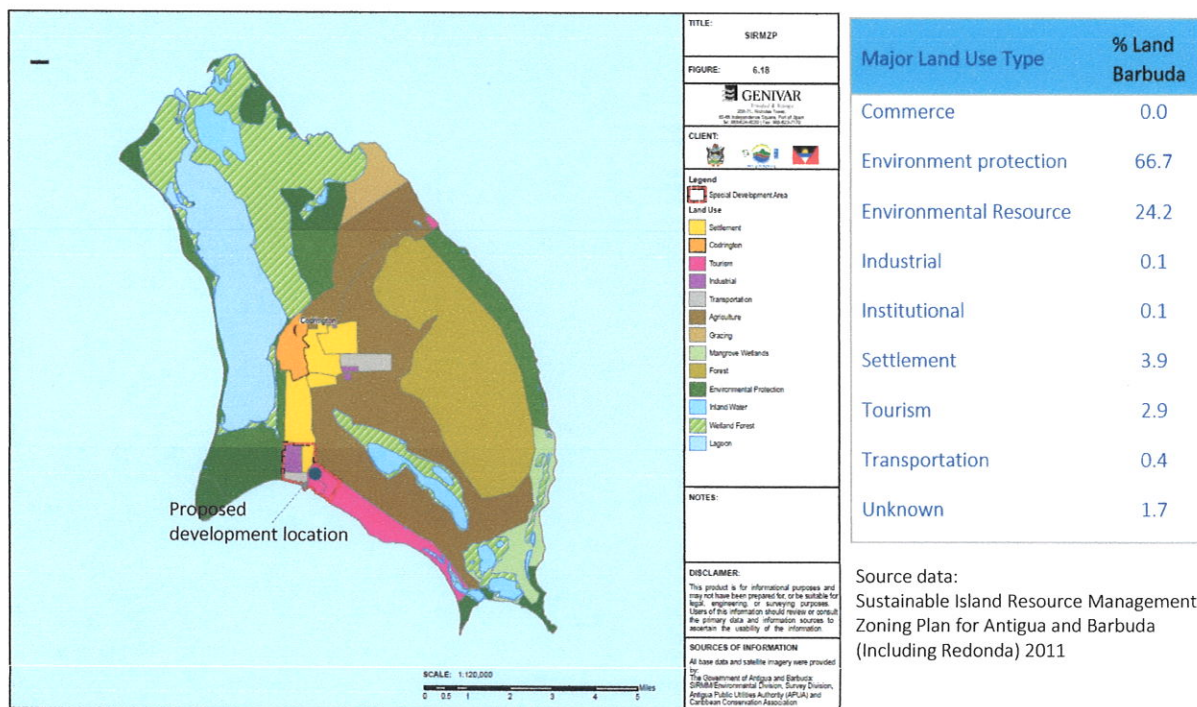
1. The site footprint **does not fall** under any special protected area for Barbuda. Such designations are created under sections 53 through to 57 of the Physical Planning Act 2003.
2. The site footprint **does not include** any important wetlands as outlined in Section 62, Schedule VI - List of Important Wetlands in the Environmental Protection and Management Act, 2019.
3. The site **does not include** any known designated historical or cultural heritage monuments, marine reserve (Marine Protected Areas) wrecks, national parks, water catchment reserves or wetland areas as specified the Convention on Wetlands of International Importance especially as Waterfowl Habitat.

A.4.2. Sustainable Island Resource Management Zone Plan for Barbuda

Land use designations for Barbuda are outlined in the Sustainable Island Resource Management Zoning Plan for Antigua and Barbuda (incl. Redonda) 2011. For Barbuda 2.9% of the land is designated for tourism development, predominantly located on the south coast of the island.

The site is located within the area designated for tourism development and is not located within areas designated for Environmental protection.

It is important to note the location and geometry of the designated sanctuaries identified in the Barbuda (Coastal Zoning and Management) Regulations 2014 (please see Figure 2) with respect to the location of the proposed development.



Sustainable Island Resource Management Zoning Plan for Barbuda 2011 Pink- area designated for tourism development; dark green areas -areas designated for environmental protection

A.5. Environmental Baseline

A.5.1. Introduction

The environmental baseline outlines the main and natural presentation of environmental attributes of the proposed development footprint namely, the physical, biological and social-cultural context associated with or influenced by the proposed development footprint. Key points for consideration are identified and serve to inform this appraisal process.

It is important to outline that the development footprint **does not fall** within any zones designated as :

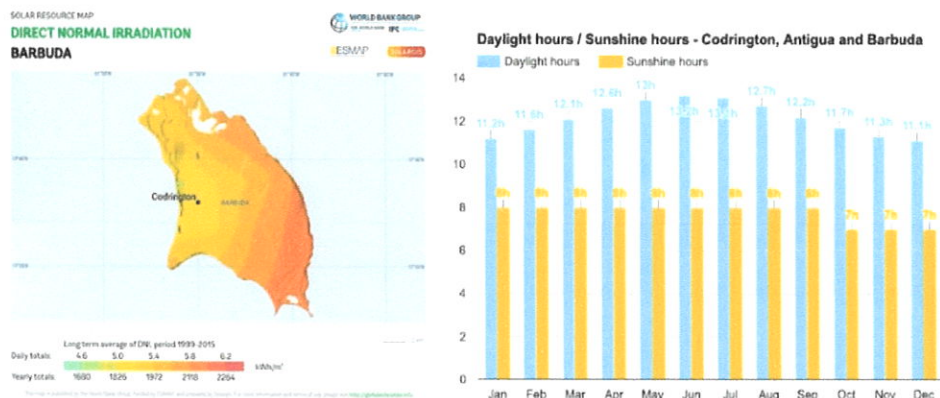
- environmental protection areas
- environmental risk areas
- environmental resource areas

A.5.2. Physical Environment

A.5.2.1 General Physical Attributes

A.5.2.1.1. Climate

Barbuda has a tropical maritime climate (warm, wet air mass originating at low latitudes over ocean areas) with an air temperature range from 18 - 45°C and a sea average temperature of 27°C, with no more than 3°C in variation. The island experiences steady north-easterly Trade Winds with velocities ranging between 30 - 48 km/h (19-30 mph), however, the island experiences a relative humidity of 70 - 85 percent. Precipitation is one of the most fundamental climate variables in Barbuda due to its importance in atmospheric dynamics and as the most critical natural resource of maximum impact on the island physiology and ecology. Annual precipitation for Barbuda ranges between 790 and 990 mm and is distributed during two seasons: a wet season running from October to December and a dry season from March to June. Insolation is fairly constant across the island, with a slight decrease in the winter months from October to December. The greatest intensity regarding irradiation is to the southeast of the island and less intense in and around Codrington.



(r) Irradiation map for Barbuda © 2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis. (l) Daylight/sunlight house, Barbuda (source: weather-atlas.com)

A.5.2.2. Terrestrial Physical Attributes

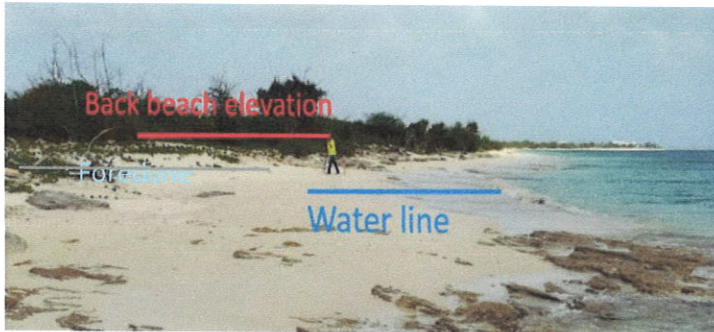
A.5.2.2.1 *Physiology, geology and soil type*

The island is relatively flat island with an abrupt escarpment along the eastern margin of the island on its Atlantic coast known as the Highlands, occupying ~25% of the island landmass. The Highlands is skirted by a marginal plain with a very low gradient on the west flank of the Highlands known locally as the Lowlands. The site lies to the south of the marginal plain with a gentle dip to the shoreline.

The rock formation which lies beneath the site is young (Palmetto Formation - Holocene) and comprises sandstones and limestone intercalations, often with hard aragonite noted from exposed rocky areas (outcrops) and beach rock formed from poorly cemented sandy layers. These rock formations are overlain by thin, poorly developed soil from the Codrington Clay Loam (Codrington Clay Loam Series No. 26) with the Palmetto Sands and fine clays further inland (Palmetto Sand Series BS No. 7) with recent medium to fine sand deposits along the shoreline.



To the west of the site lies an area which is slightly lower and forms an ephemeral pond during the rainy season, which retains water for a short period of time following a rainfall event. The soil type is the Palmetto Sands series. The area mostly devoid of vegetation.



Site coastline

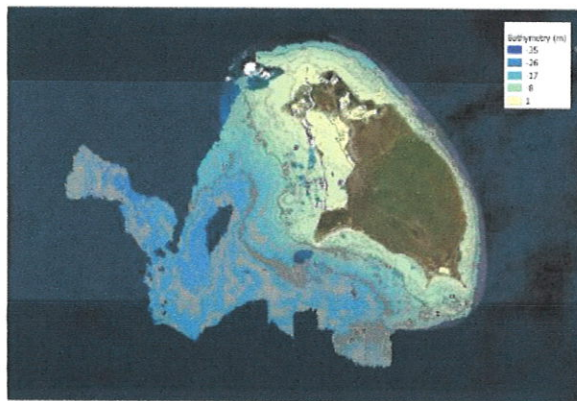
The coastline includes a foredune structure with eolian ridges usually covered in stabilizing vegetation .

A.5.2.2.1 Drainage and groundwater

Drainage across the site seems relatively good with no evidence of gley (waterlogged) soils. The site footprint is relatively dry.

A.5.2.3. Marine Physical Attributes

A.5.2.3.1. Physiology



Bathymetry profile, Barbuda © Data Management Unit, DoE

Barbuda is an island known for its very low-lying profile, often noted to seem concealed behind a swell and its extensive fringing and patch reefs which make it almost invisible and a treacherous approach during storms. The island is known as one of the greatest navigational hazards in the Region with limited safe marine navigational approaches, confirmed by the numerous shipwrecks just offshore.

The Escape to Barbuda proposed development lies within the sheltered side of the island (not exposed to the regular swell driven storms), but is not fully protected by coral reefs (as is the eastern coast of the island), but scattered reef outcrops are present. (CBCL accompanying report 2021) The water is clear and devoid of any land-based discharge.

A.5.3. Biological Environment

A.5.3.1 Terrestrial



Site looking S to coast.



Site to left looking W along south Coast Road.

The site footprint is dominated by open scrub sclerophyllous vegetational assemblage, displaying stunted growth in comparison with that found in the Highlands. It comprises sparse broad-leaved evergreen and dense dwarf-shrubs. The vegetation comprises a diverse plant community characterized by *Croton balsamifer* (balsam), *Lanata involucrata* (sweet sage), *Leucaena leucocephala* (wild tamarind), *Agave karatto* (dagger plant), *Phyllanthus epiphyllanthus* (bilbush), *Pilosocereus royenii* (duldul), *Comocladia ilicifolia*, (poison ash/hogwood), *Pisonia subcordata* (loblolly) and *Plumeria alba* (White Frangipani) and non-native climax species such as *haematoxylum campechianum* (logwood) and *Prosopis juliflora* (mesquite) which have deep tap roots and quickly become the dominant species. This habitat is frequently grazed by donkeys with several ground-feeding birds such as the helmeted guineafowl (*Numida meleagris*), *Zeanida aurita* (Zenida dove) and invertebrates such as *Coenobita clypeatus* (Caribbean Hermit crab). No endangered terrestrial flora or fauna are

known to occur within the development footprint.

A.5.3.2 Coastal

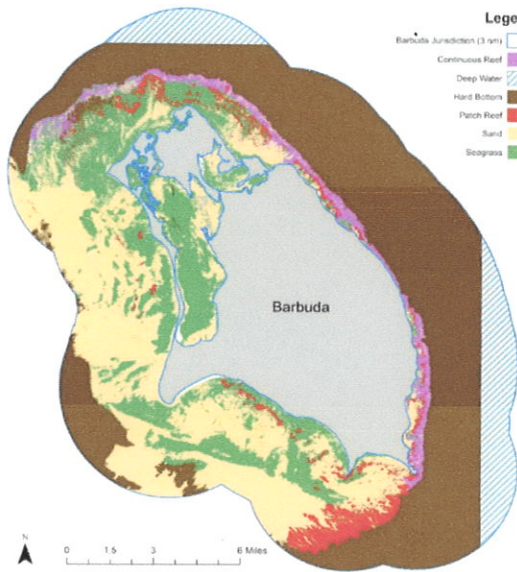


Large bay cedar tree on site coastline

The coastal habitat which fringes the site is dry and devoid of prominent fringing mangrove or salt ponds. Coastal evergreen shrubland lies along the seaward, western fridge. This vegetational assemblage comprises bay cedar (*Suriana maritima*), button mangrove (*Conocarpus erectus*) with low-lying dune grasses and vines dominated by beach morning glory (*Ipomoea pes-carpae*) which are established along the foredune ridges from just above high-water mark inland as far as sand extends. Other coastal species include sea grape (*Coccoloba uvifera*) and the coco plum (*Chrysobalanus icaco*). Non-native green Iguana (*Iguana*

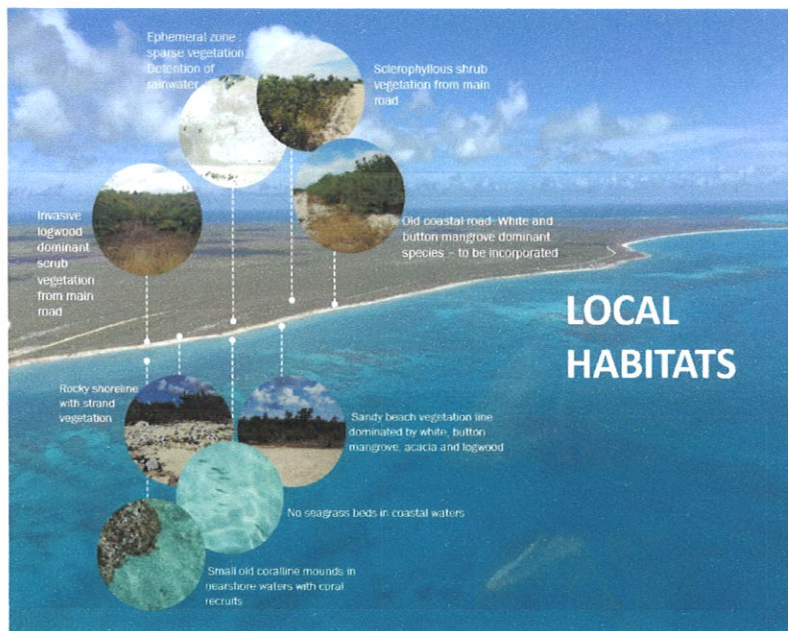
iguana) have often been seen scavenging along the rocky shorelines and seem to take advantage of their mobility to actively nest in the supralittoral zone and hunt in the eu littoral or intertidal zone. Turtles are endangered species and are known to nest along the coastline of Barbuda. However, nesting has not been recorded within the site footprint .

A.5.3.3 Marine



The seascape is dominated by a sandy substrate with scattered seagrass beds. Patch reefs dominate and are in good health as noted by the considerable number of coral recruits on the coralline mounds. The water is clear with demersal fish in modest abundance. The area is a no-net and no anchor/mooring zone. The seagrass habitats are an important component of the marine ecosystems they create rich meadows of single species or mixed assemblages and provide a vital food source for many important species such as turtles. Both hawksbill and green turtles have been observed in the nearshore environment

A summary of the local habitats, flora and fauna for the site are presented as follows:



Local habitats associated with the development footprint.



Old Coastal Road and example of unauthorized dumping and debris following local small social events.

A.5.4.2 Access and Accessibility

The proposed development will not only offer a bijou hotel complex equipped with a with conference center, health and wellness facilities, and children’s play area which will operate as a non-exclusive basis.

The developer seeks to create a footprint on the south coast of the island that embodies a resilient design and use of engineering technology but also is accessible to the local community and guests to the island. The facilities are also designed on one level to enable greater access to less able guests. Community access and use is important to the developer.

A.6. Environmental Appraisal

A.6.1 Sustainable Development Design

A.6.1.1 Design Concept

An important aspect in the development of the design concept was the early consideration of environmental aspects and attributes and integration of these aspects into the layout and orientation of structures and engineering systems to enable a development footprint that was visually and spatially aligned with the environment and needs for climate change safeguarding. The development footprint is located within dry scrub habitat which includes climax invasive species such as logwood and local acacia. There are few structural trees such as loblolly, clement, whitewood and button mangrove which will be incorporated into the landscaping of the site. The layout serves to preserve as much of the visual assets that the site offers. This early inclusion of aspect into the design approach is evident in the results of the environmental appraisal.

A.6.1.2 Appraisal and mitigation strategies

As the approach taken by the team was an early integration of environmental considerations and mitigation enabled through a charette. The design was modified throughout the process using the mitigation hierarchy of *avoid*, *minimize*, *restore* and *offset*, with avoid and minimise being the dominant mitigation strategies employed to layout, material use, orientation, flow with local vegetational forms considered for both aesthetics and as green coastal defence structures. The summary appraisal for the development design and layout is presented in Appendix 1.

A.6.1.3 Design modifications for environmental protection

A.6.1.3.1. Drainage

The design includes a retention pond which will act as storm water management for the site. It is an artificial pond with vegetation around its perimeter and will provide an aquatic aesthetic feature for the development footprint which will run parallel to the main infrastructure and coastline. The pond will be brackish and will serve as a buffer for surge and runoff. This is further detailed in the outline of the design concept report.

A.6.1.3.2. Setbacks

Full attention has been given to setback and the coastal models have determined an optimum level for the buildings observing the setback requirements which take into consideration the recent sea-level rise projects from the IPCC. The marine and coastal engineering analysis which included storm surge has informed the design concept. The details of this study can be found in the coastal study report for the site footprint.

A.6.1.3.3. Engineering Infrastructure and utilities

The selection of systems and services for the site includes a robust integration of renewable systems and best practice for the hotel, conference facility, health and wellbeing facilities and the planned 15 guest cottages. The approach will be prescribed for the 10 development plots located to the west of the site.

A.6.1.3.4. Use of material

The material to be used on site has not yet been fully detailed at this stage of the design process.

A.6.1.3.5. Lighting and Construction Setbacks

Turtle nesting has not been recorded for this site but as it is probable that turtles may in the future use the sandy shoreline of the development footprint as a nesting area, consideration has been given in site layout, setbacks and coastal lighting to harmonize the coastal realm. Construction demarcation and setbacks have been considered in the site layout to ensure obstacle free landward pathways to facilitate turtle nesting. Lighting along beachfront properties and hotels strongly affect sea turtle hatchlings, misdirecting them inland and leading them away from the sea. As such, the design will incorporate turtle friendly lighting structures.

A.6.1.3.6 Landscaping and layout



Example of button mangrove being used as structural planting - flood defence, Darkwood, Antigua.

The layout strongly considers the anticipated multi-use of the development and through its structure enables exemplar use of space, form, light and vegetation to present a spacious functional environment. Use of strong coastal defence vegetation such as local species such as sea grape (*Coccoloba uvifera*), wild grape (*Coccoloba krugii*), coco plum (*Chrysobalanus icaco*), bay cedar (*Suriana maritima*), button mangrove (*Conocarpus erectus*) and whitewood (*Bucida buceras*), which provide through their growth habitat, strong vegetation lines as a form of coastal defence. Examples of this have been noted in Darkwood beach, Antigua.





Summary

The charrette process has allowed the design team to create a development that is responsible to the visual and environmental integrity of the site footprint and has incorporated modifications in the layout, inclusive of a retention pond, to enable function and flow across the site from a natural and physical environmental perspective, through the design elements and layout.

The development intent is one of open engagement with the Barbudan community, providing a place to enjoy, especially for children with the children's play area feature of the development. The development uses space and location effectively, especially in its water and energy utilization.

A.7. Appendix 1

Environmental Appraisal Matrix

	Impact * (denoted as I) <i>Short (<1 year)/medium (1-5 years)/long term > 5 years</i>
	Aspect/activity perceived to have neutral impact on this environmental attribute of proposed development footprint; May present opportunity for enhancement
	Aspect /activity may have short-term negative impact on this environmental attribute of proposed development footprint
	Aspect /activity may have medium-term negative impact on this environmental attribute of proposed development footprint; may leave residual impact
	Aspect /activity may have long-term and permanent negative and undesirable impact on this environmental attribute of proposed development footprint

DESIGN MASTERPLAN ENVIRONMENTAL APPRAISAL

Environmental Attribute Observations

DESIGN MASTERPLAN ENVIRONMENTAL APPRAISAL		Anticipated Impact of Proposed Development Activities										
Environmental Attribute	Observations	Site clearance	Location/ layout of development infrastructure	Development drainage requirements	Building Material/ Cladding	Landscaping	Energy generation	Water resource	Sewage management	Solid waste management	road layout/parking	COMMENTS ON MITIGATION AND ENHANCEMENT APPLIED FROM CHARETTE
TERRESTRIAL												
Physical Environment												
Location	Site located on marginal scrubland sandwiched by the old coastal road and the new coastal road. Area does not include sensitive or protected land.											
Visual landscape	Coastal occlusion due to thick medium height scrub vegetation to S; lowland with slight elevation to N with mature scrubland and sclerophyllous vegetation											
Terrain	Lowland terrain with no outstanding features											
Slope	Very gentle slope to coast											
Geology	Palmetto Formation - limestone and sandstone intercalation											
Soil	Thin Codrington Loam on limestone regolith											
Surface water drainage	High rate of percolation expected due to geology and soil type; Known run off from outside of development footprint (N) inland to coast in rainy season											
Groundwater												
Biological Environment												
Flora	Common species expected for vegetational assemblages: thickets dominated by invasive species											
Sensitive vegetational assemblages	None											
Fauna	Occasional roaming donkeys and small livestock. Deer/wild boar not known for feeding/breeding in this area. No bat roosting areas											
Fauna: protected species	None											
Special ecosystem services	Area noted to have high permeability and facilitates drainage											
Habitats	Scrubland											
Sensitive habitats	no identified sensitive habitats											
Socio-cultural												
Land use designation	Site located in zone designated for tourism development											
Other development activities	No other development adjacent to site footprint											
Current community use	Dry scrubland; no current use identified; occasional drinking spot											
Cultural heritage sites	None identified/designated											
Archaeology	No known pits, or post-Columbian structures noted for footprint; No known pits, or post-Columbian structures noted for footprint; No known pits, or post-Columbian structures noted for footprint; Strombus line crossover unknown											

DESIGN MASTERPLAN ENVIRONMENTAL APPRAISAL

Environmental Attribute Observations

Anticipated Impact of Proposed Development Activities

COASTAL

Physical environment

Environmental Attribute	Observations	Site clearance	Location/ layout of development infrastructure	Development drainage requirements	Building Material/ Cladding	Landscaping	Energy generation	Water resource	Sewage management	Solid waste management	road layout/parking	COMMENTS ON MITIGATION AND ENHANCEMENT APPLIED FROM CHARETTE
Terrain	Rocky coastline with small sandy beach			X	X	X	X	X	X	X	X	Build will be away from this area on the coast due to construction setback adherence.
Geology	Palmetto Formation - limestone and sandstone intercalation			X	X	X	X	X	X	X	X	
Slope	Gentle			X	X	X	X	X	X	X	X	Climate studies support the construction setback and infrastructure design.
Substrate/sediment plain	Broken beachrock; Saline Coastal soils; landslide and fine sand seaside			X	X	X	X	X	X	X	X	Varied sediment plain- useful for beach use
Wave climate	Calm to moderate			X	X	X	X	X	X	X	X	Climate studies support the construction setback and infrastructure design.
Storm exposure	Moderate coastal protection - Storms E to W (hurricane season); Winter storm from NW			X	X	X	X	X	X	X	X	
Surface water drainage	No runoff; high degree of percolation			X	X	X	X	X	X	X	X	
Biological environment												
Flora	No protected species; Scrubland species incl acacia (cassia), wild tamarind; dominant inv. species - logwood; No red/black mangrove; white & button mangrove present to E of site			X	X	X	X	X	X	X	X	Establish trees will be marked for preservation on site and will be incorporated into landscaping.
Vegetation line	Established vegetation line; Strand vegetation along sandy substrate			X	X	X	X	X	X	X	X	Vegetation line will be retained and enhanced with seagrape planting - Coccoloba sp.
Fauna	Scrub assemblage of invertebrates and occasional anoles. Some small birds when shrubs are fruiting.			X	X	X	X	X	X	X	X	No change. Species will re-establish post construction.
Special ecosystem services (drainage)	Area noted to have high permeability and facilitates drainage			X	X	X	X	X	X	X	X	Groundwater will be high as sit is on coast. Retention pond will maintain integrity and will provide an important function regarding sediment and stormwater capture.
Sensitive habitats	No turtle nesting sites identified or noted from monitoring programmes for this footprint	X	X	X	X	X	X	X	X	X	X	Turtle lighting will still be applied at all coast facing illumination points.
Sociocultural												
Land use designation	Site located in zone designated for tourism development			X	X	X	X	X	X	X	X	Site is located within the tourism development zone as outlined in the planning zone designations for Barbuda
Current activity	Open beach- no special community designation			X	X	X	X	X	X	X	X	No best beach by Barbudan standards so not a popular bathing spot however, occasionally used by youth as a drinking spot.
Cultural heritage sites	None identified			X	X	X	X	X	X	X	X	No flora/fauna attributes of cultural significance
Archaeology	no pre- or post-Colombian structures identified; Strombus line crossover point unknown			X	X	X	X	X	X	X	X	Query on location of Strombus Line. Client wishes to incorporate into the development narrative.

DESIGN MASTERPLAN ENVIRONMENTAL APPRAISAL

Environmental Attribute Observations

Anticipated Impact of Proposed Development Activities

MARINE

Physical environment

Nearshore slope
Geology
Current dynamics
Storm exposure
Water quality

Gentle
Sand on beachrock
Longshore E to W
Dominant E to W
Clear waters

X
X
X
X
X

X
X
X
X
X

X
X
X
X
X

X
X
X
X
X

X
X
X
X
X

X
X
X
X
X

X
X
X
X
X

X
X
X
X
X

Bio logical environment

Flora
Fauna
Special ecosystem services
Sensitive habitats

Algae (chlorophyllous and calcareous) in small quantities on coralline mounds; no seagrass beds
Occasional demersal fish species; small coral reef associated species including coral recruits on small coralline mounds
Small coral mound communities; shoreline protection
No seagrass beds; isolated coralline mounds

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

Socio cultural

Marinescape use- fisherfolk
marine use- other
Cultural heritage sites
Archaeology

Area shallow and not in designated mooring zone; Not used for fishpots et al
None
None
No wrecks known

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

X
X
X
X

Development does not include any docks or over water features, nor will encourage any fishing activity. Area is a no mooring zone