ENVIRONMENTAL IMPACT ASSESSMENT

Proposed Renovation of Holiday Island Resort

Dhiffushi, South Ari Atoll, Maldives

Proponent: Villa Shipping and Trading Co. Ltd.

Sandcays

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List of Abbreviations

DO	Dissolved Oxygen
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Areas
GPS	Global Positioning System
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
K	Kaafu (Atoll)
l/p/d	litres per person per day
MEA	Maldives Energy Authority
MECCT	Ministry of Environment, Climate Change and Technology
MEE	Ministry of Environment and Energy
MNPHI	Ministry of National Planning, Housing and Infrastructure
MOT	Ministry of Tourism
MSL	Mean Sea Level
NBSAP	National Biodiversity Strategy and Action Plan
NE	North East
NEAP	National Environment Action Plan
NW	North West
NSSD	National Strategy for Sustainable Development
PVC	Poly Vinyl Chloride
RO	Reverse Osmosis
SE	South East
SW	South West
TDS	Total Dissolved Solids
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VEC	Valued Environmental (and Social) Components
VSTC	Villa Shipping and Trading Co. Ltd.

Consultant's Declaration

This EIA has been prepared according to the EIA Regulations of the Maldives. I certify that the statements in this Environmental Impact Assessment study are true, complete and correct to the best of my knowledge and abilities.

Ahmed Zahid (EIA P08/2007)

Proponent's Declaration

As the proponent of the proposed development, I guarantee that I have read the report thoroughly and that to the best of my knowledge all information provided here is accurate and complete.

Mohamed Yaqzan

Villa Shipping and Trading Co. Pvt. Ltd.

Executive Summary

This report addresses the environmental concerns of the proposed renovation of Holiday Island Resort and Spa, Dhiffushi, South Ari Atoll. The Proponent of the proposed development is Villa Shipping and Trading Company Pvt. Ltd.

It is proposed to demolish 46 single rooms and 9 double rooms to be replaced by 25 single pool villas, 10 double pool villas and 17 single honeymoon villas. The total number of villas would reduce to 96 units. Most of the proposed rooms are to be located in the same areas as the rooms to be demolished except for a slight inward movement of the villas on the southern side of the island. In addition, the jetty, main pool, restaurant, Italian Bar, fitness facility and diesel tank is to be reconstructed. Other facilities and some of the rooms will remain as they are.

The proposed development will conform to all current environmental laws and regulations. These include the Environmental Protection and Preservation Act, Tourism Act, EIA Regulations and Regulation on the Protection and Conservation of the Environment in the Tourism Industry. Environmental regulations such as the dredging and reclamation regulation, fuel handling and management regulations and desalination regulation among others will also be adhered to. Existing national policies on matters relating to environmental protection and preservation will also be strictly followed.

The main negative impact of the proposed development will be due to the construction of the proposed swimming pool on the beach and removal of vegetation for part of the proposed rooms on the southern side. The construction of the proposed new jetty is also expected to have some degree of negative impacts due to machinery. This, however, would have no effect on the overall long-term transport around the island as it is on the same footprint as the previous jetty. The swimming pool, on the other hand, would have some negative impacts on longshore sediment transport. The other impacts are minor excavation for installation of columns for the construction of jetty (minor negative and short term cumulative). The building and construction activities on land have short-term impacts and does not affect areas other than some of the proposed new rooms. The impacts of water supply, electricity and waste and wastewater disposal during the construction as well as operational phase would have long-term negative impacts which would be mitigated based on existing good practices which have been well-established over the years by the Government of Maldives including good legislative frameworks developed by the Ministry of Tourism and the Ministry of Environment.

Furthermore, Villa resorts have been at the forefront of environmental management and have well established environmental controls. Holiday Island Resort and Spa has had such for a number of years.

The environmental impacts of the proposed renovation are inevitable, yet every effort is to be made to minimize the impacts and footprint of the impacts. Since the island has been an operational resort, only previous footprint areas would be mainly affected and vegetation clearance would be minimal. When excavation for laying of footings on water are carried out, tidal windows and weather conditions would be considered in order to minimize sedimentation. It is to be noted that there are no corals in the project areas (i.e. the existing jetty). The proposed jetty is at the same footprint area as the existing jetty and would be built in the same manner using piles with their footings buried in the seabed. The use of sand beds for excavator movement to lay any piles or structures shall not be allowed. Furthermore, additional measures have been considered to minimize erosion so that sedimentation is kept at minimal levels. These include some additional groynes in affected areas.

The other environmental impacts of the proposed development include solid waste management, atmospheric emissions due to burning of fossil fuel and brine and sewage/wastewater disposal. Solid waste will be generated both during the constructional and operational phase of the resort. Constructional waste will be managed using the existing waste disposal mechanisms. During the operational phase, waste management facilities, which have been previously established as per the Tourism Regulations, will be used in managing waste. It is during the construction stage that the waste is often not managed properly and waste ends up in the environment. Therefore, it is vital that appropriate waste management procedures are strictly enforced during construction. Construction waste including concrete debris especially demolished concrete piles from the jetty will be taken our and/or buried at site. Sand and aggregate shall not be placed on the beach but at designated locations inland. Supervision and awareness of construction workforce shall be in place with strict environmental controls and staff made aware of the need to preserve and protect the fragile environment of the island from the very onset of the project.

Electricity is provided by diesel generator sets for the generation of power for lighting, machinery, water supply, sewage treatment, etc. Due to the small scale of the operation (below 600kVA in total), the emissions are low but would contribute to global emissions in negligible quantities with a cumulative long-term impact. Desalination, electricity supply and sewage

treatment are the main fuel-dependent processes. Therefore, fuel efficiency would be given priority and energy efficient technology would be used for any replacements of existing energy infrastructure such as the proposed improvements to the wastewater treatment plant. Energy optimization practices will be in effect.

Brine discharge has no impact due to the small volume and its discharge location is irrelevant and does not need to be changed. Treated effluent with low levels of BOD (less than 60mg/l) will be disposed beyond the reef at a depth of over 7m at the current discharge location. The current discharge pipe would be improved including anchors used for the outfalls. Given that wastewater will be treated and disposed at appropriate location and depth, the impact from sewage and wastewater disposal will be of minor significance. In fact, the daily peak flows are quite small that the proposed sea outfall would provide over 700-fold dilution to the sewage effluent even if it were raw sewage, which would occur only in the unlikely event that the sewage treatment plant fails. Hence, no further mitigation measures have been considered for sewage disposal and treatment.

Environmental monitoring has been incorporated into the project. Arrangements for monitoring will be continuous with the monitoring being undertaken for the coastal modification phase as per the EIA approved in 2020. Monitoring will be undertaken according to the monitoring programme recommended in this report including water quality (marine and groundwater), coastal hydrodynamics, beach profiles, waste management practices, desalinated water quality and ambient water quality at brine discharge location. Annual environmental monitoring report will continue to be submitted to the EPA and the Ministry of Tourism at the end of construction and annually during the operational phase. The monitoring programme may be reviewed regularly to incorporate additional requirements or reduce the scope depending on environmental performance of the project.

The overall environmental impacts of the project have been assessed using appropriate matrices and the results indicated that the proposed project has net positive impact. Given that the project has major socio-economic benefits although there would be some negative environmental impacts, it is recommended to allow the project to proceed as proposed.

ޚުލާސާ

މި ރިޕޯޓަކީ އަރިއަތޮޅު ދިއްފުށީގައި ހުންނަ ހޮލިޑޭ އައިލެންޑް ރިސޯޓް ރިނޮވޭޝަން ކުރުމުގެ މަޝްރޫއާ ގުޅޭ އެންވަޔަރަންމަންޓަލް އިމްޕެކްޓް އެސެސްމަންޓް ރިޕޯޓެވެ. މި މަޝްރޫއުގެ ތަފާސީލު، މަޝްރޫއުގެ ސަބަބުން ތިމާވެށްޓަށް ކުރާނެ އަސަރު ދިރާސާކޮށް، އެ އަސަރުތައް ކުޑަކުރުމަށް އަޅަންޖެހޭ ފިޔަވަޅުތައް މި ރިޕޯޓުގައި ބަޔާންކޮށްފައިވެއެވެ.

މި މަޝްރޫއުގެ ދަށުން މިހާރު ހުރި 46 ސިންގަލް ކޮޓަރި އާއި 9 ޑަބަލް ކޮޓަރި ތަޅާލައިގެން 25 ސިންގަލް ޓުއިން ވިލާ އާއި 10 ޑަބަލް ޓުއިން ވިލާ އާއި 17 ހިސާބުން ވިލާ ހަދަން ވަނީ ހުށަހަޅާފައެވެ. މިގޮތުން ކޮޓަރީގެ ޖުމްލަ އަދަދު 96 އަށް ކުޅަވާލެވޭނެއެވެ. އަދި ދުވަސް ފަހަރުގައި ހުރި ބޯޓުތައް ކުޅަދާނަ އޮޕަރޭޝަނަށް ބަދަލު ގެނައުމަށް ފިހާރައި އެތަން ހަދާ ކޮޓަރިތައް ހެދުމަށް ކުރިން ހުރި ބޯޓުތައް ހުރި ތަނުގައެވެ. ކޮޓަރީގެ އިތުރުން މިހާރު ހުރި ޖެޓީ ނަގައި އައު ޖެޓީއެއް ގެނައުމާ، ރެސްޓޯރަންޓް، ސްޕާ، ޖިމް، އިލެކްޓްރިކް ރޫމް، ވޭސްޓް މެނޭޖްމަންޓް ސިސްޓަމް އެއް ގެނައުމާ މިހާރު ހުރި ޕާސަލް އަޅާ ބޭނުންކުރާ އަލުން ގެނައުން ހިމެނެއެވެ.

މި މަޝްރޫއު އެކުލަވާލެވިފައި ވަނީ ކުރުވެގެން ދާނެ ކަމެއް ގޮތަށް ފާސްކުރެވޭ ފަރާތްތަކުގެ ބަސްފުޅު ގޮތުގެ މަތިން ކަމަށެވެ. މީގެ ތެރޭގައި ޕްރޮޖެކްޓުގެ ދިރާސާކުރެވުނު ތިމާވެށީ ކަންތައްތަކާއި ގުޅުންހުރި ޖުމްލަ ބޭސް ލައިން، ފާރަވެރިކަމުގެ ލައިން، ތިމާވެށްޓަށް އަސަރުކުރާނެ ކަންތައްތައް ކުޑަކުރުމުގެ ފިޔަވަޅުތައް "ރަށުގެ ތިމާވެށި ރަނގަޅު ހާލަތުގައި ބަހައްޓާ ފިޔަވަޅުތަކާއި ހާލަތު މޮނިޓަރިންގ ޕްރޮގްރާމް" ފަދަ ކަންތައްތައް ހިމެނެއެވެ. އަދި ދިރާސާގެ ނަތީޖާތަކުން ފާހަގަކުރެވުނު ފައިދާތަކާއި ގެއްލުންތައް މި ރިޕޯޓުގައި ބަޔާންކޮށްފައި ވެއެވެ.

މަޝްރޫޢު ގެ ސަބަބުން ތިމާވެށްޓަށް ކުރާނެ އަސަރު ފާހަގަކުރުމަށް ރަށުގެ ކަނޑުގެ ފަރުގައި (އިންވެސްޓް ސާވޭގެ ޖާގަ ކުރުމާއި، ދިރާސާކުރެވުނު ހިސާބު ސަރަހައްދު، އިމާރާތްކުރާ ސަރަހައްދު ފަދަ) ގޮތުގެ މަތިން ތިމާވެށި ދިރާސާކުރެވުނު ބައިތަކެއް ހުރި ކަމަށް ފާހަގަ ކުރެވިފައިވާ ސަރަހައްދުތަކުގެ ތިމާވެށްޓަށް އަސަރުކުރާނެ ކަންތައްތައް ފާހަގަކޮށް، އަދި މިފަދަ ތިމާވެށީގެ އަސަރުތައް ކުޑަކުރުމަށް ހިންގާނެ ފިޔަވަޅުތަކާއި ރަށުގެ ތިމާވެށި ރައްކާތެރިކުރުމަށް ދޭ ސަމާލުކަމާއި ރަށުގެ ތިމާވެށީގެ ޖާގަ ދިރާސާކުރެވުނު

ކުންފުނި ދަށުގެ ތިން ބަނދަރު ތަކުގެ ފަރާތުން، ކުރިއަށްގެންދަނީ ހަމަ ބަދަލު ގެނައުމުގެ ކުރިން ކުރިއަށްގެންދާ (ވަނަވަރުގައި ލޯ ހުއްދަ ދީފައި) ބަދަލުތަކުގެ ތަފާތު ބަލައިގަތުމަށް ކަނޑުގައި ހިންގާ ކަންތައް

މި މަޝްރޫޢުގެ މަސައްކަތް ހިނގުމުންދާއިރު އަދި ރިސޯޓް އޮޕަރޭޓްކުރުމުން ދާއިރު އުފެދޭ ކުނި ނައްތާލުމާއި ފެނާއި ނަރުދަމާގެ ހިދުމަތް އަދި ކަރަންޓުގެ ހިދުމަތްދިނުމުގައި ތިމާވެށްޓަށް އަސަރު ފޯރާ މިންވަރު ކުޑަކުރުމަށް މަސައްކަތްކުރާނެއެވެ. އިމާރާތްކުރާ ސްޓޭޖުގައި އުފެދޭ ކުނި މިހާރު ޤާއިމުކުރެވިފައިވާ ކުނިނައްތާލުމުގެ ނިޒާމުގެ ތެރެއިން ދޫސްޖެކާރް ތިލަފުށްޓަށް ގެންދިއުމުގެ ކަންކަން އިދާރީ ހަމަޖެއްސާނެއެވެ. ރިސޯޓް ހިނގުމުންދާއިރު ކުނި ނައްތާލުމަށް ބޭނުންވާ ވަސީލަތްތައް، ފަތުރުވެރިކަމުގެ ދާއިރާގެ ކަމާއި ބެހޭ ގަވާއިދު ބުނާހެން، ހޮޓަލު އައިލެންޑުގައި ވަނީ ޤާއިމުކުރެވިފައެވެ. އިމާރާތްކުރާ ސްޓޭޖުގައި އުފެދޭ ކުނީގެ ތެރެއިން ތޮލިކުނޑި، ބާވަތްތަކާއި ޖޫޓާ ކޮންކްރީޓު ބައިތައް ދުދުރުގައި ވަޔަރިންގްވާޅަން ވަލިވަލިން ނަރަގި އުކާލުމާއި ހިލަގާއި ހިލަވެލި ގޮނޑުދުރުގައި ނުބޭރުކޮށްތުން ފަދަ ކަންކަން ރަނގަޅަށް ބެލެހެއްޓުން ކުރުވާން އިންތިޒާމުކޮށްގެން ހަމަޖެހިފައި ކުނިނައްތާލާނެއެވެ. މީގެ އިތުރުން މަސައްކަތްކުރާ ފަރާތްތަކުން މަސައްކަތްކުރަނީ ރަނގަޅު ސާފުކޮށް ގާރަޑުގާއިރު ފަރުވާތެރިވުމަށް ހަޔާތްކަމަށްވާނެއެވެ.

އަދި ފެނާއި ނަރުދަމާ އަދި ހަކަތައިގެ ނިޒާމަކީ ޑީސަލް ތެލުގެ ބޭނުންކުރާ ނިޒާމުތަކަކަށްވާތީ، ޖައްވަށް "ގްރީންހައުސް" ގޭސް ބޭރުވާނެއެވެ. ނަމަވެސް، ފެނާއި ނަޖިސްފެން އަދި ހަކަތަ އުފެއްދާ މިންވަރު ކުޑަކުރަން ވާތީ، ޖައްވަށް ބޭރުވާ ގޭސް މިންވަރު ވަރަށް ކުޑަވާނެއެވެ. ނަމަވެސް، މިއީ ދިގު މުއްދަތަކަށް ބަލާއިރު ޖުމްލަ ބޭރުވާ މިންވަރު ކުޑަނަމަވެސް އިތުރުވާނެ މިންވަރެއް ކަމުން ހަކަތަ ބޭނުންކުރުން ކުޑަކުރުމަށް ކުރެވޭނެ ހުރިހާ ކަމެއް ކުރަންވާނެއެވެ. މިގޮތުން އަވިން ހަކަތަ އުފައްދާ ނިޒާމުތަކަށް އިސްކަންދިނުމާއި ހަކަތަ މަދުން ބޭނުންކުރާ އާލާތްތަކަށް އިސްކަން ދިނުމަށް ވިސްނާފައެވެ.

ފެން އުފެއްދާ ނިޒާމުން ބޭރުކުރާ ލޮނު/ބްރައިން ގެ މިންވަރު ކުޑަވެފައި އޭގެ ނުރައްކާ އަސަރު ލޮނުބޭރުކުރާ ދުރުގެ ސަރަހައްދަށް ނުކުތާތަކުގެ އެކަމުގެ ސަރަހައްދުން ނުކުތާ އަސަރެއް ނުކުރާ ކަމަށް ކަނޑައެޅިފައެވެ. އަދި ނަރުދަމާއި ނަޖިސް ފެނުން ތިމާވެށްޓަށް ސަމާލުކަމާ ކުޑަކުރުމުގެ ގޮތުން ބިން ނިގުޅާ ޓެކްނޮލޮޖީ ކުރިއަރާފައިވާ ނަޖިހާއި ނަޖިސްފެން ސެޕްޓިކް ނަޖިހާއި ތަރުކީބުވެފައިވާ ފަރުވާ ކުރެވޭ ނިޒާމެއް ގާއިމުކުރެވޭނެ ބާވަތެއް މަދުން ބޭނުންކުރާ ފަރުވާ ދީގެން ނަޖިސްފެން ބޭރުކުރާނެއެވެ. އަދި މިގޮތުން ނަޖިސްފެން ފަރުން ބާރަށް އަދި 7 މީޓަރަށްވުރެ އަޑިއަށް. އަދި މިހާރު އޮތް ނަޖިސްބޭރުކުރާ ޕަމްޕްހައުސްގައިވާ ކޮންޓްރޯލް އިންޓަރމީޑިއޭޓް ޕަމްޕްހައުސްއަކާ ގުޅުވައިގެން ބިމުދަށުން ކޮށްފައިވާ ސިސްޓަމްގެ އަސަރު ކުރިމަތިވާ ނުރައްކާތައް ނުކުމެއެވެ. އަދި ނަޖިސްފެން ސަރަހައްދަކީ މަދުން ސަރަހައްދުން ނެގޭ ފަރުވާދީގެން ނަޖިސްފެން ބޭރުކުރާ ހިސާބު ސަރަހައްދު ފެށިގެން 700 މީޓަރަށް ވުރެ ދުރު މިންވަރަކަށް ނަޖިސް އަސަރު ކުޑަވެގެން ދާނެއެވެ.

ދަށެއްގެ ސަބަބުން ތާއީދުކުރާ ތަކެތި ބަދަލުކުރުމަށް ތަކެތި ލިޔެބަދަލުކުރުމަށް ދަތި ވާ ކަމަށް ވާނަމަ ކަ ކ ކ ކ

1 Introduction

1.1 Introduction

This EIA report has been prepared in order to meet the requirements of the Tourism Act and the Environmental Protection and Preservation Act of the Maldives to assess the impacts of proposed renovation of Holiday Island Resort and Spa in North Malé Atoll, Maldives. Clause 5 of Environmental Protection and Preservation Act states that an Environmental Impact Assessment (EIA) study need to be carried out before implementing any development project which may have potential impacts on the environment. All resort projects are considered as projects that require EIA under the EIA Regulations of the Maldives.

This report will look at the justifications for undertaking the proposed project components. Alternatives to proposed components or activities in terms of location, design and environmental considerations would be suggested. A mitigation plan and monitoring programme before, during and after the works would also be included. Monitoring would ensure that the proposed activities are undertaken with caution and appropriate care so as to protect and preserve the built environment of the areas in proximity to the site or those areas and environmental components affected by the development.

The findings of this report are based on qualitative and quantitative assessments undertaken during site visits in August 2021 as well as professional judgement. Data and information presented in the EIA for Coastal Modifications carried out in 2020 and project concept documents have been relied upon in order to understand and present the project. The impact assessment methodology has been restricted to field data collected, professional judgment and experience of similar settings and projects across the Maldives and elsewhere. Long-term data relevant to this report on specific aspects such as meteorology and climate were gathered from secondary sources and published reports on the Maldives. Since several projects of this sort have been undertaken in the past, documents and experiences from these projects have been reviewed and taken into consideration. Personnel experiences of the EIA Consultants; especially experiences with resort development projects undertaken recently, have been taken into consideration.

1.2 Background to the EIA

This EIA is prepared in accordance with the Terms of Reference (TOR) approved by the Environmental Protection Agency on 14 July 2021. It is a legal requirement that new projects having potential for environmental impacts gain environmental clearance or approval prior to implementation of such projects.

The principal environmental institution that implements EIA process in the country is Environmental Protection Agency. Once submitted, EPA will review this EIA report and provide a Decision Statement once all concerns following the review have been addressed appropriately.

1.3 Scope of the EIA and Approach

The main scope of this EIA report as per the approved TOR is to broadly assess, identify, predict and document potential environmental impacts from the proposed re-development of Holiday Island Resort on Dhiffushi, Alifu Dhaalu Atoll. Hence, importance is given to document the project in detail, identify the main environmental impacts that are associated with the proposed development and address the legal requirements that need to be taken into consideration while implementing this project. This document also addresses the existing environmental condition of the project site and foresees the ways in which potential environmental impacts will be managed, mitigated and reduced.

Hence the key aims of the report are to;

- Describe in detail the proposed project;
- Identify the need and justification for the proposed development;
- Describe the biophysical status of the existing environmental condition of the project site based on the findings undertaken during the site visits;
- Assess, identify and predict potential environmental impacts of the proposed development;
- Evaluate the significance and magnitude of impacts that will be generated; and identify and predict ways in which these environmental impacts will be prevented and removed through appropriate environmental management and mitigation measures;

- Develop a mechanism to closely monitor and understand the long-term effects and changes of the proposed development on the environment with respect to the available baseline information, mostly collected from field assessments and site visits;
- Provide legal protection with regards to the proposed development activities; and
- Review the predictions and assessments made on environmental impacts that are associated with the proposed development activities.

In general, the EIA report has been based upon the following sources of information:

- Review of available project documentation;
- Review of the Coastal Modification EIA (2020) for Holiday Island Resort;
- Discussions with involved key personnel;
- Site visits to the island and baseline environmental assessments;
- Environmental and tourism laws and regulations;
- National development plans and policies;
- Consultants previous experience of similar EIAs in the Maldives;
- Other EIAs for similar development projects carried out in the Maldives; and
- EIAs undertaken for projects South Ari Atoll.

1.4 Relevant Studies

Recent EIA reports for resort development as well as redevelopment projects, in which the project consultants have been recently involved have been carefully studied. Furthermore, other projects undertaken by the Consultant in ADh. Atoll has also been taken into consideration. These include:

- EIA for resort development on Lagoon 19, Malé Atoll (2021)
- EIA for resort development on Ethere Madivaru (2021)
- EIA for water park and green house at Sun Island Resort (2020)
- EIA for road project at ADh. Maamigili (2020)
- EIA for coastal modifications at Holiday Island Resort (2020)
- EIA for resort development on Giraavarufalhu (2020)
- EIA for resort development by reclamation of several islands at Kudavattarufalhu, North Malé Atoll (2018)

- EIA, Addendum, project management and monitoring of coastal works including seagrass removal at M. Hakuraa Huraa (2018 to 2019)
- EIA for proposed coastal modifications at ADh. Thundufushi (2019)
- EIA and ongoing environmental monitoring for resort development by reclamation of several islands at Maadhunifaru, North Malé Atoll (2016 onwards)
- EIA for reclamation of islands for resort development at ADh. Heenfaru (2017)
- EIA for resort development by reclamation of several islands at Kassanfaru, North Malé Atoll (2017)
- EIA for resort development in Keredhdhoo, Gaafu Alifu Atoll (2018)
- EIA for resort development in Ismehelahera, Seenu Atoll (2018)
- EIA for the ecotourism project in Fuvahmulah, Gn. Atoll (2017)
- EIA for resort development in Uthurumaafaru, Raa Atoll (2017)
- EIA for resort development in Bodufarufinolhu, Raa Atoll (2017)
- EIA for resort development at ADh. Huruelhi (2016)
- EIA for resort development by reclamation at J Lagoon, North Malé Atoll (2017)
- EIA for coastal modifications at K. Dhonveli (2016)
- EIA for resort development at ADh. Heenfaru (2016)
- EIA for the second phase renovation and coastal modifications at Lux Maldives, South Ari Atoll (2016)

Some EIAs by other consultants for recent resort projects undertaken in central Atolls have also been studied.

- EMP for renovation and upgrading of K. Vaagali (Abdul Awwal Ahmed Nizar 2020)
- EIA for redevelopment of Velifinolhu and erosion mitigation on Veligandu Island Resort, North Ari Atoll (CDE 2020)
- EIA for redevelopment of Finolhu Maldives, Baa Atoll (Zahir and Shujaath 2020)
- EIA for upgrading and renovation works at Four Seasons Landaagiraavaru, Baa Atoll (CDE 2019)
- EMP for redevelopment of Angsana Velavaru (Amir Musthafa 2019)
- EIA for reclamation at K. Maadhoo Falhu (Water Solutions 2019)
- EIA for resort development at Kudafari, Raa Atoll (Mahmood Riyaz 2014)
- EIA for resort development at Kudakurathu, Raa Atoll (LaMer 2012)

1.5 EIA Implementation and Methodologies

This study was based mainly on data collected during field investigation missions in August 2021 by a team from Sandcays. Published literature on similar settings and projects as well as various modelling studies carried out for the other projects have been reviewed. The EIA report was compiled by Ahmed Zahid. Zahid is a registered EIA consultant with over 24 years of experience who has been involved in numerous coastal and resort development projects in the Maldives.

Established and widely accepted methods have been applied in this EIA study. Field studies have been undertaken using methods generally employed for EIA studies in the Maldives. The field assessment methodologies are briefly described in Section 4.2 of this report.

The methods used to identify, predict and assess impacts are based on matrices that have been established by the Consultants over a long period. In the matrix, the consultants assign a likert-scale number to represent the magnitude, significance, duration and spatial extent of the potential impact for each project activity against the key environmental and socio-economic components that the specific project activity may have an impact on. The product of the magnitude, significance, duration and spatial extent for each activity and component is summed up to measure the exact nature of the impacts by each activity and the overall impact of the proposed project is the sum of all activities.

The Terms of Reference (TOR) for this EIA has been attached as Appendix 1. This EIA has been prepared based on this term of reference.

2 Project Description

2.1 Introduction

The purpose of this chapter is to describe the project in terms of the need and justification of the project, location and boundaries of the project, project schedule, main inputs, project mobilization as well as project construction activities. In addition, this chapter discusses about materials and resources that will be used as well as the main output of the project.

2.2 Proponent

The proponent of the proposed project is Villa Shipping and Trading Co. Ltd. (VSTC). VSTC is one of the largest private companies in the Maldives. Mr. Qasim Ibrahim founded the company in 1986 to manage trading and shipping interests. In 1988, VSTC poured its profits from its trading operations into the tourism industry. The company operates five resorts with 2008 beds and carries out trading operations supported by a shipping fleet of 8 cargo ships and tankers. Holiday Island Resort is one of these resorts operated by VSTC.

2.3 Project Location and Boundaries

Dhiffushi (Holiday Island Resort) is a medium sized island measuring about 18 hectares. It is located on the southern rim of South Ari Atoll (Alifu Dhaalu Atoll) at geographic coordinates 72°49'E, 3°29'N. The length of the island is about 900m. The average width is 200 meters.

The island lies on a 15 km long lagoon along with Sun Island Resort (also leased to VSTC), Fenfushi (an inhabited island) and Bodufinolhu (another resort under construction) on the west and Maamigili on the east of Holiday Island. Maamigili is the closest inhabited island and also has an international airport. Maamigili and Holiday Island Resort are separated by a 167m wide stretch of deepened water forming a harbour for the airport. Mahibadhoo, the atoll capital is located about 34.9 km north-east of Holiday Island.

The long stretch of two reef systems from the northern tip of Dhigurah on the east to Huruelhi on the west comprises the South Ari Atoll Protected Area where whale sharks can be found throughout the year. Holiday Island Resort is nearly a kilometre away from the protected reef area.

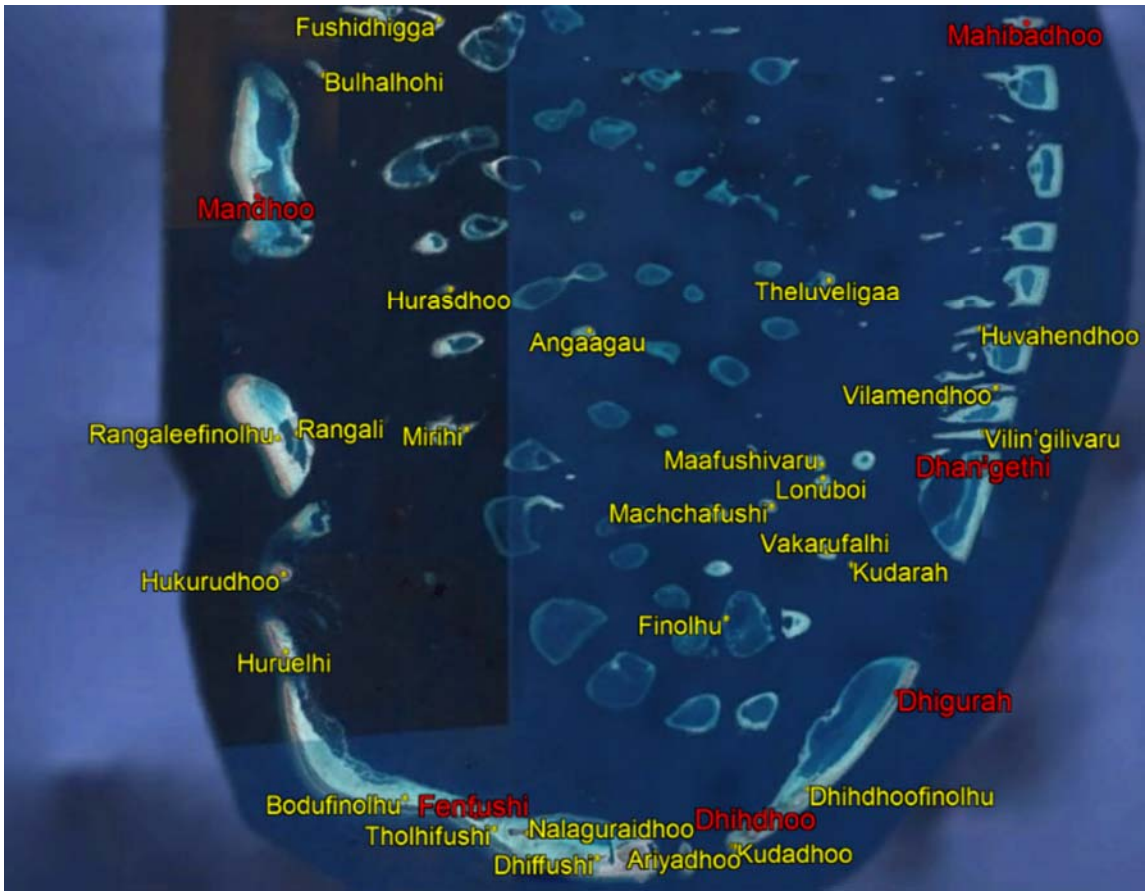


Figure 2-1: Location of Dhiffushi (Holiday Island Resort) in S. Ari Atoll (Google Earth)

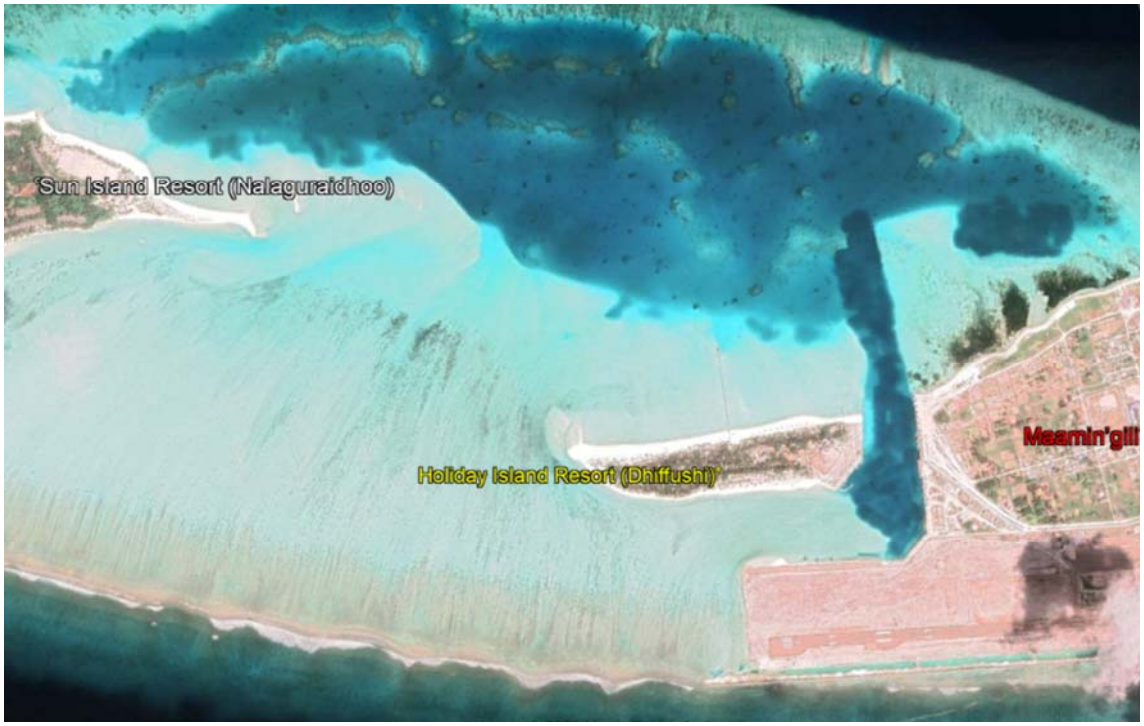


Figure 2-2: Holiday Island Resort and its vicinity (Google Earth)

2.4 The Project

The Project involves the renovation or upgrading of the luxury tourist resort as per the approved demolition plan and concept attached. The following existing structures are proposed to be demolished and replaced with new structures.

- Single rooms 136-169, 193-202, 211-242
- Double rooms 202-210
- Jetty, Sail Hut, Beach Bar, Water Sports Center and Diesel Tank

The proposed new structures are as follows:

- Haven Residences (single)
- Haven Deluxe Pool Villa (single)
- Jetty, Main Pool, Restaurant WC, Italian Bar, Fitness Facility and Diesel Tank

The following structures are proposed to undergo renovation:

- Haven Pool Villa (single)
- Havel Pool Villa (double)
- Haven Honeymoon Villa (single)
- Public Area (including extension)

2.5 Environmentally significant activities

The following project components are of environmental significance for this project.

1. Mobilization of material to site
2. Demolition and demolition waste disposal
3. Construction of new structures
4. Possible changes to coastal protection
5. Resort operation (restored after renovation)

The following sub-sections looks at the details of these environmentally significant elements of the proposed project.

2.5.1 Mobilization

Heavy machinery would be mobilized to site upon receipt of construction permit from the Ministry of Tourism following the EIA Decision Statement issued by the EPA. Material and machinery would be mobilized to site using Proponent's barges and/or landing crafts. Once mobilized, materials and machinery will be closed in designated areas inland and away from beach areas.

2.5.2 Demolition

At present some demolition works are underway to speed up the demolition once heavy machinery has been mobilized to site. Demolition of existing buildings marked for demolition will be undertaken using excavator and demolished material moved in trucks. Demolition plan is provided in Figure 2-3.

Demolition of the fuel tank would be carried out after emptying the fuel tank and desludging the inside and bund area of the fuel tank. The sludge from desludging of the fuel tanks would be carefully removed and kept in a separate area in closed containers. Any remains of the sludge would be further removed by steam treatment. All necessary safety precautions would be taken during the cleaning and demolition of the fuel tank.

2.5.3 Vegetation Clearance

It is estimated that about 100 coconut palms would have to be transplanted during clearing for the proposed villas on the south side and a few coconut palms transplanted from the northwest side. In addition to bushes of scaevola tacada (magoo) and sea hibiscus (dhiggaa), some mature trees like sea hibiscus may have to be cut down. However, all efforts will be made to ensure minimal vegetation clearance and transplanting of trees. In addition, branches of trees to be removed would be transplanted in the areas on the south which would be cleared of existing rooms. The coconut palms that need to be removed would also be transplanted in this area and other areas which require additional landscaping.

The project site would have a nursery established at the early stages of the project. This nursery would help in vegetating the cleared areas. There would be no need to transplant palms or trees from other islands.

2.5.4 Construction of new structures and renovation works

The proposed villas will be constructed at the footprint of the existing villas except for a few villas on the southern side and some on the western side. They will be constructed after demolition of the existing buildings. New materials will be used in the construction except for a few materials from the previous buildings which may be re-used.

Jetty will be built on new concrete columns and the entire structure including existing columns will be carefully removed and taken out of the island. New concrete columns would be cast on land and placed using excavator on barge.

2.5.5 Construction and operation of the fuel tanks

The proposed new fuel tank has a capacity of 190m^3 and would be at the same location as the previous fuel tank of the same size. The containment or bund of the fuel tank would be 110% of the size of the tank instead of 100% which is the case for the present tanks. Leak detection mechanisms would be included in the tanks.

The fuel tank would be built according to the requirements of the fuel handling and management regulations. Day tanks will be utilized to provide fuel to the generator sets. Fuel will be transported to site by registered or approved fuel suppliers. A fuelling system installed with a fuel pump at the Jetty area will deliver fuel to fuel tanks in the island. At least five-day supply of fuel would be stored.

2.5.6 Possible changes to coastal protection

Due to the potential impact on the longshore transport regime of the island due to the construction of the proposed swimming pool on the northern shoreline, some structural protection on this side (on either sides of the swimming pool) is considered as a mitigation measure and would be discussed in the mitigation section of the report.

Regular beach nourishment will also be a continuous operation in most, if not all, resorts of the Maldives due to the constant need for their maintenance. For Holiday Island Resort, beach nourishment would be mostly required for the northern beach areas. The total volume required for regular beach nourishment is about 5,000cbm. Nourishment can be achieved by directly pumping to eroded areas from the deep lagoon areas on the north to northeast of the island.

2.6 Hazard vulnerability

Fire, electrical and explosion hazards would be minimal. A central fire hydrant system would be included in the design revision for the water supply and sewerage system. Fully addressable fire alarm system would also be in place. In order to reduce the risk of chemical spills and explosion hazards, all chemicals would be safely kept in a separate store.

Holiday Island Resort is at over a km from the northern housereef with a deep lagoon area in between and over 600m from the rim reef on the south. Therefore, the effect of oceanic swells on the island beaches is low. The large fetch of shallow lagoon and deep lagoon protects the island from oceanic swell generated waves. However, the large fetch can cause wind-driven waves and subsequent currents to cause erosion of the beaches, especially northern beach during the northeast monsoon.

Due to its location and the above described lagoon conditions, Dhiffushi (Holiday Island Resort and Spa) has average elevations of about 1m above MSL as its natural elevation and slightly lower levels in the filled beach areas. This may be considered as a low elevation given that most of the natural islands of the Maldives are at about 1.2 to 1.4m above MSL on average. However, the island is narrow and high towards the middle, therefore, the risk of flooding is low. Vulnerability to storms and other natural hazards would be discussed in Chapter 4.

2.7 Health and Safety

The proposed project involves several areas of work that require proper health and safety measures to be in place. Hence, proper equipment and safety gears will be provided to staff and workers at all worksites. To minimise the risks associated with health and safety issues, the project Proponent will be responsible to ensure that adequate health care arrangements will be available at the site throughout the construction period.

General health and safety measures that will be followed during construction and operation of the proposed project are as follows.

- An appropriate person would be appointed for all health, safety and environment related matters at the project site.
- Provide standard operational procedures to all management and operational staff.
- Make available several first aid kits.

- Attend and report accidents and incidents immediately.
- Personal protective equipment would be provided on site.
- All contractors are deemed to have appropriate emergency response procedures, which are communicated to the Proponent.
- General communication procedures will be established by the Proponent. Furthermore, communication plan and procedures would be established by each Contractor. Everyone should know who to contact in case of an emergency. Appropriate signage would be kept in place.
- Fuel will be handled and managed according to the requirements of fuel regulations providing appropriate bunds, signage and other safety measures
- Hazardous material will be handled according to their safety requirements and stored in a specific area until safe disposal.

The following sub-sections considers project specific measures in particular.

2.7.1 Demolition waste management

Demolition waste would comprise primarily of concrete rubble. Steel and timber used in buildings that are demolished would also comprise a large portion of the demolition waste. These materials will be moved and disposed of in Thilafushi waste management facility during or upon completion of construction.

The sludge from desludging of the fuel tanks would also be taken to Thilafushi for safe disposal or re-use. Until such time, sludge from fuel tanks would be carefully removed and kept in a separate area in closed containers. All necessary safety precautions would be taken during the cleaning and demolition of the fuel tank.

2.7.2 Waste Management

All general waste from the construction workforce will be kept at designated location on site and taken to Thilafushi regularly or upon completion. Constructional waste management procedures will be established prior to start of works. During the construction phase, the main waste stream including kitchen waste, waste from accommodation blocks, hazardous waste (e.g. spent oil) and waste from office blocks will be collected in designated bins for different groups of wastes (e.g. plastic, packaging, paper, glass, waste food etc.). There would be no green waste except a small quantity during landscaping, which will be mulched and used as

fertilizer for landscaping. In addition to these daily wastes, spillages during unloading of material would be of concern. Therefore, unloading processes will be properly supervised and any spillages immediately dealt with.

All solid waste infrastructure required for resorts as per the Tourism Regulations have been installed and additional equipment may be installed on the resort. These include incinerator, recycling bins, bottle crusher, metal can compactor and general waste bins. Solid waste generated on the island will be transported to Thilafushi for proper disposal.

During the operational phase, similar sorts of wastes will be generated. Solid waste generated on the island will be segregated on site and transported to Thilafushi for proper disposal on contract basis by licensed party(ies). Recycling and reducing waste would be encouraged, especially among staff. Sludge from the sewage treatment process will be UV-treated on site and used as fertilizer or disposed in a safe manner acceptable to EPA and the Ministry of Tourism.

2.7.3 Hazardous waste

Hazardous wastes such as grease, waste oil from gensets and machinery, empty paint and varnish cans, batteries, water proofing and other finishing chemicals will be generated during the construction phase. They will be collected in separate areas and sent for appropriate disposal at Thilafushi in separate and appropriate packaging.

Resort operations require the regular delivery, handling and disposal of fuels, oils and other hazardous chemicals and wastes that have the potential to pollute soil, groundwater and marine environment. Given that the quantities from the resort would be small and risks of spill during transport has been rarely reported, general management measure would be adopted. The range of fuels and other hazardous chemicals handled at the resort include the following.

- Diesel fuel (spills can rapidly pollute groundwater and shallow reef flats);
- Flammable gases (LPG, oxygen and acetylene)
- Volatile liquids (petrol, dry cleaning solvents, paint thinners)
- Flammable oxidising substances (liquid and powder chlorine, oxygen bleaches)
- Acids and alkalis (RO filter back-washing, floor stain removal, drain cleaning, general cleaning, paint stripping, etc.)
- Poisonous chemicals (pesticides, insecticides and vermicides)

- Gases for servicing air conditioners and refrigeration units (R22 and other HCFCs that are controlled in the Maldives by regulation 2017/R-9).

2.7.4 Fire safety

As a means of addressing potential fire hazards, firefighting equipment that meets the requirements of Tourism Regulations and National Fire Code has been installed at the resort. Any additional requirements would be met during the construction phase

Contractor(s) would be required to follow the emergency response procedures established by the Proponent at site prior to start of works. The plan considers the type of equipment, communication mechanisms, response time and emergency access and evacuation procedures.

Prior arrangements for fuelling of machinery/vessels will also be made and appropriate supervision of contractor's staff undertaken by the Proponent's representative(s).

2.7.5 COVID-19 Prevention and Control Measures

The following measures are proposed for the prevention and control of COVID-19 for the project site(s). Some or all of these measures are currently in place.

- Guidelines on social distancing, hand-washing and general hygiene have helped to contain the spread of COVID-19 and, therefore, strict adherence to such procedures and guidelines issued by WHO and HPA would be enforced at site to minimize the risk of spreading COVID-19 among the workforce during the construction phase.
- Adhere strictly to COVID-19 control procedures/ guidelines endorsed by HPA and WHO with regard to isolation and quarantine.
- Plan to manage any outbreak within the work environment through necessary protocols such as contact tracing, isolation, quarantine and travel restrictions.
- Travel to and from the island would be restricted. Persons working under the project would be resident on the island throughout the project. There would be no unauthorized entry into the site at any time. Strict security procedures would be in place.
- PCR tests (as required by HPA) will be done before any person is allowed entry into the work site and appropriate quarantine windows observed. As such, quarantine facilities will be established on site.
- Sanitizers and washing stations will be made available at all necessary locations during the pandemic.

- Masks would be made mandatory for all persons who are visiting the island including supply vessels and boat crew. Such persons will not be allowed to mix with the resident working population at site.

2.8 Energy, Water and Wastewater

Energy and water production systems are already established on the island. However, a wastewater treatment plant and improvements to wastewater reticulation system would be carried out as part of the renovation works.

The following subsections will look at energy efficiency and conservation efforts that would be adopted in the project implementation.

2.8.1 Equipment, Machinery and Tools

In the construction phase key activities based on the proposed concept include site preparation, mobilization of materials and equipment, accommodation and services for labour force, renovation of existing jetty, construction of new villas and other infrastructure, renovation of some of the existing villas and structures, shore protection modifications, beach nourishment and landscaping. Machinery and tools used for these activities would be in good condition and used under strict supervision. Heavy vehicles such as excavators, bulldozers and trucks would be kept in designated areas and existing or project specific paths would be used. Movements on the beach would be minimized.

The operational phase would not involve the use of heavy equipment. However, the machinery and equipment used during operational phase such as heavy-duty washing machines, air-conditioning units, desalination plants and sewerage treatment plant would be energy efficient. All air-conditioning units would use refrigerants that meet the requirements of the Montreal protocol (and circulars issued by the Ministry of Environment regarding the Montreal protocol from time to time). Solar water heaters would be used for water heating.

2.8.2 Transport

The heavy transportation involved in the operation of the proposed new resort is considered to be one of the activities that would cause direct impact to environment similar to other such projects in the Maldives. The overall per capita carbon footprint will be very high in all such

operations in the Maldives, as the Maldives is highly dependent on light and heavy fuel dependent sea transport system. Guests will be transferred on speed boats since the resort is close to the airport while goods and materials will be supplied on local boats called *dhoni*. The environmental concerns anticipated are mainly due to contributions to global warming as a result of carbon emissions. The resort will join with the national efforts to minimize country wide carbon emissions as the Maldives is one of the first countries to sign the Kyoto Protocol and Paris Agreement and has plans to go carbon neutral.

2.9 Tourist Activities and Services

The resort is all about tourist activities and services. The fragile marine ecosystem would be subjected to stress from several tourist activities such as snorkeling, diving and disposal of wastewater and that would be the main concern while the stress on natural resources such as fuel would be an indirect and yet an important concern. The Government of Maldives has had maintained sustainable development targets from the very onset of tourism in the country. Over the years the regulatory framework has been strengthened maintaining limits of development including the limit of landuse to less than 30% (which was 20% prior to 2013). With increasing focus on the enforcement of environmental regulations, the resort would have the necessary plans to manage tourist activities and services including adherence to Diving Regulations, Desalination Regulations, wastewater disposal guidelines, Solid Waste Management Regulations, HACCP Plans as per the requirements of the Food and Drug Authority, Fire Code, Regulation on the Management and Control of Products with HFC and HCFC and most importantly environmental mitigation measures proposed in the EIA report. Energy and water conservation policies will be implemented.

International conventions such as Paris Agreement, Kyoto Protocol, Montreal Protocol, United Nations Framework Convention on Biological Diversity and other such conventions to which Maldives is party to, will be strictly respected. Protected areas, protected marine life, protected birds and banned exports will be made known to tourists, staff and all concerned.

2.10 Project Duration

The demolition, renovation and construction of new structures would be started soon after the relevant approvals. The construction period is expected to last until December 2022. Therefore, the project will be undertaken in a period of about 15 months. A detailed work plan is given in the Appendices.

2.11 Project Inputs and Outputs

The project has inputs in terms of human resources, natural resources and machinery. The main output of the project is the proposed resort developed and operated providing several social and economic functions including employment opportunities for several locals and generating state revenue while contributing to sustainable tourism development in the Maldives. The inputs and outputs are summarized in the tables below.

Table 2-1: Matrix of key inputs of the proposed project

Input resource(s)	Est. quantity	How to obtain resources
Construction workers	100-150 people	Proponent/Contractor
Management and maintenance staff	10-30 people	Appointed by Proponent/Operator
Construction materials: timber, cement, thatch roofing materials, concrete blocks, electrical cables, circuit boards, main circuit boards, reinforcing steel bars, river sand, aggregates, telephone cables, PVC conduits, PVC pipes, paint, varnish, thinner, roofing sheets, floor and wall tiles, toilet fittings, diesel, petrol, tar etc.	Varying quantities	Locally purchased or imported
Maintenance material	Varying quantities	Locally purchased or imported
Water (during construction)	50 to 100m^3/day	Desalinated water and rainwater
Water (during operation)	400m^3/day	Desalinated water and rainwater
Electricity/Energy (during construction)	<150kW	Diesel-based electricity
Electricity/Energy (during operation)	<1,200kW (total)	Diesel-based, solar and other renewable resources combined
Machinery and equipment	Various	Contractor's responsibility
Water treatment chemicals (e.g. chlorine, anti-scalants, pool chemicals, etc)	Small	Locally purchased or imported
Fuel (e.g. diesel, petrol)	Moderate	Locally purchased
Fertilizers (e.g. for gardening)	Small	Locally purchased or imported
Soaps and Detergents (laundry and washing)	Moderate	Locally purchased or imported
Cleaning agents (floor cleaning, toilet cleaning)	Moderate	Locally purchased or imported
Bleaching agents (laundry washing)	Small	Locally purchased or imported
Electrical appliances (TV, Refrigerators, Air Conditioners)	1-2 units per building	Locally purchased or imported
Communication (phones, fax machines, cables)	N/A	Locally purchased or imported
Insecticides, pesticides, fungicides (pest control)	Small	Locally purchased or imported
Stationary products (pens, papers, files etc)	Moderate	Locally purchased or imported
Kerosene, LPG	Small/moderate	Locally purchased or imported
Diving equipment (snorkeling gears)	N/A	Locally purchased or imported
Water bottles	Moderate	Locally purchased or imported

Table 2-2: Matrix of major outputs

Products and waste materials	Est. quantity	Method of disposal
Waste oils from machinery and sludge from existing fuel tanks	Minute	To Thilafushi
Cleared green waste	Small	Stockpiled for natural decompose/mulched on site
Constructional waste (concrete and cement debris)	Small	Taken to Thilafushi
Used water bottles (PET)	Considerable	Taken to Thilafushi
Sludge (by product of sewage treatment)	small	Sun dried in a drying bed and either used as fertilizers or taken to Thilafushi for disposal
Wastewater effluent	Major	Discharged into ocean after treatment
Timber, cardboard and scrap metals (construction site waste)	Major	Recovered, reused, recycled and any leftovers taken to designated landfill for disposal
Used oil (waste oil), grease	minute	Reused, or taken to designated landfill for disposal
Solid waste (kitchen waste, waste from accommodation blocks, waste from office blocks)	Major/moderate	Taken to Thilafushi for proper disposal
Bottles	moderate	Taken to Thilafushi for proper disposal
Garden waste	moderate	Stockpiled for natural decomposition
Hazardous waste (used pesticide bottles, insecticide bottles, health care waste etc)	moderate	Taken to Thilafushi for proper disposal

2.12 Need and Justification

Tourism is the largest economic activity in the Maldives which accounts for over 30% of the GDP and over 60% of foreign exchange receipts. With tourism being the key driver of the economy, expansion and diversification of the tourism industry is of utmost importance. The Fourth Tourism Master Plan clearly targets increasing tourist beds throughout the Maldives. The Fourth Tourism Master Plan (2013 to 2017) plans to increase tourist arrivals to over 1.6million by the end of 2017, maintaining a 10% growth every year. The tourist bed capacity is intended to be increased to 35,500beds and includes the proposed resorts. The tourism sector's contribution to the economy has been greatly setback in the past few months due to the Corona virus pandemic. However, proposed developments target at foreseen demand arising from the post-COVID growth in the tourism industry.

Resorts in the Maldives usually comprise of a unique 'one-island-one-resort' concept, which makes it very attractive and appealing to tourists. At the end of 2013, there were a total of 110 resort islands with 23,677, which represents 79% of the total bed capacity that year. Kaafu and Ari Atoll are the highest in terms of the number of resorts. The bed capacity is on a further rise due to the prevailing demand and the guesthouse market has found itself gaining interest with a several guesthouses coming up in Male Atolls and Ari Atolls.

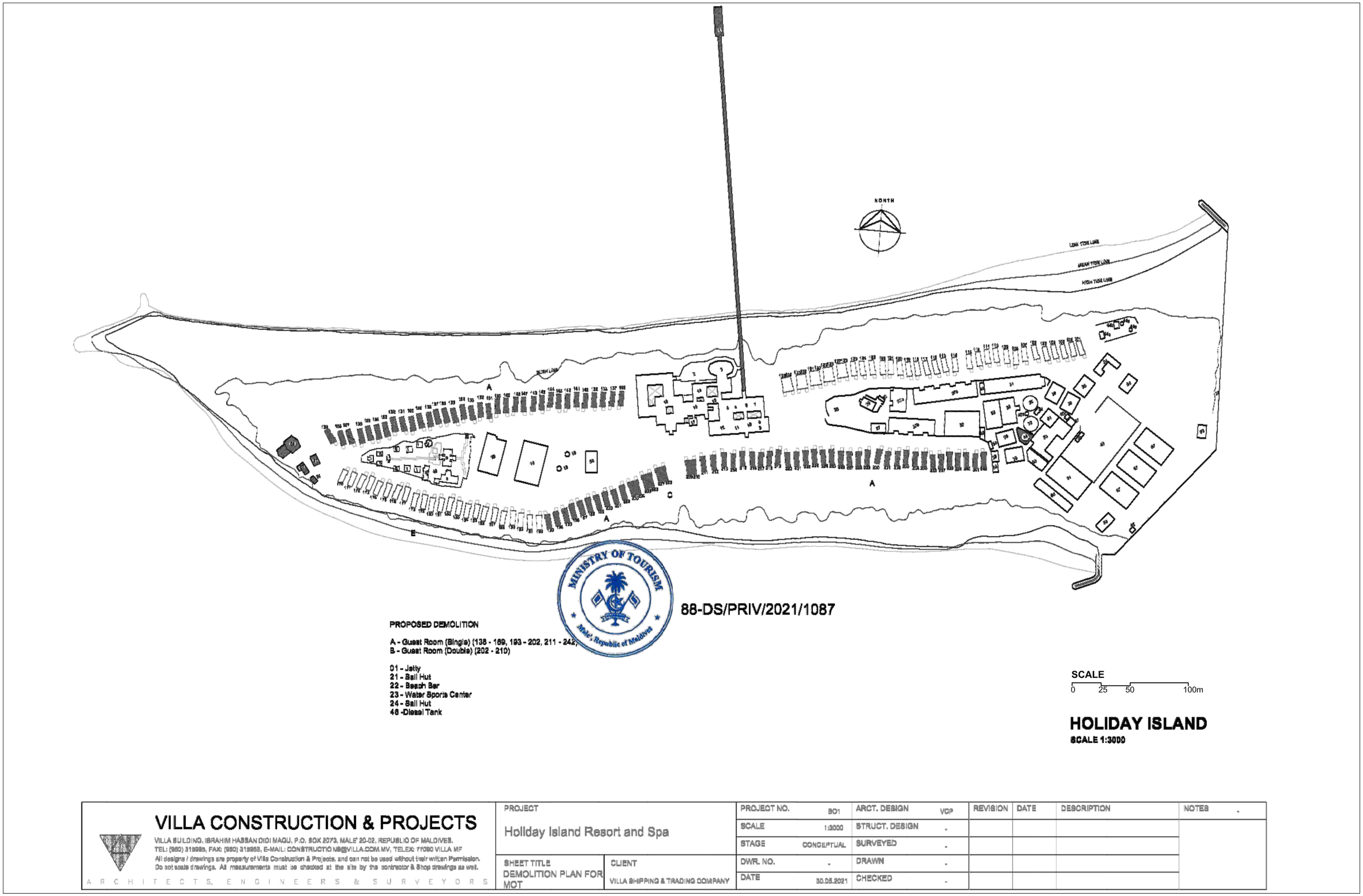
Holiday Island being close to an International Airport provides several opportunities for tourism growth. It is also located within the South Ari Atoll Marine Protected Area where whale sharks and manta rays can be spotted throughout the year. Hence, it is in a strategic location and with potential for expansion.

Tourism also is the key contributor to employment in the Maldives. Maldivians as well as people from across the globe find employment in the resorts of the Maldives. The proposed resort is expected to provide over 300 jobs and subsequent training opportunities, especially for Maldivians. In fact, Villa resorts have a large proportion of their employees as Maldivians with several Maldivians in management posts.

There would be several socio-economic benefits associated with the proposed resort development. The construction stage will provide local consultants and contractors with several opportunities as the project involves people of varied disciplines. During the construction phase and especially the operational phase, the resort will add to the state revenue generated from tourism through land rent and goods and services tax. Resort development projects subsequently help to improve public services and living standards. It will also provide direct and indirect employment and other income generating opportunities helping to address several social issues. Related economic sectors including transport, fisheries, agriculture and handicrafts industry would grow.

For these reasons, the proposed redevelopment of Holiday Island is considered to contribute positively to the economy and people of the Maldives with several benefits to the neighbouring inhabited islands.

Figure 2-3: Proposed demolition plan



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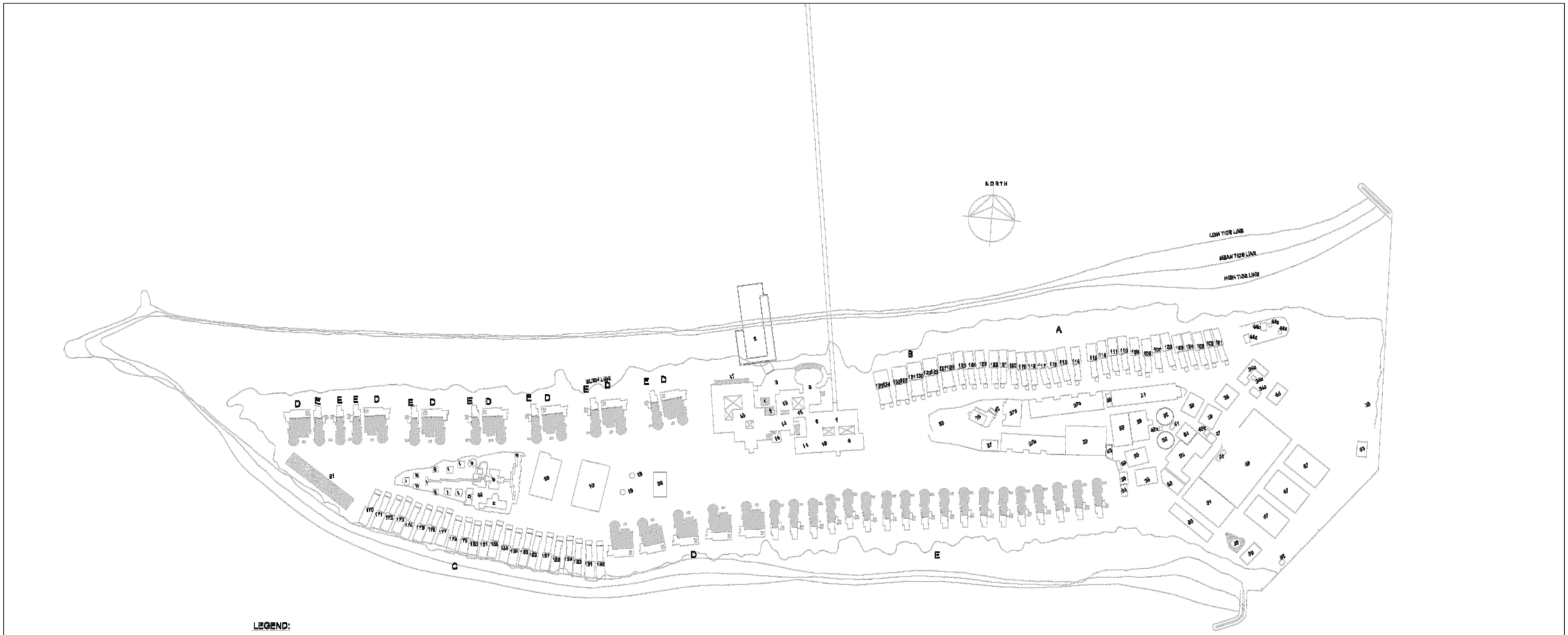
			SCALE 1:3000	STRUCT. DESIGN -				
			STAGE CONCEPTUAL	SURVEYED -				
	SHEET TITLE DEMOLITION PLAN FOR MOT	CLIENT VILLA SHIPPING & TRADING COMPANY	DWR. NO. -	DRAWN -				
			DATE 30.05.2021	CHECKED -				

Figure 2-4: Proposed re-development concept



LEGEND:

01 - Jetty
02 - Main Pool
03 - Pool Desk
04 - Italian Bar
05 - Restaurant WC
06 - Lounge Bar
07 - Healing Hall (Lobby)
08 - Offices
09 - The Shoppes
10 - Perfumeries
11 - GM Office / Meeting Room
12 - Toilets
13 - Main Bar
14 - Main Restaurant Kitchen
15 - Butchery
16 - Main Restaurant
17 - Main Restaurant Dining Deck
18 - Communication Antenna
19 - Tennis Court
20 - Animation Theatre
21 - Fitness Facility
22 - *RESERVED FOR FUTURE*
23 - *RESERVED FOR FUTURE*
24 - *RESERVED FOR FUTURE*
25 - Mosque
26 - Staff Volley Court
27 - Bottling Plant
28 - Staff Mess - Kitchen
29 - Staff TV Hall / Cyber Cafe' / Gym / HR / Staff Accommodation
30 - Laundry
31 - Stores
32 - Water-Tank
33 - Power House
34a - Dive School
34b - Dive School Cleaning Hut
34c - Dive School Briefing Hut
35 - Service Jetty
36 - Senior Staff Rooms
37a - Junior Staff Rooms (3 room block)
37b - Junior Staff Rooms (6 room block)
37c - Junior Staff Rooms (9 room block)
38 - Pump House & Tank
39 - Fish Tank
40a / 40b - Pump Room
41 - Fresh Water Pump House
42 - Ablution Area
43 - Environment Building
44a - Waste Management Structure 1
44b - Waste Management Structure 2
44c - Waste Management - Incinerator
45 - Play Ground
46 - Trolley House
47 - Transport Building
48 - Spa
a - entrance pavilion
b - spa reception
c - spa lobby
d - Jacuzzi hut
e - saloon
f - treatment huts
g - treatment huts
h - treatment huts
I - treatment huts
J - pavilion
49 - Diesel Tank
50 - Store, Workshop & Accommodation
51 - Carpentry and Carpentry store
52 - Petrol Hut
53 - Arrival Pavilion
54 - TV Control Room & IT Building
55 - Compressor Room
56 - LPG Hut
57 - Accommodation Building
58 - Herb Garden
59 - Petrol Store
60 - Workshop and Carpentry
61 - Butchery - Back of House

GUEST ROOMS
A - Haven Pool Villa (Single)
B - Haven Pool Villa (Double)
C - Haven Honeymoon Villa (Single)
D - Haven Residence (Single)
E - Haven Deluxe Pool Villa (Single)

PROPOSED RENOVATION
A - HAVEN POOL VILLA SINGLE (101-125)
B - HAVEN POOL VILLA DOUBLE (126-135)
C - HAVEN HONEYMOON VILLA SINGLE (176-192)
6 - 17 - PUBLIC AREA EXTENSION

PROPOSED NEW STRUCTURES
D - HAVEN RESIDENCE (SINGLE)
E - HAVEN DELUXE POOL VILLA (SINGLE)

01 - JETTY
02 - MAIN POOL
05 - RESTAURANT WC
06 - ITALIAN BAR
21 - FITNESS FACILITY
49 - DIESEL TANK

MINISTRY OF TOURISM Male', Republic of Maldives

88-DS/PRIV/2021/1087

HOLIDAY ISLAND
SCALE 1:3000

SCALE
0 25 50 100m

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PROJECT: Holiday Island Resort and Spa		PROJECT NO. SC1	ARCT. DESIGN VCP	REVISION	DATE	DESCRIPTION	NOTES -
		SCALE 1:3000	STRUCT. DESIGN -				
		STAGE CONCEPTUAL	SURVEYED -				
SHEET TITLE: CONCEPT PLAN	CLIENT: VILLA SHIPPING & TRADING COMPANY	DWR. NO. -	DRAWN -				
		DATE 30.05.2021	CHECKED -				

3 Legislative and Regulatory Considerations

This section will identify the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project and identify the appropriate authority jurisdictions that will specifically apply to the project. The proposed project is expected to conform to all the policy and regulatory aspects outlined here. This section outlines and summarizes key policies, applicable laws and regulations and regulatory bodies that the Proponent should comply with and be answerable in terms of implementing the project.

3.1 Permits Required for the Project

3.1.1 EIA Decision Statement

The most important environmental permit to initiate the proposed project works would be a decision regarding this EIA from the Environmental Protection Agency (EPA). The **EIA Decision Statement**, as it is referred to, shall govern the manner in which the project activities must be undertaken. This EIA report assists decision makers in understanding the existing environment and potential impacts of the project. Therefore, the Decision Statement may only be given to the Proponent after an independent review. Based on the outcome of the review EPA may request for further information or approve it if further information is not required or following the submission of further information requested.

3.1.2 Design Approvals

As part of the preliminary approvals, development concept or master plan shall be approved. These has been approved by the Ministry of Tourism. The EIA process was initiated once the demolition plan and re-development concept has been approved by the Ministry. The detailed design approvals will be given by the Ministry (in coordination with Utilities Regulatory Authority) once the EIA has been approved.

3.1.3 Registration of Utilities

Power system, desalination plant and waste management system under the project shall be registered with the Utilities Regulatory Authority (URA), which has been formed recently. The registrations of RO plant and power system have been done recently and only renewal of the registrations would be done if necessary.

3.1.4 Operating License

In order to operate the resort, an operating license will be required. The operating license would be issued once all other permits including the environmental clearances, fire and hazards prevention measures, disaster management plans and utilities registrations have been completed. There will be a renewal of the existing operating license.

3.2 Applicable Laws and Regulations

There are several laws and regulations relating to environment in the country. Only relevant laws and regulations have been outlined in this section.

3.2.1 Environmental Protection and Preservation Act

The Environmental Protection and Preservation Act of the Maldives, EPPA (Law No. 4/93) provides the basic framework for environmental management including Environmental Impact Assessment (EIA) process in the Maldives, which is currently being implemented by EPA on behalf of Ministry of Environment and Energy.

Clause 2 of the EPPA mandates the Ministry of Environment to formulate policies, rules and regulations regarding the environment.

Clause 5 of this Act specifically provides for environmental impact assessment (EIA), a tool implemented to attempt to integrate environmental issues into development decisions. According to the Clause, environmental impact assessments are a mandatory requirement for all economic development projects.

Clause 6 of the EPPA gives the Ministry of Environment the authority to terminate any project that has an undesirable impact on the environment.

Clause 7 of the EPPA refers to the disposal of oil, wastes and poisonous substances in to the Maldivian territory. According to this clause, any type of waste, oil, toxic gas or any substance that may have harmful effects on the environment should not be disposed within the Maldivian territory. If, however, the disposals of such substances become absolutely necessary, the clause states that they should be disposed only within the areas designated for that purpose and if incinerated, appropriate precautions should be taken to avoid harm to the health of the population.

Furthermore, clause 9 sets a fine between five and five hundred Rufiyaa for minor offenses in breach of this law and a fine of not more than one hundred million Rufiyaa for major offenses. The fine shall be levied by the Ministry of Environment or by other government authorities designated by that Ministry in case of minor offenses.

Finally, Clause 10 of EPPA gives the government of the Maldives the right to claim compensation for all damages caused by activities that are detrimental to the environment.

The Environmental Act or Law 4/93 is the most important legal instrument with regards to environmental management and it gives very high prominence towards safeguarding the environment with regard to all the development activities. Under this Act, the Ministry of Environment has developed regulations and guidelines concerning environmental protection through the implementation of EIA procedures.

3.2.2 Maldives Tourism Act

The Articles of the Maldives Tourism Act (Law No. 2/99) provides for the determination of zones and islands for the development of tourism in the Maldives: the leasing of islands for development as tourist resorts, the leasing of land for development as tourist hotels and tourist guesthouses, the leasing of places for development as marinas, the management of all such facilities; and the operation of tourist vessels, diving centers and travel agencies, and the regulation of persons providing such services., which are relevant, understood and adhered to in the proposed project.

The leasing of islands and land for development as tourist resorts and tourist hotels, the leasing of places for development as marinas, the management of tourist resorts, tourist hotels, establishments such as tourist guest houses and marinas; and the operation of tourist vessels, shall all be in accordance with this Act and regulations made under it.

Zones for the development of tourism in the Maldives, islands for development as tourist resorts and places for development as marinas shall be determined by the President.

In addition to various requirements including operating license and services to be established on a resort, there are also various environment-related concerns that have been given due consideration including vegetation clearance, carrying capacity and dredging and reclamation activities. It is stated that felling of coconut palms and trees on an island or land leased for development as a tourist resort, dredging of the lagoon of such an island, reclamation of land,

or any other activity determined by the Ministry of Tourism as may be likely to cause a permanent change to the [natural] environment of such places, may only be carried out after obtaining written permission from that Ministry and in accordance with relevant regulations made by it.

Carrying capacity standards are useful to ensure that ecological habitat destruction is minimized and ensures sustainability in tourism development. Within the requirements of carrying capacity standards for resorts are controls of cutting down mature trees or vegetation clearance, restrictions on building height ensuring that buildings are not above the vegetated canopy and most importantly the limits on the maximum built up area, which was 20% of the total land area. This limit on built-up area has been increased to 30% in 2013.

Furthermore, resorts are required to have 5m of linear beach in front of beach villas and only 68% of the total beach length is for guest rooms, 20% for public use and 12% as open space.

There are also other design controls such as restrictions on developing on reef flat areas and use of coral and sand in construction. Coral and sand mining from the resorts and their house reefs are strictly prohibited.

3.2.3 9th Amendment Law (Law No. 13/18) to the Maldives Tourism Act (Law No. 2/99)

The 7th Amendment Law to the Maldives Tourism Act was enacted on 27 April 2015, which made provisions for the Ministry of Tourism to undertake the environmental assessment process including approving EIA reports prepared for tourism projects undertaken in the Maldives. This Amendment was annulled by the 9th Amendment (Law No. 13/18) enacted on 20 December 2018 in which the environmental assessment process for tourism projects was reinstated under the mandate of the Ministry of Environment (Environmental Protection Agency).

3.2.4 Environmental Impact Assessment Regulation

Between April 2015 to December 2018, there had been 2 EIA Regulations in force in the Maldives – one implemented by the Ministry of Tourism for Tourism Projects and the other implemented by the Environmental Protection Agency for all other projects. However, as discussed above, with the 9th Amendment to the Tourism Act (Law No. 13/18), a fifth

Amendment to the EIA Regulations was gazette on 27 December 2018 with the inclusion of tourist resorts and hotels within clause 13 of the EIA Regulations.

The Regulation sets out the criteria to determine whether a development proposal is likely to significantly affect the environment and is therefore subject to an EIA. Schedule E of the EIA Regulations defines the projects that would be subject to Environmental Impact Assessment. Resort development has been re-included in the list with the 5th Amendment.

The main purpose of this Regulation is to provide step-by-step guidance for proponents, consultants, government agencies and general public on how to obtain approval in the form of an Environmental Decision Statement. The structure of the EIA report and EMP report as well as monitoring report are also given in the Regulation.

3.2.5 Regulation on the Protection and Conservation of Environment in the Tourism Industry

This regulation was made pursuant to the Maldives Tourism Act. The regulation mandates the standards for the protection and conservation of environment in the tourism industry of the Maldives, which are relevant, understood and adhered to in the proposed project. The purpose of this regulation is to protect the environment in the tourism industry and to encourage and facilitate sustainable development of tourism. As per this Regulation, any of the following activities in an island or place leased for the purpose of tourism shall be carried out after obtaining permission from the Ministry of Tourism:

- Dredging of the lagoon and reclamation of land
- Construction on the beach and lagoon
- Beach enhancement by pumping sand
- Construction of breakwater
- Construction of sea wall, revetment or groyne
- Dredging of lagoon or reef for safe access
- Dredging of reef
- Felling of trees
- Importing and exporting living species
- Conducting research of land, sea and lagoon
- Demolition of a building or facility
- Anything which may adversely affect the vegetation or fresh water lens of the island

In addition to the provisions above, any activity that may cause damage or adversely affect the environment shall be carried out after obtaining permission from the Ministry of Tourism. The following requirements are of specific relevance.

- Trees shall not be felled in order to construct buildings or for other purpose in an island, resort, or other place leased for the purpose of tourism, except with prior written permission from the Ministry of Tourism.
- In the event, any tree or coconut palm is felled for construction or any other reason in any resort, Picnic Island, or marina or such other place leased for the purpose of tourism, two trees or coconut palms shall be replanted in the same island.
- Ground water shall not be extracted for the purpose of construction in an island or land leased for the development of tourism.
- Any infrastructure or facility in an island or land leased for the development of tourism shall be built five meters inwards from the vegetation line
- To preserve and maintain the natural environment of islands or part of it leased for purpose of tourism, at least 80% of the island shall be spared un-built. The area inwards from the vegetation line shall be taken as the area of the island. If the relevant area is a designated part of an island, the area inwards from the vegetation line of that area shall be taken. However, this percentage was later amended to 70%.
- It is prohibited to extract coral stones from any part of the lagoon or the reef of an island in the Maldives, for any purpose of an island leased for the development of tourism
- In an island or land leased for the development of tourism, all jetties built in all resorts, picnic islands, marinas or other islands shall be built in such a way that allows free movement of water current and sand beneath the jetty.
- Waste disposal in tourist resorts, picnic islands, and marinas operating in the Maldives shall be carried out in a manner that would have the least impact on the environment, and in accordance with the laws and regulations and in accordance with the rules prescribed by the Ministry of Tourism.
- For the provision of clean and safe water sufficient for use in the resort, every resort shall have a desalination plant. The plant shall be registered in accordance with the "Regulation on Desalination Plants", and shall comply with such regulation in the operation of the desalination plant.

- Sewage shall be disposed in a manner that would have the least impact on the environment, and in accordance with the laws and regulations and in accordance with the rules prescribed by the Ministry of Tourism.
- If any provision of this regulation is contravened by any tourist resort, picnic island, marina, hotel, guest house, or tourist vessel, shall be guilty of an offence, and shall be liable to a fine, taking into consideration the seriousness of the non-compliance, as stipulated in the Regulation. If non-compliance of a provision occurs more than once, the Ministry reserves the right to revoke the license.

3.2.6 Maldives Recreational Diving Regulation

This Regulation deals with the recreational diving in the Maldives. During the operational phase of the project, what is relevant from this regulation would be adhered to.

3.2.6.1 Environment Protection

As responsible divers, reasonable care should be taken to protect the marine environment, its associated living organisms and their habitats. Divers should be briefed by the dive instructor on responsible behavior whilst diving, such as buoyancy control, avoiding damage to corals and physical contact with marine animals. Shark feeding is NOT permitted for the divers and the dive centre staff alike.

Activities that are detrimental to marine protected areas and protected species and their habitats are prohibited under the Environment Protection & Preservation Act (Act No. 4/93) of Maldives. Marine Protected Areas are living marine aquariums. Look but don't touch is the message in these areas, and ONLY permitted activities can take place. Protected areas, as their name suggests, are there to protect typical areas of the coral reef system, and its resident fish and other animals, in as near to a pristine condition as possible.

Permit to dive in marine protected areas may be required. Please check before you venture.

3.2.6.2 Damage Due to Anchoring

Dive boats are not allowed to anchor on dive sites. Drift boat diving is the norm in Maldives. Boat anchors destroy fish habitats especially corals and even sea-grass beds. If anchoring is required for any reason prevents reef damage by anchoring in sandy areas or using mooring buoys.

3.2.6.3 Diving in Bait Fishery Areas

Bait fishing is an important activity for the traditional pole and line tuna fishery in the Maldives. Hence, occasionally divers may encounter fisherman collecting bait. In order to reduce conflict between local fishermen, diving should be avoided in the same area whilst fishermen are engaged in bait fishing. Any such conflicts should be reported to the Ministry of tourism through the responsible dive centre as soon as possible. Dive centres should also keep divers informed of these traditional economic activities in the country.

3.2.6.4 Protection of Underwater Cultural Monuments

Nothing should be taken out from the sea, and particularly this prohibition refers to cultural monuments. Please contact the National Centre for Linguistics & Historical Research and the Ministry of Finance should you find any.

Damaging and extracting cultural monuments is prohibited, as well as taking the same abroad. Underwater archaeological researches may be performed only with permits issued by the Maldivian government authorities, and the procedure is NOT covered under these regulations.

3.2.7 Regulation on Protected Areas

The regulation on Protected Areas was published on 5th August 2018 (Regulation number: 2018/R-78). The main objective of this regulation is to set requirements for declaration and management of protected areas. The Ministry of Environment is responsible for drawing up the necessary regulations and guidelines for biodiversity protection and conservation. As such, for identifying protected areas and biosphere reserves in the Maldives too. Under its mandate, the Ministry has declared 61 protected areas in the Maldives.

3.2.8 Regulation on Migratory Birds

The Regulation on Migratory Birds (Regulation No. 2014/R-169) was gazetted on 21 August 2014. Birds which migrate to the Maldives in different monsoons form an integral part of the avian fauna of the Maldives. The objective of this regulation is to protect migratory bird species by deterring any activities that may harm their population. As per this regulation, all birds in the Maldives except the following are considered as migratory birds.

- Maldivian water hen (*Dhivehi kanbili*)
- Maldivian pond heron (*Huvadhoo raabondhi*)

- Maldivian little heron (*Dhivehi Raabondhi*)
- Central Maldivian little heron (*Medhu-raajetherey raabondhi*)
- Asian koel (*Dhivehi koveli*)
- Crow (*Kaalhu*)

It is illegal to carry out any of the following activities with respect to migratory birds.

- Rearing in captivity,
- Trade of birds or their eggs,
- Poaching birds or their eggs,
- Eating bird meat or their eggs, and
- Harming birds or their nests.

If any of the above activities is to be carried out for research in the Maldives, written approval shall be sought from the Environmental Protection Agency.

3.2.9 Regulation on Uprooting, Cutting and Transportation of Palms and Trees

This regulation is of relevance to the proposed landscaping (including tree transplanting) component of the project. Therefore, this has been discussed in the previous EIA. However, since this EIA covers the details of landscaping or vegetation requirements under the project this regulation is reviewed here.

This Regulation was implemented on 1 February 2006 by the then Ministry of Environment, Energy and Water and later amended in January 2014. The primary purpose of the Regulation is to control and regulate large-scale uprooting, removal, cutting and transportation of palms and trees from one island to another. According to the regulation, certain types of trees and plants that have unique attributes are prohibited to be removed from its natural environment. Also, uprooting and removal of 10 or more trees and palms are subject to Environmental Impact Assessment (EIA), which is required to be submitted to the Environmental Protection Agency and written approval is required prior to implementation of the project. Trees within 15m of the vegetation line, or 15m buffer zone of any mangrove or wetland area and protected trees as well as trees in Protected Areas. Furthermore, 6 trees or palms as replacement for trees cut down or uprooted is a requirement in the 2014 amendment. Also, as per the Guidelines on uprooting, cutting and transplanting of palms and trees (issued June 2017), uprooting and removal of 200 or more trees and palms are subject to environmental impact assessment (EIA), which is

required to be submitted to the Environmental Protection Agency and written approval is required prior to implementation of the project.

This regulation would be respected in implementing the proposed project. The proposed project would require quite a number of plants to be transplanted from one location to the other within the project site for the purpose of landscaping. Most of the mature trees transplanted at site would be coconut palms.

3.2.10 Dredging and Reclamation Regulations

This regulation is relevant to the dredging and reclamation component and has been covered in detail in the EIA for coastal modification carried out in 2020.

3.2.11 Regulation on Fuel Storage, Handling and Usage

The Regulation on Fuel Storage, Handling and Usage (2015/R-160) came into effect recently on 12 August 2015. The following clauses of the regulation may be of relevance to the proposed project.

Clause 4 deals with installation, registration and inspection of fuel storage facilities. The following sub-clauses in this clause are of relevance.

a. Fuel storage facilities shall be established according to the Regulations and shall have appropriate fire safety and protection systems.
b. All fuel storage facilities shall be registered with the Ministry of Defense and National Security as per the Regulations
c. The Ministry reserves the right to inspect the facilities prior to registration and every six months thereafter in the presence of the Developer or Developer's designate. In case of rectification

Clause 6 considers the requirements of petrol storage facilities. This may not be of relevance to the proposed project.

Clause 11 states the design requirements for fuel/petrol storage tanks/containers. The maximum capacity allowed for underground tanks is given as 40,000litres. The containers/tanks should be separate from other buildings such as convenience stores. Requirements for overhead tanks are also provided.

Clause 12 discusses about the requirements for petrol dispensers and filling points and Clause 13 prohibits keeping wet cells, acids and pressurized containers in petrol sheds or petrol storage areas.

Clause 14 to Clause 17 states the requirements for the installation of diesel and kerosene storage and handling facilities. These are similar to those for petrol sheds and handling facilities.

Clause 18 discusses the requirements for fuel delivery line. Fuel delivery lines are required to be kept underground and the pipes are required to conform to BS EN10025 and BS EN10296 or similar international standards. The delivery line is required to be buried at safe depth from ground within a trench that can contain the entire volume of the pipeline in case of breakage.

Clause 19 provides definitions and clause 20 penalties. The penalties vary from fines of MVR5000 to MVR25000 and withdrawal or cancellation of permits depending on the severity of the offense.

3.2.12 Regulation on Environmental Damage Liabilities

Under the Environmental Protection and Preservation Act (No. 4/93), the Ministry of Environment formulated the Environmental Damage Liabilities Regulation in February 2011, which encompasses the basis to avoid environmental deterioration, extinction of biological resources, environmental degradation and avoid wastage of natural resources. The main purpose of this regulation is to stop unlawful activities on environment and adequately implement a fining procedure for violations as well as implement a compensation mechanism on environmental damages. Its schedules form the basis for levying fines on various environmental components and activities. Hence, the proposed project will be subject to this Regulation for any activity outside of the resort boundaries, i.e. outside the jurisdiction of the Ministry of Tourism.

3.2.13 Utilities Act and Regulations

The Utility Services Act (Law No. 4/96) has been in force since 1996 and is mainly related to public utilities including those operated by private parties, which indirectly relates to resorts and other private entities in the Maldives. This Regulation requires that utility service providers be registered with the responsible government agency and appropriate approvals sought for the provision of services.

The Utilities Regulatory Authority Act (Law No. 26/2020) came into effect recently with the formation of the Utilities Regulatory Authority (URA). This Act gives the URA the authority to establish and implement relevant regulations for utility services in the Maldives (which would include resort utilities) and monitor performance criteria and service standards. Therefore, this EIA will look at the environmental aspects of power generation for the proposed resort in order to assist the powerhouse registration process.

Desalination Plant Regulation (2002) states that all sea water desalination plants installed and intended to supply water to 200 or more people or large scale agricultural needs or tourism related activity need to be registered prior to the operation of the plant. Therefore, it would be necessary to consider the impacts of desalination plant in this EIA so that registration can be done without further environmental scrutiny. Desalination plant registration is required to be renewed every five years. Therefore, regular monitoring shall be ensured in order to carry out an efficient renewal process. Presently, with the URA taking over the responsibilities, the URA is working on making the necessary changes to the Desalination Regulation to reflect recent changes in the legislative structure related to utilities regulation.

Other regulations, standards and guidelines that are currently in effect/implemented within the umbrella of the Utilities Regulatory Authority Act include:

- General Regulations for Water and Sewerage Services in the Maldives
- Water Resources Conservation and Management Regulation
- Water and Sewerage Tariff Regulation
- Dewatering Regulation
- Waste Management Regulation
- Electricity Network Installation Standards (2006)
- Guidelines for power System Approvals

3.2.14 Waste Management Regulation

The Waste Management Regulation (Regulation No. 2013/R-58) came into effect in August 2013. The objective of Waste Management Regulation is to implement the National Waste Management Policy; through which it aims to protect the environment by minimizing the impact of waste on the environment, including the impact of waste on human health, establishing an integrated framework for minimizing and managing waste in a sustainable manner and establishing uniform measures to reduce the amount of waste generated. The

regulation also ensures waste is reused, recycled and recovered in an environmentally sound manner before being safely treated and disposed. The regulation covers the management of general, hazardous and special waste. Wastes arising from paints and chemical solvents are considered as special waste.

Clause 7 of the regulation requires the preparation of Waste Management Plans for specific sectors or areas. Clause 7(c) requires that City and Island Councils prepare their own Waste Management Plans for EPA approval. Clause 8 is for hazardous waste management and clause 9 for special waste management. The types of hazardous waste considered under clause 8 are given in Appendix J of the Regulation.

Clause 10 is about extended producer responsibility and Clause 11 requires that waste shall be disposed in approved locations only. Clause 11(b) states the areas where waste should not be disposed at all including roads, parks, beaches, lagoon, reef, and so on. Clause 11 (c) (d) states the situations that exempt the enforcement of the regulation including situations where human life is at risk and natural disasters or national security threats. Clause 11(e) states that waste management at household level would not require any permits under the regulation. Clause 12 states the provisions for managing waste in public places; that appropriate bins be placed in appropriate locations with appropriate labels distinguishing different kinds of waste and that those bins shall be emptied periodically in an appropriate manner to avoid nuisances of any sort.

Clause 13 is for waste management on sea-going vessels. Clause 14 is for waste management at harbours or ports. Clause 15 is for recycling and recovery of waste.

Clause 16 to 23 deals with waste management permits including the standards to be adhered by licensed parties, renewing licenses, types of licenses, renewal and change of licensee, cancellation of licenses, fees and charges. Clause 24 requires that EPA maintains an inventory of the licensed parties and the details required in the inventory.

Clause 25 to 28 lists the provisions for waste transport. Clause 29 talks about the responsibilities of the licensed parties. Clause 30 requires that administrative records including fines shall be maintained by the EPA. Clause 31 gives the EPA the authority to check/monitor the activities of the licensed parties. Clause 32 and 33 are also about data collection and reporting.

Clause 34 discusses the actions to be taken in case of non-compliance. Clause 35 sets the conditions for cancellation of license. Appendix M of the regulation states the different fines that will be levied upon non-compliance.

This regulation was effective from 6 January 2014 and EPA was responsible for the implementation this regulation until the Utilities Authority was established in 2020.

3.2.15 Ozone Layer Protection Act

The Ozone Layer Protection Act (41/2015) provides the necessary controls for the management and use of for ozone-depleting substances (ODS) in the Maldives.

3.2.16 Regulation on Ozone Depleting Substances

The Regulation on Ozone Depleting Substances (2017/R-9) was gazetted on 22 January 2017 in purview of the Ozone Layer Protection Act (41/2015) to define the ozone depleting substance, that are banned and those that are restricted and import and licensing procedures for those substance. It provides details of how banned ODSs will be disposed of and fines and legal action for illegal import and use of those substances.

3.2.17 The Borehole Guidelines

These Guidelines are not specifically relevant to the proposed project. However, it is considered important to discuss these regulations to understand current requirements.

Borehole Drilling Technical Specifications and Guidelines were issued by EPA dated 25 September 2011. The Guidelines covers drilling of boreholes and installation of electric pumps for source water extraction for various water supply development projects. The Guidelines state that boreholes shall be drilled at the location(s) designated by the client in consultation with Environmental Consultant and Environmental Protection Agency (EPA). It is also stated that care must be taken in handling and storage of all drilling fluids, oils, greases and fuel on site, to avoid any environmental pollution, damage and degradation. Any toxic materials, drilling fluids and other additives, cuttings and discharged water shall be disposed in a manner that do not cause damage to the environment, public and private property.

According to the Guidelines, the in-land borehole depth shall be more than 30m even if the electrical conductivity of discharge water has reached 50-60mS/cm before reaching 30m depth.

If electrical conductivity of discharge water at 30m depth is measured less than 50-60mS/cm, drilling shall continue until electrical conductivity reaches to 50-60mS/cm. This aspect of the Guidelines has raised concerns especially with reference to boreholes at the periphery of the island where, according to renowned hydro-geologists, the freshwater lens may not exist and therefore shallower depths may be considered. Further studies are proposed under the scope of the proposed project in order to determine the exact nature of this.

The Guidelines also provide guidelines for the different records that ought to be made during the drilling process. For monitoring purpose, boreholes drilled shall provide water sampling tubes at the interval of 5m from top to bottom. Water quality testing that may be necessary to be performed upon completion of the borehole has also been indicated in the Guidelines.

This guideline would be respected in case desalination is considered for the project and a borehole is the preferred option for feedwater. However, borehole drilling for water supply has been exempted from the EIA Regulations under the Fourth Amendment.

3.2.18 Labour Laws and Regulations

As a member of the International Labour Organisation (ILO), the Government of the Maldives has ratified 8 core conventions on the ILO's fundamental labour rights on 4 January 2013. These include the Forced Labour Convention, 1930 (No. 29), the Abolition of Forced Labour Convention, 1957 (No. 105), the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), the Right to Organise and Collective Bargaining Convention, 1949 (No. 98), the Equal Remuneration Convention, 1951 (No. 100), the Discrimination (Employment and Occupation) Convention, 1958 (No. 111), the Minimum Age Convention, 1973 (No. 138), and the Worst Forms of Child Labour Convention, 1999 (No. 182).

The national laws and policy instruments relevant to labour and working conditions include:

- Human Rights Act
- Anti-Human Trafficking Act
- Employment Act
- Immigration Act
- Pensions Act
- Regulation on Employment of foreign workers in the Maldives

- Work Visa Regulation

The Anti-Human Trafficking Act was ratified on 08 December 2013. The objectives of the Act include establishing the crimes of trafficking in persons, preventing trafficking of persons through and across the Maldives, prescribing punishments, prosecuting perpetrators of human trafficking, protection and assistance to victims of human trafficking, promoting and protecting the rights of victims and engaging with NGOs working against human trafficking.

The Regulation on Employment of foreign workers in the Maldives (2011/R-22) provides the details of regulatory requirements for foreign employment including quota, security deposit, employment approvals, work permits and work visa requirements. A foreign national applying for work visa shall have appropriate employment approval and get work permit card within 15 days of arrival after settling work visa fees. It is also required to register the foreign migrant worker with the Island or City Council. The Work Visa Regulation (2010/R-7) provides further details for work visa.

3.2.19 Regulation on the Construction Safety Standards

The Regulation on the Construction Safety Standards is a recent regulation which is relevant to this project. The regulation specifies that for contractual works above MVR1,500,000 a health and safety plan shall be made which includes safety of the workers as well as the general public. It also required that all workers/employees be trained and appropriate measures enforced by the contractor.

3.3 Policy Guidance

The policy guidance on the development of the proposed project is taken from a number of policy documents prepared by the Government of Maldives on sectoral developments. Key documents outlined in this EIA are currently being implemented towards sustainable development of the country.

3.3.1 Fourth Tourism Master Plan

Tourism master plans are for four years, the most recent one being the Fourth Tourism Master Plan (4TMP). The plan is currently in the draft stage. The emphasis of the 4TMP is on six themes.

- Maintaining Maldives position in the world
- Managing environment and conservation issues
- Engaging more Maldivians in tourism careers
- Promoting sensible ways for communities to participate in tourism
- Promoting investment towards sustainable growth and high product quality
- Efficient in marketing and destination management.

The Fourth Tourism Master Plan focuses mainly on increasing the number of tourists who visit Maldives with a good transport system being the main solution to achieving this.

3.3.2 Third National Environment Action Plan

NEAP 3 sets out the agenda for environmental protection and management in the Maldives for the five-year period 2009-2013. This plan is targeted to achieve measurable environmental results that matter to the people of the Maldives.

The aim of developing NEAP 3 is to protect and preserve country's environment and properly manage natural resources for sustainable development of the country and encompasses ten principles, six strategic results with targeted goals to be achieved under each result.

The key principles of the NEAP 3 are:

Principle 1: Environmental protection is the responsibility of every individual

Principle 2: Achieve results

Principle 3: Promote and practice sustainable development

Principle 4: Ensure local democracy

Principle 5: Inter-sectoral co-ordination and co-operation

Principle 6: Informed decision making

Principle 7: Precaution first

Principle 8: Continuous learning and improvement

Principle 9: Right to information and participation

Principle 10: Environmental protection complements development

The six strategic results of NEAP3 are: resilient islands; rich ecosystems; healthy communities; safe water; environmental stewardship; and a carbon neutral nation with 30 result oriented environmental goals that will be achieved in the span of the NEAP 3.

3.3.3 Strategic Action Plan 2019 to 2023

The Strategic Action Plan (SAP) outlines the developmental targets and priorities of the Government. It is the five year action plan of the Government of Maldives guiding the overall development of the country. The SAP covers five core sectors and 33 subsectors. The five core themes covering the 5 core sectors are (1) blue economy, (2) caring state, (3) dignified families, (4) *Jazeera dhiriulhun* and (5) good governance. Of these Blue Economy is of primary relevance to the proposed project related sector(s). Under this theme or sector, the following goals/targets set for 2023 are of relevance:

- Tourist arrivals Tourist arrivals from markets such as Russia, India, Middle East, China and other new markets to increase by 20% compared to pre-2019 levels
- 35,000 new tourist beds by 2023
- 30,000 to benefit from Tourism Training Fund
- By 2023, partnership agreements exist with at least 5 organisers of global sporting events and 5 environmental organisations
- By 2023, at least 5 events of the following are held - international conference, international entertainment event and international sea sport festival
- By 2023, at least 3 marina and 1 cruise ship terminal are operational
- Occupational health and safety standards are systematically monitored in tourism and other sectors

3.3.4 Sustainable Development Goals

The Sustainable Development Goals (SDGs) were adopted by all United Nations Member States in 2015 as a universal call to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030 (2030 Agenda for Sustainable Development). There are 17 SDGs and they are integrated with one area affecting the outcomes in other areas.

A Sustainable Development Goals Division has been established at the Ministry of Environment in May 2016 to coordinate, monitor and report the implementation process of

SDGs in the Maldives. According to Voluntary National Review in 2017, Some sectors such as education, health, energy, waste management, fisheries, water and sanitation, and local governance, have incorporated the SDGs into respective policy documents and action plans. For instance, National Food Safety Policy (2017-2026) developed by the Ministry of Health is in line with SDG2.

3.3.5 National Biodiversity Strategy and Action Plan

The National Biodiversity Strategy and Action Plan (NBSAP) 2016-2025 constitutes of three guiding principles, as follows:

6. The people of this generation and the generations to come reserve the right to access and share benefits of rich biodiversity and ecosystem services
7. Responsibility of conserving and sustainably using biodiversity lies with everyone and shall be taken as a shared responsibility
8. Biodiversity shall be mainstreamed into all sectors and in a manner whereby monitoring progress and accountability is ensured.

These principles were developed taking into account the three goals of the Convention on Biological Diversity (CBD). The principles were built with the understanding that it is the combined effort of everyone that will achieve the goals of biodiversity. Additionally, monitoring progress and ensuring accountability will be key factors that will ensure sustainability in achieving the targets of NBSAP.

In implementing the proposed project activities due to care has to be given to ensure that the national biodiversity strategies are adhered to.

3.3.6 Protected Species

Section 3.2.8 provides a list of birds that have been protected under the regulation 2014/R-169 (Regulation on Migratory birds in the Maldives). In addition, below is a list of marine species protected in the Maldives and relevant regulations.

Table 3-1: Marine species protected and relevant regulations

Species	Relevant documentation	Date
Whale Shark	FA-A1/29/95/39	24 June 1995
Conch (triton) Shell	FA-A1/29/93/14	15 May 1993

Species	Relevant documentation	Date
Whales	FA-A1/29/93/14	15 May 1993
Giant Clams	FA-A1/29/93/14	15 May 1993
Dolphins	FA-A1/29/93/14	15 May 1993
Lobster	FA-A1/29/93/14	15 May 1993
Black Coral	FA-A1/29/95/01	1 January 1995
Napoleon Wrasse	FA-A1/29/95/39	24 June 1995
Turtles	FA-A1/29/95/39	24 June 1995
All Sharks species	30-D2/29/2010	11 March 2010
Rays and Skates	(IUL)438-ECAS/438/2014/81	9 June 2014
Green Turtle	(IUL)438-ECAS/438/2016/72	4 April 2016
Hawksbill Turtle	(IUL)438-ECAS/438/2016/72	4 April 2016
Olive Ridley Turtle	(IUL)438-ECAS/438/2016/72	4 April 2016
Loggerhead Turtle	(IUL)438-ECAS/438/2016/72	4 April 2016
Leatherback Turtle	(IUL)438-ECAS/438/2016/72	4 April 2016

There is also a regulation on the protection of old trees. According to that regulation, the following trees are declared as protected.

- Trees that have been recorded to exist for more than 50 years
- Trees that are in danger of extinction based on diversity/locality
- Environmentally significant trees based on its location, historical significance or use
- Trees considered worthy of protection by the community with approval from the Ministry of Environment. An inventory of such are kept by the Environmental Protection Agency

3.3.7 Maldives Climate Change Policy Framework

This framework consists of strategic polices for responding to climate change impacts over the next 10 years (2014–2024). The strategic components are based on low emission development aimed at stabilizing greenhouse gas concentration at a level that prevents human interference with the climate system, achieving a window of time that will enable adaptation of ecosystems to climate change and using opportunities to ensure food safety and sustainable economic development and meeting international obligations and commitments. The policy defines five thematic goals and strategies: (1) sustainable financing in climate change adaptation; (2) low emission development ensuring energy security; (3) adaptation actions and opportunities and build climate resilient infrastructure and communities; (4) build local capacity and take up an advocacy role at international level; and (5) foster sustainable development.

In addition to the Maldives Climate Change Policy Framework, the legislative and policy instruments that are relevant for climate change in the Maldives include Maldives Intended

Nationally Determined Contribution and Second National Communication of Maldives to UNFCCC.

3.3.8 National Environmental Health Action Plan

National Environmental Health Action Plan (NEHAP) has been formulated based on National Environmental Action Plan and National Health Masterplan. It has been in the making since 1998. The following are the guiding principles proposed under NEHAP (2015-2020):

9. Environmental protection is the responsibility of every individual: Health is everybody's business. And since health is the product of the healthy environment we live in, this principle of everyone's responsibility becomes paramount.
10. Promote and practice sustainable development: Since Rio 1992, the world has taken steps to follow this paradigm, and so it is appropriate that we take this path too seriously.
11. Subsidiarity: Things are best done at the level that makes sense best to the recipients of the service. Given that environmental concerns are felt most visibly at the local levels in atolls and islands, this responsibility of implementation is best given to them with facilitation support from the central government.
12. Inter-sectoral cooperation and coordination. Environmental health concerns, just as all development work, is a confluence of the effort of many sectors. Even though the bureaucratic model still applies at the planning level, only an inter-sectoral approach can make progress and success possible at the implementation stage.
13. Informed decision making: Research needs to be invoked and the information from it effectively used to make decisions relevant and acceptable to the recipient population.
14. Precautionary principle: In the case of environment there is enough evidence that action needs to be taken. Even though there might still be uncertainty on several aspects of its outcome, it is necessary to err on the needs to the environment, for without its health, the dangers of the disaster can be irrevocable.
15. Environmental protection complements development: The environment provides the resources for development; thus, it becomes the necessary that they complement.

3.4 Regulatory Bodies

3.4.1 Ministry of Tourism

For this project, the Ministry of Tourism is the key government institution dealing with all matters relating to the project except for EIA and land registration. Even Environmental Assessment was legally mandated to the Ministry for tourism projects from April 2015 to December 2019 after which it was included back into the mandate of Environmental Protection Agency (EPA) under the Ministry of Environment. However, for coastal modifications at resorts, the concept approvals are given by the Ministry of Tourism. All communications regarding the EIA including the submission of EIA report have been changed to the EPA in December 2019.

The Ministry also has its own regulations and environmental standards for tourist establishments, which shall be strictly adhered to. Therefore, the Ministry will monitor the environmental impacts of the development in collaboration with the EPA.

3.4.2 Ministry of Environment, Climate Change and Technology

The primary environmental institution in the Maldives is Ministry of Environment, Climate Change and Technology (MECCT). It is mandated with formulating policies, strategies, laws and regulations concerning environmental management, protection, conservation and sustainable development. The Minister of Environment or a designate gives the environmental approval or clearance to EIA by an Environmental Decision Statement.

Additionally, MEE is responsible for formulating relevant laws and regulations, policies and strategies concerning energy, water and sanitation, waste and infrastructure.

3.4.3 Environmental Protection Agency (EPA)

EPA is the key regulatory body on environment, which is an autonomous body formed under the umbrella of MEE. It is mandated with implementing the EIA process in the Maldives, implementing the Environment Act and subsequent regulations on behalf of MEE, regulating water and sanitation, biodiversity conservation, waste management and coastal zone management. Also, it is responsible for developing environmental standards and guidelines in the country.

This EIA report shall be submitted to the Environmental Protection Agency. The Terms of Reference for this EIA was also approved by the Environmental Protection Agency. Environmental monitoring report shall also be submitted to the EPA.

With the formation of the Utilities Regulatory Authority (URA), the legal framework relating to water, wastewater, electricity and waste management has been incorporated into the mandate of URA.

3.4.4 Atoll/City Councils and Island Councils

Under the Maldives Decentralization Law, elected Atoll Councils, City Councils and Island Councils have been formed as regulatory bodies dealing directly with atoll, cities and island issues. In this regard, some of the development projects are subject to approval of these councils through a public consultation process. For the proposed project, EPA requires that a copy of the final draft of the EIA Report be submitted to Atoll Council for their information and receipt provided to EPA or attached to the EIA report.

3.5 International and Regional Context

3.5.1 Environment Sector

The major global issue facing the Maldives is climate change, global warming and subsequent sea-level rise. The small size of the islands and their low elevation above MSL makes possible impacts of it very seriously. Consequently, the country plays a prominent role in fore-fronting environmental issues faced by many other small islands developing states including the Maldives in the international arena. The Maldives is, therefore, a party and signatory to various international conventions and declarations. These include:

- The Paris Agreement (2016)
- UN Convention on the Law of the Sea – UNCLOS (1982)
- International Convention for the Prevention of Pollution of the Sea by Oil (1982)
- Vienna Convention for the Protection of the Ozone Layer (1985)
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (1989)

- The London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1990)
- Agenda 21 and the Rio Declaration of the United Nations Conference on Environment and Development (1992)
- Convention on Biological Diversity (1992)
- United Nations Framework Convention on Climate Change (1992)
- The Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1992)
- The Montreal Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1997)
- The Beijing Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1999)
- Washington Declaration on Protection of the Marine Environment from Land-Based Activities
- Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998)
- Cartagena Protocol on Biosafety (Maldives acceded on 2 September 2002)
- United Nation Convention to Combat Desertification (2002)

The Maldives is also a key player in formulating and adopting various regional plans and programs to protect the environment by continuously participating in various activities organized by regional bodies such as SACEP, ESCAP and SAARC. As a result, the Maldives is committed to the following;

- SAARC Environment Action Plan adopted in 1997 in Male'
- SAARC Study on Greenhouse Effect and its Impact on the Region
- South Asian Regional Seas Action Plan and Resolutions concerning its implementation (1994)
- SAARC Study on Causes and Consequences of Natural Disasters, and
- South Asian Seas Program initiated by SACEP
    - Male' Declaration on Control and Prevention of Air Pollution and its likely Transboundary Effects for South Asia (1998)

4 Existing Environment

4.1 Introduction

Conditions of the existing environment of the study area were analysed by using appropriate scientific methods. Field surveys were undertaken to get further understanding of the existing environment of the island. These surveys were carried 3 times since 2015. Additional data is also collected for the purpose of this EIA report. Field data including location maps and photographic site records from the previous reports are included in the Appendices.

The following components of the existing environment were assessed;

- Ocean currents at designated locations
- Shorelines
- Vegetation and groundwater quality
- Marine water quality
- Socio-economic aspects

4.2 Methodologies

Conditions of the existing environment of the study area were analysed by using appropriate scientific methods. The environmental components of the study area were divided into marine, coastal and terrestrial resources.

The different methods used in assessing and reporting the conditions of the existing environment of the island are given in the following subsections.

4.2.1 Location identification

The location of data collection sites have been marked using handheld GPS. Figure 4-17 shows the data collection and sampling locations.

4.2.2 Water Quality

One of the main environmental components that would be affected by implementing the project would be marine water quality. Water quality was assessed in-situ for most of the parameters using a YSI handheld water quality logger and Hach portable turbidity and TSS meter. Water

quality was assessed at different locations within the impact zone. Water testing was also undertaken for other marine location identified as control marine reef survey locations.

All water samples were taken at a depth of 1m from the mean sea level or mid water depth for shallow areas. GPS coordinates of each water sampling location was taken. The samples were analysed for the following parameters as indicated in the environmental monitoring manual issued by the EPA.

Table 4-1: Water quality parameter optimum conditions

PARAMETER	OPTIMAL RANGE	REFERENCE
TEMPERATURE	18°C and 32°C Changes should not surpass 10°C above the average long term maximum	GBRMPA, 2009
SALINITY	3.2% - 4.2%	GBRMPA, 2009
PH	8.0-8.3 Levels below 7.4 pH cause stress	
TURBIDITY	3-5 NTU >5 NTU causes stress	Cooper et al. 2008
SEDIMENTATION	Maximum mean annual rate 3mg/cm2/day Daily maximum of 15mg/cm2/day	GBRMPA, 2009

Groundwater was also tested in-situ and by bringing samples to the laboratory. A sample from the back-of-house area was taken.

4.2.3 Coastal processes

Wave and tide data were based on long term wave and tide data available with the Hulhule' Meteorological Station. In addition, current meters were installed at specified impact areas to understand oceanic currents around the island. Repetitive long-term measurements at the same locations would help to understand the general current patterns that will be used in assessing impacts as well as designing long term shore protection measures.

4.2.4 Marine Ecology

Marine environmental surveys were conducted to collect data on key environmental components (i.e. the coral reef system) that will be impacted due to the development. The key objectives of the surveys are to define and establish marine environmental baseline conditions for impact evaluation during and after the proposed project implementation. Surveys were based on standard marine environmental survey techniques (English, *et al* 2007) so that they can be repeatedly carried out to monitor and record changes and assess possible impacts on the marine environment from the proposed work activities as well as operation of the facility. These

surveys should be continually repeated to assess the short-term and long-term impacts on the marine environment. The surveys done in 2015 and baseline surveys repeated in 2018 were both done at the same locations.

Quantitative surveys were conducted to establish the status of the coral reef system of the Lagoon. Methodologies adopted for these surveys are internationally accepted and widely used to assess the status of coral reefs in the country as well. Photo Quadrates and visual observation of the reef were conducted at the coral reef system. Photo Quadrate technique has been used for objectives ranging from large-scale special problems to morphological comparison of coral communities and studies assessing impacts natural and anthropogenic disturbances.

Photo Quadrates have been conducted 5 different locations around the island including one of the baseline locations used in the original EIA; locations of the reef surveys are shown in Figure 4-17. These sites are representative areas within the reef system that can be monitored on long-term basis for assessing magnitude of possible impacts. Some of these areas may be most prone to any adverse impacts from the proposed work, therefore establishing permanent monitoring sites at these areas is important to assess the impacts.

4.3 Climate

4.3.1 General meteorological conditions

The Maldives, in general, has a warm and humid tropical climate with average temperatures ranging between 25°C to 30°C (MHAHE, 2001) and relative humidity ranging from 73 percent to 85 percent. The country receives an annual average rainfall of 1,948.4mm. Table 4-2 provides a summary of key meteorological findings recorded for Maldives.

Table 4-2: Key meteorological information

Parameter	Data
Average Rainfall	9.1mm/day in May, November 1.1mm/day in February 1900mm annual average
Maximum Rainfall	184.5 mm/day in October 1994
Average air temperature	30.0 ^{0}C in November 1973 31.7 ^{0}C in April
Extreme Air Temperature	34.1 ^{0}C in April 1973 17.2 ^{0}C in April 1978
Average wind speed	3.7 m/s in March 5.7 m/s in January, June

Parameter	Data
Maximum wind speed	W 31.9 m/s in November 1978
Average air pressure	1012 mb in December 1010 mb in April

Monsoons of Indian Ocean govern the climatology of the Maldives. Monsoon wind reversal plays a significant role in weather patterns. Two monsoon seasons are observed: the Northeast (*Iruvai*) and the Southwest (*Hulhangu*) monsoon. Monsoons can be best characterized by wind and rainfall patterns. These are discussed in more detail in the following subsections. The southwest monsoon is the rainy season which lasts from May to September and the northeast monsoon is the dry season that occurs from December to February. The transition period of southwest monsoon occurs between March and April while that of northeast monsoon occurs from October to November. However, according to Elliot *et al,* 2003 due to proximity to the equator, the monsoon seasons in Maldives are not as well defined as they are in Sri Lanka. The monsoons in Maldives are best defined in the northern part of the country where a distinct monsoon seasons including the strong southwest monsoon from June through September and a noticeable northeast monsoon from December through February occurs.

The climate of the Maldives varies slightly from South to North of the country. As pointed out by Elliot *et al,* 2003 the monsoon in north region is more pronounced and distinct. In Maldives, meteorological data are not recorded in all islands across Maldives. It has been recorded regional airports. General meteorological conditions prevailing in the region based on meteorological data for Hulhulé has been used to understand climatic factors affecting the project site. Table below shows summary of four seasons in Maldives.

Table 4-3: Summary of Seasons in the Maldives

Season	Months
North East-Monsoon (Iruvai moosun)	December to February
Transition Period - 1 (Hulhangu Halha)	March to April
South West-Monsoon (Hulhangu moosun)	May to August
Transition Period - 2 (Iruvai Halha)	October to November

4.3.2 Temperature

The temperature of Maldives varies little throughout the year with a mean daily maximum temperature of about 32°C and mean low of 26°C and are rarely below 25°C or above 33°C. The highest temperature ever recorded in the Maldives was 36.8°C, recorded on 19 May 1991 at Kadhdhoo Meteorological Office. Likewise, the minimum temperature ever recorded in the

Maldives was 17.2°C, recorded at the National Meteorological Centre on 11th April 1978. The highest recorded temperature for Male' was 34.1°C on 16th and 28th of April 1973. The hottest month of the year is usually April reaching a peak around 24 April.

The figure below represents monthly low (blue) and high (red) temperature with mean temperature based on the recorded data from 1975 to 2020.

Based on recorded data from past 45 years, a notable increase in annual average temperature is noted for Hulhule'. In 1975, average annual temperature was around 27.5°C while the recorded data from 2020 indicates an annual temperature of 29.3°C (Figure 4-2).

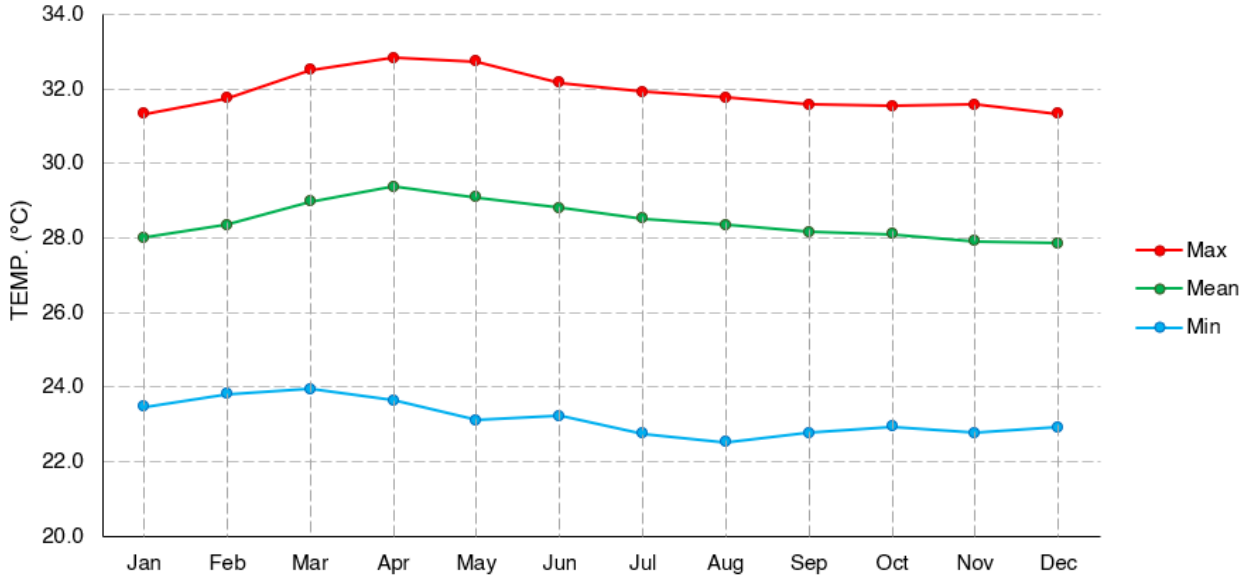


Figure 4-1: Monthly average temperature for Hulhule (*data: MMS*)

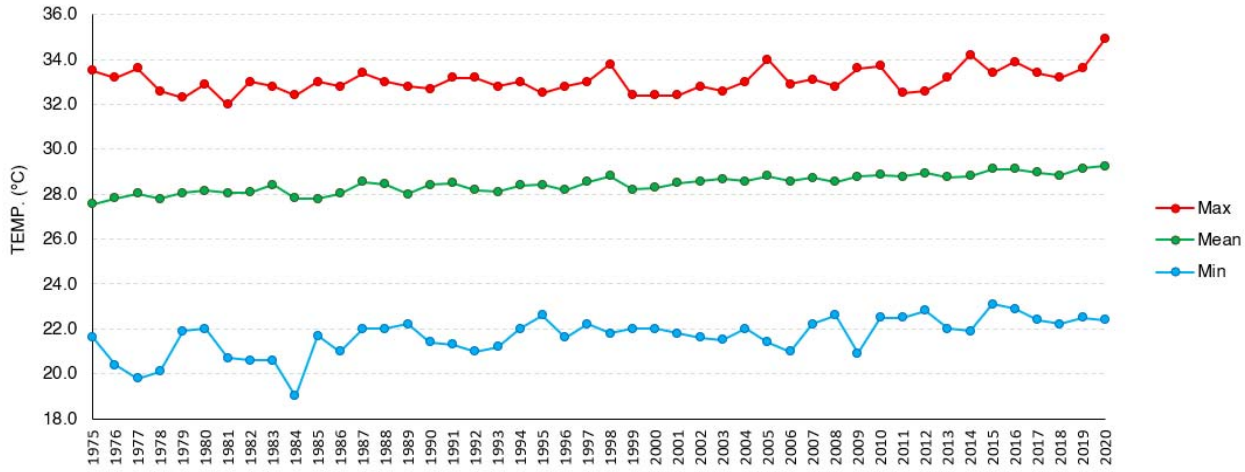


Figure 4-2: Average annual temperatures for Hulhule' (*data: MMS*)

4.3.3 Rainfall

Annual average rainfall in the Maldives is about 1900mm. There is a marked variation in rainfall across Maldives with an increasing trend towards south. The annual average rainfall in north is 1977mm and for south is 2470mm. The southwest monsoon is known as the wet season with monthly average rainfall ranging from 125-250mm. The northeast monsoon is known as the dry season with average monthly rainfall of 50-75mm.

Based on published data from Maldives Meteorological Services (Figure 4-3) the wettest month of the year is May with an average rainfall of 232.3mm while the driest is February with 40.4mm of rain. Based on the data, May to December is generally more wet compared to January to April; i.e. Southwest monsoon is generally associated with rain while northeast monsoon is considered drier.

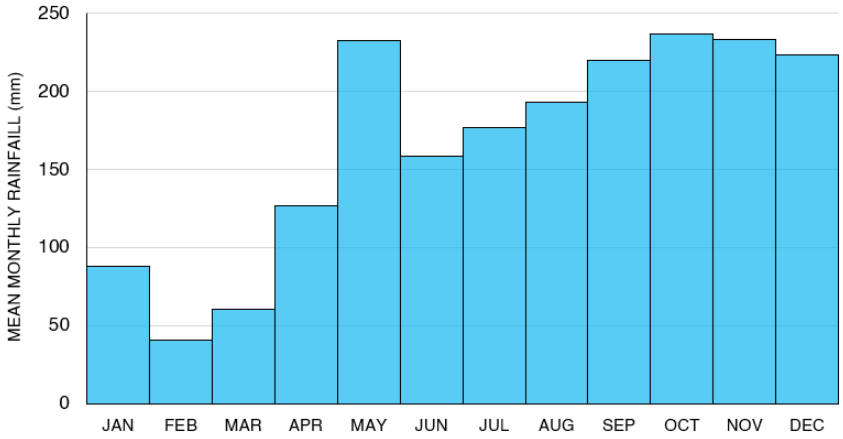


Figure 4-3: Average rainfall per month at Hulhule' (data: MMS)

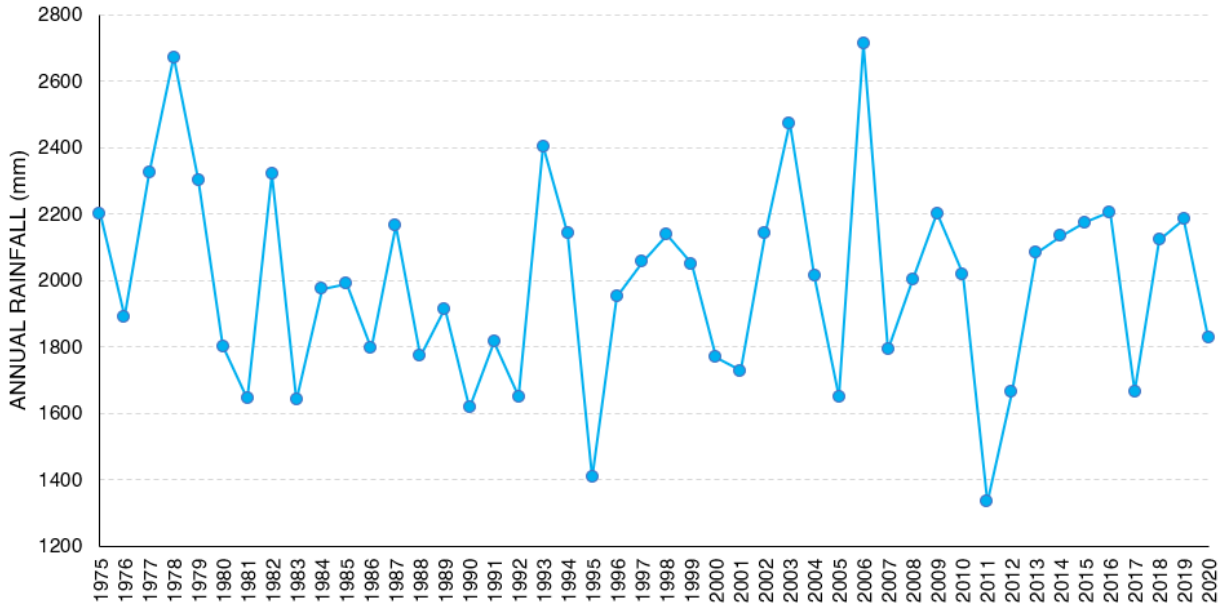


Figure 4-4: Annul rainfall recorded from Hulhule' between 1975 and 2020 (data: MMS)

4.3.4 Humidity and Evaporation Rates

Based on data obtained from Hulhulé weather station over a period of 45 years from 1975 to 2020 (MMS), the daily mean relative humidity typically ranges from 76% to 80.8% over the course of a year (Figure 4-5). Based on the recorded data from Hulhule', the lowest recorded relative humidity was 43% on 7th January 2019 while the highest recorded was 100% on 27th August 2019 during the past 3 years (2018 to 2020).

The air is *driest* in March, at which time the mean daily relative humidity drops to 76%; it is *most humid* around November, reaching daily mean relative humidity of 80.8%. The mean daily relative humidity shows a similar pattern to rainfall where humidity rises during wetter months (Figure 4-7).

Over the course of a year, the dew point typically varies from 23°C to 27°C and is rarely below 21°C or above 28°C.

Open water evaporation and transpiration from vegetation are very high. The high rates of evaporation and transpiration, especially owing to global warming, may be considered to add further to the evaporation rate and cause sea levels to fall in the future (Morner *et al* 2004). Evaporation rates are influence by wind, temperature and humidity and level of particulates in the air, studies of pan evaporation rates

are influenced by the amount of sunlight hitting the pan, rather than other meteorological factors (Dawson and Spannagle 2009).

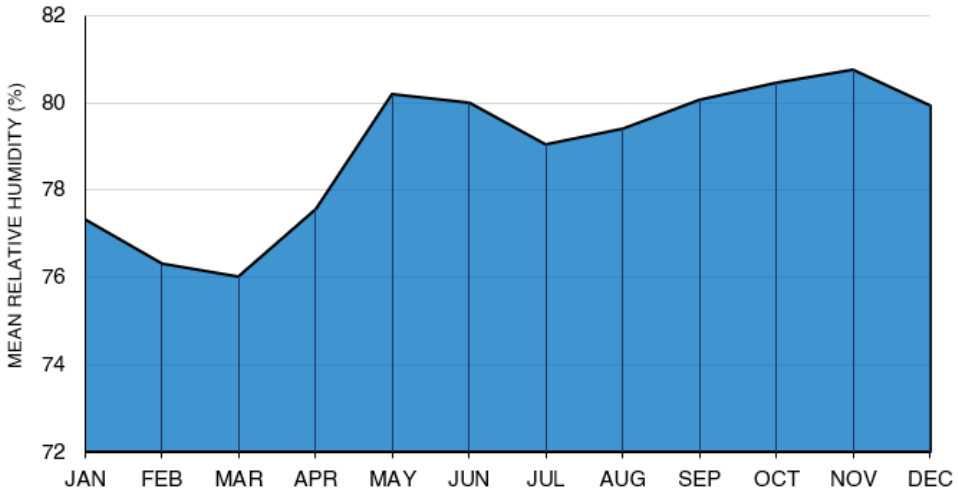


Figure 4-5: Monthly Relative Humidity at Hulhule' (data: MMS)

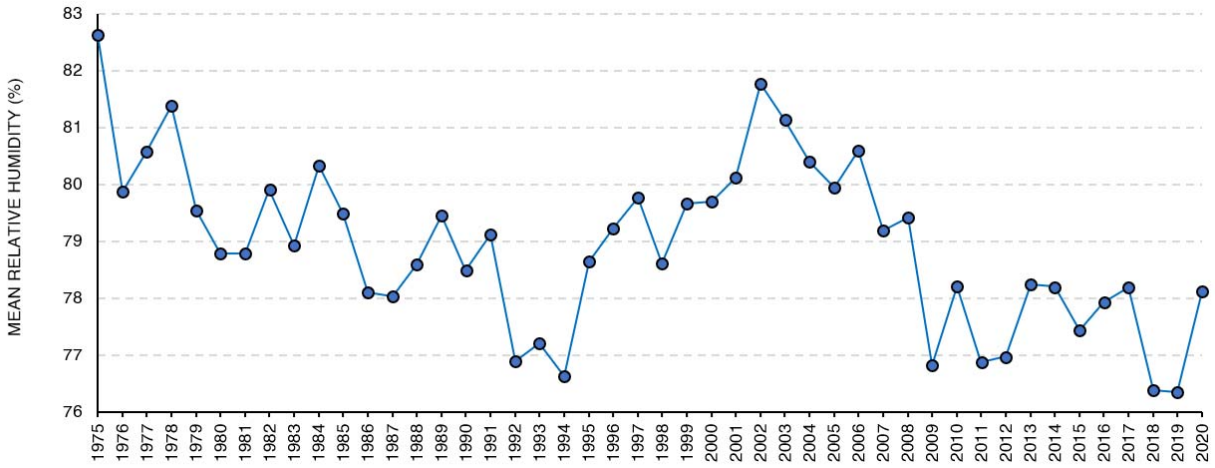


Figure 4-6: Mean annual relative humidity recorded at Hulhule' (data: MMS)

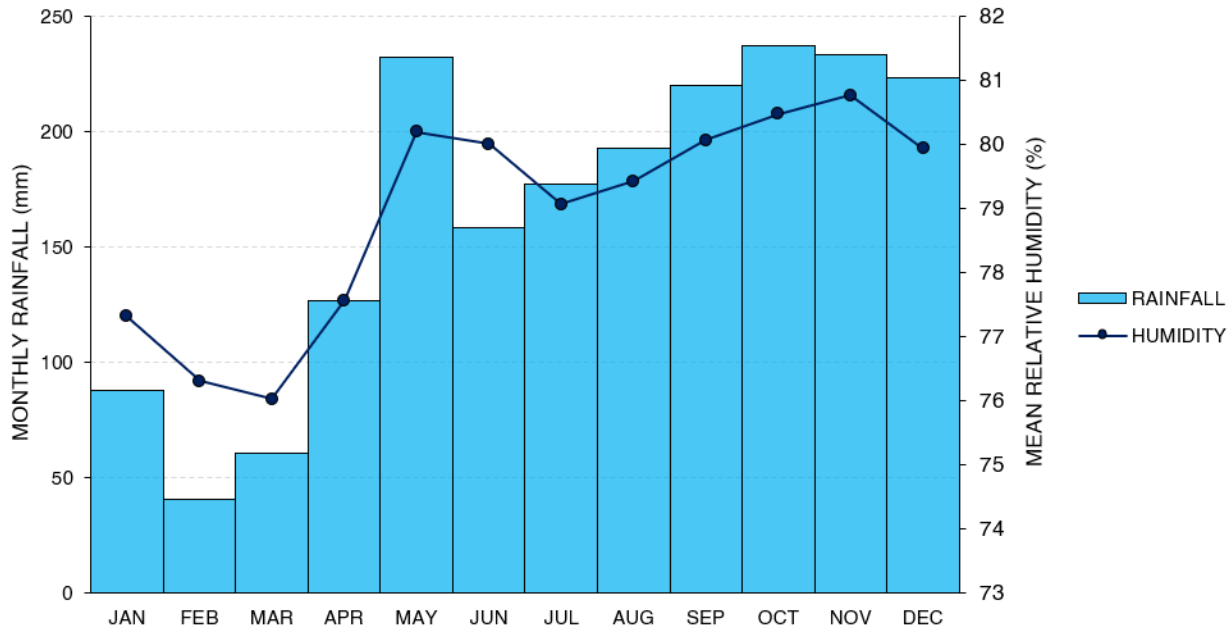


Figure 4-7: Mean relative humidity against rainfall data from Hulhumale' (data:MMS)

4.3.5 Wind

Wind has been shown to be an important indirect process affecting formation, development and seasonal dynamics of the islands in the Maldives. Winds often help to regenerate waves that have been weakened by travelling across the reef and they also cause locally generated waves in lagoons. Therefore, winds are important here, as being the dominant influence on the hydrodynamics around the island (waves and currents). With the reversal of winds in the Maldives, NE monsoon period from December to March and a SW monsoon from April to November, over the year, the accompanying wave and current processes respond accordingly.

Wind was uniform in speed and direction over the past twenty-plus monsoon seasons in the Maldives (Naseer 2003). Wind speed is usually higher in central region of the Maldives during both monsoons, with a maximum wind speed recorded at 18 m/s for the period 1975 to 2001. Maximum wind speed recorded in the south was 17.5 m/s during the period 1978 to 2001. Mean wind speed was highest during the months January and June in the central region, while wind speed was in general lower and more uniform throughout the year in the southern region. Wind analysis indicated that the monsoon was considerably weaker in the south (Naseer 2003). During the peak months of the SW monsoon, southern regions have a weak wind blowing from the south and south-eastern sectors.

Figure 4-8 summarizes the annual wind conditions in the central region where Dhiffushi is located (source: windfinder.com). This analysis represents wind data from Malé Velana International Airport taken between 07/2002 - 02/2019 daily from 7am to 7pm local time.

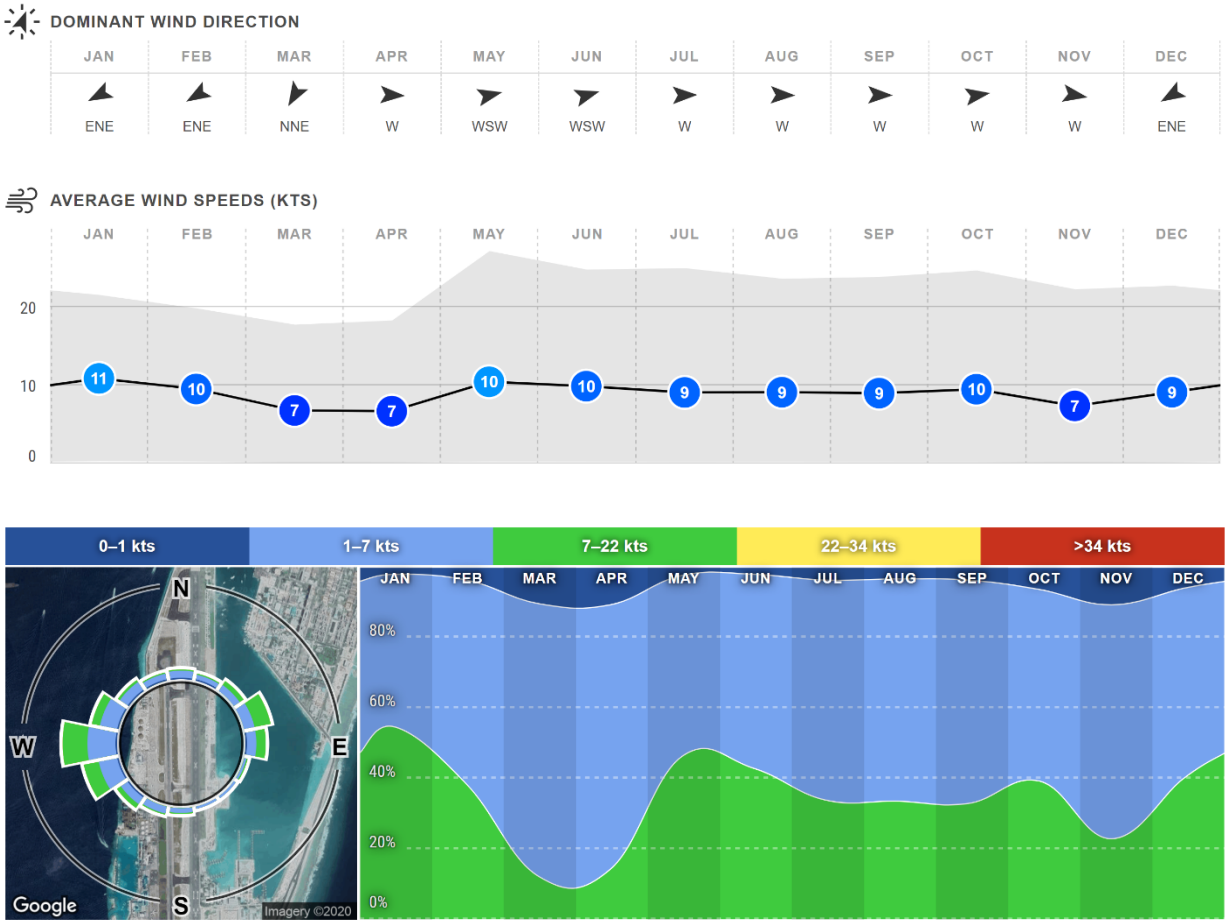


Figure 4-8: Summary of general wind conditions in the central Maldives

Figure above indicates that the southwest monsoon has stronger winds than the northeast monsoon. Therefore, with the proposed islands on the western rim of the atoll, the southwest monsoon would have a greater impact on the western shores than the eastern due to wind-generated waves combined with oceanic swells during the southwest monsoon. Therefore, shore protection measures shall be focused on the western shoreline than the eastern.

The Maldives experiences strong ocean winds at speed of 6m/s to 7.5m/s at a height of 10m during June, July and August (Elliott *et al*, 2003). Since the lagoon is on the western rim and oriented in a west to east direction in the three protrusions, it is quite protected except for the eastern end and for a few days during the northeast monsoon. The project is best undertaken during the northeast monsoon since the northeast monsoon is generally mild, therefore, working

in the northeast monsoon is not going to pose much difficulty in this area. Also, the net flow is in the easterly direction. So, there will be stronger currents in the area during southwest monsoon compared to the northeast monsoon; so it may be easier to mobilize and operate heavy machinery at this site during northeast monsoon.

4.3.6 Waves

Wave energy is important for sediment movement and settlement, and it is also a crucial factor controlling coral growth and reef development. Waves have been attributed to the diversity and the abundance of coral and algal species. These aspects have implications for the type and perhaps the supply of sediments into the island.

Studies by Lanka Hydraulics (1988 & 1989) on Malé reef indicated that two major types of waves on Maldives coasts: wave generated by local monsoon wind and swells generated by distance storms. The local monsoon predominantly generates wind waves which are typically strongest during April-July in the south-west monsoon period. During this season, swells generated north of the equator with heights of 2-3 m with periods of 18-20 seconds have been reported in the region. Local wave periods are generally in the range 2-4 seconds and are easily distinguished from the swell waves.

Distant cyclones and low pressure systems originating from the intense South Indian Ocean storms are reported to generate long distance swells that occasionally cause flooding in Maldives (Goda 1988). The swell waves that reached Malé and Hulhule in 1987, thought to have originated from a low-pressure system of west coast of Australia, had significant wave heights in the order of 3m. Recent tidal swells (in July 2020) have caused inundation of low-lying areas in several islands.

In addition, Maldives has recently been subject to earthquake generated tsunami reaching heights of 4.0m on land (UNEP 2005). Historical wave data from Indian Ocean countries show that tsunamis have occurred in more than one occasion, most notable been the 1883 tsunami resulting from the volcanic explosion of Karakatoa (Choi *et al* 2003).

Spot measurements of waves at the project site was measured during the filed visit using a portable wave logger (RBR) from 4pm 2nd March 2020 to 4pm 3rd March 2020.

Figure 4-9: RBR 24hr wave data

During the recording period, average wave heights were recorded to be 0.025m to 0.045m during high tide and 0.005m and 0.015m during the low tide. No significant difference was observed in average wave period between high tide and low tide; however, an increase in wave period from an average of 5sec to 10sec was observed from 2nd March to 3rd March. The highest maximum wave height recorded during this period was 0.09m around 6pm on 2nd March and 2am on 3rd March (high-tide); while the lowest maximum wave height recorded was around 0.005m around 11:30am on 3rd March (low-tide). Significant wave height during the logging period was recorded between 0.09m and 0.005m.

4.4 Geology and geomorphology

In geological terms, the Maldives are the summit of a submarine mountain chain, which begins 300 or 400km west of India, and then extends over 2300km to the south (Amsler, 1994). This underwater mountain or linear ridge rises from the ocean bottom at depths of 4000m. As this ridge is a major site of reef limestone development in the Indian Ocean, atolls and islands are entirely made up of limestone structures (Brown, 1997). The atolls of the Maldives rise from 350- 450m depth from this ridge, which largely owes to coral reef formations over a long period of time. The formations of coral reefs die in time and space, and new reefs grow on top to replace old reef structures to form atoll shapes. The reefs in which the atolls are found serve as the foundation for the islands, which is also the result of reef limestone development within the atoll structures.

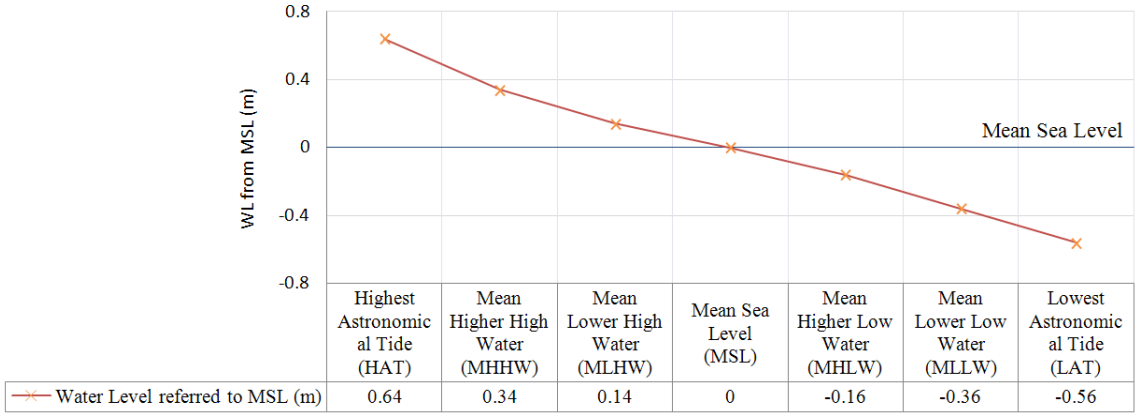
There is no site-specific information available on geology including age structure of Holiday Island Resort. However, from the visual observations and field assessments undertaken, it was observed that the island is mature in geological terms. Most of these rock formations are large in size and must have died several years ago to form the old reef structure. The old reef structure now supports the new and recent coral formations around the reef.

The topography of the island was typical of Maldivian islands with limestone structure and coralline topsoil forming the basis of the island. The shape of the islands is characterized by strong tidal and current patterns, which are subject to the climatic condition. The beach systems found on the islands are highly dynamic and have directional shifts within the shoreline in accordance with the prevailing seasonal condition. As the beach systems are highly dynamic in nature, the prevailing seasonal conditions may gradually shift the position of the island by strong beach erosion and accretion on either side of the island, however, the ultimate position depends on the size of the reef in which the island is found. The phenomenon of beach erosion and accretion is highly common in Maldivian islands.

4.5 Hydrography

4.5.1 Tides

The Maldives experiences mixed semi-diurnal/diurnal type of tides which on two extreme ends of the country (North to South) found varying tidal range. The tide at Hanimaadhoo, HDh. Atoll is about 20cm lower than that recorded in Gan, Seen Atoll (MHAHE 2001). Tides affect wave conditions, wave-generated and other reef-top currents. Tide levels are believed to be significant in controlling amount of wave energy reaching an island. In the Maldives, where the tidal range is small (1m), tides may still have significantly important influence on the formation, development, and sediment movement process around the islands. Tides would play an important role in lagoon flushing, water circulation within the reef and water residence time within enclosed areas.



	Highest Astronomical Tide (HAT)	Mean Higher High Water (MHHW)	Mean Lower High Water (MLHW)	Mean Sea Level (MSL)	Mean Higher Low Water (MHLW)	Mean Lower Low Water (MLLW)	Lowest Astronomical Tide (LAT)
Water Level referred to MSL (m)	0.64	0.34	0.14	0	-0.16	-0.36	-0.56

Figure 4-10: Astronomical tidal variation in the Maldives

4.5.2 Currents

Studies on current flow within a reef flat in Malé Atoll suggests that wave over wash and tides generate currents across the reef platforms, which are also capable of transporting sediments (Binnie Black & Veatch, 2000). However, available information suggests that tidal currents are not strong due to small tidal range.

Generally current flow through the Maldives is driven by the dominating two-monsoon season winds. Westwardly flowing currents are dominated from January to March and eastwardly from May to November. The change in currents flow pattern occurs in April and December. In April the westward currents flow are weak and eastward currents flow will slowly take place.

Similarly, in December eastward currents flows are weak and westward currents will take over slowly.

Studies on current flow process within a coral atoll have shown that waves and tides generate currents across the reef flats, which are capable of transporting sediments on them. Currents, like waves are also modified by reef morphology. Under low-input wave conditions (0.5m heights) strong lagoonward surge currents (>60cm/sec) are created by waves breaking at the crest. Studies on current flow across reef platforms have shown that long-period oscillations in water level cause transportation of fine-grained sediments out of the reef-lagoon system, while strong, short duration surge currents (<5sec.) transport coarse sediments from the breaker zone to seaward margin of the backreef lagoon. Always sediment accumulates at the lee of high-speed current zones. Generally, zones of high current speed (jets or rips, 50-80cm/sec) are systematically located around islands.

In order to understand the flow patterns around the lagoon, current meters were installed at two different locations, the results of which are discussed below.

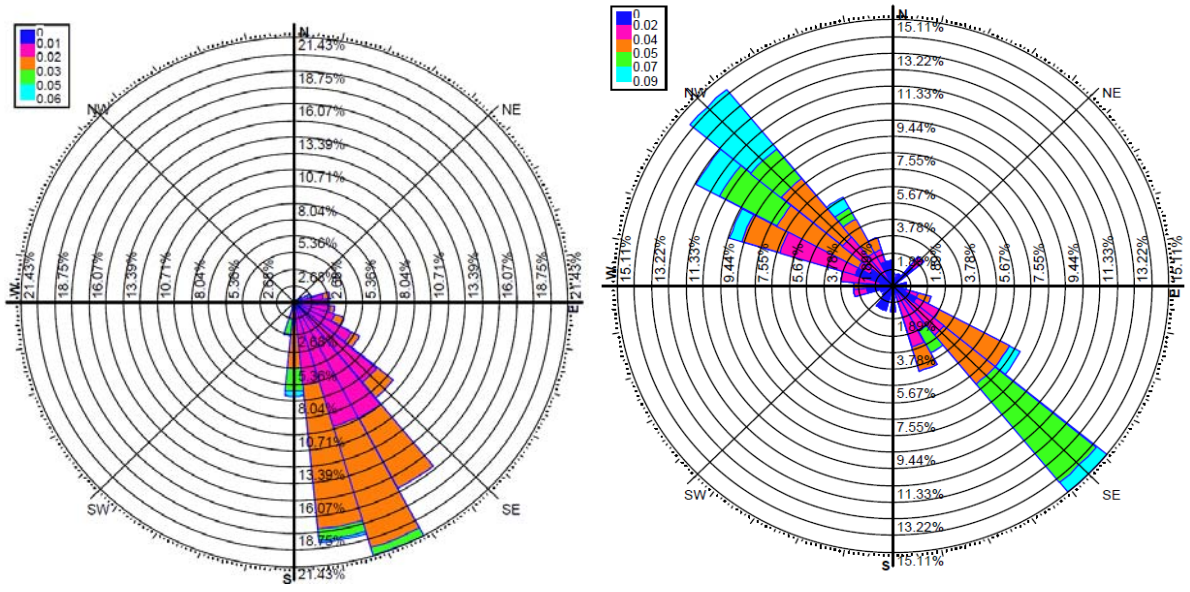


Figure 4-11: Result of current loggers at CM1 (left) CM2 (right)

The logger deployed on the eastern side of the island; CM1 shows a predominant southerly flow with a recorded maximum speed of 0.05ms^{-1}. The current speed recorded mostly stayed between 0.02ms^{-1} and 0.03ms^{-1}, rarely surpassing the latter. In contrast, the logger deployed on the northern side of the island; CM2 indicates a strong tidal influence where current direction switched between southeasterly and northwesterly during the logging period. Additionally,

compared to CM1, the speed of the currents was slightly higher where speed surpassing 0.05 ms^{-1} was fairly common.

4.6 Groundwater quality

Groundwater quality has been measured from the back-of-house area. The water quality results indicate that the groundwater is slightly brackish in both locations.

Table 4-4: Water quality results

	Units	Sample 1
Location		GW1
Temperature	°C	29.30
pH		8.23
E. Conductivity	uS/cm	1693
Dissolved oxygen	mg/l	2.40
Nitrate	mg/l	2.8
Phosphate	mg/l	0.18
Total Petroleum hydrocarbon	mg/l	0.072

4.7 Coastal Environment

The coastal environment of Holiday Island Resort was assessed in 2020 for the EIA for coastal modification. During the time significant erosion was observed on the north-eastern tip of the island while extensive dry beach was observed on the north-western side of the island. Fair amount of erosion was observed on the south-eastern and southwestern side of the island as well. The shore protection and beach enhancement project that was proposed to be implemented has been nearly completed with some areas remaining to be filled further. The northeastern end and the southern side have been filled recently and land area has increased by about 5 hectares.

4.8 Ecology

4.8.1 Background

Both terrestrial and marine ecological systems are important habitats for small islands like the Maldives. With about 1% of the area of the Maldives being dry land, terrestrial ecosystems are small compared to marine ecosystems. Hence, the Maldives has a rich marine biodiversity and several marine protected areas. Due to the small land area of the Maldives, terrestrial biodiversity is limited.

According to the Fourth National Report to the Convention on Biological Diversity (MHE 2010), the present records indicate that Maldives has a total of 1,100 species of demersal and epipelagic fish including sharks, 5 types of marine turtles, 21 species of whales and dolphins, 187 species of corals and 400 species of mollusks. There are 120 species of copepods, 15 species of amphipods, over 145 species of crabs and 48 species of shrimps. There are also 13 species of mangroves and 583 species of vascular plants. Additionally, two species of fruit bats (mammals) which are endemic have been found. The bird species number 170 of which most are sea birds: 70 of these birds are protected.

According to NBSAP 2016-2025, marine biodiversity in the Maldives is characterised by the large megafauna found in the waters of Maldives. Over 20 species of whales and dolphins, and 40 species of sharks Over 167 species of birds, of which 5 are endemic to the country, have been identified in the Maldives. Majority of these are migratory species and protected under Environment Protection and Preservation Act of Maldives (4/93). Maldives is also characterised by mangroves, acting as a buffer as well as a drainage during floods and other natural hazards. Fourteen species of mangrove plants and many more associated species have been identified in Maldives. The size and diversity of mangrove ecosystems, although not globally significant, plays a critical role in sustaining the delicate balance of the island ecosystem.

The economy and the livelihoods of the people of Maldives are largely dependent on the biological resources of the country. Industries that directly benefit from biological resources include fisheries, agriculture, tourism and handicrafts. According to the report "Valuing Biodiversity Report" (2009), biological diversity of Maldives contributes to 71% employment, 89% of Gross Domestic Product (GDP) and 98% of export. The sectors that depend entirely on biodiversity such as the tourism industry, fisheries and agriculture contribute significantly to the country's GDP.

4.8.2 Flora of ADh. Dhiffushi

Dhiffushi (Holiday Island) has a number of coconut trees and other mature and young vegetation around the island. The following table shows the results of the tree surveys carried out in 3 locations as shown in Figure 4-17. The results indicate that coconut trees and sea hibiscus are the dominant trees in the island.

Table 4-5: Vegetation survey results, August 2021

Dhivehi name	Common name	Scientific name	Count
Ruh (bodu)	Coconut palm (mature)	*Cocos nucifera*	80
Dhiggaa	Sea hibiscus	*Hibiscus tiliaceus*	27
Kaani	Sea trumpet	*Cordia subcordata*	3
Boashi	Heliotrope	*Heliotropium arboreum*	3
Uni	Nit pitcha(s)	*Guettarda speciosa*	2
Fithuroanu	Beef wood	*Casaurina equisetifolia*	3
Kuredhi	Iron wood	*Pemphis acidula*	2

4.8.3 Marine Protected Areas and sensitive sites

As per the requirements of the TOR, Marine Protected Areas (MPAs) and ecologically important or sensitive sites such as breeding or nursery grounds for protected or endangered species have been considered.

Figure 4-12: Marine Protected Areas (MPAs) found in South Ari

South Ari Atoll has two small Marine Protected Areas namely Kudarah Thila situated on the eastern inside of South Ari Atoll near Kudarah Resort and Madivaru Channel situated on the western side of the atoll near Conrad Rangali Resort. Kudarah Thila is found approximately 14km northeast of Holiday Island Resort and Spa and Madivaru Channel is found approximately 17km northwest of Holiday Island.

Holiday Island is situated close to the boundary of a large Marine Protected Area dedicated for protecting whale sharks in the Maldives. The South Ari Marine Protected Area (SAMPA) covers an area from the western tip of Conrad Rangali Resort to eastern tip of Dhigurah Island covering an approximate length of 40km having a boundary of 1km from the outer reef crest of the reefs and islands. It is the largest MPA in the Maldives with an area of 4,863ha.

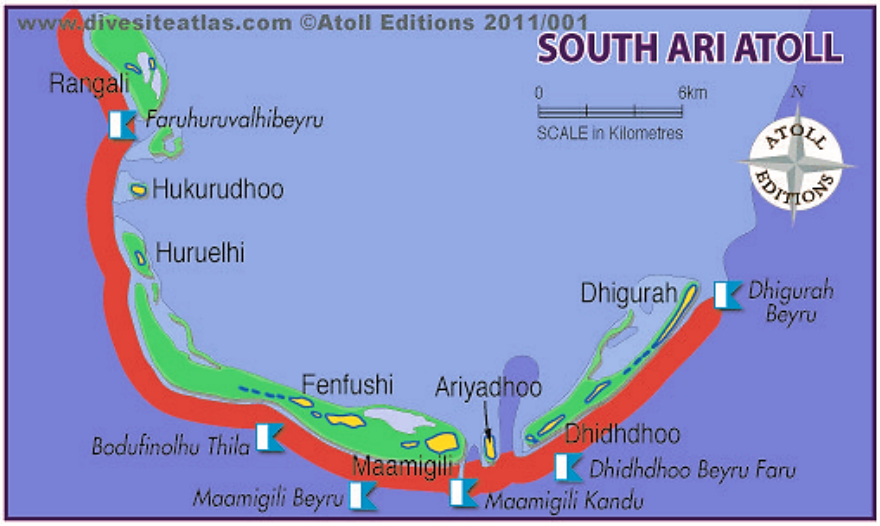


Figure 4-13: The extent of South Ari MPA

4.8.4 Endangered species

The South Ari Protected Area is famous for whale shark sightings throughout the year. It is also one of the few spots in the world known for whale shark breeding. Whale sharks can be spotted on the atoll rim reef which is about 750m from Holiday Island. Manta rays can also be observed in the area throughout the year including some manta ray cleaning stations. In addition, sting rays, black tip reef shark and turtles (which are protected species in the Maldives) have been spotted during the recent visits to Holiday Island and Sun Island resorts.

4.8.5 Marine survey at the jetty area

The jetty area is comprised of fine sandy bottom. The entire length of the jetty area is found to be devoid of marine life except for a few fish (mostly Pomacentridae and Acanthridae). The jetty piles had some algae growing on them.

The jetty extends to over 265m from the shoreline of Holiday Island up to a dredged harbour basin connecting to the deep lagoon close to the end of the jetty.

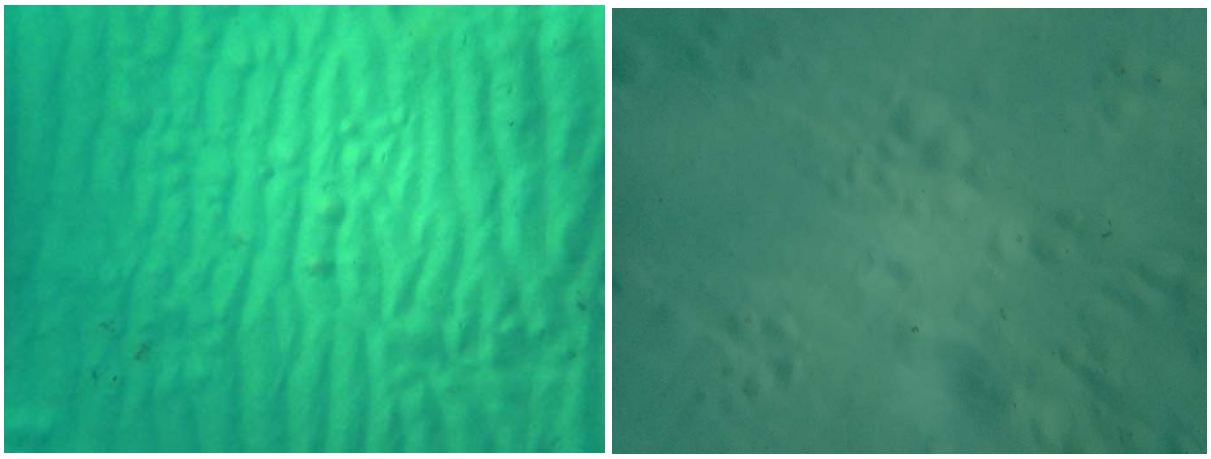


Figure 4-14: Photos of the seabed in the shallow and deep end of the jetty area

Table 4-6: Marine water quality at jetty end

Parameter	Unit	Jetty end
GPS Location	UTM	258324.79 m E, 384746.48 m N
Temperature	°C	29.99
pH		7.84
E. Conductivity	uS/cm	55,180
Total Dissolved Solids	mg/l	35,598
Salinity	ppt	35.43
Dissolved Oxygen	mg/l	4.97
Turbidity	NTU	0.28
Total suspended solids	mg/l	0

4.9 Socio-economic environment

Holiday Island Resort and Spa (on Dhiffushi) is located very close to Maamigili, which has a population of about 2500 persons. Located on the southern tip of South Ari Atoll, Holiday Island shares a large lagoon extending almost the entire length of the South Ari Atoll MPA.

Sout Ari Atoll has a total registered population of 9,029 (Census 2014). There are 10 inhabited islands in South Ari Atoll with Maamigili being the closest and with the largest population in Alifu Dhaalu atoll. The atoll capital, Mahibadhoo is approximately 35km from Holiday Island Resort and Spa.

Table 4-7: Island level Demographic statistics of Alifu Dhaalu Atoll (Census 2014)

Island	Total			Maldivians			Foreigners		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Hangnameedhoo	501	260	241	475	240	235	26	20	6
Omadhoo	886	454	432	842	413	429	44	41	3
Kuburudhoo	462	226	236	437	206	231	25	20	5
Mahibadhoo	2075	1108	967	1929	973	956	146	135	11
Mandhoo	363	229	134	287	158	129	76	71	5
Dhagethi	827	449	378	712	345	367	115	104	11
Dhigurah	608	315	293	523	241	282	85	74	11
Fenfushi	836	461	375	724	353	371	112	108	4
Dhidhdhoo	156	77	79	140	62	78	16	15	1
Maamigili	2315	1296	1019	2042	1040	1002	273	256	17

There are sixteen operational resorts in the Alifu Dhaalu Atoll. In the recent years, there has been a rapid growth in the guest house industry in inhabited islands with several guest houses in all inhabited islands of the atoll including the neighbouring four islands as well as Maamigili, Fenfushi, Dhigurah and Dhangethi within the vicinity of Holiday Island.

4.10 Natural hazard vulnerability

Holiday Island is on the southern rim of Ari Atoll and, therefore, is subjected to oceanic swells from the southeast side. However, Holiday Island is at a considerable distance from the rim reef with a large rim reef flat. The southeast half of Holiday Island is in the lee of the runway. The southwest side is more prone to erosion than the southeast. The northern side is subjected to wind-generated waves during the northeast monsoon, with erosion more prominent on the northeast corner. However, the island is generally in a calm area of a generally shallow lagoon. Therefore, it has naturally low elevations all around it with the island at an average height of a little over 1m from MSL.

The west and north-western sides of the island are better protected, and accretion has always been more prominent on the west end of the island. The south and southeast side would be prone to erosion due to wind-generated waves as well as swell-induced turbulence during the northeast monsoon as well as the southwest monsoon. Therefore, shore protection is mostly required for the southern side of the island.

Apart from the above concerns, there are no natural hazard concerns specific to the proposed island. The following paragraphs provide a general account of the vulnerability of the islands of Maldives to natural hazards (UNDP 2006), which has been discussed in greater detail in the reclamation phase EIA. They are summarised based on Developing a Disaster Risk Profile for Maldives, a study undertaken by UNDP following the tsunami of 2004.

According to the UNDP (2006), the disaster risk scenario for Maldives can be described as moderate in general. Despite this, Maldives is among the most severely affected countries hit by the Asian tsunami on December 26th, 2004. Maldives experiences moderate risk conditions due to a low probability of hazard occurrence and high vulnerability from exposure due to geographical, topographical and socio-economic factors.

The natural vulnerability of the islands and atolls of the country to potential hazards have been modelled to understand the risk factors of the country in the report entitled Disaster Risk Profile for Maldives by UNDP in 2006. It can be summarized that the northern parts of the country are vulnerable to cyclones and storm surges while southern parts of the country are vulnerable to seismic activity. The eastern side of the country is more exposed to potential tsunamis and surges.

Maldives faces tsunami threat largely from the east and relatively low threat from the north and south. So, islands along the eastern fringe are more prone to tsunami hazard than those along the northern and southern fringes. Islands along the western fringe experience a relatively low tsunami hazard. The eastern fringe also is susceptible to greater risk of storm surges than the western side with the northern part of the eastern side facing the greatest risk of storm surges.

The islands of Maldives are less prone to tropical cyclones. The northern islands of the country were affected by weak cyclones that formed in the southern part of the Bay of Bengal and the Arabian Sea. Figure below shows the tracks of cyclones affecting Maldives during the period 1877-2004. The number of cyclones directly crossing Maldives is small. Only 11 cyclones

crossed the islands over the entire span of 128 years. Most of the cyclones crossed Maldives north of 6.0o N and none of them crossed south of 2.7°N during the period (UNDP 2006).

Figure 4-15: Tracks of Cyclones affecting Maldives, 1877-2004

UNDP (2006) stated that there were 21 cyclonic disturbances within the 500km radius during 1877-2004, of which 15 were depressions with an average wind speed of about 28 knots. The highest wind speed due to cyclonic disturbances that affected the islands during that time was about 65 knots.

Based on historical catalogues of earthquakes in the region, identifying seismic sources based on this historical information and based on numerical models, it was found that except for Seenu, Gnaviyani and Gaafu Atolls, earthquake hazard is low across the country. The probable maximum Modified Mercalli Intensity (MMI) is estimated between 7-8 in Zone 5 (Fuvah Mulah and Addu Atoll). This level of MMI can cause moderate to high damages (UNDP 2006).

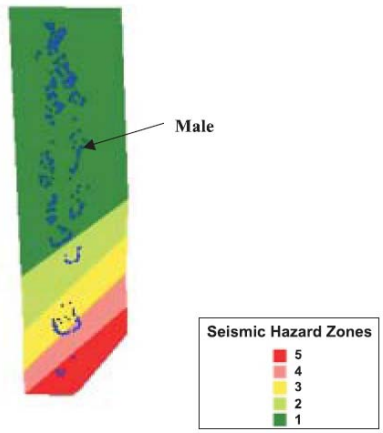


Figure 4-16: Maldives Seismic Hazard Zones

Figure 4-17: Survey locations

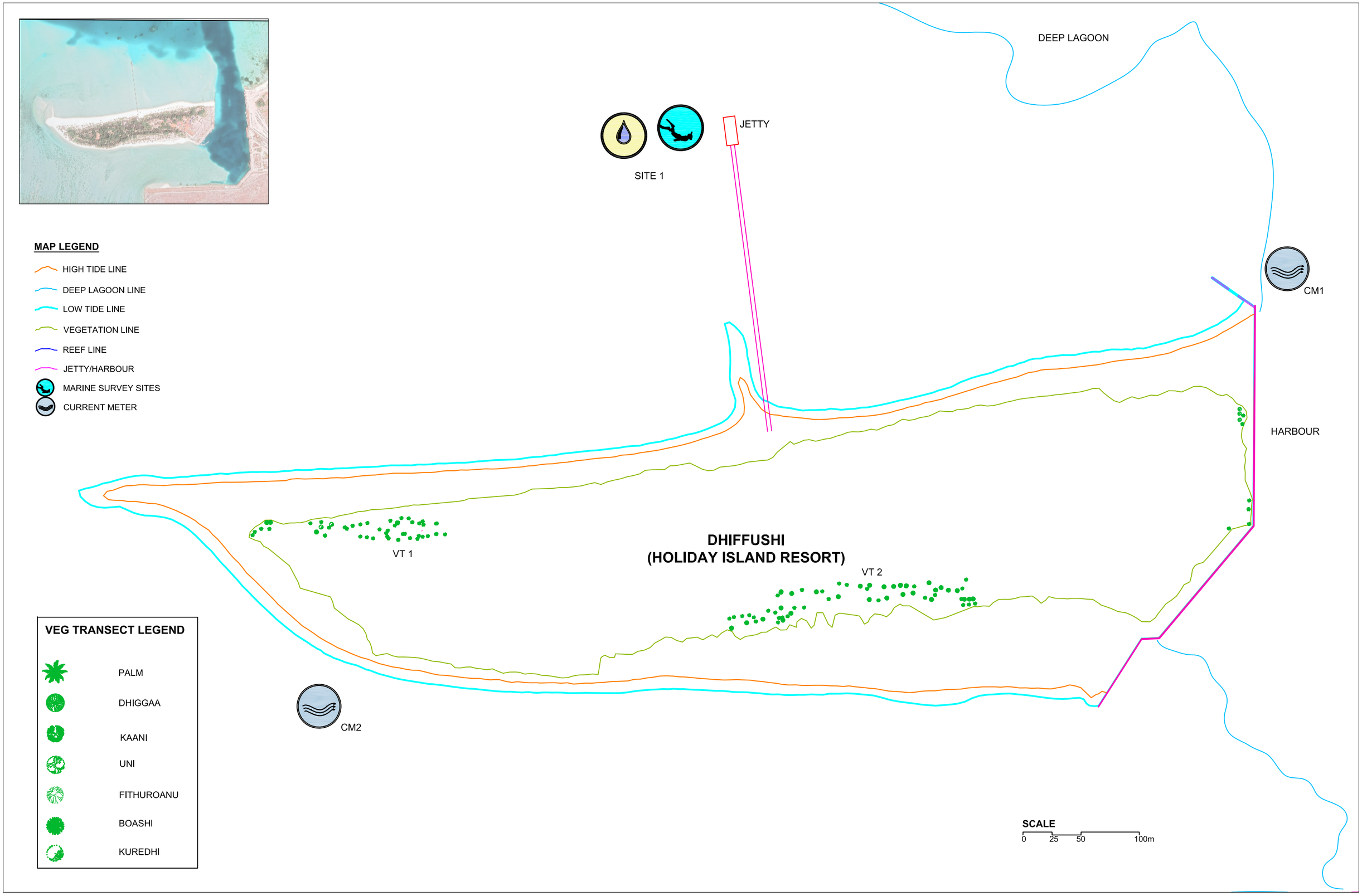
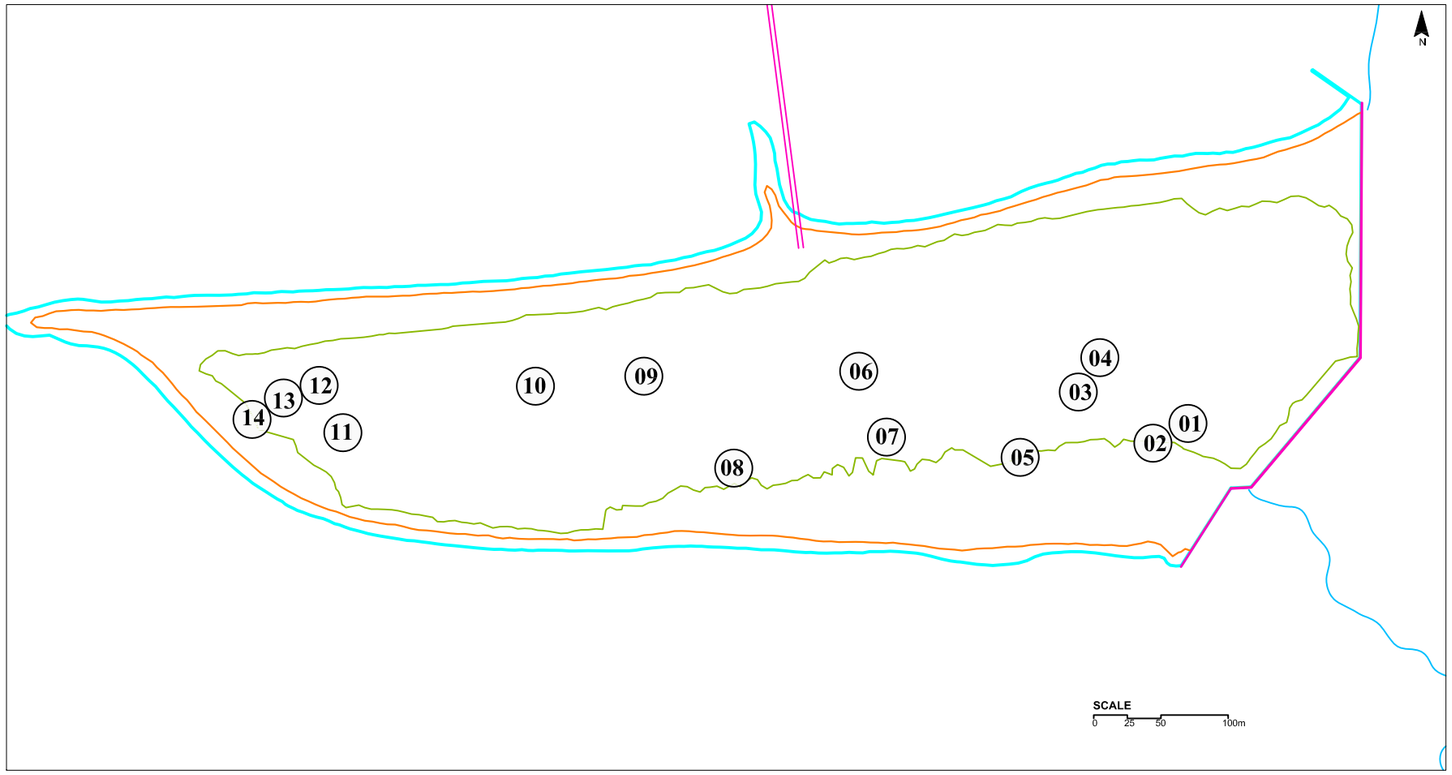


Figure 4-18: Pictorial summary of site conditions



5 Stakeholder Consultations

The key stakeholders of the project include the Proponent and the Government of Maldives represented by the Ministry of Tourism and the Ministry of Environment (the Environmental Protection Agency). Other stakeholders include the Contractors, Project Engineers and Consultants. Stakeholders identified in the approved TOR are as follows.

1. Ministry of Environment, Climate Change and Technology (Environment Department)
2. EPA - Environmental Research and Conservation Unit (ERC)

This chapter will consider the presence of any vulnerable groups, how stakeholders would be engaged and finally the outcomes of consultations with specific stakeholders identified in the approved TOR, as above.

5.1 Vulnerable groups

There was no mention of any persons or groups that may be affected by the proposed project during the consultations held with relevant government agencies. Even the consultations with the Maamigili Council in 2020 had no mention of any affected parties due to project activities in Holiday Island.

5.2 Stakeholder engagement

As per the ToR, it was considered necessary to identify appropriate mechanisms for providing information on the development proposal and its progress to all stakeholders. Since there are two islands in the vicinity of the project site, the relevant Councils have to be informed about the proposed project in Holiday Island.

There would be a need to coordinate with neighbouring resorts, namely Sun Island Resort on the west of Holiday. However, Sun Island and Holiday Island are operated by Villa Hotels and therefore there is good coordination between the two resorts with no possibility for conflicts due to the proposed project.

All communication by the Proponent would be via the Ministry of Tourism. Therefore, the Ministry will be the coordinating body for the project. The development concept, the EIA and the detailed design for the project has been submitted to the Ministry of Tourism for approval.

The EPA will be involved with the EIA administrative process and provide a Decision Statement, as per normal procedures in the Maldives. If any artefact of cultural/heritage significance has been found, the Ministry of Arts, Culture and Heritage shall be informed.

Upon completion of the project and prior to operation of the resort, the land area has to be registered with the Maldives Land and Survey Authority. Currently, this registration process is also coordinated by the Ministry of Tourism and relevant documents shall be submitted to the Ministry of Tourism. The land registration survey for Holiday Island following the recent beach enhancement has been undertaken in August 2021.

During the design stage, electrical network details, sewerage system details, fire safety details will be submitted to the Ministry of Tourism (MOT) and MOT will get coordinate with the relevant Ministries. Registration of desalination plant and power system approval will be from the Utilities Regulatory Authority.

During the construction and operational phase, environmental monitoring reports shall be submitted to the EPA. The EPA will make such documents available to the Ministry of Tourism and relevant government agencies on request. It is recommended to submit copies of Environmental Monitoring Reports to the Ministry of Tourism. In case of non-compliance with environmental laws and regulations, the Minister of Environment or his/her Designate may intervene in collaboration with the Ministry of Tourism.

The Proponent shall, therefore, ensure that all relevant regulations are complied with during the construction and operation of the proposed project. As such, the Proponent shall make sure that environmental impacts are minimized and there is regular monitoring data to support the efforts. Environmental compliance monitoring reports shall be regularly submitted to the Ministry of Tourism to assure compliance in all matters relating to the project. These reports should cover the efforts of the resort to involve stakeholders in the government sector as well as the neighbouring resorts.

5.2.1 Grievance Redress Mechanism

Stakeholders consulted for this EIA have no reservations. However, a grievance redress mechanism is proposed to be established for community grievances as well as labour/staff grievances. The objective is to keep a record of grievances from all stakeholders including neighbouring resorts, general public and workers, assess the grievances and address significant

concerns/grievances in a timely manner in order to ensure stakeholders are confident with the manner in which the project is implemented.

Grievances can be lodged in person, by phone or via email/letter. In fact, it is the policy of the Proponent to encourage its staff to lodge their grievances by email as a formal form of communication.

The proposed mechanism for redressing grievances is as follows:

- Assess and document grievances as and when received.
- Attend to the grievance by respective persons assigned by the Proponent. During the construction phase, the grievance is to be directed to the Contractor/Supplier. If the Contractor/Supplier (Site Supervisor) is unable to respond appropriately, the matter can be taken up with the Project Management Consultant (PMC)/Project Manager (PM) assigned by the Proponent or the environmental consultant. The PM/C will be the primary focal point for all grievances during the construction phase. If the PM/C or environmental consultant fails to attend to the grievance, the matter can be communicated to the Proponent directly by email. The concerned persons are required to attend to and address the issues within a given time frame and notify the affected person as soon as the issue is resolved. It would be necessary to resolve any matter within a week or two. For any matters requiring longer timeframe, the grieving party shall be informed of possible delays and a potential time frame for a resolution.
- During the operational phase, the grievance is to be directed to the Health, Safety and Environment Manager of the resort or environmental consultant. Alternatively, the matter can be communicated to the Proponent directly by email. The concerned persons are required to attend to and address the issues within a given time frame and notify the affected person as soon as the issue is resolved. It would be necessary to resolve any matter within a week or two. For any matters requiring longer timeframe, the grieving party shall be informed of possible delays and a potential time frame for a resolution.
- All records of grievances and actions taken will be reported in the monitoring reports.

6 Environmental Impacts

6.1 Introduction

Development projects involving infrastructure development in island environments are believed to generate a series of environmental impacts, of which some can be felt immediately on the surrounding environment while others can be felt continually and can be far reaching. By far and large the most significant environmental impacts are those that are felt on the immediate environment. Coral reef environments are sensitive and highly susceptible to immediate changes that will be incurred from most of the development activities. Therefore, all the development activities must take into consideration the understanding of the environment and changes as well as implications that it will bring about to the environment and surrounding.

The following account describes potential environmental impacts that will be associated with the proposed resort re-development both during construction and operation phases of the development.

6.2 Methods and Limitations

The methods used to predict and evaluate the environmental impacts that may be associated with the proposed dredging and reclamation may not be the most comprehensive methods as they are quite simple prescriptive methods. The main shortcoming of these methods is that only assumptions have been made to predict the impacts which may or may not be accurate. Also, the degrees at which these impacts are either accurate or inaccurate as well as uncertainties and natural variability are the key factors that affect the accuracy of these methods. Nonetheless, the methods used are concise and provide a general overview as well as the range of impacts that can affect the environment. Also, the EIA report has taken into consideration similar studies undertaken in the Maldives as well as expert judgement in identifying the main environmental impacts that may be associated with the proposed development.

6.3 Impact Identification

Impacts on the environment from various activities of the proposed development have been identified through:

- A consultative process within the EIA team and the Proponent

- Purpose-built checklist
- Existing literature and reports on similar developments in small island environments and other research data specific to the context of the Maldives
- Baseline environmental conditions described in Chapter 4.
- Consultant's experience of projects of similar nature and similar settings

A purpose built matrix has been used to evaluate the overall impacts of the proposed project. The impacts of the project have been evaluated according to the following criteria:

1. Magnitude (or severity): the amount or scale of change that will result from the impact
2. Significance: importance of the impact. Reversibility is considered part of its significance
3. Duration: the time over which the impact would be felt
4. Extent/spatial distribution: the spatial extent over which the impact would be felt

The scales associated with the above criteria are given in the table below.

Table 6-1: Impact evaluation scale

Criteria	Scale	Attribute
Magnitude *Change caused by impact*	-3	Major adverse
	-2	Moderate adverse
	-1	Minor adverse
	0	Negligible
	1	Minor positive
	2	Moderate positive
	3	Major positive
Significance/Reversibility *Impact implications / Reversibility of impact's effects*	0	Insignificant
	1	Limited implications / easily reversible
	2	Broad implications / reversible with costly intervention
	3	Nationwide or global implications / irreversible
Duration *Duration / Frequency of Impact*	0	Immediate
	1	Short term/construction period only
	2	Medium term (five years of operation)
	3	Longterm/continuous
Extent/Spatial Distribution *Distribution of impact*	0	None/within 1m from point of discharge/no affected party
	1	Immediate vicinity/household level/developer/consumer
	2	Specific areas within the island/atoll/specific parties
	3	Entire island/atoll/nation/all stakeholders

Based on the above scale, an impact matrix was developed for the proposed development to determine the overall impact of the proposed project. This matrix is given in Table 6-2.

An impact potential index was then developed from Table 6-1. The impact potential index table represents a product of the magnitude (M), significance (S), duration (D) and extent/spatial distribution (E) given in the above table. The sum of all key component specific indexes for one activity (i.e. sum by rows) provides the Activity Potential Impact Index (API) and the sum of all activity specific indexes for one key component (i.e. sum by column) provides the Component Potential Vulnerability Index (CPVI) which gives an indication of the vulnerability of each key component to activity related impacts. Table 6-3 represent the impact potential indices for the proposed project.

6.4 Overall Impacts of the Proposed Project

The overall impact of the proposed project is moderately positive due to the strong economic potential of the proposed project. The direct and project specific negative impacts of the proposed project during the construction phase are due to excavation to remove existing piles and install new piles (moderate to major negative, direct and indirect, short term), jetty renovation (minor negative, cumulative, short term), shore protection (minor negative), increased noise and pollutant levels (minor negative, cumulative, short term), construction of

new villas (minor negative, direct, short term) and labour-related activities (minor negative, direct, short term).

Negative impacts related to beach maintenance, marine activities (diving, snorkeling, etc.), solid waste, sewage disposal, water and energy production are causes for concern both during construction and during operation. They have cumulative and indirect as well as direct impacts over the long term. The creation of employment opportunities (direct and indirect) and related economic ventures (direct and indirect), government revenue, ownership and responsibility of taking care of the natural environment of the island and surrounding marine environment as well as the value of property associated with the development are considered as major positive socio-economic impacts of the project. They are also cumulative impacts given that they add to the existing socio-economic impacts from other projects, programmes or activities.

The cumulative nature of the above impacts affect the carrying capacity as well as the socio-economic conditions of the project area (South Ari Atoll in this case). As there are several resorts in the project area (South Aril Atoll) with other tourism developments such as guesthouses, the cumulative impacts that result from the incremental impact of these developments on valued environmental (and social) components (VECs) on which all of these developments impact, is considered necessary. Therefore, cumulative impacts of this nature have been separately considered. Measures to mitigate negative cumulative impacts have also been considered in the Mitigation Measures section of this report.

Table 6-2: Impact matrix for the proposed project

PROJECT ACTIVITIES	KEY COMPONENTS																								
	Environment																	Socio-Economic							
	Coral and reef benthos	Marine biodiversity	Baitfish/fishery	Lagoon habitats/seagrass	Protected marine area/species	Coastal hydrodynamics	Beach/coastal landscape	Marine water	Visual aesthetics	Groundwater	Other terrestrial waters	Soil/land	Avian fauna	Terrestrial flora/fauna	Air	Noise	Services and Infrastructure	Cultural assets/values	Health and Safety	Employment - local	Employment - foreign	Property Value	Revenue (state/private)	Costs to consumer/tax payer
Construction																								
Jetty demolition and installation	-1 0 1 1	-1 0 1 1	-1 0 1 1	-2 1 1 1	-2 1 1 1	-2 1 1 1	-2 1 1 1	-2 2 1 2	-2 0 1 1	0	0	-1 0 1 1	0	0	-1 0 1 1	-1 0 1 1	2 1 1 2	0	-1 0 1 1	2 1 1 2	1 1 1 3	-1 0 1 1	1 1 1 3	-1 1 1 1
Demolish existing and construct new fuel tank	0	0	0	0	0	0	0	-1 0 2 2	-1 0 1 1	-1 0 1 1	0	-1 0 1 1	0	0	-2 0 1 1	-1 0 1 1	2 2 1 2	0	-1 1 1 1	2 1 1 2	1 1 1 3	2 2 3 2	1 1 1 2	-1 1 1 1
Demolish existing and construct new villas	0	0	0	0	0	0	0	0	-2 0 2 1	-1 0 1 1	0	-1 0 2 1	-1 0 2 1	-1 0 2 1	-1 2 2 1	-1 0 1 1	2 1 1 2	0	-1 0 1 1	2 1 1 2	1 1 1 3	-2 1 2 1	1 1 1 2	-1 1 1 1
Landscaping	0	0	0	0	0	0	0	0	0	-1 0 1 1	0	1 1 3 1	1 1 3 1	1 1 2 1	1 2 3 1	1 0 3 1	2 1 1 2	0	-1 0 1 1	2 1 1 2	1 1 1 3	2 2 3 1	1 1 1 2	-1 1 1 1
Construction of swimming pool	0	0	0	-1 0 1 1	0	-1 1 3 1	-1 1 3 1	-1 0 1 1	-1 0 3 1	0	0	0	0	0	-1 0 1 1	-1 0 1 1	2 1 1 2	0	-1 0 1 1	2 1 1 2	1 1 1 3	2 2 3 1	1 1 1 2	-1 1 1 1
Renovation of existing buildings	-1 0 1 1	-1 0 1 1	-1 0 1 1	-1 0 1 1	-1 0 1 1	-1 0 3 1	-1 0 1 1	-1 0 1 1	-1 0 1 1	0	0	0	1 0 3 1	1 0 3 1	-1 0 1 1	-1 0 1 1	2 2 3 2	0	-1 0 1 1	2 1 1 2	1 2 1 3	2 2 3 1	1 1 1 2	-1 1 1 1
Improvements to existing utilities	0	0	0	0	0	0	-1 0 2 1	-1 0 1 1	-1 0 1 1	1 0 3 1	0	-1 0 2 1	-1 0 2 1	-1 0 3 1	-1 0 2 1	-1 0 1 1	2 2 3 1	0	-1 0 1 1	2 2 1 2	1 2 1 3	2 2 3 1	1 2 1 2	-1 2 1 1
Machinery and construction equipment	-1 1 1 1	-1 0 1 1	-1 0 1 1	-1 1 1 1	-1 0 1 1	-1 0 1 1	-1 0 1 1	-1 1 1 1	-1 1 1 1	-1 0 1 1	0	-1 1 1 1	-1 0 1 1	-1 0 1 1	-1 1 1 1	-1 0 1 1	2 2 3 1	0	-1 1 1 1	2 2 1 3	1 2 1 3	0	1 1 1 2	-1 1 1 1
Workforce	0	-1 0 1 1	-1 0 1 1	-1 0 1 1	-1 0 1 1	0	-1 0 1 1	-1 0 1 1	0	-1 0 1 1	0	-1 0 1 1	-1 0 1 1	-1 0 1 1	0	-1 0 1 1	1 1 1 2	-2 0 1 1	-1 1 1 1	2 2 1 3	1 2 1 3	0	1 1 1 2	-1 1 1 1
Operation																								
Brine and wastewater effluent/sludge	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 0 3 1	0	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 0 3 1	0	-1 0 3 1	-1 0 3 1	0	-1 0 3 1	-1 0 3 1	1 1 3 2	0	-1 0 3 1	1 1 3 2	1 1 3 3	1 1 3 1	-2 1 3 2	-2 1 3 2
Solid waste	-1 1 3 3	-1 0 3 3	-1 1 3 3	-1 1 3 3	-1 1 3 3	0	-1 1 3 2	-1 1 3 2	-1 1 3 2	-1 0 3 1	0	-1 1 3 1	-1 0 3 3	-1 0 3 1	-1 0 3 1	-1 0 3 1	1 1 3 2	-1 0 3 2	-1 0 3 1	1 2 3 2	1 1 3 3	-1 0 3 1	-2 1 3 2	-2 1 3 2
Energy/electricity	-1 0 3 3	-1 1 3 3	-1 0 1 3	-1 0 1 3	-1 0 1 3	0	-1 0 3 1	-1 0 3 3	-1 0 3 1	-1 1 3 1	0	-1 1 3 1	-1 0 3 1	-1 0 3 1	-1 1 3 3	-1 1 3 1	1 1 3 2	-1 0 3 3	-1 0 3 3	1 2 3 2	1 1 3 3	1 1 3 1	-2 1 3 2	-2 1 3 2
Snorkelling, diving and watersports	-1 1 3 1	-1 0 3 1	-1 0 3 1	-1 0 1 1	-1 0 1 1	0	0	-1 0 3 2	-1 0 3 1	0	0	0	-1 0 3 1	-1 0 3 1	0	0	1 1 3 2	-1 0 3 1	-1 0 3 1	1 2 3 2	1 1 3 3	1 1 3 1	2 2 3 2	2 2 3 2
Accommodation and facilities	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 0 1 1	0	0	0	-1 0 3 2	-1 0 3 1	-1 0 3 1	0	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 0 3 1	2 2 3 2	-1 0 3 2	3 3 3 3	3 2 3 2	3 2 3 3	1 1 3 1	2 3 3 2	2 3 3 2
Transfers and transport	-1 0 3 2	-1 0 3 2	-1 0 3 2	-1 0 3 2	-1 0 3 2	0	-1 0 3 2	-1 0 3 2	-1 1 3 2	0	0	-1 0 3 1	-1 0 3 2	-1 0 3 2	-1 0 3 2	-1 0 3 2	1 1 3 2	-1 0 3 2	-1 0 3 2	1 1 3 2	1 2 3 3	1 1 3 1	2 1 3 2	2 1 3 2
Regular beach nourishment	-1 0 3 1	-1 0 3 1	-1 0 3 1	-1 1 3 2	-1 1 3 2	-1 0 3 2	1 1 3 2	-1 0 3 2	-1 1 3 2	0	0	-1 0 3 1	-1 0 3 2	0	-1 0 3 3	-1 0 3 1	1 1 3 2	0	1 1 3 2	1 1 3 2	1 1 3 3	1 1 3 1	-2 1 3 2	-2 1 3 2

KEY: M S Magnitude Significance
D E Duration Extent (spatial)

Table 6-3: Impact potential indices for the proposed project

	KEY COMPONENTS																							
	Environment																Socio-economic								
PROJECT ACTIVITIES	Reef benthos	Marine biodiversity	Baitfish/fishery	Lagoon habitats/seagrass	Protected marine area/species	Coastal hydrodynamics	Beach/coastal landscape	Marine water	Visual aesthetics	Groundwater	Other terrestrial waters	Soil/land	Avian fauna	Terrestrial flora/fauna	Air	Noise	Services and Infrastructure	Cultural assets	Health and Safety	Employment - local	Employment - foreign	Property Value	Revenue (state/private)	Costs to consumer/tax payer	**TOTAL API**
Construction																									
Jetty demolition and installation	0	0	0	-0.02	-0.02	-0.02	-0.02	-0.1	0	0	0	0	0	0	0	0	0.05	0	0	0.05	0.04	0	0.04	-0.01	-0.01
Demolish existing and construct new fuel tank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	-0.01	0.05	0.04	0.3	0.02	-0.01	0.49
Landscaping	0	0	0	0	0	0	0	0	0	0	0	0.04	0.04	0.02	0.07	0	0.05	0	0	0.05	0.04	0.15	0.02	-0.01	0.47
Construction of swimming pool	0	0	0	0	0	-0.04	-0.04	0	0	0	0	0	0	0	0	0	0.05	0	0	0.05	0.04	0.15	0.02	-0.01	0.22
Renovation of existing buildings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.05	0.07	0.15	0.02	-0.01	0.58
Improvements to existing utilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15	0	0	0.1	0.07	0.15	0.05	-0.02	0.5
Machinery and construction equipment	-0.01	0	0	-0.01	0	0	0	-0.01	-0.01	0	0	-0.01	0	0	-0.01	0	0.15	0	-0.01	0.15	0.07	0	0.02	-0.01	0.31
Workforce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	-0.01	0.15	0.07	0	0.02	-0.01	0.24
Operation																									
Brine and wastewater effluent/sludge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0	0	0.07	0.11	0.04	-0.15	-0.15	-0.01
Solid waste	-0.11	0	-0.11	-0.11	-0.11	0	-0.07	-0.07	-0.07	0	0	-0.04	0	0	0	0	0.07	0	0	0.15	0.11	0	-0.15	-0.15	-0.66
Energy/electricity	0	-0.11	0	0	0	0	0	0	0	-0.04	0	-0.04	0	0	-0.11	-0.04	0.07	0	0	0.15	0.11	0.04	-0.15	-0.15	-0.27
Snorkelling, diving and watersports	-0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0	0	0.15	0.11	0.04	0.3	0.3	0.93
Accommodation and facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	1	0.44	0.67	0.04	0.44	0.44	3.33
Transfers and transport	0	0	0	0	0	0	0	0	-0.07	0	0	0	0	0	0	0	0.07	0	0	0.07	0.22	0.04	0.15	0.15	0.63
Regular beach nourishment	0	0	0	-0.07	-0.07	0	0.07	0	-0.07	0	0	0	0	0	0	0	0.07	0	0.07	0.07	0.11	0.04	-0.15	-0.15	-0.08
TOTAL CPVI	-0.16	-0.11	-0.11	-0.21	-0.2	-0.06	-0.06	-0.18	-0.22	-0.04	0	-0.05	0.04	0.02	-0.05	-0.04	1.59	0	1.04	1.75	1.88	1.14	0.5	0.2	6.67

API = Activity Potential Impact Index

CPVI = Component Potential Vulnerability Index

Table 6-4 indicates that the project has some negative environmental impacts during the construction phase as well as operational phase, which are not as strong as the positive outcomes of the project, as a result of which the total potential impact index for the project is mainly positive.

6.5 Cumulative Impacts – Construction Phase

The cumulative impacts that result from the incremental impact of the proposed development as well as other developments in the project vicinity on valued environmental (and social) components (VECs) on which all of these developments impact, are considered here for the construction phase.

6.5.1 Ecology

Uncontrolled and inadequate waste disposal, climate change, coral bleaching, habitat modification and over-exploitation are increasing dominant threats to ecological systems.

There are some adverse cumulative impacts on the biotic VECs in the project area. This is because the project takes place in a significant Marine Protected Area and reclamation activities and other such developments that may affect the biotic environment has been carried out and would continue into the future. Therefore, conservation efforts are underway to ensure minimal disruption to the important ecological setting of the project area. Although there has been no documented evidence of any severe impacts of reclamation of Maamigili Airport as well as the more recent reclamation of Bodufinolhu in the same lagoon as Holiday Island and Huruelhi closeby, the Environmental Protection Agency and the respective government bodies are watchful of potential impacts of any development in the area and is continuously monitoring negative impacts of any development in the area on the South Ari Atoll MPA.

Development projects in the area would continue to have negative impacts on the ecological habitats, especially South Ari Atoll MPA. Similarly, the proposed project would add cumulatively only to a small degree especially during the beach nourishment, which has been completed and also to a minor extent during the operational phase. The beach nourishment and coastal protection phase is not known to have any negative impacts in terms of sedimentation on any reef areas. The proposed project would only have sedimentation impacts of a minor degree due to proposed jetty renovation works.

Corona Virus Diseases (COVID-19) and other epidemic or pandemic situations are also considered as cumulative impacts. COVID-19 is of specific relevance at the time of project implementation. Corona virus pandemic, which has disrupted the world economy has affected several projects in the Maldives. The capital city has been under lockdown for several months to minimize and control the spread of the disease. All passenger flights have been cancelled between March and August 2020. Anyone going to other parts of the country from Malé City required that person to be under quarantine. The same applied to people in other resorts. Some of the resorts under construction were placed in isolation/quarantine and projects suffered as a result.

Greenhouse gas emissions from energy production (power generation), transport of goods and personnel during the construction phase is considered as a cumulative impact that is insignificant and adds to the global emissions to a small degree.

6.6 Project Specific Impacts - Construction Phase

The construction phase of the proposed project involves operation of machineries, vehicles, use of energy, manpower and resources and clearance of vegetation. There will be a considerable number of environmental impacts; both negative and positive. For instance, the loss of terrestrial vegetation to some extent compared to an increase in job opportunities.

The following subsections include a detailed assessment of impacts from all the components of the construction phase of the proposed redevelopment of Holiday Island Resort.

6.6.1 Temporary jetty, facilities and machinery

Jetty for unloading of machinery and materials to site for the construction of the resort would be necessary. The existing jetty is proposed to be used during the initial stage. However, a temporary jetty using dredged sand may have to be made during the jetty demolition. The impact of the temporary jetty would be high if the jetty was made as in many sites by dredging from the lagoon. However, in the case of the proposed project, the temporary would be made from dredge material during recent coastal works.

Machinery and materials can be unloaded to the island by bringing barge or landing craft up to the proposed temporary jetty. The end of the jetty may not have have suitable depths, however, there would be no dredging at the end of the temporary jetty.

The site has sufficient facilities for the construction workforce including the necessary utilities since the resort has been in operation until recently. Hence, the impact of temporary structures would be minimal.

The use of diesel as well as petrol in vehicular engines and operation of machines such as trucks cause emissions of carbon dioxide, sulphur dioxide and nitrogen oxides with fine particulate matter. For the proposed project, carbon emissions are considered to be very small or negligible.

There is an unlikely risk of major pollution given that the hazards are well controlled. Usually, when fuelling of heavy machinery is undertaken manually it carries the risk of spills. Such spills are not a cause for concern in the case of the construction equipment as fuel prevention measures would be in place. In order to minimize the impact on the quality of soil and groundwater, proper storage facilities will be maintained for construction materials, construction waste and oil and grease.

Construction materials such as cement and fuel for machineries have the potential to damage the marine and terrestrial environment. Both terrestrial and coastal activities can pollute the environment including soil, aquifer and coastal water due to accidental spill of oil and chemicals. Sometimes these materials are thrown into the environment due to absence of appropriate supervision at work sites.

Pollution of the lagoon can be caused by waterborne and windblown debris (especially light debris such as plastic bags) escaping from the construction. There is a sound solid waste management mechanism in place to ensure waste is well managed. For final disposal, waste will be transported to Thilafushi on a regular basis or upon demobilization.

Reefs also get damaged due to boating activities including mooring, loading and unloading of materials. However, the reef and the temporary jetty are far apart, this impact would be small or negligible.

6.6.2 Jetty reconstruction

The proposed jetty would be made using concrete piles and the footings would be buried in the seabed similar to the existing jetty. Alternatively, spun piles may be inserted into the seabed. In case of burying concrete footings, there would be some degree of excavation, which would have only a small amount of sedimentation. The jetty location is appropriate and there would be no need to consider alternative locations.

6.6.3 Swimming Pool and coastal structures

The proposed Swimming Pool is partly in water and therefore, it is expected to affect the longshore sediment transport on the northern side especially locations downdrift at around 100 to 150m on either side of the pool. Hence, with the proposed swimming pool, it may be necessary to have a few structures on the northern side to minimize related impacts on longshore transport on that side. This would be considered as a mitigation measure in the Mitigation chapter of this report.

The shore protection for the proposed resort has been discussed in the EIA carried out in 2020. The shore protection structures on Holiday Island is be considered to be soft and low. It is also cost-effective compared with shore protection provided to some resort islands in the past.

6.6.4 Construction of new and renovation of existing villas

The proposed villas will be constructed at the footprint of the existing villas except for a few villas on the southern side and some on the western side. They will be constructed after demolition of the existing buildings. New materials will be used in the construction except for a few materials from the previous buildings which may be re-used.

The impacts of the demolition and construction would be minor negative due to the small scale of the works and the works being carried out at existing building locations. For some of the villas, there will be vegetation clearance. This is expected to affect some of the terrestrial fauna, however, there is very few fauna and if the started at a slow pace, the impact would be very minimal.

6.6.5 Fuel tank

The demolition of existing fuel tank would have occupational health and safety concerns as well as environmental concerns. These include potential spills on the ground if the tank were not emptied prior to demolition. Furthermore, workers may be affected in case of lack of ventilation and lighting inside the tank during cleaning of the tank prior to demolition. The sludge below the tank is also expected to contaminate soil if the sludge is not removed and disposed of appropriately.

6.6.6 Health and Safety

Construction stage will involve a construction workforce and several risks related to construction activities. Key impacts predicted for the construction workforce is related to health and safety issues. Some have been discussed for the demolition of the fuel tank above. Often in construction sites, workers are prone to injuries and diseases that can result from:

- Lack of or inadequate safety, ventilation and cleanliness in work areas.
- Inadequate safety procedures and gear/equipment (personal protective equipment)
- Poor safety training prior to start of construction
- Lack of proper waste management at site
- Inadequate disposal of sewage and wastewater or lack of good sanitation facilities at the onset of the project
- Improper handling of hazardous materials/substances. Accidental spills/leakage of hazardous substances can contaminate the site and pose risks to human health.
- Lack of or inadequate supervision at worksites

The ongoing COVID-19 pandemic can potentially affect all involved in the project with a possible outbreak within the work environment. Also, workers travelling to and from the island(s) for contractual and other purposes would also be at risk. An outbreak could affect the works including supplies to the island(s), due to quarantine as well as emergency evacuations for the critically ill.

If precautionary measures on health and safety are not taken into serious consideration, the entire operation may be affected due to disease, incidents and injuries. Such effects would have negative socio-economic impacts.

6.6.7 Waste management

During construction phase, a considerable amount of concrete debris from demolition of the existing jetty and some of the existing rooms will be produced. This waste will be congregated in a specific area in the island. This waste is not expected to have major environmental concerns. The concrete debris is proposed to be taken to Thilafushi during or at the end of the construction.

Waste management is, at times, taken for granted. Waste is disposed rather than managed. The impacts of improper waste management during resort construction have been observed in some resort projects, some of which have been highlighted here.

- Waste disposal on the coastal areas (including burying the waste on shore) have caused the waste to be washed into the lagoon during high tide causing long-lasting impact on the nearshore environment as well as getting floated away to long distances.
- Material, such as aggregate, mobilized to site is at times kept on the beach especially if the beach were to be filled and during operational phase the material resurfaces.
- Waste is thrown into the lagoon or sea at the (temporary) jetty area including waste from supply vessels and other vessels.

Therefore, proper waste management strategies shall be in place during the construction phase and supervision and monitoring arrangements made.

6.6.8 Sewage and wastewater disposal

During the construction phase, sewage and wastewater disposal have been seen to have negative impacts in some resort construction projects. If temporary but proper septic tanks are not constructed and sewage is disposed directly to lagoon, it can cause degradation of lagoon water quality and nutrient enrichment that may enhance growth of algae and seagrass, which would cause the quality of the environment to degrade. This is not expected to happen in Holiday Island as there is a functioning wastewater management system in place and no temporary facilities will be required.

6.6.9 Emissions, noise and light pollution

Carbon emissions from machinery have been discussed earlier. Greenhouse gases including carbon dioxide emissions will be restricted to powerhouse operation, and operation of vessels for delivery of good and persons to and from site and vehicles such as excavators and trucks that use fossil fuels. During the construction phase, the resort's fuel consumption would be very low, so it would have very little or insignificant impact on combined global emissions. While emitted greenhouse gases can persist in the atmosphere in the long term, the level of emission from the construction phase of this project is expected to be negligible.

There are light sensitive areas such as resorts at affected distance from the project site. Therefore, lights at the workplace would be a cause for concern. However, noise is not expected to be a cause for concern. The use of strong flood lights at night would be a cause for concern for terrestrial as well as marine fauna. However, the jetty being in an area devoid of marine life

to a large extent, there would be no such impacts of significance. Yet, it would be best to avoid such activities in the night.

6.7 Cumulative Impacts – Operational Phase

As has been discussed in section 6.5, there have been some reclamation projects taking place in South Ari Atoll the southern rim zone which is a Marine Protected Area. The cumulative impacts of these projects on the marine environment including the protected area may not be significant assuming adequate mitigation measures have been and would be undertaken.

The South Ari Atoll Protected Area is of specific concern for Holiday Island and nearby resorts. The visitor numbers to this area, which is possibly the largest protected area in the Maldives and kept in pristine condition, would increase with increasing numbers of tourists. Therefore, controls are expected to be put in place for this site by the EPA such as those controls in place for Hanifaru in Baa Atoll. The government also has plans to ensure that a minimum of 10% of the reef areas of all atolls are to be protected in some form, according to Strategic Action Plan 2019 to 2023. The proposed project is expected to reduce the number of rooms and therefore, a reduction in the number of tourist beds. Yet, the number of beds in the area will increase with the new resorts and further development of the tourism sector, especially the guesthouse sub-sector.

Given that there are several new resort projects taking place in the South Ari Atoll, there will be an increase in the employment within the tourism sector as well as other related sectors. In fact, the development stage of these projects, as discussed earlier, is providing several opportunities to national corporations as well as SMEs. The operational phase of these resorts including those at Holiday Island will have knock-on effects in related sectors providing several opportunities to SMEs in the Maldives. The government has several policies outlined in its SAP 2019 to 2023 in order to ensure that locals reap the benefits of employment in the tourism sectors.

The greenhouse gas emissions from the power generation and other resort activities will not be significant. However, as discussed earlier, given its cumulative nature when combined with other hotel/resort operations in the country, this impact is considered minor to moderate. Greenhouse gas emissions from energy production (power generation), transport of goods and personnel during the operational phase of the resort is considered as a cumulative impact that

is insignificant. Yet, it is important to mention that rising carbon emissions and resulting climate change have several impacts on the tourism industry ranging from increasing cost of operations due to extreme weather events, effects on destination image and popularity, water and electricity shortages and transport services. Rising sea-levels as a result of global warming can have tremendous negative impacts on coastal areas, especially low-lying areas, such as the Maldives where the land is merely 1m about sea level. Erosion of beaches and protection costs are on the rise. Coral reefs have been severely affected in the recent years due to global warming resulting in coral bleaching. Several reefs in the Maldives have been affected to a large extent. This would have a negative impact on tourism.

6.8 Project Specific Impacts - Operational Phase

6.8.1 Health and safety

Operation of resort will involve a large workforce in several areas/types of work, some of which are more hazardous than others. As with the construction phase, workers are prone to injuries and diseases resulting from:

- Lack of or inadequate safety, ventilation and cleanliness in work areas
- Inadequate safety procedures and gear/equipment (PPE)
- Poor safety training where required
- Lack of proper waste management at site and waste handling
- Improper handling of hazardous materials/substances. Accidental spills/leakage of hazardous substances can contaminate the site and pose risks to human health.
- Potential inadequacy in supervision at worksites.

COVID-19 pandemic is not expected to be a concern during the operational phase of the resort. However, emergencies related to epidemic and pandemic situation including quarantine procedures would help to minimize the risk of infection and spread of disease during any epidemic or pandemic situation.

6.8.2 Pollution

Solid and liquid wastes/wastewater as well as fuel and chemicals cause pollution of the land, air and water in an around the project site. Operation of powerhouse, wastewater treatment and desalination have the potential to pollute the air, water and soil. Key impacts identified include:

- Contamination of soil from oil and chemical spill
- Contamination groundwater from oil, chemical and wastewater
- Air pollution due to emissions from powerhouse and vessels
- Generation of solid waste from accommodation blocks, kitchen/restaurants, office etc.
- Generation of liquid waste from accommodation blocks, office blocks, restaurants, bars, engine repair and maintenance areas, desalination etc.

Inappropriate handling of solid waste (garbage) and its disposal into the surrounding environment can have impacts on the groundwater due to seepage. Groundwater aquifer of the islands of Maldives lies at about 1m below the ground surface and can get easily contaminated due to solid waste and faecal matter. However, the quantities of solid waste dumped on land is generally small resulting in low levels of pollution, especially in resorts. Groundwater pollution in the Maldives is mainly due to improper sewage/wastewater disposal in the inhabited islands. Groundwater pollution is also caused due to inadequate fuel handling/delivery operations and recently regulations have come into effect to ensure fuel tanks are appropriately bunded and constructed.

Solid waste can have even more significant impact on the marine environment including pollution of coastal waters and consequential effects on coral reefs and marine life. The types of solid waste generated during the operation will mainly consist of plastic bags, glass and plastic bottles, cans, tins, paper, wrappings, other discarded litter and possibly human faeces. Waste can have adverse impacts on the marine environment ranging from reduced aesthetic beauty of the surrounding area to degraded water quality as well as potential ecological disturbances. Ecological impacts associated with solid waste disposal into the marine environment include reductions in fish populations due to water pollution, as well as killing corals and other marine organisms by smothering by certain items such as plastic bags. EPA in cooperation with Manta Ray Trust has recently issued guidelines for minimizing risks of entanglement of marine creatures, especially manta rays, in mooring and buoy lines. These will be discussed in the mitigation measures.

Often wastewater gets inappropriately discharged into marine environment during operational phase which cause direct contamination of surrounding water causing degraded water quality. Some of the sources include wastewater from boats that are usually contaminated with oils and fats, cleaning agents, detergents and other chemicals. Most of the wastewater is potential

pollutants that can have direct effects on coral reef ecology and has potential to harm and devastate the ecosystem.

Discharge of treated sewage via marine outfalls is not expected to cause any noticeable impact on the marine environment as the currents and wave action will disperse remaining minerals and coliform content of effluent to surrounding area to suitable levels. Even in case of an STP failure, given the likely quantity and duration of discharging untreated sewage, it is not expected to cause significant impact on the marine environment. It has been shown that for a population less than 10,000 adequate dilution would be provided even under worst case scenario if untreated wastewater were to be disposed off in an appropriate location (Johnson et al, 2007; WS and LHI, 2006). Many studies exist on the effects of saltwater on faecal indicator bacteria (Anderson 2005, Anderson 1979, Barcia-Lara et al. 1991, Ferguson 2005) and scientists agree that saltwater eliminates faecal indicator bacteria. Studies have shown a combination of the biological, chemical and physical makeup of saltwater all affect the presence of indicator bacteria (Anderson 2005). A study conducted by Iris Anderson shows that the higher the salinity, the more stressed the sample of E. coli becomes (Anderson 1979). Therefore, risk of significant impact on the environment from faecal bacteria is eliminated by pumping untreated sewage to ocean. The faecal bacteria cannot survive in saltwater for long and the strong currents will spread the minerals reducing chances of eutrophication greatly. Given the small size of the resort population (smaller effluent quantity per day) and strong currents (greater dilution potential of the receiving body) impact of using the proposed outfalls to dispose sewage into the marine environment is considered as minor negative or almost negligible.

Brine concentrate generated from seawater desalination is not expected to affect the environment. The estimated quantity of brine arising from the combined desalination capacity of the island is below 100m^3/day and with continuous currents at the discharge area, there would be no change in salinity of the surroundings. This has been reported in past environmental monitoring reports. However, effects, if any, would be evaluated as part of the proposed monitoring programme under this project.

Pollution or waste from ships/vessels will not be a cause for concern given that no vessels would discharge any waste or its contents including ballast water into the marine waters surrounding the proposed development. According to Regulation 37 of MARPOL Annex I, oil tankers of >150 gross tonnage and all ships of >400 gross tonnage are required to carry an approved Ship

Oil Pollution Emergency Plan (SOPEP). The proposed project will not receive such vessels at any time.

6.8.3 Transport Related Impacts

The use of diesel as well as petrol in vehicular engines and operation of machines cause emissions of carbon dioxide, sulphur dioxide and nitrogen oxides with fine particulate matter. Carbon dioxide being the primary greenhouse gas and the main contributor to global warming, likely future carbon emissions would be a cause for concern, as the impact cumulatively adds to the global burden of carbon emissions.

For the proposed resort, the impacts related to transport have the following considerations.

- The resort is just next door to the International Airport, Therefore, travel distance is small.
- The island is in close proximity to one of the largest Protected Marine Areas (MPAs) in the Maldives. Therefore, travel time is minimized.
- The island has been in operation for a number of years and transport related impacts have been and would be minimized through planning.

6.8.4 Socio-Economic Impacts

The socio-economic impacts from the proposed project are positive, in terms of job opportunities and other income generating opportunities for island communities. These include opening new market(s) for agricultural products, thatch, handicrafts and fishery products required for the construction, operation and maintenance of the facility.

In addition, there are no potential resource use conflicts identified. Further, no vulnerable groups that may be affected by the project has been identified. In fact, Villa resorts are considered as socially responsible in their operations and in giving preference to local people in terms of job opportunities.

6.8.5 Emissions, noise and light pollution

The continued use of diesel generators for production of electricity needed (including RO plant and other utilities) will release pollutants such as carbon dioxide, sulfur dioxide and nitrogen oxides (major greenhouse gases) to the atmosphere. These emissions will not be significant and would be well below 25,000 metric tonnes annually. However, as discussed earlier, given its

cumulative nature when combined with other hotel/resort operations in the country, this impact is considered minor to moderate. Greenhouse gas emissions from energy production (power generation), transport of goods and personal during the operational phase of the resort is considered insignificant on its own. Yet, cumulative impacts are considerable, as discussed earlier.

Increased tourism related activities on the island and surrounding marine environment will undeniably disturb the fauna by means of increased noise levels. As the animals are not used to humans, it may stress them; nonetheless, the animals are expected to get used to the increased noise levels and exposure to humans in time. Similarly, during operational phase of the project, lights will be used on the island; this has potential to stress wildlife as well. These impacts are considered as minor negative, especially when the project is not a new development but a renovation project.

6.9 Likely accidents and hazard scenarios

Accidents and hazards in the workplace will arise mainly during the construction phase. Workers would be susceptible to injuries due to workplace hazards arising from improper management of workplace and unavailability of safety gear. For the proposed project, the likely incidents/accidents and hazard scenarios include possible use of inappropriate or poor handling of tools and chemicals and injuries due to fallen objects in the work areas or untidy work areas. These can be during the construction phase mainly.

During the operational phase, poor handling of chemicals would be the main hazard scenario that may have to be taken into consideration for the safety of staff. Oil spills are one of the hazards that need to be taken into consideration. Hence, oil spill prevention measures would be discussed under mitigation.

There would be potential hazards that relate to staff and guest activities including snorkelling and diving. These hazards would have to be understood and clearly communicated. When the resort has been in operation for a number of years, this can be expected to be well managed.

At the time of preparation of this report there is an ongoing global pandemic of novel Corona Virus (COVID-19). In response to this, Health Protection Agency (HPA) declared a health emergency which has been greatly eased due to reducing prevalence in the country. Several steps including travel restriction, curfew hours, mandatory 14-day quarantine for people

travelling into and within the country and PCR testing of personnel moving between islands have helped to contain the spread of disease. Guidelines on social distancing, hand-washing and general hygiene have also helped to contain spread of COVID-19. Strict adherence to procedures and guidelines issued by WHO and HPA will be necessary to minimize the risk of spreading COVID-19 among the workforce during the construction phase. The operational phase is not expected to be affected by the COVID-19 pandemic. However, it is important to continue to promote and adhere to good hygiene practices safety guidelines at all times.

An Emergency Response Plan is proposed to be developed for the resort.

6.10 Uncertainties in Impact Prediction

The methods used to predict and evaluate the environmental impacts that may be associated with the proposed renovation components may not be the most comprehensive methods as they are quite simple prescriptive methods. The main shortcoming of these methods is that only assumptions have been made to predict the impacts which may or may not be accurate. Also, the degrees at which these impacts are either accurate or inaccurate as well as uncertainties and natural variability are the key factors that affect the accuracy of these methods. Nonetheless, the methods used are concise and provide a general overview as well as the range of impacts that can affect the environment. Also, the method is considered among one of the best methods used in impact assessments in the Maldives so far.

Environmental impact assessment involves a certain degree of uncertainty as the natural and anthropogenic impacts can vary from place to place due to even slight differences in ecological, geomorphological or social conditions in a particular place.

There are uncertainties in data due to the short duration of field specific data and pandemic-related difficulties. This, however, has been the case for all projects given that EIA is undertaken at the initial planning and preparatory stages of projects and detailed design of structures and changes to structures are often based on longterm monitoring or long-term data collection.

The level of uncertainty, in the case of the proposed development, may be expected to be low due to the experience of similar projects in similar settings in the Maldives. Nevertheless, it is important to consider that there are elements that relate to social aspects and social acceptability in a highly evolving political and social landscape. Hence, there will be uncertainties and hence,

it is important to undertake voluntary monitoring as described in the monitoring programme given in the EIA report.

6.11 Summary of Impacts

The table below provides a summary of the environmental impacts of the project. The cumulative impacts that relate to the project but are not of specific relevance to the projects have been avoided.

Table 6-4: Summary of impacts of the proposed project

Activity	Causal Factors	Impact	Impact Significance
Beach nourishment and shore protection	Sedimentation and changes in hydrodynamics around the island	Sedimentation and sediment resuspension in the nearshore zone	Minor negative
		Impact on sediment transport regime (without sand fill)	Minor negative
		Retention of filled sand and slowed erosion due to shore protection structures	Positive
Temporary jetty	Sedimentation and changes in hydrodynamics around the island	Sedimentation and sediment resuspension	Minor negative
		Changes in longshore transport (short duration)	Minor negative
Jetty demolition and reconstruction – construction and operation	Demolition waste	Increase in quantities of waste Carbon emission	Minor negative
	Installation of footings	Sedimentation of some degree	Negligible
	Spill of cement and chemicals during in-situ works	Pollutes water	Minor negative
Demolition of existing villas and construction of new villas	Demolition and other wastes	Increase in waste quantity Groundwater pollution	Minor negative/ negligible
	Vegetation clearance	Impact on carbon sequestration and terrestrial fauna	Minor negative
Construction of swimming pool	Part of pool in water	Impact on longshore transport	Minor negative
Demolition and reconstruction of fuel tank and fuel handling	Demolition and other wastes including hazardous sludge	Soil and groundwater contamination	Minor negative
	Working in enclosed space during cleaning of tanks	Health and safety issues during demolition	Minor negative
	Rupture/failure of fuel tanks	• Soil and groundwater contamination • Leachate into marine environment and impact marine ecology	Moderate negative
Health and safety	• Lack of or inadequate safety, ventilation and cleanliness in work areas • Inadequate safety procedures and personal protective gear/equipment • Poor safety training in the construction phase	• Accidental spills/leakage of hazardous substances can contaminate the site • Accidents and risks to human health.	Minor to moderate negative

Activity	Causal Factors	Impact	Impact Significance
	• Improper handling of hazardous substances. • Lack of or inadequate supervision at worksites		
Waste disposal	• Lack of proper waste management at site • Disposal or accidental spill of motor oils, lubricants, hydraulic fuels, other chemicals such as antifoulants and paints • Contamination of soil from oil and chemical spill • Oil, chemical and wastewater leakage into ground • Air pollution due to emissions from powerhouse and vessels • Generation of waste from accommodation blocks, office blocks, restaurants, bars, engine repair and maintenance areas, desalination etc.	• Land, groundwater and marine pollution • Contamination groundwater from oil, chemical and wastewater	Low to moderate negative
Wastewater and brine discharge	Discharge from the marine outfall(s)	Marine pollution	Negligible
	High concentration of salt with anti-scalants/chemicals	Marine water pollution at discharge location	Low or insignificant
	Leaks in the wastewater reticulation system	Groundwater pollution	Low/ negligible
Power generation	• Noise from gensets • Stack emissions	Noise pollution impacts on hearing, enjoyment, habitats, etc.	Insignificant
		Emission of greenhouse gases (mainly cumulative in nature)	Cumulative, minor negative
		Occupational hazards	Minor negative
Machinery and equipment for construction	Heavy machinery operation and construction	Local noise and air pollution	Insignificant
	Accidental damage from operation of barges, etc.	Local damage to live corals	Minor negative
	Accidents during machinery and material transport to site	Oil and waste spillages to oceans/reefs	Minor negative
Handling and transport of goods and materials	Loading/unloading/movement of goods	Dust and air emissions	Insignificant
	Transport	Increased risk of accidents Cumulative emission	Minor negative
Guest activities on the reef/marine environment	Use of marine environment for different activities	Accidental damage to corals Impact on wildlife	Low to moderate negative
Operation of the resort	Rent and tax Employment Development of related sectors	• Generates Government revenue • Income to local people/expatriates • Indirect benefits to society/ies • Economic opportunities • Social interactions	Highly positive

7 Impact Mitigation, Management and Monitoring

7.1 Introduction

It is evident that island and coral reef environments are highly susceptible to changes and implications that will bring about from the development of the proposed resort. As described earlier, some impacts are felt largely while others are localized. However, most of the environmental impacts associated with the development of the resort cannot be either reduced or minimized unless effective environmental management and mitigation as well remediation process are well placed accordingly.

The following sections describe key environmental mitigation measures and management and monitoring plan that will be undertaken during the construction and operation of the proposed project.

7.2 Mitigating and Managing Cumulative Impacts

7.2.1 Managing exploitation of ecological resources

According to NBSAP 2016-2025, one of the major emerging threats to biodiversity is the destruction of habitats, including reefs, lagoons, beaches and mangroves due to land reclamation, habour and channel development, seawall construction and many related infrastructure development activities. It has been estimated that 202 artificial harbours have been constructed and over 10 km^2 of lagoon and reef area modified for land reclamation purposes.

In order to address over-exploitation, several efforts are underway, including marine protected areas, bans on turtle and shark fishing and coral mining. About 42 areas, 103 bird species and 14 marine species have been declared protected by 2016 (NBSAP 2016-2025). Several legal instruments have been recently developed including the regulation on cutting down, felling or removal of mature trees and regulations on protected areas and migratory birds have been important steps towards protecting terrestrial and marine biota and their habitats. Although the Waste Management Regulation is an important step, measures to control or address inadequate waste disposal are still lacking and several efforts are needed. Pollution from untreated sewage also poses reasonable degree of threats to the biodiversity of the Maldives. However, the significance of the risk is low due to small size of population in most of the islands and the

sewage being predominantly domestic in nature. The growth of seagrass in the lagoons surrounding local fishing islands and neighbouring resorts have been degrading the aesthetics of the coastal areas of these islands although seagrass has been in the spotlight recently and preservation of large areas of seagrass is encouraged by the EPA.

Global greenhouse gas emissions and resulting rise in global temperatures and subsequent sea level rise scenarios have become quite evident in the recent years. Recent bleaching events due to increasing global temperature have affected almost all reefs of the Maldives and globally too. The speed of recovery is slow due to continuum of increasing temperatures as well as human activities such as reclamation. However, the impacts of reclamation on coral bleaching and death would be a short-term impact with small spatial range while the effect of global warming would last for a long time on a global scale.

7.2.2 *Managing cumulative effects of development projects in the project vicinity*

The impact mitigation measures for negative cumulative impacts discussed in sections 6.5 and 6.7 are discussed in this section. One of the key impacts of the proposed project and other projects in the project vicinity, as discussed earlier, is sedimentation and effects of reclamation and shore protection on natural hydrodynamics in the area. However, given that so many projects have the potential for degradation of environmental quality, it is necessary for the private sector and government sector to ensure that the socio-economic benefits of these projects compensates for the loss of environmental quality of marine resources in the atoll. One way of achieving this would be to continue to place controls on large-scale developments. The Proponent shall advocate for such developmental controls. According to the NBSAP 2016 to 2025, “private sector remains the main beneficiary of the biological resources of the country and thereby has the responsibility in being a benefactor”. Furthermore, Statistical Year Book 2014 states that the tourism sector is the main beneficiary in terms of biodiversity’s contribution to GDP with more than 30% compared to about 7% for the fisheries sector. Therefore, as a benefactor, the Proponent shall advocate the following biodiversity conservation measures to be implemented.

- Promote sustainable development, especially that of the tourism sector.
- Support government’s efforts to protect and preserve the biodiversity of the country.
- Contribute to the identification of sensitive habitats and implementing protective measures such as buffer zones.

- Avoiding the introduction of new invasive species in landscaping (e.g. hispid beetle introduction in the past due to transplanting) and doing landscaping using native species as much as possible.
- Minimize lighting in the resort to reduce impact on nocturnal habitats.
- Engage in coordination with other resorts and government institutions in the management of potential impacts related to migratory species and transboundary ecosystems.
- Support visitor limitations to protected areas and foster non-invasive methods of visitation to the South Ari MPA.

7.2.3 Managing cumulative impacts of epidemics or pandemics

If the project were to proceed during an epidemic/pandemic situation such as prevailing COVID-19, all necessary protocols shall be adhered to. The Proponent shall have a plan to manage outbreak within the work environment through necessary protocols such as contact tracing, isolation, quarantine and travel restrictions.

7.2.4 Pollution control and resource efficiency

Pollution arises mainly from discharges and emissions including waste (general and hazardous) and burning of fossil fuels for energy generation. Pollution, especially marine pollution due to waste is becoming an increasingly significant environmental problem in the Maldives. Since waste management at project is not even close to sufficient to address the problems associated with waste management, the following measures are recommended for the resort to address the cumulative impacts of waste management and to contribute to sustainable tourism development in the country.

- Ensure resort operations have sound waste management practices on site and off-site including waste bins and management strategies on marine vessels and supports green initiatives involving waste minimization (such as buying in bulk)
- The resort rightly refuses fuel deliveries from tankers not complying with national and/or international regulations
- Where practicable, avoid or minimize the use of hazardous materials. For instance, substitute asbestos in building materials, PCBs in electrical equipment, persistent

organic pollutants (POPs) in pesticides formulations, and ozone depleting substances in refrigeration systems.

- Ensure that waste delivered to Thilafushi is adequately quantified and lobby good waste management practices in Thilafushi landfill/waste management facility.

Hotel sector, especially resorts, are considered as energy intensive. HVAC (especially air conditioning and lighting accounts for the greatest demand. In the various studies and monitoring exercises undertaken in the past, it has been noted that air-conditioning alone accounts for over 40% of the energy demand of the resort. Hence energy and resource efficiency will help to minimize/control pollution to a large extent.

7.3 Environmental Management – Construction Phase

7.3.1 Controlling and minimizing ecological damage

The project proponent, and contractor(s) shall take all practical measures to ensure that there is no irreversible and significant negative impact from the proposed project on sensitive habitats. Recent bleaching events due to increasing global temperatures have affected almost all reefs of the Maldives. Therefore, Marine Research Institute has cautioned about taking necessary measures to prevent further bleaching or impacts on recovery, if any. In order to minimize the impacts of the project on marine fauna, the following measures are proposed.

- Use bunds to the largest possible extent during beach fill to minimize sedimentation and sediment resuspension.
- Monitor water quality in the affected areas during beach fill and other sedimentation-bound activities.
- Continue the efforts to identify critical habitats within the project site
- Labour force shall be informed of what they can and cannot do. Boards should be kept on-site to remind personnel at site of the importance of environmental protection.
- Workforce shall be supervised adequately.
- Undertake rigorous monitoring during the construction phase to study the effects of reclamation and construction.
- Identify turtle nesting areas during the construction phase and demarcate those areas to keep those areas with minimal disturbance

- Keep labour force informed of necessity to inform the Project Manager or PMC if any turtle nests are observed.

7.3.2 Mitigating impacts of vegetation clearance

The following mitigation measures are recommended.

- Ensure maximal use of native plants. If trees were to be imported, ensure that they are free from pests/invasive species.
- Create a nursery at the onset of the project.
- All coconut palms can and shall be transplanted within the shortest possible time frame.
- Plant 2 coconut palms for each tree removed.

7.3.3 Waste Management

Mitigation measures are proposed to alleviate the impacts caused by the excavated materials and residual wastes during their handling, temporary storage on site, transportation and final disposal. Waste management procedures will be implemented to minimize potential impacts to the environment. The waste management plan for construction phase would comprise of the following.

- Train site staff in waste minimization and management practices
- Minimize waste generation for disposal (via reduction/ re-use onsite)
- Segregate waste materials according to type to facilitate re-use
- Plan and coordinate material deliveries to site
- Transport wastes off site safely in a timely manner
- Maintain comprehensive and accurate waste records

The following measures will be implemented to mitigate the likely adverse impacts to the environment of construction and demolition waste.

- A temporary refuse collection facility will be set-up by the contractor and wastes will be stored in appropriate containers prior to collection and disposal.
- Stockpile material and sites will be covered to prevent washout and erosion during heavy rainfall.
- Dust suppression techniques will be adopted;
- Designated areas for stockpiling will be fenced.

- It will be ensured that construction debris will be reused on site to the maximum extent possible.
- All hazardous waste such as used paints/varnishes and waste oil will be transported to Thilafushi in closed containers.

Given the fragile environment, the labour force should be made aware of the importance of protecting the environment and restrictions imposed on littering anywhere on the island or lagoon while making provisions for appropriate waste and wastewater disposal.

7.3.4 Water and wastewater management

As per Tourism Regulations, all resorts should conserve groundwater aquifer of the island. Therefore, groundwater would not be used during construction. The following measures would help to preserve the groundwater aquifer of the island as well as the surrounding marine waters.

- Maintain machineries free of oil leaks
- Wash/refuel and service machineries in an appropriate area with appropriate lining or flooring
- Store fuels and other materials for the machinery away from water sources to prevent any deleterious substance from entering water and soil
- Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

7.3.5 Health and safety measures

To minimize the risks associated with health and safety issues, the Proponent will be responsible to ensure that adequate health care arrangements will be available at the site throughout the construction period.

The following safety practices prior to and during construction are proposed.

- Considering the nature of work, proper equipment and safety gears will be provided to the workers.
- Contractual health and safety management requirements incorporated into contractual and supplier requirements.
- Enforce health and safety procedures including COVID-19 control procedures/ guidelines such as isolation and quarantine procedures endorsed by HPA and WHO.
- Produce and enforce hazardous material handling and storage procedures.

- Necessary barriers, warnings, signs demarcating unsafe areas should be followed according to standard construction practices.
- Where relevant, safety nets should be used to cover buildings and prevent injury to others.
- Provide first aid facilities in case of an emergency and safety protocols during such event.
- Aluminum and woodworks at site shall be supervised and workers informed of the necessity to take care when using tools such as electric cut-offs.
- Contractor shall be required to comply with all the precautions as required for the safety of the workers.
- Provide necessary safety appliances such as protective footwear, cloth gloves, safety goggles for welders, helmets, masks, etc. to the workers and staff.
- In order to guarantee construction safety, efficient lighting and safety signs shall be installed during construction.

It is also recommended to have an emergency response plan developed for the construction phase. This should cover sufficient details of all impacts/risks, identify all hazards and risk mitigation and emergency response procedures. The following shall be covered in specific detail.

- Fire prevention and response: (1) Fire extinguishing equipment would be readily available and employees will be trained in its use, (2) Oxygen, acetylene or LPG bottles will be stored properly and (3) All welding and cutting will be done in accordance to high safety regulations by experienced personnel.
- Emergency spill response: (1) hazardous material and spill scenarios shall be understood and communicated, (2) Heavy vehicles shall be operated by experienced personnel only to avoid overturning, (3) fuel and other hazardous materials shall be handled carefully and appropriate training provided to relevant personnel, (4) larger spills shall be notified immediately through established mechanisms to the relevant authorities and shall be appropriately attended to, (5) spill response kits shall be provided at site and relevant personnel trained.
- Hazardous operations: (1) hazardous operations shall be carried out with care to avoid injury to personnel, (2) safety gear shall be worn at all sites where it is necessary

7.3.6 Labour management

The following labour management strategies are proposed for the construction phase.

- Existing accommodation with adequate sanitation facilities would be used during the construction phase.
- In order to avoid any social conflicts arising during the construction phase, workers will be given proper orientation regarding local cultural values and traditions and a Grievance Redress Mechanism for the labour force would be setup and a register of grievances/complaints would be kept on site.
- Proponent's policies on labour and working conditions would be available/accessible to workers in the main languages spoken by workforce, which would be predominantly Maldivians and Bangladeshis. Contractors and suppliers would be required to abide by the policies and procedures laid down.
- Proponent would make provisions for identifying and ensuring migrant workers are engaged on equivalent terms and conditions to local workers, and that working conditions and terms of employment are consistent with Proponent's policies and national law/regulations.
- All contractors and suppliers would be required to contribute to logs kept of workers including details of visa, nationality and site of accommodation.
- Accidents and injuries should be promptly reported and attended to. All concerned would be informed of the necessary procedures to be followed in case of accidents and injuries. Accidents and injuries would be logged as part of the environmental monitoring programme and reported in post-construction monitoring report.

7.3.7 Managing impacts on longshore sediment transport

As mentioned in the Impacts section, the proposed swimming pool is expected to have some negative impacts on the longshore sediment transport on the northern side. Hence, it is recommended to consider about 2 to 4 groynes or nearshore breakwaters on the northern side to minimize sediment loss due to possible impacts of the proposed swimming pool. This is suggested as a measure to minimize the frequency of beach fill. However, the Client may also opt to continue to nourish the beaches since there is no coral cover within 500m of the beach and nourishment can be continuously carried out with no significant impact on marine fauna.

7.3.8 Managing impacts of Jetty

The following mitigation measures are recommended.

- Dredge or excavate for foundations only.
- Precast footings and columns will be used.
- Excavator movements shall be minimized.
- Excavators shall move as far from coral reef flat areas as possible.

7.3.9 Managing air and noise pollution

Mitigation measures to minimize emissions from machinery and vehicles related to the project including mobilization and operational phase include:

- Use light fuel (with low sulphur content) as much as possible.
- Avoid unnecessary operation of vehicles, machines and boats.
- Keep in place appropriate transport management system.
- Minimize mobilization by planning the mobilization. In most of the projects undertaken near cities, several mobilizations happen to not only increase the cost of the project but also the environmental impact. Appropriate planning is the key.
- Keep in place appropriate logistic management system during construction and operation phase.
- A resort is a noise-sensitive environment. Generally, resort islands have about 45dB(A) sound levels even during the day. Therefore, noise levels would be kept to a minimum by appropriate design of powerhouse/RO plant and other noisy operations to reduce noise emissions. In addition to providing appropriate noise protection gear to those working in the powerhouse or undertaking other noisy operations, the following measures would be taken.
    - Place generators on anti-vibration mounts
    - Insulate the walls/roof to mitigate noise outside ensuring noise levels outside the powerhouse (at the façade) does not exceed 55dB(A)
    - Propose intermittent working hours for persons working in noisy areas

7.4 Environmental Management – Operational Phase

The following sections describe proposed mitigation measures to be undertaken during the operational phase of the proposed resort.

7.4.1 Controlling and minimizing ecological damage

Recent bleaching events due to increasing global temperatures have affected almost all reefs of the Maldives. Although the proposed project has no significant impact on marine fauna and flora, the following measures are recommended.

- Identify through regular monitoring areas of reef that have faster regeneration and keep all concerned informed of those areas and the need to preserve those areas in particular.
- Reduce the harm caused by uninformed and careless snorkelers/divers, who could easily damage or kill existing live corals as well as new colonies by educating guests as well as staff regarding the fragility of the marine environment. Below are some of the good national and international practices.
    - No anchoring on reef except for emergency rescue
    - No touching and standing on corals
    - No removal of coral, shells or other specimens
    - Buoyancy control checking and training
    - No spearfishing or unsupervised fish feeding
- Promote coral reef awareness and understanding through displays, videos, etc.
- No black coral or turtle shell products shall be offered for sale in the resort shop
- Prevent all disturbances to turtle nesting areas and monitor number, location and type of turtle activity in the housereef of the resort.
- Ban plastic bags and minimize the use of readily disposable plastic
- Coral transplanting/nursery efforts may be started from the onset of the project.
- Put up signs on important locations such as the coastal inlet reminding tourists and staff to be mindful of sensitive fauna such as birds.

EPA in cooperation with Manta Ray Trust has recently issued guidelines for minimizing risks of entanglement of marine creatures, especially manta rays, in mooring and buoy lines. These include the following steps.

- Step 1: Identify all mooring and buoy lines around the island and ensure that the mooring lines are installed properly without excess in the line and if any, loose rope or

loops are removed or secured (e.g. using tape or cable ties) to minimise the chance of entanglement.

- Step 2: Make all mooring lines "manta safe" by attaching cable ties so that the ties extend outwards at a right angle from the rope and each cable tie is at a 45^{o} from the previous tie, in order to maximise visibility of the rope from all sides (so that it looks like a DNA helix).
- Step 3: Prioritize lines that are in areas where the most manta ray activity occurs – e.g. on house reefs close to channels where feeding animals are sighted.
- Step 4: Educate resort staff and guests about the measures taken to make all mooring lines manta safe.

7.4.2 Labour Management

The staff area in resorts of Maldives are in a separate area (usually the center of the resort) thereby maintaining workers' rights to freedom of movement and association. Staff are provided with essential facilities such as staff canteen, staff recreation areas/facilities and adequate accommodation with toilets and showers as per Tourism Regulations. In addition, the following measures would be in place.

- Resort's foreign staff will be given proper orientation regarding local cultural values and traditions.
- Proponent's policies make provisions for communicating and addressing grievances including communication via email for staff to express their opinions that reflect any problems or issues. Accordingly, staff would be motivated to submit any relevant information or complaints to the Proponent/resort management in a timely manner.
- Proponent's policies on labour and working conditions would be available/accessible to workers in main languages spoken by workforce.
- Migrant workers would be engaged on equivalent terms and conditions to locals.
- Working conditions and terms of employment would be consistent with Proponent's policies and national law/regulations.

7.4.3 Waste management

It is recommended to improve on the existing waste management plan for the operational phase aimed at waste avoidance, material re-use and recycling, appropriate transport and disposal of waste as well as monitoring the waste management system. The resort's waste management

system comprises of appropriate equipment, labour force dedicated and trained for waste management and an efficient transport/delivery and disposal system. The waste management plan for the operational phase would comprise of the following.

- Evaluate waste production processes and identify potentially recyclable/reusable materials.
- Identify recycling markets/opportunities in the region.
- Train dedicated workforce for waste management.
- Segregate waste materials according to type to facilitate re-use.
- Minimize waste generation for disposal (via reduction/ re-use onsite)
- Plan and coordinate material deliveries to site.
- Transport wastes off site safely in a timely manner.
- Maintain comprehensive and accurate waste records.

The resort currently has appropriate waste management practices according to the requirements of the Ministry of Tourism. As such, the resort(s) has a Waste Management Center with an incinerator, a bottle crusher and a metal can compactor as the basic minimum in addition to waste bins and bags of appropriate sizes. Furthermore, mulching machine and other waste management equipment have been provided. Additionally, the following strategies are followed as per general practices in the Maldives.

- Regular transfer of plastics, scrap metal, compacted metal cans and old batteries to the landfill/waste management facility at Thilafushi by licensed parties as required by the Waste Management Regulation
- Regular deep waste disposal at designated ocean areas of biodegradable material including kitchen waste using dhoni (local vessel) at resort or licensed party
- Re-use or recycle dry bulk storage material, wooden crates
- Used engine oil would be re-used to a large extent (e.g. for engine parts cleaning, wood preservatives) or sold to local parties who would re-use waste oil.

The following mitigation measures are proposed to minimize impacts of waste.

- The largest type of plastic waste by volume are drinking water bottles (over 40 per person per month) and the various 10-100 litre plastic drums that contain cleaning chemicals used by housekeeping. To minimize these, water would be bottled on the island using reusable glass bottles.

- To reduce waste in general and cleaning chemicals in particular, products would be bought in bulk.
- When operating the incinerator, smoke and noxious gases would be avoided by routinely temperature and load logs to esnure high temperature combustion.
- Incineration of plastics would be highly discouraged.
- Ensure prompt servicing and repairs of incinerator and other waste management tools if performance falls below manufacturer's specifications
- Crushed glass would be kept in designated storage area for eventual re-use in concrete foundations.
- Marine pollution from inappropriate waste dumping would be avoided by routinely monitoring the type and quantity of wastes taken for deep water disposal. In fact, Thilafushi waste management site has a monitoring mechanism where records of waste incoming from resorts are checked at the point of delivery and signed off. This system needs improvement, however, it is quite effective in ensuring waste quantities are well accounted for thereby minimizing disposal to sea on the way.

Other measures are as follows.

- Most importantly dispose wastes only after all potential waste prevention and recycling strategies have been adopted. Reusable wastes include wood, concrete blocks and formwork. Metals can be recycled through scrap metal buyers.
- Adopt good housekeeping measures and operating practices such as inventory control to reduce waste of material (expired, off-specification, contaminated, damaged, etc.)
- Institute procurement measures that recognize opportunities to return usable materials such as containers and prevents over-ordering
- Avoid chemical and oil spills into the environment.
- Minimize hazardous waste through stringent waste segregation
- Avoid direct discharge of untreated liquid waste (spent oil, kitchen wastewater, sewage) into environment.
- Build appropriate grease traps at restaurants and kitchen and appropriate drainage systems in engine repair and service areas
- Avoid cleaning and washing of oily tools, equipment and parts (e.g. engine parts, machines) on bare ground
- Avoid open dumping of solid waste and keep all areas clean and free of pests.

7.4.4 Hazardous waste management

The following measures are proposed for the safe handling of fuels and hazardous chemicals.

- Include in Resort Emergency Response Plan appropriate safety measures for handling hazardous wastes including combating and cleaning up fuel and chemical spills and leaks, as well as covering fire and medical emergencies
- Substitute chemical cleaning products with biodegradable products
- Provide and ensure use of protective gear/clothing
- Train staff in appropriate and safe handling of hazardous materials/waste
- Provide appropriate signs, labels and Material Safety Data Sheets (MSDS)
- Provide bunding (secondary containment structure) around fuel tanks to contain 110 percent of the tank or largest tank (in case of a combined structure for all tanks)
- Store hazardous waste in shaded, ventilated/air-conditioned places in appropriate containers)
- Use appropriate decanting equipment and containers for transferring working quantities of volatile liquid chemicals from bulk containers to the work site
- Provide appropriate ignition protection and safety equipment (e.g. spark-protectors, earths and lightening conductors, gear for securing gas cylinders in upright position to prevent falling or damage during transport, etc.)
- Regular supervision to ensure safe handling and management of hazardous chemicals
- Monitoring hazardous waste generation and disposal such as hazardous chemical incidents, marine spill incidents, incidents involving resort fuel line, petrol or oil drums on open ground, sites with contaminated soils, oil trap inspections, etc.)

7.4.5 Energy and resource conservation

Hotel sector, especially resorts, are considered as energy as well as water and other resource intensive. To conserve natural resources and minimize pollution, the following measures are adopted in the resort or recommended.

- Use ambient light and natural ventilation during design stage to reduce lighting and air-conditioning needs including reduced window to wall ratio and optimized building orientation.
- Promote guest awareness involving reusing of towels and bedding

- Maximize use of energy efficient technologies. For example, air-conditioners are becoming increasingly energy-efficient and such air-conditioning would greatly reduce the electricity demand.
- Reduce the use of lights and air conditioning by keeping them off when not in use
- Energy optimization (including demand management, engine heat recovery, excess heat from gensets for water heating/laundry)
- Installing PV systems installed in all roofs. This could be achieved through Power Purchase Agreements such as that agreed between Sonevafushi and Yingli where Yingli installed the system and sold electricity to Sonevafushi.
- Use of other alternative energy sources such as deep-sea cooling/OTEC, fuel cells, etc.
- Use of low-flow and single flush sanitaryware and efficient shower heads
- Use of intelligent/innovative technology. IFC/ITP, The Business Case for Sustainable Hotels, March 2020 discusses the AquanomicTM Low-Temp Laundry Solids Program (the innovative chemistry cleans thoroughly in shorter wash cycles) and LightStay (a cloud-based system providing a digital touch-point that makes it easy for each hotel to track its utility consumption, identify and implement best practices, and work towards annual reduction targets) to manage Hilton's environmental performance across all its hotels.
- Wastewater may be treated to tertiary level to meet EPA standards for BOD of 5mg/l as well as World Bank/IFC standards so that it can be recycled for use in toilet flushing and gardening.

7.4.6 Health and safety measures

A Resort Environment and Safety Management Action Plan (RESMAP) was prepared by the Proponent in 2003 and this would be further improved prior to the operation of the resort after renovation. The objective of the RESMAP was to prevent or minimise adverse environmental effects from resort operations and activities and promote and maintain high standards of safety for guests and staff in the resort. This would cover the following basic aspects of operation in addition to various other operational environmental, health and safety concerns.

Coastal Management: managing beaches and coastal vegetation so as to protect resort infrastructure and land from erosion and similar causes while avoiding guest complaints due to lack of beach.

Reef rehabilitation and management: Reef rehabilitation efforts are underway and those efforts shall be maintained through regular monitoring and research. Anthropogenic impacts on the reef shall be minimized through appropriate solid and liquid waste management as well as established procedures as well as guidelines for snorkelling and diving.

Water and wastewater management: Groundwater resource is required to be preserved in its natural state, therefore, polluting sources shall be identified and monitoring efforts established to ensure groundwater is not polluted. Water and wastewater treatment systems shall be regularly monitored for performance and safety as well as undetected leaks to minimize negative environmental impacts and financial burden of operation. Marine water quality with emphasis on wastewater and excess brine disposal area(s) shall be monitored.

Waste management: With the tourism sector being the largest generator of waste in the Maldives, the cumulative, negative impacts of solid and hazardous waste management shall be clearly understood and waste management given a priority. Waste minimization strategies, safe handling of all types of waste especially hazardous waste and regular maintenance of waste management equipment and health and safety measures for waste management personnel shall be in place. Fuel, chemical and other hazardous waste handling procedures shall also be in place.

Health and Safety: Health and safety of resort guests and staff shall be guided by effective procedures in place with every simple step established and made known. Measures should be well in place as they would be elsewhere in the Maldives to prevent accidents or incidents related to snorkeling and diving. Furthermore, areas of high currents, shall be mapped and such information provided to staff and guests. Also, hazards/risks related to snorkeling and diving shall be identified and communicated appropriately.

Fire prevention and control: The ever-present danger of fire and its impact on guests and staff as well as the resort infrastructure shall be well understood, and strict controls shall be in place to avoid fires. Fire-detection systems and fire-fighting equipment shall be in place and ready to provide an immediate, orderly and effective response to any fire incident/alarm.

Oil spill prevention and control: Accidental oil spills are prevented through standard requirements for bunding of fuel tanks in resorts. All fuel tanks proposed under the project would be bunded to contain the entire contents of the fuel tank in the unlikely event of a spill. Furthermore, bunds should be kept clean at all times so that the spilled fuel can be used without

the need to dispose of any. Additionally, all precautions shall be taken during filling of tanks including day tanks and handling fuel in fuel handling areas.

Emergency Response: An emergency response plan is recommended to be developed prior to the operation of the resort. The plan should cover the following aspects of the operation.

- Trained Emergency Response Team on site who understand emergency scenarios and basic response techniques. They shall be able to establish emergency procedures including provision of emergency communication procedures, emergency telephone services, etc.
- Fire prevention and response: (1) Fire extinguishing equipment would be readily available and employees will be trained in its use, (2) Oxygen, acetylene or LPG bottles will be stored properly and (3) All welding and cutting will be done in accordance to high safety regulations by experienced personnel.
- Emergency spill response: (1) hazardous material and spill scenarios shall be understood and communicated, (2) hazardous material shall be kept in appropriate storage conditions and disposed off according to specified standards (3) fuel and other hazardous materials shall be handled carefully and appropriate training provided to relevant personnel, (4) bunds around fuel storage tanks shall be inspected for leaks on a regular basis (5) larger spills shall be notified immediately through established mechanisms to the relevant authorities and shall be appropriately attended to, (5) spill response kits shall be provided at site and relevant personnel trained.
- Hazardous operations: (1) hazardous operations shall be carried out with care to avoid injury to personnel, (2) safety gear shall be worn at all sites where it is necessary including powerhouse and during waste/wastewater management operations.
- Injuries and illnesses: (1) need for immediate and appropriate medical attention (2) appropriate reporting mechanism for accidents and health and safety incidents, and (3) follow-up and review to identify ways to avoid repetition.

In addition, the following health and safety measures would be adopted.

- Contractual health and safety management requirements incorporated into contractual and supplier requirements.

- Develop a Grievance Redress Mechanism and train or make aware of the availability of the document(s) to all resort staff.
- Enforce health and safety procedures including COVID-19 or similar epidemic/pandemic control procedures/guidelines such as isolation and quarantine procedures endorsed by HPA and WHO.
- Produce and enforce hazardous material handling and storage procedures.
- Ensure emergency procedures in case of spill out of dangerous substances are in place.
- Enforce health and safety procedures at all work sites.
- Conduct ongoing monitoring/verification of the implementation of environment and safety management plans to ensure Proponent/Developer's standards are being met.

7.5 Environmental Monitoring

Environmental monitoring is essential to ensure that potential impacts are minimized and to mitigate unanticipated impacts. The parameters that are most relevant for monitoring the impacts that may arise from the proposed project are included in the monitoring plan. These include water quality, sedimentation, shore dynamics, live coral cover and nektonic fauna.

Monitoring would ensure that the proposed activities are undertaken with caution and appropriative care so as to protect and preserve the built environment of the areas in proximity to the site or those areas and environmental aspects affected by the development.

The purpose of the monitoring is to provide information that will aid impact management, and secondarily to achieve a better understanding of cause-effect relationship and to improve impact prediction and mitigation methods. This will help to minimize environmental impacts of projects in future.

The monitoring plan shall target to measure:

- live coral cover and nektonic fauna
- avian fauna in the area
- water quality and visibility
- beach profile and hydrodynamic changes
- impacts are accurate and mitigation measures taken are effective and
- the thresholds are kept within the baseline limits predicted.

7.5.1 Recommended Monitoring Program

The annual monitoring programme targeted at monitoring the terrestrial and marine environment of Holiday Island is given in Table 7-1 and Table 7-2. This programme starts from the onset of the project. In addition, if the project were to be delayed by more than six months from the approval of the EIA report, it is proposed to undertake further assessment of all baseline components covered in this EIA report. The proponent's commitment to undertake this monitoring programme for at least two years form part of this report.

7.5.2 Monitoring Report

A detailed environmental monitoring report is required to be compiled and submitted to the Environment Protection Agency annually, based on the data collected for monitoring the parameters included in the monitoring programme given in this report. The monitoring report shall be submitted in accordance with the requirements of the EIA Regulations 2012. As per Schedule (Jadhuvalu) Laamu of the regulations, summary reports need to be submitted every two months during construction phase and detailed report or reports after project completion as per the schedule identified in the EIA report. For this project, it is recommended to submit a monitoring report following completion of construction and during the operational stage (after the completion of the project), a monitoring reports should be provided after six months. Annual monitoring reports based on data collected according to the monitoring programme given in the EIA report shall be provided.

The monitoring report will include details of the site, strategy of data collection and analysis, quality control measures, sampling frequency and monitoring analysis and details of methodologies and protocols followed. It will follow the recommended format under Schedule Laamu of the regulation.

Table 7-1: Proposed annual monitoring programme (construction phase)

No.	Indicator/locations	Parameters to be monitored	Frequency and duration	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total	Rate (USD)	Total (USD)
1	Marine water quality (around the jetty area)	Water quality: temperature, conductivity/salinity, DO, pH, Turbidity, TSS	Every three months	5			5			5			5			20	25.00	**500.00**
2	Marine life/biodiversity (baseline locations)	Live coral cover and fish survey - Photo quadrates/LIT and fish survey	Every six months				5						5			10	100.00	**1,000.00**
3	Currents/hydrodynamics (baseline and additional)	Ocean currents	Every three months	2			2			2			2			8	50.00	**400.00**
4	Shoreline changes (baseline and additional)	High tide line, low tide line	Every three months	2			2			2			2			8	50.00	**400.00**
5	End of construction stage monitoring report		Construction phase only												1	1	1,000.00	**1,000.00**
TOTAL																		**3,300.00**

Note:

M indicates Month

Logistic costs for monitoring visits have not been included. Estimated cost per monitoring visit is about MVR3,000

Table 7-2: Proposed annual monitoring programme (operational phase)

No.	Indicator/locations	Parameters to be monitored	Frequency and duration	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total	Rate (USD)	Total (USD)
1	Marine water quality (baseline and additional, if necessary)	Water quality: temperature, conductivity/salinity, DO, pH, Turbidity, TSS	Every six months				5						5			10	25.00	**250.00**
2	Marine life/biodiversity (baseline locations and additional)	Live coral cover and fish survey - Photo quadrates/LIT and fish survey	Every six months				5						5			10	100.00	**1,000.00**
3	Currents/hydrodynamics (baseline and additional)	Current meter/drogue	Every six months				5						5			10	50.00	**500.00**
4	Shoreline changes	High tide line, low tide line	Every six months				2						2			4	50.00	**200.00**
5	Shoreline changes	10 beach profiles	Every six months				10						10			20	25.00	**500.00**
6	Groundwater quality at BOH area and control location	pH, EC, TDS, faecal coliforms, hydrocarbon, phosphates and nitrates	Every six months				2						2			4	50.00	**200.00**
7	Air quality at powerhouse and control location	Temperature, humidity, SO2, NO2, PM2.5, PM10, CO and ozone	Every six months				2						2			4	30.00	**120.00**
8	Noise at powerhouse and 4 other locations	SPL (dB)/day and night levels	Every six months				5						5			10	15.00	**150.00**
9	Desalinated water (product tank, staff room, guest room, kitchen)	pH, EC/TDS, total coliforms, faecal coliforms	Every three months				4						4			8	60.00	**480.00**
10	Annual Monitoring Report		Once a year												1	1	1,000.00	**1,000.00**
TOTAL																		**4,400.00**

Note:

M indicates Month

Logistic costs for monitoring visits have not been included. Estimated cost per monitoring visit is about MVR3,000

7.6 Summary Management and Monitoring Plan

The following table summarizes the environmental impact mitigation management and monitoring measures discussed in this report.

Table 7-3: Summary of impact mitigation, management and monitoring plan

Managing cumulative and overall development impacts		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Identify areas for development on land and marine • Clearly identify and mark the areas that require clearing of vegetation • Design all development on the principle of cleaner production	Developer (Proponent)/ Project Engineer	Identify clean technologies	
Construction phase	• Ensure proper and efficient operation of machinery to minimize energy use • Precast footings and columns will be used. • Selection of appropriate development windows (e.g. execute coastal and marine works at low tide) • Completion of work as soon as possible but by avoiding working at night to the greatest possible extent • Avoid any spillage into the ground that can contaminate soil and groundwater • Keep sensitive areas protected from damage (e.g. bird and turtle nest sites) • Avoid discharge of untreated sewage/wastewater effluent into ocean • Undertake rigorous monitoring during the construction phase to study the effects of construction. • Workforce shall be supervised adequately.	Proponent/ Contractor	Choose appropriate technologies and equipment	
Operation phase	• Monitor marine water quality, groundwater quality, beach profiles and shore dynamics, coral reef as well as other aspects at designated locations • Continue the efforts to identify critical habitats within the project site • Staff and guests shall be informed of what they can and cannot do. Boards should be kept on-site to remind personnel at site of the importance of environmental protection. • Identify turtle nesting areas and demarcate those areas to keep those areas with minimal disturbance • Carry out coral transplanting/nursery from the onset of the project • Put up signs on important locations such as the coastal inlet reminding tourists and staff to be mindful of sensitive fauna such as birds.	Developer (Proponent) and Tourism Ministry/EPA		
Landscaping and gardening		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Ensure maximal use of native plants. • Design to clearly simulate natural island environment setting	Developer (Proponent)/ Project Engineer	Identify clean technologies	
Construction Phase	• Create a nursery at the onset of the project. • All coconut palms can and shall be transplanted within the shortest possible time frame.	Developer (Proponent)/ Contractor		

	• Plant 2 coconut palms for each tree removed. This can be done at the parent site at already cleared areas and areas that need vegetation.			
Operation phase	• Use organic fertilizers. • Minimize use of fertilizers	Developer (Proponent)/ Operator		
Power generation		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Appropriate design of powerhouse/RO plant and other noisy operations to reduce noise emissions by placing generators on anti-vibration mounts, insulating walls, etc.	Developer (Proponent)/ Project Engineer	Identify clean technologies	
Construction Phase	• Avoid unnecessary operation of vehicles, machines and boats. • Minimize mobilization by planning the mobilization. Keep in place appropriate logistic management system.	Developer (Proponent)		
Operation phase	• Use light fuel (with low sulphur content) as much as possible. • Keep in place appropriate transport management system. • Keep in place appropriate logistic management system. • Provide appropriate noise protection gear to those working in the powerhouse. • Plan intermittent working hours for persons working in noisy areas	Developer (Proponent)/ Operator		
Machinery and equipment		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Plan for the use of appropriate equipment. • Provide appropriate working windows	Developer (Proponent)/ Project Engineer		
Construction phase	• Ensure proper monitoring of construction activities. • Establish strict regulations and safety measures for machinery operation. • Locate storage area on the island. • Reduce movement of excavators and other machinery on the reef flat during construction of proposed water villas and breakwaters.	Developer (Proponent)/ Contractor		
Mitigation measures for mitigating impacts of waste and wastewater disposal		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Design for appropriate solid and liquid waste disposal such as provision of disposal facilities and collection procedures • Establish appropriate mechanism for waste and wastewater management with trained personnel	Developer (Proponent)/ Project Engineer	Choose appropriate technologies	
Construction phase	• Construction waste must be disposed of at Thilafushi. • Construction debris shall not be disposed in the marine environment. • Provide effective management of fuel handling area and other dangerous substances storage	Developer (Proponent)/ Contractor		
Operation phase	• Disposal of solid waste including fish waste, wastewater and waste oil disposal other than designated areas shall be prohibited. • Fuelling of boats and vessels on sea shall be closely supervised and monitored. • Ensure emergency procedures in case of spill out of dangerous substances are in place.	Developer (Proponent)/ Operator		

	• Appropriate solid waste collection facilities shall be placed in all necessary locations. • Promote effective management of fuel handling area and other dangerous substances storage.			
Hazardous waste management		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Include in Resort Emergency Response Plan appropriate safety measures for handling hazardous wastes including combating and cleaning up fuel and chemical spills and leaks, as well as covering fire and medical emergencies.	Developer (Proponent)/ Project Engineer	Identify clean technologies	
Construction Phase	• Substitute chemical cleaning products with biodegradable products. • Provide and ensure use of protective gear/clothing. • Provide bunding (secondary containment structure) around fuel tanks to contain 110 percent of the tank or largest tank (in case of a combined structure for all tanks).	Developer (Proponent)/ Contractor		
Operation phase	• Train staff in appropriate and safe handling of hazardous materials/waste. • Provide appropriate signs, labels and Material Safety Data Sheets (MSDS). • Store hazardous waste in shaded, ventilated/air-conditioned places in appropriate containers). • Use appropriate decanting equipment and containers for transferring working quantities of volatile liquid chemicals from bulk containers to the work site. • Provide appropriate ignition protection and safety equipment (e.g. spark-protectors, earths and lightening conductors, gear for securing gas cylinders in upright position to prevent falling or damage during transport, etc.) • Regular supervision to ensure safe handling and management of hazardous chemicals. • Monitoring hazardous waste generation and disposal such as hazardous chemical incidents, marine spill incidents, incidents involving resort fuel line, etc.)	Developer (Proponent)/ Operator		
Water and wastewater management		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Include wastewater minimization strategies in designing the system. • Waste treatment system upgrade considered.	Developer (Proponent)/ Project Engineer	Identify clean technologies	
Construction Phase	• Construct proper septic tanks at site on the onset of the project and dispose of properly upon construction of sewerage system. • Persons shall not be allowed to defaecate on the beach or coastal areas. • Take care to minimize sedimentation on the reef when placing outfall pipe and anchors. • Avoid/transplant live corals in the path of the outfall.	Developer (Proponent)/ Contractor		
Operation phase	• Groundwater would be fully conserved (not used for any purpose including gardening or landscaping). • Treated water quality will be assessed on monthly basis.	Developer (Proponent)/ Operator		

	• Desalinated water quality will be monitored on weekly basis for basic parameters including faecal and total coliforms.			
Goods/material handling and health and safety		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Raising awareness and utilizing environmental best practice • Careful planning to ensure minimal disturbance to access the island • Prepare Project Environment and Safety Management and Monitoring Plans (ESMMPs) and incorporate specific requirements into contracts • Develop a worker grievance mechanism that is accessible to all workers (including contractors).	Developer (Proponent)/ Project Engineer		
Construction phase	• Development shall be carried out in a manner it will not affect or minimize the effects on the existing ecological system • Developer (Proponent) shall ensure that construction contractor(s) take health and safety seriously and implement the Proponent's policies on labour and working conditions. • Train or make aware of the availability of a Grievance Redress Mechanism to all workers • Enforce health and safety procedures including COVID-19 control procedures. • Follow HPA guidelines on COVID-19 including isolation and contact tracing.	Developer (Proponent)/ Contractor		
Operational phase	• Produce and enforce hazardous material handling and storage procedures • Ensure emergency procedures in case of spill out of dangerous substances are in place. Identify clear responsibilities. • Enforce health and safety procedures at all work sites • Conduct ongoing monitoring/verification of the implementation of ESMMPs to ensure Proponent/Developer's standards are being met.	Developer (Proponent)/ Operator	Implement good housekeeping, provide training and raise awareness	
Activities on Sensitive Environments		**Implementing responsibility**	**Technology/ equipment**	**Cost**
Design Phase	• Plan to keep noise sensitive locations away from noisy activities • Plan activities on reefs and identify sensitive environments, if any	Developer (Proponent)/ Project Engineer	Identify clean technologies	
Construction Phase	• Continue the efforts to identify critical habitats within the project site • Labour force shall be informed of what they can and cannot do. Boards should be kept on-site to remind personnel at site of the importance of environmental protection. • Workforce shall be supervised adequately. • Identify turtle nesting areas during the construction phase and demarcate those areas to keep those areas with minimal disturbance. • Keep labour force informed of necessity to inform the Project Manager or PMC if any turtle nests are observed.	Developer (Proponent)/ Contractor		

Activities on Sensitive Environments		Implementing responsibility	Technology/ equipment	Cost
Operation phase	• Identify through regular monitoring areas of reef that have faster regeneration and keep all concerned informed of those areas and the need to preserve those areas in particular. • Educate about the fragility of the marine environment and implement measures like: o No anchoring on reef except for emergency rescue o No touching and standing on corals o No removal of coral, shells or other specimens. o Buoyancy control checking and training. o No spearfishing or unsupervised fish feeding. • Take measures to minimize risks of entanglement of marine creatures. • Promote coral reef awareness and understanding through displays, videos, etc. • No black coral or turtle shell products shall be offered for sale in the resort shop. • Prevent all disturbances to turtle nesting areas and monitor number, location and type of turtle activity in the housereef of the resort. • Ban plastic bags and minimize the use of readily disposable plastic • Continue coral transplanting/nursery efforts started from the onset of the project. • Put up signs on important locations such as the coastal inlet reminding tourists and staff to be mindful of sensitive fauna such as birds.	Developer (Proponent)/ Operator		

8 Conclusions

It appears justified, from a technical and environmental point of view, to carry out the proposed project to renovate and upgrade the existing Holiday Island Resort and Spa on Dhiffushi, South Ari Atoll. The project has huge socio-economic benefits in terms of employment and state revenue and economic opportunities.

The most adverse impacts arise due to the proposed swimming pool and clearing of vegetation in a few areas for the proposed land villas. The sedimentation and other impacts during the jetty reconstruction is also of concern. However, these impacts are of minor significance and does not require major impact management and mitigation measures. The impacts can be minimized by undertaking works during low tide (where appropriate), minimizing tree removal, transplanting coconut palms and other mature trees, planting 2 trees for any tree removed and transplanting live coral in affected area(s), if any. To further mitigate impacts, jetties will be constructed on concrete piles carefully placed using excavators on barge and minimizing movements in the water. Other impact areas of the proposed project include soil and groundwater contamination due to construction activities especially fuel tank reconstruction. Steps to minimize pollution due to excess oil in tanks shall be taken.

The impact of power generation is considered insignificant and measures would be in place to optimize energy consumption and to increase use of alternative sources such as photovoltaics. Impacts of sewage disposal is also considered minor negative or negligible since sewage will be treated before disposal. Brine discharge into the lagoon has no known negative impacts. Feedwater intake from boreholes is considered normal practice with minor negative impacts and no impacts on groundwater table due to the depth of the borehole. Even if shallow boreholes were considered, there would be no environmental impacts of significance.

Environmental monitoring is proposed to continue. It is also recommended to strengthen the monitoring programme by including additional parameters during construction and operational phase. The monitoring of changes to the shorelines, current and waves in the area during the construction and operational phase shall continue. Long term monitoring of shorelines, beach profiles, currents, water and energy/fuel consumption data, waste management data and water quality including groundwater quality is proposed.

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- Abdul Raheem, Administrator, Sandcays

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11 Appendices

Appendix 1: Approved Terms of Reference

Appendix 2: Commitment letter from Proponent

Appendix 3: Approved Demolition Plan

Appendix 4: Approved Master Plan

Appendix 5: Work Schedule

Appendix 6: Email of final report to Atoll Council

No: 203-ECA/PRIV/2021/281

Terms of Reference for Environmental Impact Assessment of the Proposed Renovation of Holiday Island Resort (Dhiffushi), South Ari Atoll

This is the Terms of Reference (ToR) for undertaking the **EIA of the proposed renovation at Holiday Island Resort (Dhiffushi), South Ari Atoll**. The proponent of the project is **Villa Shipping and Trading Company Pvt. Ltd**. The EIA consultant is Mr. **Ahmed Zahid (License No. EIAP07/2007).**

While every attempt has been made to ensure that this TOR addresses all major issues associated with development proposal, they are not necessarily exhaustive. They should not be interpreted as excluding from consideration of matters deemed to be significant but not incorporated in them, or matters currently unforeseen, that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIA report.

1. **<u>Introduction and rationale</u> –** Describe the purpose of the project and, if applicable, the background information of the project/activity and the tasks already completed. Objectives of the development activities should be specific and if possible quantified. Define the arrangements required for the environmental assessment including how work carried out under this project is linked to other activities that are carried out or that is being carried out within the project boundary, if any. Identify the institutional arrangements relevant to this project.

2. **<u>Study area</u> –** Submit a minimum A3-size scaled plan with indications of all the proposed infrastructure. Specify the agreed boundaries of the study area for the Environmental Impact Assessment highlighting the proposed development location and size. The study area should include adjacent or remote areas, such as relevant developments and nearby environmentally sensitive sites (e.g. coral reef, sea grass, mangroves, marine protected areas, special birds site, sensitive species' nursery and feeding grounds). Relevant developments in the areas must also be addressed including residential areas, all economic ventures and cultural sites.

3. **<u>Scope of work</u>**

Task 1. Description of the proposed project – Provide a full description and justification of the relevant parts of the project, using maps at appropriate scales where necessary. The main activities of the proposed project are:

- Mobilization;
- Demolition of some of the existing beach villas, jetty and other structures;
- Construction of new structures and renovation of existing structures;
- Possible changes to coastal protection;
- Environmental monitoring during construction activities;
- Resort operation
- Measures to protect environmental values during construction and operation phase;
- Project management (include scheduling and duration of the project and life span of facilities; communication of construction details, progress, target dates, construction/operation/closure of labour

camps, access to site, safety, equipment and material storage, fuel management and emergency plan in case of spills)

Construction requirements and temporary facilities

- Construction methods, scheduling and operation of any temporary facilities, waste management and decommissioning.
- Labour requirements and (local) labour availability;
- Emergency plan in case of spills

Demolition

- Demolition plan (with special consideration for fuel tank demolition)
- Demolition waste (types and quantities)

Fuel tank

- Fuel storage tank details (size, location, containment);
- Fuel delivery from jetty to the tank;
- Fuel handling and management during operation;
- Leak detection and spill management procedures

Vegetation clearance

- Type and estimated quantities of vegetation cleared;
- Plans for vegetating cleared areas

Health and Safety

- Demolition waste management;
- Hazardous waste management.
- Fire, electrical and explosion hazards;
- First aid facilities and safety gear;
- COVID-19 protocols

Task 2. Description of the environment – Assemble, evaluate and present the environmental baseline study/data regarding the study area and timing of the project (e.g. monsoon season). Identify baseline data gaps and identify studies and the level of detail to be carried out by consultant. Consideration of likely monitoring requirements should be borne in mind during survey planning, so that data collected is suitable for use as a baseline. As such all baseline data must be presented in such a way that they will be usefully applied to future monitoring. The report should outline detailed methodology of data collection utilized.

All survey locations shall be referenced with Geographic Positioning System (GPS) including water sampling points, reef transects, vegetation transects and manta tows sites for posterior data comparison. Information should be divided into the categories shown below:

General climatic conditions

- Temperature, rainfall, wind, waves, tides (including extreme conditions)
- Risk of hurricanes and storm surges;

Hydrography/hydrodynamics (use maps)

- Tidal ranges and tidal currents;

- Wave climate and wave induced currents;
- Wind induced (seasonal) currents;
- Sea water quality measuring these parameters: temperature, pH, salinity, turbidity, and total suspended solids within the proposed reclamation area.

Water quality

- Groundwater quality at fuel tank/powerhouse area and control location measuring pH, electrical conductivity/TDS, dissolved oxygen, nitrate, phosphate and total hydrocarbon;

Ecology

- Identify marine protected areas (MPAs) and sensitive sites such as breeding or nursery grounds for protected or endangered species (e.g. coral reefs, spawning fish sites, nurseries for crustaceans or specific sites for marine mammals, sharks and turtles). Include description of commercial species, species with potential to become nuisances or vector. Undertake Benthic and Fish census assessments to determine the current status of any sensitive/protected areas
- Benthic and fish community monitoring (Coral Cover and Fish Census) from around the dredging location and alternative locations (all reefs within 03 kilometers of the dredging site needs to be assessed);
- Current use of the reef system (eg: fishing sites, bait fishing sites, sand mining and diving)

Hazard vulnerability:

- Risk of hurricanes and storm surges;
- Vulnerability of project areas to flooding and storm surge.

Task 3. Legislative and regulatory considerations – Identify the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project and identify the appropriate authority jurisdictions that will specifically apply to the project. Include permits and approvals in the EIA document.

Task 4. Potential impacts (environmental and socio-cultural) of proposed project, incl. all stages The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

Impacts on the natural environment

- Impacts on marine habitats in affected lagoon areas;
- Impacts of vegetation clearance and revegetation of cleared areas;
- Impacts on landscape integrity/scenery;
- Impacts on groundwater table and quality;
- Changes in erosion/sedimentation patterns, if any;

Impacts on the socio-economic environment

- Impacts on employment and income, potential for local people to have (temporary or long term) job opportunities (and what kind) in the execution of the works;
- Disturbance to local natural resource users such as fishing areas, other tourism ventures;
- Impacts to nearby resorts, dive sites, etc.;

Construction related hazards and risks

- Pollution of the natural environment (e.g. oil spills, discharge of construction waste);
- Risk of accidents and pollution on workers and local population, where applicable.

The methods used to identify the significance of the impacts shall be outlined. One or more of the following methods must be utilized in determining impacts; checklists, matrices, overlays, networks, expert systems and professional judgment. Justification must be provided to the selected methodologies. The report should outline the uncertainties in impact prediction and also outline all positive and negative/short and long-term impacts. Identify impacts that are cumulative and unavoidable.

Task 5. Mitigation and management of negative impacts – Identify possible measures to prevent or reduce significant negative impacts to acceptable levels. These will include both environmental and socio-economic mitigation measures. Mitigation measures to avoid or compensate habitat destruction, e.g. temporal sediment control structures, coastal protection structures to reduce erosion, coral reconstruction and MPA replacement areas. Measures for both construction and operation phase shall be identified. Cost the mitigation measures, equipment and resources required to implement those measures. The confirmation of commitment of the developer to implement the proposed mitigation measures shall also be included. In cases where impacts are unavoidable arrangements to compensate for the environmental effect shall be given.

Task 6. Development of monitoring plan – Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan. Monitoring reports shall be submitted to the Ministry of Tourism to evaluate the damages during construction and once a year thereafter throughout the operational phase. Details of the monitoring programme including the physical and biological parameters for monitoring, cost commitment from responsible person to conduct monitoring in the form of a commitment letter, detailed reporting scheduling, costs and methods of undertaking the monitoring programme must be provided.

Task 7. Stakeholder consultation – Identify appropriate mechanisms for providing information on the development proposal and its progress to all stakeholders, government authorities such as Ministry of Tourism, South Ari Atoll council and islands in the vicinity. The EIA report should include a list of people/groups consulted, their contact details and summary of the major outcomes

- Ministry of Environment, Climate Change and Technology (Environment Department)
- EPA - Environmental Research and Conservation Unit (ERC)

Presentation- The environmental impact assessment report shall be concise and focus on significant environmental issues. It shall contain the findings, conclusions and recommended actions supported by summaries of the data collected and citations for any references used in interpreting those data. The environmental assessment report will be organized according to, but not necessarily limited by, the outline given in the Environmental Impact Assessment Regulations.

Timeframe for submitting the EIA report – The developer must submit the completed EIA report within 6 months from the date of this Term of Reference.

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14th July 2021

بسم الله الرحمن الرحيم

VILLA®
Shipping & Trading Company Pvt Ltd

Ref No: VSTC- VCP-LT-21-056 15 September 2021

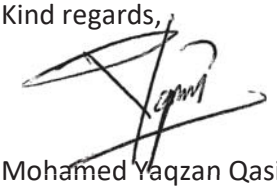
Mr. Ibrahim Naeem,
Director General,
Environmental Protection Agency,
Malé,
Maldives.

Dear Mr. Naeem,

This is in reference to the Environmental Impact Assessment (EIA) report for the Proposed Renovation of Holiday Island Island Resort, Dhiffushi, South Ari Atoll Atoll.

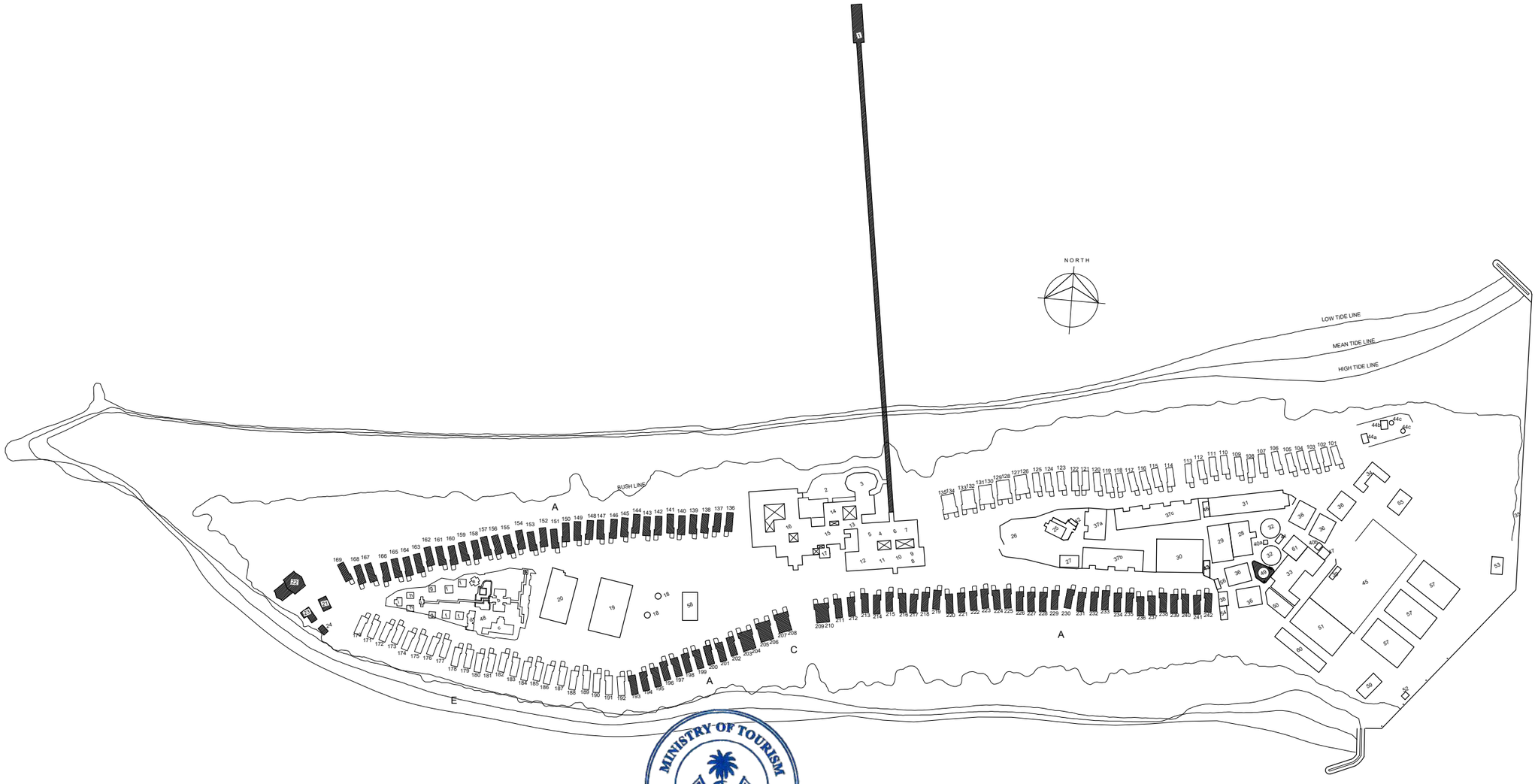
As the Proponent of the project, we assure you our commitment to undertake the proposed environmental impact mitigation measures and environmental monitoring programme given in the EIA Report. We shall carry out the project in a manner that has the least impact on the environment.

Kind regards,



Mohamed Yaqzan Qasim
Director

Villa Building, Ibrahim Hassan Didi Magu, P.O.Box 2073, Male' 20187, Maldives
Tel: (+960) 332 5195, Fax: (+960) 332 5177, e-mail: info@villa.com.mv



MINISTRY OF TOURISM
Male', Republic of Maldives

88-DS/PRIV/2021/1087

PROPOSED DEMOLITION

A - Guest Room (Single) (136 - 169, 193 - 202, 211 - 242)
B - Guest Room (Double) (202 - 210)

01 - Jetty
21 - Sail Hut
22 - Beach Bar
23 - Water Sports Center
24 - Sail Hut
46 -Diesel Tank

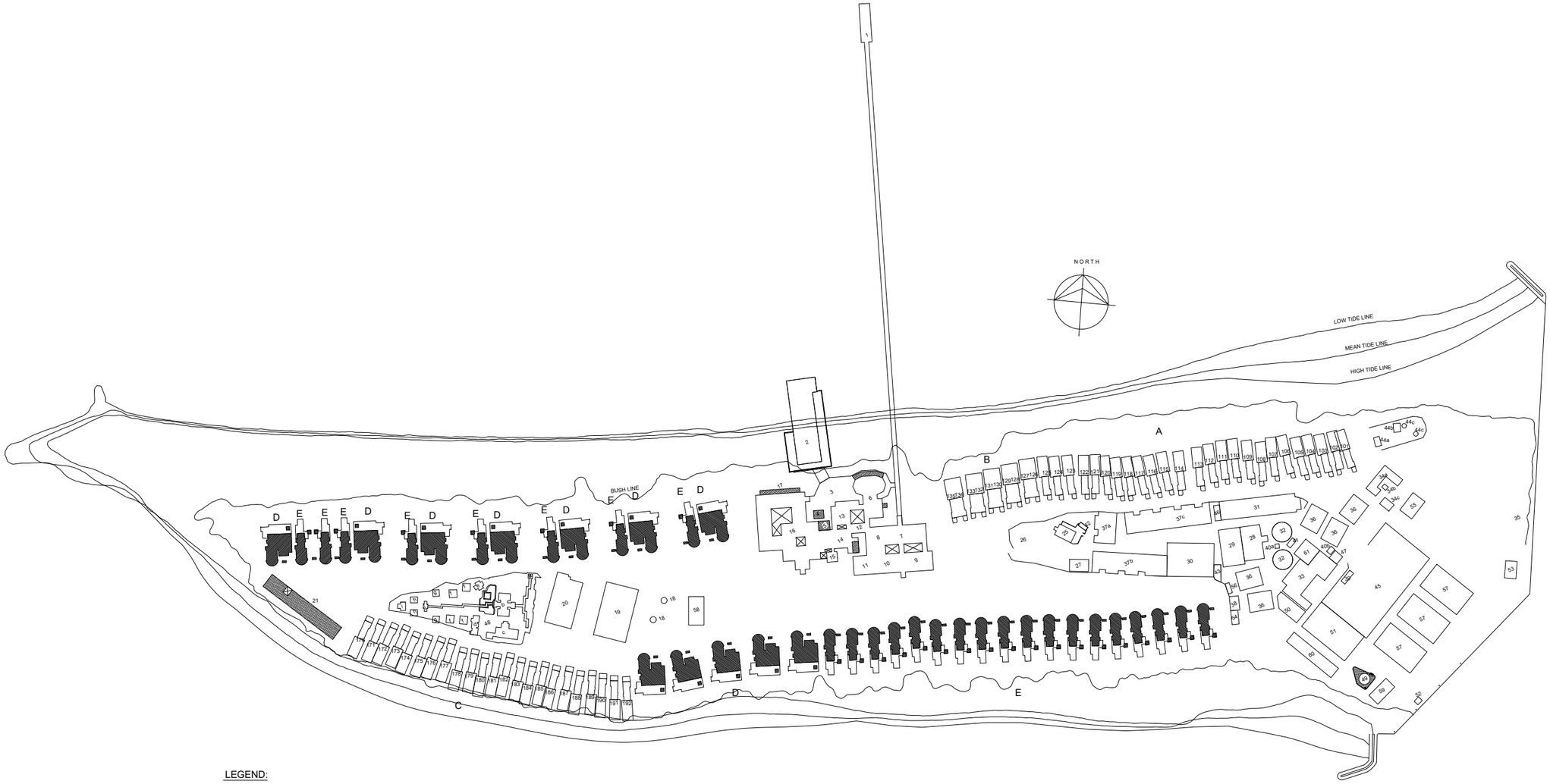
HOLIDAY ISLAND

SCALE 1:3000

VILLA VILLA CONSTRUCTION & PROJECTS
VILLA BUILDING, IBRAHIM HASSAN DIDI MAGU, P.O. BOX 2073, MALE' 20-02, REPUBLIC OF MALDIVES.
TEL: (960) 315965, FAX: (960) 315966, E-MAIL: CONSTRUCTIONS@VILLA.COM.MV, TELEX: 77090 VILLA MF

ARCHITECTS, ENGINEERS & SURVEYORS

PROJECT: Holiday Island Resort and Spa		PROJECT NO. BO1	ARCT. DESIGN VCP	REVISION	DATE	DESCRIPTION	NOTES -
		SCALE 1:3000	STRUCT. DESIGN -				
		STAGE CONCEPTUAL	SURVEYED -				
SHEET TITLE: DEMOLITION PLAN FOR MOT	CLIENT: VILLA SHIPPING & TRADING COMPANY	DWR. NO. -	DRAWN -				
		DATE 30.05.2021	CHECKED -				



LEGEND:

01 - Jetty
02 - Main Pool
03 - Pool Deck
04 - Italian Bar
05 - Restaurant WC
06 - Lounge Bar
07 - Healing Hall (Lobby)
08 - Offices
09 - The Shoppes
10 - Perfumeries
11 - GM Office / Meeting Room
12 - Toilets
13 - Main Bar
14 - Main Restaurant Kitchen
15 - Butchery
16 - Main Restaurant
17 - Main Restaurant Dining Deck
18 - Communication Antenna
19 - Tennis Court
20 - Animation Theatre
21 - Fitness Facility
22 - *RESERVED FOR FUTURE*
23 - *RESERVED FOR FUTURE*
24 - *RESERVED FOR FUTURE*
25 - Mosque
26 - Staff Volley Court
27 - Bottling Plant
28 - Staff Mess - Kitchen
29 - Staff TV Hall / Cyber Cafe' / Gym / HR / Staff Accommodation
30 - Laundry
31 - Stores
32 - Water-Tank
33 - Power House
34a - Dive School
34b - Dive School Cleaning Hut
34c - Dive School Briefing Hut
35 - Service Jetty
36 - Senior Staff Rooms
37a - Junior Staff Rooms (3 room block)
37b - Junior Staff Rooms (6 room block)
37c - Junior Staff Rooms (9 room block)
38 - Pump House & Tank
39 - Fish Tank
40a / 40b - Pump Room
41 - Fresh Water Pump House
42 - Ablution Area
43 - Environment Building
44a - Waste Management Structure 1
44b - Waste Management Structure 2
44c - Waste Management - Incinerator
45 - Play Ground
46 - Trolley House
47 - Transport Building
48 - Spa
  a - entrance pavilion
  b - spa reception
  c - spa lobby
  d - Jacuzzi hut
  e - saloon
  f - treatment huts
  g - treatment huts
  h - treatment huts
  i - treatment huts
  J - pavilion
49 - Diesel Tank
50 - Store, Workshop & Accommodation
51 - Carpentry and Carpentry Store
52 - Petrol Hut
53 - Arrival Pavilion
54 - TV Control Room & IT Building
55 - Compressor Room
56 - LPG Hut
57 - Accommodation Building
58 - Herb Garden
59 - Petrol Store
60 - Workshop and Carpentry
61 - Butchery - Back of House

GUEST ROOMS
A - Haven Pool Villa (Single)
B - Haven Pool Villa (Double)
C - Haven Honeymoon Villa (Single)
D - Haven Residence (Single)
E - Haven Deluxe Pool Villa (Single)

PROPOSED RENOVATION
A - HAVEN POOL VILLA SINGLE (101-125)
B - HAVEN POOL VILLA DOUBLE (126-135)
C - HAVEN HONEYMOON VILLA SINGLE (176-192)
6 - 17 - PUBLIC AREA EXTENSION

PROPOSED NEW STRUCTURES
D - HAVEN RESIDENCE (SINGLE)
E - HAVEN DELUXE POOL VILLA (SINGLE)

01 - JETTY
02 - MAIN POOL
05 - RESTAURANT WC
06 - ITALIAN BAR
21 - FITNESS FACILITY
49 - DIESEL TANK

HOLIDAY ISLAND

SCALE 1:3000

MINISTRY OF TOURISM
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A R C H I T E C T S, E N G I N E E R S & S U R V E Y O R S

PROJECT: Holiday Island Resort and Spa		PROJECT NO. BO1	ARCT. DESIGN VCP	REVISION	DATE	DESCRIPTION	NOTES -
		SCALE 1:3000	STRUCT. DESIGN -				
		STAGE CONCEPTUAL	SURVEYED -				
SHEET TITLE: CONCEPT PLAN	CLIENT: VILLA SHIPPING & TRADING COMPANY	DWR. NO. -	DRAWN -				
		DATE 30.05.2021	CHECKED -				

Ahmed Zahid

From: Ahmed Zahid <zahid@sandcays.com>
Sent: 17 September 2021 23:27
To: 'admin@adh.gov.mv'
Subject: EIA for proposed renovation of Holiday Island Resort
Attachments: EIA for Holiday Island Redevelopment 2021_final draft.pdf

Dear Sir/Madam,

Attached please find the final draft of the EIA for Renovation of Holiday Island Resort for your information.

Kind regards,
Ahmed Zahid
EIA Consultant