Addendum to

ENVIRONMENTAL IMPACT ASSESSMENT

Male’ West Coast Re-development Project

Proponent: Ministry of Housing and Infrastructure

Consultant:

Amir Musthafa (EIA01/13)

January 2016

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Consultants Declaration

This EIA has been prepared according to the EIA Regulations 2012. We certify that the statements in this Environmental Impact Assessment study are true, complete and correct to the best of our knowledge and abilities

Amir Musthafa (EIA01/13)

20th January 2016

Proponents 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.

Signature: ______________________

Name: Fathimath Shaana Farooq

Designation: Director General

Ministry of Housing and Infrastructure

20th January 2016

Executive Summary

This is the First Addendum to the approved main EIA prepared for the re-development of the Male' west coast area. The main EIA was approved on 10th September 2015. The proponent of the project is Ministry of Housing and Infrastructure.

This addendum is based on the proposed transplantation of 70 young coconut palms from K. Kaashidhoo to the on going Male' West Coast Development project. It is a legal requirement under the Amended EIA Regulation 2012 that EIAs/Addendums be prepared and approved for projects that may generate negative environmental impacts. This Addendum has been prepared as per the approved Terms of Reference (TOR) on 7 December 2015.

The scope of this EIA involves studying the existing environmental condition of the proposed project areas and surrounding environment, identifying potential environmental impacts, propose environmental management and mitigation measures to minimize environmental impacts and propose an environmental monitoring plan.

The palms are to be uprooted from the site for the proposed construction of jail and from households. This site for jail construction is at the western end of the island and is under the Jurisdiction of Maldives Correctional Services.

It is envisaged that the project will have several socio-economic benefits. This includes providing a means of shelter and relaxation to the community in Male' City, especially in the Maafannu district. Moreover, it would assist in alleviating the burden these large no. of trees had been causing the community in K. Kaashidhoo. From this perspective, the project can be regarded as means to balance the amenities in both communities. The economic benefits to the coconut tree owners from the sale of the coconut palms could also be considered as a direct positive impact. Furthermore, the Kaashidhoo council had committed to plant 2 trees for each palm that has been removed in more strategic locations in the island, where tree plantation is required.

Negative impacts include the holes that would be left after the digging. It may become a public nuisance, although the area is seldom used by the community. As a mitigation measure, the holes would be filled with sand available onsite, without the need for dredging. Provisions such as monitoring are proposed to understand the overall impacts of the project over the long term.

Therefore, considering the beneficial nature of the project for both communities, and minimum environmental impact that can be easily mitigated, it is proposed to proceed with the project. However, it is recommended to have proper monitoring in place to observe any future impacts that project may result in.

1.1 ސާދާ ޚުލާސާ

މި ރިޕޯޓަކީ މާލެ ހުޅަނގު ސަރަހައްދު ތަރައްޤީ ކުރުމުގެ މަޝްރޫޢުގެ އިތުރު މަސައްކަތްތަކުގެ ގޮތުން 70 ގަސް ކ. ކާށިދޫއިން ގެންނަން ހަމަޖެހުމާއި ގުޅިގެން މިމަޝްރޫޢުއަށް ހަދާފައިވާ އީ.އައި.އޭ ރިޕޯޓުގެ ފުރަތަމަ އެޑެންޑަމް ރިޕޯޓެވެ. މިމަސައްކަތަށް އީ.އައި.އޭ އެޑެންޑަމެއް ބޭނުންވީ މިމަސައްކަތަކީ ތިމާވެށްޓަށް އަސަރު ފޯރާން މިންވަރު ބަޔާންކުރާ ރިޕޯޓު ހެދުމުގައި ބަލާ ގަވާއިދު 2012 ގެ 'ޖަދުވަލު ރ' ގައި މިފަދަ ރިޕޯޓު ހަދަންޖެހޭ މަޝްރޫޢުގެ ލިސްޓުގައި މިފަދަ މަސައްކަތްތަކެއް ހިމެނިފައިވާތީއެވެ. މިމަޝްރޫޢު ތިމާވެށްޓާއިބެހޭ ގަވާއިދާއި ގުޅުން ފުރުމުގެ އިތުރުން، މި އީ.އައި.އޭގެ ސަބަބުން މިމަޝްރޫޢުގެ އުދައެރުމާއި ކަރަންޓު އުޅުން ފަރުތަކުގެ މަޝްރޫޢާއި ބެހޭ ނިންމުންތައް ނިންމުމަށް އެހީއަކަށް ވެގެންދާނެއެވެ. އަދި ދެމެހެއްޓެނިވި ގޮތަކަށް މިމަޝްރޫޢު ކުރިއަށް ގެންދިއުމަށް އޮތް ފުރުޞަތުތަކުން ވެސް ދެނެގަނެ މަޢުލޫމާތު ފޯރުކޮށްދެއެވެ.

މިރިޕޯޓުގެ ހޯދުންތައް ބިނާވެފައިވަނީ ނޮވެމްބަރު 2015 ގައި މަޝްރޫޢުގެ ކޮންސަލްޓެންޓް، ހާމިދު މުބްޖަރާގެ ބެލުން މިމަޝްރޫޢުގެ ސަރަހައްދުގެ ތިމާވެށި ދެނެގަތުމަށް ކުރެވިފައިވާ ތަޙްޤީޤުތަކުން ބިނާކޮށްގެންނެވެ. މީގެ އިތުރުން މިފަދަ މަޝްރޫޢުތަކުން ކުރިން ދިރާސާކުރެވިފައި އަދި ރާއްޖޭގައި ކުރެވިފައިވާ މަޢުލޫމާތުތަކުން ވެސް ރިޢާޔަތް ކުރެވިފައެވެ. އަދި މަޝްރޫޢުގެ ވެރިފަރާތް، މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ އަދި ކ. ކާށިދޫ ކައުންސިލުން ވެސް ދިރާސާއަށް މަޢުލޫމާތު ފޯރުކޮށްދީފައެވެ.

މިމަޝްރޫޢު ހިންގުމުގެ މަޤްޞަދަކީ ބޮޑުމަސް މާލެ ހުޅަނގު ސަރަހައްދުގައި ހުރުމުން ގޮސްޖެހުން ފިޔަވަ އެސަރަހައްދަށް ހިއްލާފައި ގެންނަން ގަސްތަކުގެ ސަބަބުން އިތުރު ގެއްލުން ދިނުމަކީ ފައިދާއެއް ހުރި ރަނގަޅު ޖާގައެއް ހަމަޖެހުމަށް ދިޔައިން ގޮތަށް ގަސްތައް ހިއްޕައިދީ ތަނުގެ ސަބަބުން ކުރިމަތިވާ ތިމާވެށީގެ އަސަރުތައް ކުޑަކުރަން މަޝްރޫޢުގެ ސަބަބުން ފައިދާ ވެގެންދާނެއެވެ. މިމަޝްރޫޢާއި ގުޅިގެން ކުރާނެ ނުރައްކާ މަސައްކަތުގައި އަސަރެއް ގަސް އުފުރުމުގެ ސަބަބުން އެސަރަހައްދުގައި ވަށައިގެންވާ ހަމަޖެހުން ނަމަވެސް މިމަޝްރޫޢުގެ ތަރައްޤީ ވިއްސާރަ ބަލައިގެން ހުރުން ކުޑަކުރެވޭ ބޮޑުބައިގެ މަސައްކަތް ކުރެވިދާނެއެވެ.

އެހެން ކަމުން މިކަމުގެ މަސައްކަތުގެ ސަބަބުން ކުރާނެ ފައިދާތަކަށް ބަލައި، އަދި ކުރާނެ ނުރައްކާ އަސަރުތައް ވަށައިގެން ހަމަޖެހިދާނެ ގޮތުގެ ބަދަލުތަކުގެ އެއްގޮތް، މިމަޝްރޫޢު ކުރިއަށް ގެންދިޔުމަށް އެންމެ ރަނގަޅު ގޮތަކީ ފެނެއެވެ. ނަމަވެސް

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1 Introduction

1.1 Background

This report is the first addendum for the Environmental Impact Assessment (EIA) of the Male’ west coast re-development project. The addendum will address the coconut palm transplantation which needs to undertake to furnish the landscaping plan of the project. The coconut palms is to be sourced from the inhabited island of K. Kaashidhoo.

The aim of this EIA study is to assess the potential environmental impacts of this palm transplantation project and identify mitigation measures for minimizing the adverse impacts of the overall process. The EIA takes into consideration issues and concerns that will be considered as critical with respect to environment, sustainable development and social harmony.

This addendum to EIA report has been prepared in order to meet the requirements of the EIA Regulation 2012

The consultant for this EIA addendum is Amir Musthafa (Registration number: EIA 01/13), who has been working with the team at the Ministry of Housing and Infrastructure.

1.2 Aims and Objectives of the EIA

The aim of this report is to addresses the environmental concerns of the proposed transplanting of coconut palms from Kaashidhoo to accommodate the landscaping plan of the Male’ west coast project. The report attempts to achieve the following objectives:

- Describe the project components to the relevant authorities
- Assist in mitigating impacts caused due to the works included in the activity
- Discussing possible alternatives to the sub-components of the activity

- Promote informed and environmentally sound decision making
- Demonstrate the commitment by the proponent on the importance of environmental protection and preservation.

1.3 Methodologies

The consultant for this addendum is Amir Musthafa, a registered environmental consultant working at the Ministry of Housing and Infrastructure, with a number of years of experience in Environmental Impact Assessment in the Maldives. The consultant is experienced in similar projects undertaken in the country.

The methodologies for the EIA is based on those given in the approved TOR as found in Annex 1. Further details of methodology is given under the 'Existing Environment' Section.

2 Project Description

The scope of Male' west coast re-development project involves the creation of an additional public recreational space. The key components of the main project consist of the removal of the existing breakwater, construction of a new breakwater further seaward, demolition of an area of the coastal land, construction of the west coast road with a landward shift and the creation of an artificial beach in the space provided by the new breakwater and the new road. The key objective of this development is the enhancement of the aesthetic, social, environmental and economic value of the project area as well as the city as a whole.

This Addendum covers the transplantation activity required for the landscaping component of the main project area. A high priority has been given to recreate a touch of a typical Maldivian beach within the overall redevelopment concept. This transplantation activity involves sourcing of about 70 coconut palms (cocos nucifera) of about 10-12 feet or smaller from Kaaf atoll Kaashidhoo. In conjunction with this transplantation activity, a community program has been planned for planting about 300 coconut palms in Kaashidhoo itself.

2.1 Project Location

The main activities relevant to this Addendum will take place in Kaashidhoo. The island is about 87km away from the capital city. It takes about 1.5 hour to travel one way between Male' and Kaashidhoo by sea. The majority of the palms are to be taken from the proposed jail construction site of the island. This site has been handed over to Maldives Correctional Services and hence it is currently under their authority. About 40 palms of the required size range are available from this site (Figure 1). The remaining 30 palms has been sponsored by individual households of Kaashidhoo.

Figure 1: Project Location and Impact Area (above: Kaashidhoo plant uprooting site, below: Male' planting area)

The palms will be planted at the project location shown in Figure 1.

2.2 The Proponent

The project is being proposed by Ministry of Housing and Infrastructure. The physical works of the transplantation activity will be carried out by SENOK Pvt. Ltd. and Public Work Services (PWS) of Ministry of Housing and Infrastructure.

2.3 Detailed Project Outline

The required 70 palms are to be, uprooted from Kaashidhoo, transported to Male' site and planted according to the landscaping plan of the west coast project.

The proposed activity would consist of the following major works:

- mobilising machinery to Kaashidhoo,
- uprooting the coconut palms from the given locations,
- backfilling the pits moving the palms from uprooted sites to jetty,
- loading palms to barge,
- transport to Male' site,
- planting and management in the main project area.

70 palms can be transported within one trip.

2.4 Justifications

2.4.1 Justification for main type of plant

Coconut palms were chosen to bring a natural Maldivian island beach environment feel to the Male' West coast area. Development in Male' has progressed in such a way that it has lost its natural identity. Male' is now famously termed as a concrete jungle due to its heavily built nature. The aim of the project from the beginning has been to move away from this notion and develop a natural environment for the community in Male'. Therefore, presence of coconut palms was essential to achieve this goal.

The climate of Maldives provides favourable conditions for the growth and sustenance of coconut palms. Ohler (1999) cited in Gomes and Prado (2007) that coconut palms require hot climates with an annual mean air temperature within 22-34^{0}C, absence of temperatures below 15^{0}C, solar radiation incidence of 300-900W/m2, relative air humidity between 60-90%, annual mean rainfall above 1500mm that is fairly well distributed throughout the year, and an annual sunshine duration of 2000 hours.

Therefore these plants can be sustainably grown in Male' environment.

2.4.2 Justification for palm sourcing location

The island and its specific locations for sourcing palms was selected with consideration to the availability of the required number and sizes of palms, the proximity to the main project site and the need for their removal from the specific sites.

The island of Kaashidhoo hosts a relatively high number of coconut palms. The name of the island also suggests that coconut palm may have always been dominant and of abundance in the island, as the '*Kaashi'* locally refers to coconut. The island is 87km away from Male'. The palms that would need to be cleared within a short to medium period as well as those that are of nuisance within households were targeted. Preparations are being made to start the physical works of jail construction in the proposed site within the upcoming year.

1.2.1 Justification for backfilling soil source

The selected location is an area with natural excess soil. This soil will be compatible with the environment of the palm uprooting areas and will save the cost and impacts of sourcing sand from the sea or another island.

2.5 Work Methodology

2.5.1 Mobilization

The required machinery would be transported to Kaashidhoo via a barge towed by a tub boat. Kaashidhoo harbour would be used to unload the machinery and the existing roads provides sufficient access to the uprooting sites as identified in Figure 2.

Figure 2 Plant transport route

1.2.2 Uprooting

- Palm loosened by digging around a 3ft distance from the trunk to a depth of 6ft while removing the roots by a chain saw.
- Using a purpose-built belt by the centre of the palm trunk, the palm is gently lowered with the excavator.
- Except for the soil attached with the roots, any additional soil will not be taken with the palm.
- The palms are gently placed in the vehicle for delivery to barge.
- At each round, the vehicle and exactor would need to travel back and forth between the uprooting sites and harbour as the excavator will be needed for both loading and unloading.

1.2.3 Backfilling

- Pits left from uprooting would be backfilled, compacted and levelled using soil present on site.

1.2.4 Transfer

- One need would need to be made between Kaashidhoo and Male' to transfer all the palms to Male' project site.
- Male' project site would be accessed via the temporary sand bund in use at the west coast for the duration of the project for material transfer.(Figure 3)

1.2.5 Replanting

- Pits would be prepared in advance to facilitate immediate replanting of the palms on their arrival to site.
- Each palm would be gently lowered into a pit and backfilled with soil prepared for the purpose.

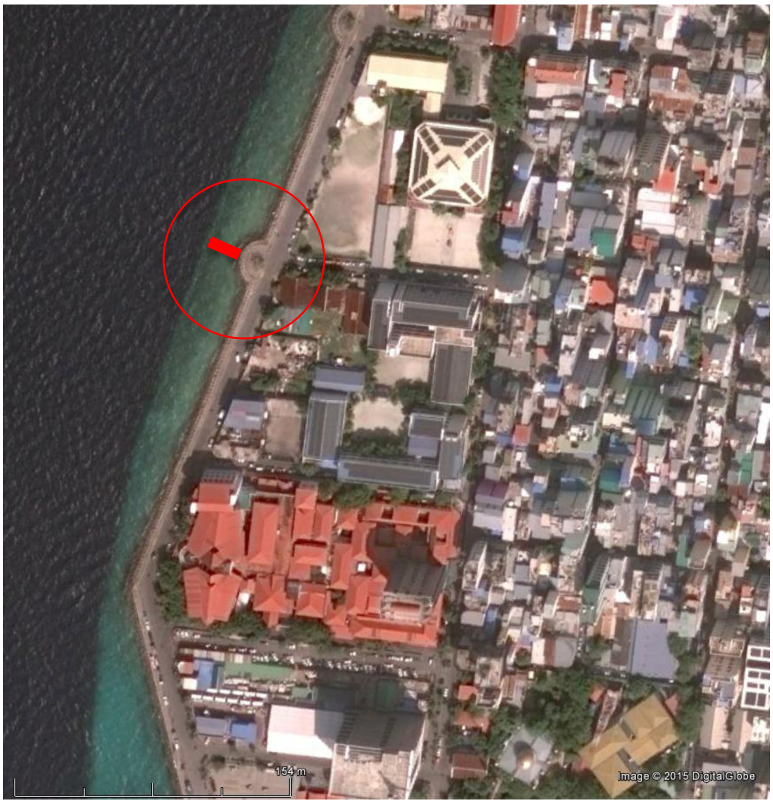


Figure 3: Location of temporary sand bund

2.6 Activity Schedule

The process of transplantation from mobilization to replanting would take about 14 days.

- Uprooting – 8 days
- Transporting – 1 day
- Planting – 5 days

2.7 Activity Inputs and Outputs

The inputs and outputs are based on human resources, equipment, machineries and materials. The major inputs and outputs associated with the palm transplantation are tabulated below. Table 1 highlights the main inputs, while Table 2 highlights the major outputs.

Table 1: Project Input

Input	Type	Source
Construction workers	Maldivians and Expatriates	Contractors workforce
Water Supply	Well water & Bottled water from workforce	Well water from households. Bottled water bought from shops.
Electricity/Energy	Island electricity mains	Island utility service
Machinery	Crane, lorries, excavators, chain saws, , etc.	Contractors in house machinery
Transport	Landing craft	Contractors in house vessels
Fuel	Diesel, Petrol, lubricants	Local suppliers

Table 2: Major outputs

Products and waste materials	Anticipated quantities	Source
Plants	70 young coconut palms	Island
Green waste	<500m^3	Green waste burned on site
Hazardous waste	<10litres of waste oil	Stored in containers on site
Noise	~65 db(A)	Localised at project area
Air pollution	Limited quantities of dust	Localised at project area

3 Existing Environment

This section covers the existing environmental conditions of Kaashidhoo with the main focus on the impact zones of the proposed works. The key environmental, social and economic components of the project under consideration are described below.

3.1 Physical Environment

1.2.6 Geologic Setting and Topography

This island is approximately 88km north of Male' and for administrative purposes although it is considered as a part of Male' atoll, geographically Kaashidhoo is an isolated atoll. The island located at the centre of Kaashidhoo Channel which is one of the most notorious local sea. At 73^{o}27'53"E and 04^{o}57'20"N, it one of the largest islands of Maldives and is approximately 2.8km in length and 1km in width with an area of about 276.5 hectares.

1.2.7 Meteorology

Climate

The general meteorological conditions of the central region are based on meteorological data collected from Hulhule' as it has the closest point of climatic data collection station. Hence this data is assumed to be sufficient for understanding the climatic factors affecting both Male' and Kaashidhoo. The main meteorological factors relevant to the proposed activity of the project are taken as wind, rainfall and temperature.

In general the climate in Maldives is warm and humid, typically tropical with two monsoon seasons, the North east and South West. The annual average temperature is 28°C with maximum of 31°C and minimum of 24°C (Ramiz, 2007). Relative humidity ranges from 73% to 83%. Although rainfall is quite rare during February and March for certain parts of Maldives, country gets rain throughout the year. Average annual rainfall is around 1,937mm (Ramiz, 2007). Heavy rainfall in central atolls occurs during May and October. Atolls between 2.2°N and 4.8°N are considered as central atolls. Southern atolls experience a higher average annual rainfall compared to the northern atolls. Greater extremes of temperature are also recorded in the southern atolls. On the other hand, as Maldives lies on the equator, Maldives receives plenty of sunshine throughout the year.

Indian Ocean monsoons govern the climatology of the Maldives. The Northeast (Iruvai) and the Southwest (Hulhangu) monsoon are the two monsoons observed in Maldives. Monsoons can be best characterized by wind and rainfall patterns. 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. Southwest monsoon's transition period occurs between March and April whereas that of northeast monsoon occurs from October to November.

Table 3: Monsoon classification in Maldives (Ramiz, 2007)

Month	**Season**
December	North East Monsoon (Iruvai)
January	
February	

March	Transition Period – 2 (Hulhanguhalha)
April	
May	South-West Monsoon (Hulhangu)
June	
July	
August	
September	
October	Transition Period – 2 (Iruvai Halha)
November	

Wind

The two monsoon seasons have a dominant influence on winds experienced across Maldives. Since Maldivian islands are spread across the equator, monsoons are relatively moderate where strong winds and gales are rare. However, during South West monsoon gusts of up to 60 knots have been recorded at Hulhule'. Wind is an important indirect process affecting the formation, development and seasonal dynamics of the Maldivian islands. Winds generate waves in lagoons and often help to regenerate waves that have been weakened by travelling across the reef. Reversal of winds in the Maldives means change of seasons from North East monsoon to South West or vice versa.

General wind surface wind pattern over the country during North East monsoon is north-easterly direction whereas during South West monsoon mean wind flow is westerly.

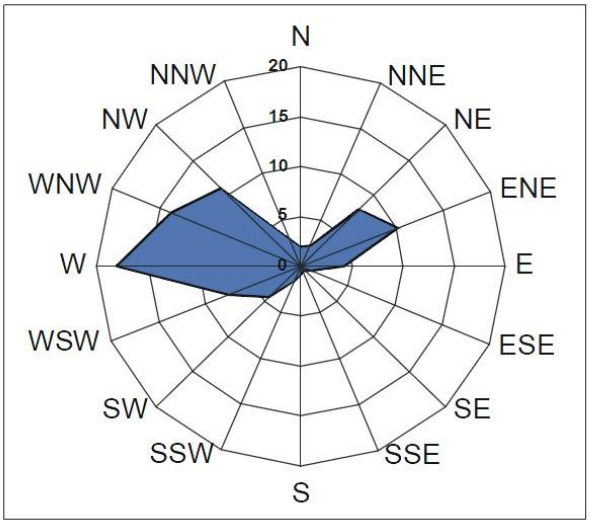


Figure 4: General Wind rose diagram (MEEW, 2006)

Rain

The average annual rainfall for the archipelago is 1,937mm. Mean monthly rainfall also varies substantially throughout the year with the dry season getting considerably less rainfall. The north east monsoon is known as the dry season and the south west monsoon the rainy season. The data suggests that this area of the country receives an average monthly rainfall ranging from 125-250mm in the wet season. With local rainfall characteristics of high intensity coupled with low frequency, Kaashidhoo faces unique concerns as the island tends to be lower at the southern periphery where most of the agricultural land is found together with marshy wetlands (Zahid, 2010).

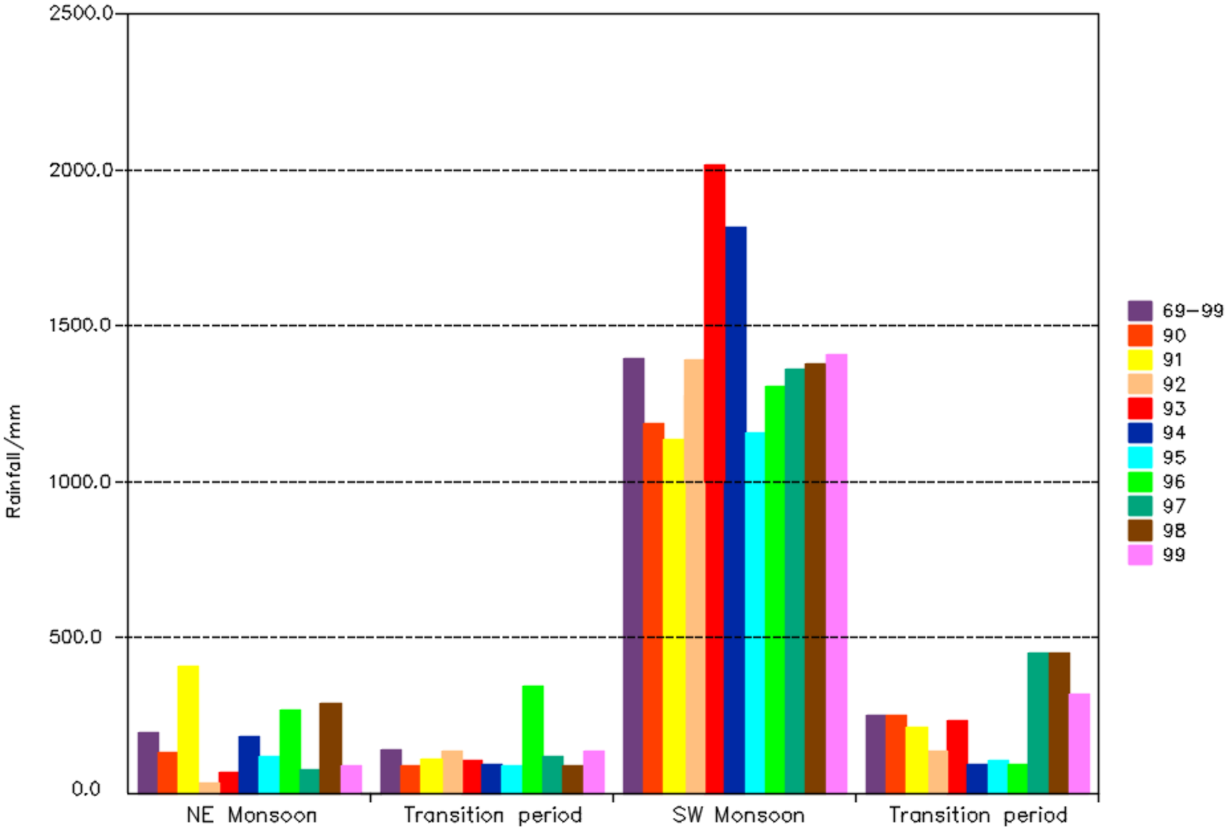


Figure 5: Annual seasonal rainfall variation in Male' (Ramiz, 2007)

Temperature

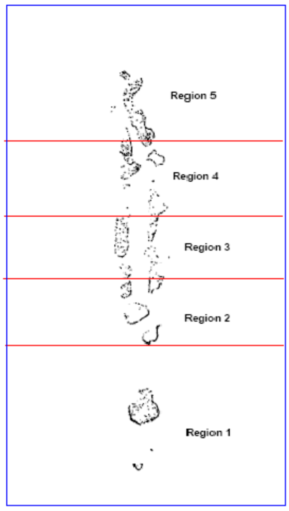
The annual average temperature of Maldives is 28°C with maximum of 31°C and minimum of 24°C which shows that the daily temperature of the country varies a little throughout the year (Ramiz, 2007). Until 1978, the mean annual temperature for Male' shows a negative trend and afterwards it is positive. The highest recorded temperature for Male' was 34.1°C on 16th and 28th of April 1973 (Ramiz, 2007). The hottest month recorded was April 1975 with a maximum monthly average temperature of 32.7°C, the next highest being 32.6°C in April 1998. The lowest minimum average temperature of 23.7°C was recorded in July 1992 (Ramiz, 2007).

3.2 Hazard Vulnerability

Maldives in general does not experience natural disasters and hazards on a frequent basis. However, the Indian Ocean Tsunami in 2004 was a major reminder on what sort of threats the country faces. The islands across Maldives face similar type of threats and hazards to varying degrees and magnitude depending on several factors.

The vulnerability of islands to natural hazards depends on geological and more importantly geographic aspects of the island. As such, the location of the island, with respect to the country and atoll is quite important. Likewise, the level of protection the island is offered from neighbouring islands, and the house reef, shape and orientation of the island are also important factors.

Based on the UNDP Disaster Risk Assessment Report of Maldives in 2006, Male' is located in an area that has been designated as a high-risk hazard zone. Moreover, as stated in the report, sea level rise due to climate change is a uniform hazard throughout the country. According to the report, the northern atolls are at greater hazard from cyclonic winds and storm surge with very low hazard in southern atolls. As shown in Figure 6, both Male' and Kaashidhoo are in hazard zone 4 with a maximum probable wind speed of 84.2 knots and cyclonic storm category of lower CAT 2 on Saffir-Simpson scale.



Hazard Zone	Probable Maximum Wind Speed (knots)	Saffir-Simpson Scale
1	0.0	0
2	55.9	0
3	69.6	1
4	84.2	2
5	96.8	3

Figure 6 Cyclonic and related storm surge hazard zones (adapted from RMSI/UNDP 2005)

The islands of Maldives are affected by severe local storms (thunder storms/thunder squalls) as well as strong winds (exceeding 100kmph), heavy rainfall, hail and lightning are the hazards usually associated with thunderstorms. As indicated in Figure 7, generally thunderstorms are more frequent in equatorial regions compared to other areas. Land areas endure more thunder storms compared to open ocean areas. However, thunderstorms close to the equator are less violent compared to those of other parts of tropics and extra-tropics. Probability of thunderstorms in this region is greater compared to the southern islands, however is not particularly great.

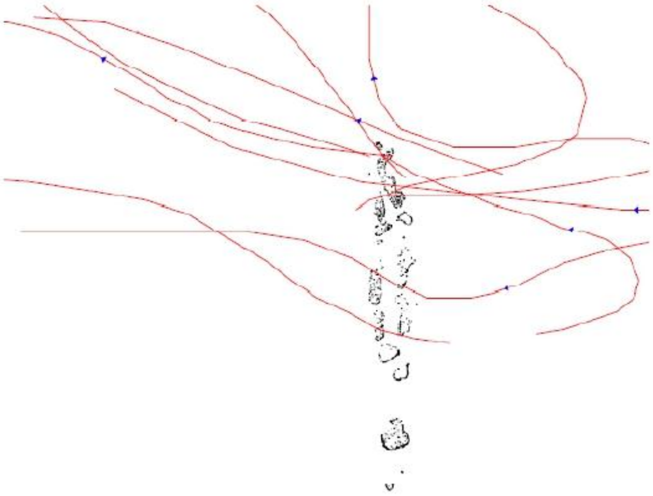


Figure 7 Tracks of severe storms affecting the Maldives during 1877 - 2004 (UNDP, 2006)

Hazard vulnerability of Male' area is discussed in the original EIA.

3.3 Island Access

Two reef entrance channels are available for accessing Kaashidhoo. Although the smaller entrance channel on the northern reef provides a closer access to the existing harbour, it is risky due to being considerably shallow and narrow. The longer channel as shown in the following figure on the southwest side of the reef that measures approximately 1.8km in length is used to access the Kaashidhoo harbour.

Figure 8 Access to island for transportation

3.4 Terrestrial Environment

The terrestrial environment of Kaashidhoo is the main potential impact zone of the proposed activity. The following are some of the significant components of the terrestrial environment of the island.

1. The residential area located at the north-west side spreads almost equally on both sides of the existing harbour
2. The residential areas have farmlands surround them
3. Mostly shrub areas are found with few mature trees
4. Thickets of mature trees mainly consist of coconut palms
5. Consists of low lying swampy or wetland/mangrove areas

1.2.8 Vegetation

The vegetation composition of the selected sites is almost entirely of coconut palms. Few species of shrubs and bushes are present at site.

Photographs showing the vegetation composition on site are given below

Figure 9 Vegetation composition entirely made up of Coconut Palms

1.2.9 Water Quality

Water quality was tested by collecting water in 500ml plastic water bottles. Bottles were dipped in wells and holes dug underground. The water samples were brought to Male' and tested in MWSC laboratory. The water quality at the site was generally good. The water quality test results from MWSC will be given in the Annex.

Table 4 Ground water samples test results

Parameter	Senet	Maaolhu	Proposed Jail construction site
Physical appearance	Clear with particles	Clear with particles	Clear with particles
Conductivity	643	690	371
pH	7.54	7.56	7.90
Salinity	0.31	0.34	0.18
Temperature	24.5	24.2	24.5

4 Legislative and Regulatory Considerations

This section takes into consideration the extent to which the complete process of this palm transplantation activity conforms to existing plans, policies, guidelines, regulations and laws of the Maldives. Particularly, the regulatory context in which it takes place and the relevant legal and policy aspects will be highlighted here.

4.1 Applicable Policies, Laws and Regulations

The environmental policies, laws and regulations of relevance include:

- Environmental Protection and Preservation Act, Law No.4/93
- EIA Regulations
- Regulations on the Felling, Uprooting and Transportation of Mature Trees
- Laws on Trees in Inhabited Islands
- Third national Environmental Action Plan
- National Biodiversity Strategy and Action Plan

1.2.10 Environmental Protection and Preservation Act

The Environmental Protection and Preservation Act (Law No. 4/93) is the key legal instrument that covers general aspects relating to environmental protection in the country. Themes such as environmental impact assessment, protected area management and pollution prevention are covered by this umbrella law. Clause 5 of this law is of specific relevance to this EIA. It states that an impact assessment study shall be approved before implementing any development project that may have a potentially detrimental impact on the environment. The EIA Regulation has been enacted by the powers vested by this law.

1.2.11 EIA Regulations

The EIA Regulations, which initially came into force in May 2007 has been amended and re-published in May 2012 by the powers vested by the Environmental Protection and Preservation Act. Since then Amendments have been made to this Regulation twice.

The list of projects that would not be exempted from an Environmental Impact Assessment is listed in 'Jadhuvalu Raa' of the current EIA Regulation. The first point of this list states that any project for which an EIA is mandated by any other local regulation is covered under it.

4.1.1 Regulation of Felling, Uprooting and Transportation of Mature Trees

This particular regulation binds the transplantation activity to the EIA Regulation. The clause 5(a) of the regulation states that any large scale felling, uprooting and transportation of trees/palms should proceed after the preparation and approval of an EIA. This regulation needs to be followed in all aspects of the transplantation process.

The key points relevant to the scope of this work include:

- Clause 5(e): the roots of coconut palms measuring above 15 ft should be cleared of sand before moving from its original location to another location.
- Clause 5(f): only those trees that are proposed to be removed and no other mature trees shall be affected during the removal process.
- Clause 9: the pits created from uprooting of the palms/trees shall be filled and levelled with sand or soil.

4.1.2 Law on Trees in Inhabited Islands

The Clause 11(b) of this Law is of specific relevance to this project activity. It states that felling or removal of trees outside house plots that are not declared to be protected by the Government is allowed to be removed only with its roots intact. This Law does not apply within the scope of The Regulation on Felling, Uprooting and Transportation of Mature Trees which is clearly specified in the latter regulation.

4.1.3 Waste management regulation

The objective of Waste Management Regulation (Regulation No. 2013/R-58) 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 Clauses of relevance include:

- Clause 11: waste shall be disposed in approved locations only
- Clause 11(b): disposing waste in areas such as roads, parks, beaches, lagoon, reef and so on are completely prohibited.
- Clause 12: concerns the provision for managing waste in public places. It conditions that suitable bins be placed in appropriate locations with guiding labels distinguishing different kinds of waste. The bins shall be emptied periodically in a proper manner to avoid nuisances of any sort.

1.2.12 National Environmental Protection Plan

The environmental policies and guidelines of this plan should be observed in the execution of the proposed project activity. It is of particular relevance to the impact assessment, stakeholder consultation, biodiversity conservation and human settlement and urbanisation.

1.2.13 National Biodiversity Strategy and Action Plan

This action plan focuses on biodiversity conservation and sustainable use of biological resources. The swamps of Kaashidhoo are among the few swamps that hosts the protected species of Maldivian Black turtles (Kanzu kahanbu).This species was given the protected status on 22 July 2003, due to the risk of extinction.

4.2 Permits required for the Project

4.2.1 EIA Decision Statement

The environmental permit to initiate proposed works is 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 a review of this document following which the EPA may request for further information or provide a decision if further information is not required. In some cases, where there are no major environmental impacts associated with the project, the EPA may provide the Decision Statement.

5 Impacts and Mitigation Measures

Most of the notable impacts of transplantation activities would be associated with the potential impact areas, transportations, work methodology and the after care of the plants. The nature of the activity does not necessarily involve significant, long-term negative impacts and on the contrary have great potential of enhanced sustainability of both the environments. However, the benefits of the activity can only be optimized by observing the required guidelines and standards in conjunction with the proposed mitigation measures.

5.1 Methodology

The methodology to identify the impacts and their significance for this addendum is kept consistent with that of the main EIA for the project.

Impacts on the environment from the sub-activities of the transplantation process have been identified through:

- A consultative process within the EIA team and important stakeholders including the proponent and atoll council
- Purpose-built checklist
- Existing literature and reports on similar developments and other research data specific to the context of the Maldives
- Baseline environmental conditions
- Consultant's experience of projects of similar nature and similar settings

The impacts of the project activities have been evaluated according to the framework proposed by Posford Haskoning (2004). The decision framework is illustrated in following Figure. The main factors used to evaluate impacts under the framework are as follows:

- Sensitivity of Receptor
- Recoverability of Receptor
- Importance of Receptor
- Spatial Distribution of impact

This lets decision makers view each project activity that may cause impacts individually and determine what type of impact they have on the environment, and whether they are of significant concern. While the Haskoning framework enables assessment of each impact, it does not allow for an overall impact assessment of the entire project, i.e. whether the project has an overall positive or negative environmental impact. Under the framework, that final decision is left for the consultants and decision makers to compare the significance of impacts of the various project components and assess the overall project impact.

Table 5: Impact Evaluation Scale

Criteria	Scale	Attribute
Sensitivity of Receptor The ease of which the impact can affect the receptor	-3	High
	-2	Medium
	-1	Low
	0	Not sensitive
	1	Positive effect
Recoverability of Receptor Impact implications / Reversibility of impact's effects	0	High
	1	Medium
	3	Low
Vulnerability of receptor Change caused by impact	0	Not vulnerable
	3	Vulnerable
Importance of Receptor Importance to the local and regional environment	0	Not important
	3	Important

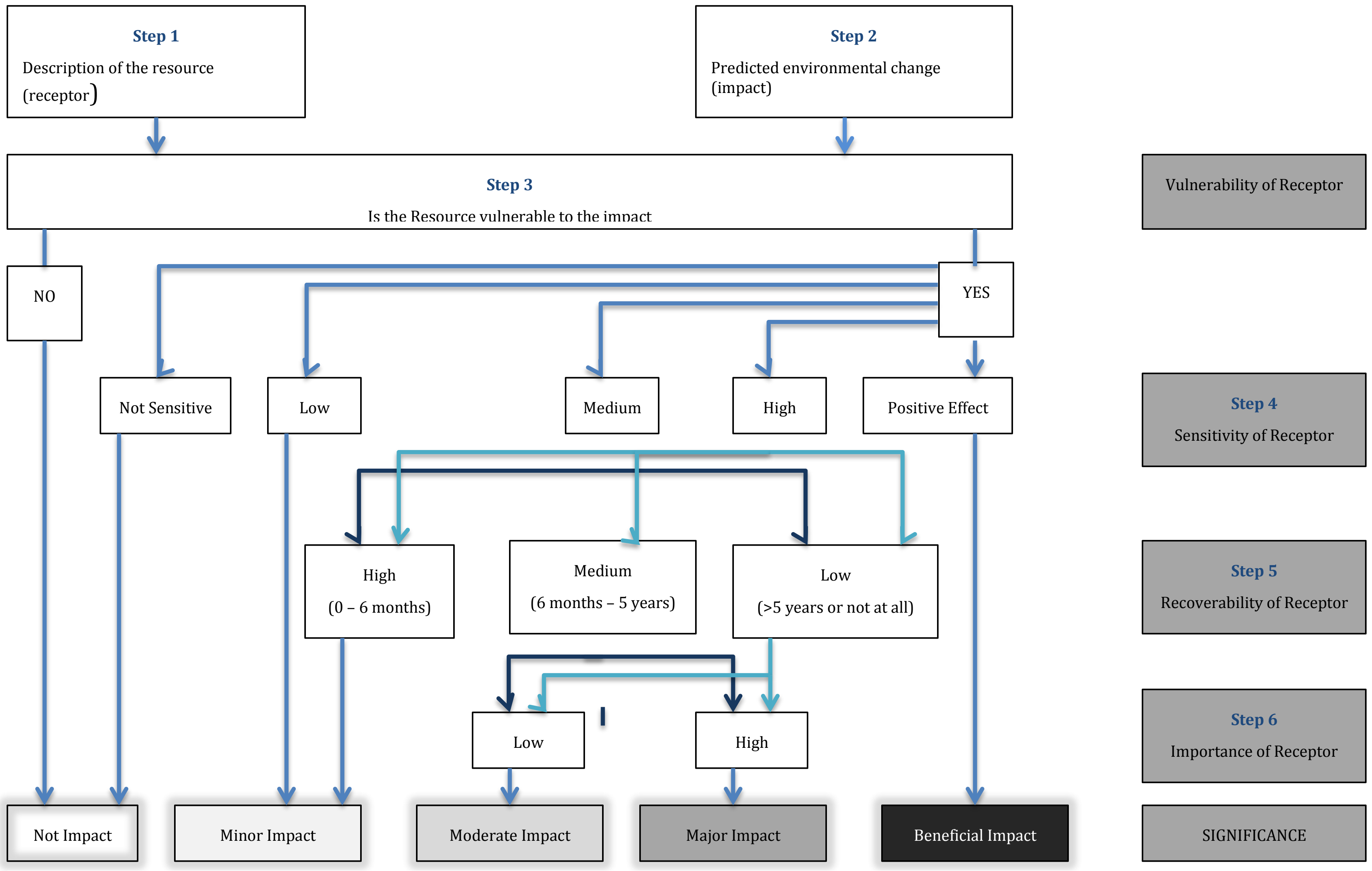


Figure 10: Project Impact Framework

5.2 Transplantation Phase

5.2.1 Air pollution

The operation of machineries, vehicles and vessels would emit fuel combustion by products such as carbon monoxide, nitrogen, sulphur dioxide and particulate matter. The minor scale of the operation would render this emission as relatively negligible.

Mitigation: The impact can be minimized by engaging efficient machineries and vehicles/vessels that are in good condition.

5.2.2 Marine pollution

The marine environment can be effected during the time the vessel spends moored at the harbour and during the transport via sea. The potential marine pollution can arise from oil leaks/spills and/or handling of solid wastes generated on board.

Mitigation: The vessels should be in good condition and kept well serviced to minimize oil leak risks. The workers should be well aware on the emergency procedures that need to be followed in case of a leakage. Any solid waste generated on board should not be disposed to sea under any circumstance and should be handled as per the waste management regulation.

5.2.3 Noise pollution

The operation of machinery and vehicles can generate a lot of noise. This can be of nuisance to the community in the vicinity and also potentially startle any fauna that might be present in the area at the time. The types of noise generated from the activity are unlikely to affect the fauna in adjacent habitats. Although the noise and/or vibration have the potential to influence the fauna, the effects are poorly understood. It has been generally noted that the habituation to the noise is fairly swift after the initial alarm with the onset of a new noise.

Mitigation: The working hours can be adjusted with consideration to hours of least inconvenience to the public. This can be identified by consultation with the island council.

5.2.4 Physical damages to flora and fauna

In the absence of sufficient awareness or concern for the environment, it is likely that the need to speed up the work can lead to deliberate or inadvertent damages to the palms and the surrounding flora and fauna during the mobilisation and operation of equipment and labour.

Mitigation: A qualified supervisor with experience in an island setting being present at all working hours to oversee the work can minimize such damages. Furthermore, it is important that the a representative of the Kaashidhoo island council also monitor the work as they will be the best to guide through places and would show concern to minimize any unnecessary damages on their own island.

5.2.5 Other uses of harbour

The usage of the harbour area for the activity may affect other regular usage of the harbour and recreational uses of the harbour area

Mitigation: Optimize the efficiency of the operation to get the transplantation completed within the shortest possible time period.

5.2.6 Soil/ groundwater contamination

The operation of machinery for long hours, there would be a risk of waste oil being spilled on the ground. This can contaminate the soil and/or groundwater. The porous nature of Maldivian soil and thinness of the ground layer above the groundwater lens makes it more prone the effects as oil can easily seep through the layers.

Mitigation: The machinery can be brought to site in clean and washed condition and then regular maintenance should be done with refuelling and servicing. The fuel and other materials for machinery requires to be kept away from water in order to prevent any deleterious substance from entering soil/water. Although the pits made from uprooting would be relatively shallow, the pits need to be promptly refilled to eliminate any risk it may pose to groundwater contamination. Additionally, an emergency spill kit could be kept to deal with accidental fluid leaks or spill from machinery.

Emissions from machinery would be the second most adverse impact from the project. Given that few machinery would need to be operated for a short duration of time, the impact can be considered to be relatively low. The time taken for execution of the sub-activities can be minimized as much as possible by applying efficient planning and supervision which would in turn limit the emission.

5.2.7 Land surface

As the roads of the island has not been paved, the movement of heavy machinery and vehicles can lead to the hardening of the land surface.

Mitigation: With effective planning and supervision, the efficiency of the work would need to be enhanced to complete the work on the island within the shortest possible time effectively.

Same paths/roads are to be used as directed by the island council. Use of different paths on different occasions would magnify the impacts.

5.2.8 Waste generation

A minimal amount of green waste would be generated from the operation which would mainly consist of coconut palm fronds from pruning. The haphazard disposition of waste could destroy several habitats and microhabitats crucial for the dynamic island environment.

Mitigation: Any waste should not be left on work sites and should be disposed properly as waste disposal sites dedicated by the island council.

5.2.9 Pests

During the transfer of species from one place to another, there can be a risk of introducing pests associated with the species to the new environment that pose detrimental effects on the existing environment of the new habitat. The consultations was conclusive that any pest organisms are currently not found in the palm species of the Kaashidhoo.

Mitigation: As a precaution each and every uprooted palm should be investigated for any signs of associated pests.

5.2.10 Health and safety

During any work, consideration should be given to accidents that might occur and well as incidences that might occur due to negligence or ignorance.

Mitigation: All staff should have a thorough understanding on the risks and safety measures and should be briefed on the standards which need to be followed. The working conditions should conform to best practice standards and the supervisor would need to ensure that safety gear and equipment are engaged under all relevant circumstances. First aid should be available on site and all staff require to be familiar with local emergency procedures.

5.2.11 Holes from uprooting

Holes that are left after the uprooting process is one of the main issues of concern in transplantation projects (Zahid 2010). Upon uprooting, the locations are left with several dug holes and pits. This result in water getting logged in these pits leading to mosquito breeding following rain. Moreover, public safety also becomes a concern as there is risk of people falling into these holes, especially at low light conditions.

Mitigation: The main mitigation measure is to backfill the holes. As part of the project, it is proposed to fill all such holes using existing sand on site.

5.2.12 Socio-economic and environmental impacts

The greening of the area would enhance public health and wellbeing and increase the attractiveness of the area. This can improve the potential for further development value of the area. Green space may filter air, remove pollution, attenuate noise, cool temperatures, infiltrate storm water, and replenish groundwater; moreover, it can provide food (Escobedo, Kroeger, & Wagner, 2011; Groenewegen, van den Berg, de Vries, & Verheij, 2006).

Table 6: Qualitative assessment of each impact

TRANSLOCATION PHASE		Criteria				
Components	Potential Impact	Vulnerability	Sensitivity	Recoverability	Importance	Significance
Mobilisation/ Demobilization and Transportation	Noise from vehicles and machinery	Yes	Low	-	-	Minor
	Oil Spills from vehicles and machinery	Yes	Med	Med	Low	Moderate

	Waste generation (solid waste, biodegradables, etc.)	Yes	Low	High	Low	Minor
	Impact on the coastline and/or reef during machinery transport	Yes	Med	Med	Low	Moderate
	Accidents and Injuries	Yes	Low	-	-	Minor
Uprooting plantation	Holes from uprooting	Yes	Med	High	-	Minor
	Noise pollution	No	-	-	-	No impact
	Transfering pests	Yes	Low	-	-	Minor
	Physical damage to flora and fauna	Yes	Low	-	-	Minor
Health and Safety Issues during construction stage	Accidents to labourers during activities	Yes	Low	-	-	Minor
	Health hazards due to noise	Yes	Low	-	-	Minor
	Health hazards due to dust	Yes	Low	-	-	Minor
	Hazards to the public at activity site	Yes	Low	-	-	Minor
Waste generation	Waste oil and other hazardous waste leaching to the groundwater aquifer	Yes	Med	Med	Low	Moderate

	Water pollution	Yes	Low	-	-	Minor
Socio-Economic	- Easily remove and reuse those palms in households which are of nuisance for the house owners. - Otherwise it would require much more time and energy for removal and chances are more that it will be left to deteriorate or burnt. - The job is done at no cost to the palm owners and on the contrary are paid for the palms	Yes	Positive	-	-	Beneficial

Table 7; Qualitative assessment of each impact of operation phase

OPERATIONAL PHASE		Criteria				
Components	Potential Impact	Vulnerability	Sensitivity	Recoverability	Importance	Significance
Air quality	Enhanced air quality of the Male' project site	Yes	Positive	-	-	Beneficial
	Enhanced air quality of Kashidhoo medium to long term with the newly planted palms	Yes	Positive	-	-	Beneficial

	Enhanced carbon sequestration at both islands	Yes	Positive	-	-	Beneficial
Coastal environment	Acts as a wind breaker to reduce the impact of strong winds	Yes	Positive	-	-	Beneficial
Socio-economic impact	Improve aesthetics in the area	Yes	Positive	-	-	Beneficial
	Provide a sense of a Maldivian island coast	Yes	Positive	-	-	Beneficial

5.3 Uncertainties in Impact Prediction

The level of uncertainty associated with this project activity is expected to be low given that the sub-activities are limited. Furthermore, similar projects have been carried out in the Maldives as well as in Kaashidhoo at larger scales, which makes the workers and community experienced with the processes and impacts. However, any level of environmental protection involves a certain degree of uncertainty. Even the slightest differences in ecological, geomorphological or social conditions can cause variations in impacts from place to place.

6 Mitigation

The following section presents the complementing details of the key recommended mitigation measures.

Table 8: Mitigation measures for construction and operation phase

Mitigation measures	Responsible Agency	Responsible Personnel	Implementing Stage	Cost
Construction Stage				
Mobilization/Demobilization and Transport				
Maintain a safe distance away from reef during transport of vehicles and materials from the seaward side of Male' project site.	Contractor	Project Engineer/Boat captain	Transport	0
Ensure no direct impact on the reef during transportation	Contractor	Boat captain	Transport	0
Maintain and monitor all machinery and vessels for until completion of the activity	Contractor	Mechanical Engineer	Transplantation	~50,000 MVR
Bring machineries on site in clean, washed condition				
Maintain machinery free of oil leaks				
Wash/refuel and service machinery away from water bodies/soil				
Health and Safety Issues				
Brief staff on health and safety measures	Contractor	Project Manager	Transplantation	0
Ensure all health and safety measures are taken on site, including availability and use of safety gear equipment	Contractor	Project Manager	Transplantation	~25,000
Plant uprooting				
Backfill holes/pits that are created after uprooting	Contractor	Site staff	Transplantation	0
Check plants for pests	Contractor	Project	Transplantatio	0

		Manager	n	
Waste Generation				
Collection of all waste generated on site and dispose at allocated sites	Contractor	Site Supervisor	Transplantation	0
Efficiency				
Minimize operational hours	Contractor	Site supervisor	Transplantation	0
Emergencies				
During working hours keep first aid available at site	Contractor	Site supervisor	Transplantation	~5,000
Keep an emergency spill kit in case of fluid leaks or spills from machinery	Contractor	Site supervisor	Transplantation	~5,000

7 Alternatives

7.1 No project option

The no project option is mainly weighed against the need for the transplantation activity. The no project option, while difficult to contemplate at this stage, cannot be excluded without proper evaluation. The no project option considers the following

1. The newly developed west coast will be opened as scheduled but will be vegetated by growing seedlings or immature palms.
2. The area will be not be opened until the area is vegetated by seedlings
3. Landscaping the area will not be part of the project

Table 9 Advantages and disadvantages of the no project option

Component	Advantages	Disadvantages
1	No need for uprooting trees from Kaashidhoo, and avoiding any possible impacts that may arise from the activity	Public will not be able to enjoy the area. Kaashidhoo community will have to continue to endure issues related to overgrowth of vegetation.
2	No need for uprooting trees from Kaashidhoo, and avoiding any possible impacts that may arise from the activity. Providing more time for the environment to acclimatise. Including the changes water quality.	Project operations commencement will be considerably delayed. Kaashidhoo community will have to continue to endure issues related to overgrowth of vegetation.
3	No need for uprooting trees from Kaashidhoo, and avoiding any possible impacts that may arise from the activity	The area will not be usable in periods such as during noon. Aesthetic value of the area will be low Kaashidhoo community will have to

		continue to endure issues related to overgrowth of vegetation. Project fails to achieve its objectives.

On comparison of the no project option with the recommended option of proceeding as planned, it can be seen that the main advantage is avoidance of impacts that may arise due to the transplantation. However, as discussed in the Environmental Impacts section of this report, there are no significant impacts envisaged. Moreover, considering the other social amenity advantages the project provides, it is recommended the project proceed as planned.

7.2 Alternative location

Since the scope of the project is very small, there are no other realistic alternatives that can be considered.

Alternatives such as use of different location to uproot trees is not relevant since the proposed location is highly favourable considering the overgrowth in the area, and considering that a construction project is proposed in the same area, which will require the area to be cleared.

Trees to be uprooted from the residential area are those that the land owners have volunteered to be removed from their yards. An alternative location to this will be from other land owners, but since they are not in favour of the removal, this alternative is also not realistic.

Therefore, considering these, the proposed locations are the recommended locations for the project to be undertaken.

7.3 Alternative type of vegetation

There are several alternative species including sea hibiscus (dhiggaa), nit pitcha (uni), country almond (midhili) and Alexander Laurelwood tree (funa), sea trumpet (kaani), tulip tree (hirundhu) which can be used instead of coconut palms. However, from an aesthetic point of view, they do not provide as much visual amenity as coconut palms for a project such as this. Moreover, coconut palms are easier to transport compared to most other species.

Therefore, while other trees could have been used, coconut trees are much more convenient to transplant and its presence is fundamentally important in a tropical island landscape.

8 Stakeholder Consultations

8.1.1 Community Consultation

The community consultation carried out in Kaashidhoo was attended by Kaashidhoo Island Council, Kaashidhoo public and Kaaf Atoll Council. Accepting the invitation, 31 individuals from the island community attended the public consultation.

The council shared with the attendees that MHI has a need for coconut palms for the Male' west coast redevelopment project. Although the proposed jail construction site of Kaashidhoo has been allocated as the main location for sourcing the palms, the site does not have sufficient quantity of the required sizes. Hence it was clarified from the participants regarding their interest in providing the remaining coconut palms for MHI and their concerns regarding this work.

Some participants expressed their interest to sponsor coconut palms and some expressed their interest to sell coconut palms. All the participants communicated their full support for the uprooting works and any concern was not voiced.

8.1.2 Scoping Meeting of EPA

The institutions represented in this scoping meeting were EPA, MHI, EIA Consultant and Kaashidhoo Island Council. The TOR was finalized after discussions and clarifications were exchanged on the scope of the works. EPA highlighted that the execution of the proposed activity should be carried out with great care to stay clear from the required zones of the heritage site as well as the protected wetland. It was assured that both the protected areas are located at distances safe from any disturbances that may arise from the proposed works.

8.1.3 Consultation with Kaashidhoo Council

Some important points noted include:

A lot of public households ready to sponsor palms to MHI.

Most of these palms are among the ones that pose as a nuisance for the household and hence have a need for removal.

As a community event, about 300 coconut palms has been planned to be planted in Kaashidhoo during the weekend soon after the uprooting.

8.1.4 Consultation with Maldives Correctional Services

It was confirmed by the MCS that the government has approved the budget for proposed jail construction project in Kaashidhoo for the year 2016. Hence the project is expected to commence within the year 2016. It was assured that MSC has no objection for uprooting palms from their construction site. All the coconut palms within the construction site have been compensated for and the land has been officially handed over to MSC by the Island Council.

9 Environmental Monitoring

This section deals with the Environmental Management and Monitoring plan for the project with respect to the coastal developments proposed in this EIA. The proposed monitoring plan is for the construction and operational phase of the project components.

The data collected for this assessment and previous assessments will be used as baseline data while undertaking the monitoring plan. Undertaking environmental monitoring is essential for several reasons including:

- To ensure that potential impacts are minimized and to mitigate unanticipated impacts.
- To aid in impact management,
- To improve impact prediction and mitigation methods.
- To gather long term data to minimise uncertainty
- To ensure sustainable development

The proposed monitoring programme will yield beneficial results if it is undertaken for a long period.

Considering the duration of the monitoring, at the Male' site the monitoring is to be undertaken together with that proposed in the original EIA. For Kaashidhoo, a 1 year monitoring is proposed to determine whether the removal of vegetation have had any significant impacts on site.

The proponent expressed their full commitment to carry out the monitoring program outlined in this report. The proponent's commitment to undertake the environmental monitoring and mitigation measures is given in the **Proponents Declaration.**

9.1 Monitoring Methodology and Costs

The methodology used for monitoring will be similar if not the same as those used in this environmental assessment and the original EIA report.

The costs given in Table 12, Table 13, are calculated for monitoring to be undertaken by hiring environmental consultants for each monitoring program.

Additionally, it is an EPA requirement that the annual environmental monitoring report needs to be compiled and formulated by a registered environmental consultant with a permanent EIA consultant license and submitted to EPA.

9.2 Recommended Monitoring Programme

The monitoring programme will be divided into 2 stages.

Stage 1	• Once during construction
Stage 2	• Once immediately after construction, & quarterly for 1 year

Stage 1 (during construction)

- Ground water quality for temperature, pH, salinity, conductivity in Kaashidhoo
- Observation and monitoring waste generation and oil spillage during vegetation uprooting in Kaashidhoo
- Observation of maintenance and management of health and safety hazards in Kaashidhoo
- Noise measurement in Kaashidhoo

Stage 2 (after construction phase for 1 year)

- Ground water quality for temperature, pH, salinity, conductivity in Kaashidhoo
- Observation and monitoring green waste generated in Male'

- Observation of maintenance and management of vegetation uprooted area in Kaashidhoo
- Socio-economic survey to determine public perception of the works in both Kaashidhoo and Male'

Table 10 Monitoring Plan

Inspection	**Parameter/ data required**	**Recommended expertise**	**Frequency**	**Cost**
Ground water	Temperature, pH, salinity, conductivity	Environment consultant & certified laboratory	Quarterly	1,000 MVR (MWSC laboratory charges)
Noise Measurement	Noise (dBa)	Environmental consultant	Once	500 MVR (hand held noise measuring device)
Waste generation	Estimated kg/day logs for biodegradable food waste, building and construction waste, plastics, glass, etc.	Site supervisor	Quarterly	Waste collection area In project cost. 5,000 MVR/month
Health and safety	Safety related incidents/day	Site supervisor on site	Once	In project cost. 15,000 MVR/month (3 life guards on shift duty salary)
Socio-economic	Online survey based on set questionnaire	Sociologist/ Economist/ Urban planner	Quarterly	5,000 MVR

9.3 Monitoring Report

Monitoring report should be compiled based on the baseline data collected. This report should be submitted to the EPA on an annual basis. Report should be compiled by a registered independent environment consultant. It is estimated that the consultant's fee would be in the range of 10,000 MVR – 30,000 MVR for each monitoring report.

The report structure may include but not limited to;

- Introduction
- Details of the site at the time of investigation,
- Data collection and analysis,
- Details of methodologies and protocols followed
- Quality control measures,
- Sampling frequency and monitoring analysis
- Conclusion and recommendations

10 Conclusion

The report has given a sufficient brief on the project and provided potential areas of concern. Since this is a small component of a larger project, extensive information has not been provided.

It is not anticipated that the project will have any significant negative environmental impact. Moreover, It is envisaged that the project will have several socio-economic benefits. This includes providing a means of shelter and relaxation to the community in Male' City, especially in the Maafannu district. Additionally, it would assist in alleviating the burden large no. of trees had been causing the community in K. Kaashidhoo. The economic benefits to the coconut tree owners from the sale of the coconut palms could also be considered as a direct positive impact. Furthermore, the Kaashidhoo council had committed to plant 2 trees for each palm that has been removed in more strategic locations in the island, where tree plantation is required. Therefore it can be concluded that the project is environmentally beneficial.

Considering alternatives, there are no real practical alternatives for the project including alternative location or vegetation types.

Therefore, considering the beneficial nature of the project for both communities living in Male' and Kaashidhoo respectively, taking into account the minimum environmental impact that can be easily mitigated, it is recommended to proceed with the project as proposed. It is further recommended monitor the tree removal site for one year, while to undertake monitoring in Male' area as proposed in the original report.

11 References

Department of Meteorology (Republic of Maldives), accessed 02/08/2015. www.meteorology.gov.mv

Maldives MMS (2012), *Severe Weather Forecasting, Report submitted to WMO*, Maldives Meteorological Service, Jan 2012.

Ministry of Housing and Environment 2011, Survey of Climate Change Adaptation Measures in the Maldives, Integration of Climate Change Risks into Resilient Island Planning in the Maldives Project, Version 2.

Ministry of Housing, Transport and Environment (2009), Third National Environment Action Plan - 2009-2013,

Morris P & Therivel, R (ed.) 2009, *Methods of Environmental Impact Assessment*, 3rd edn, Routledge, London; New York.

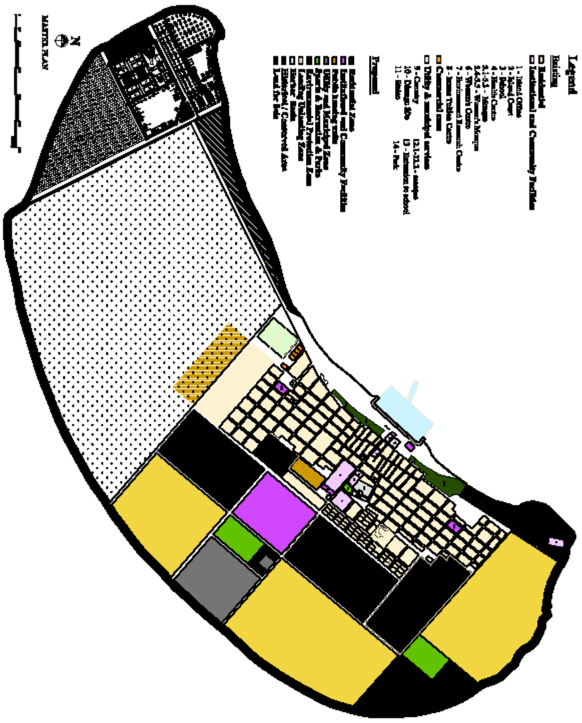
UNDP 2006, *Developing a Disaster Risk Profile for Maldives*, Male', United Nations Development Programme and Government of Maldives.

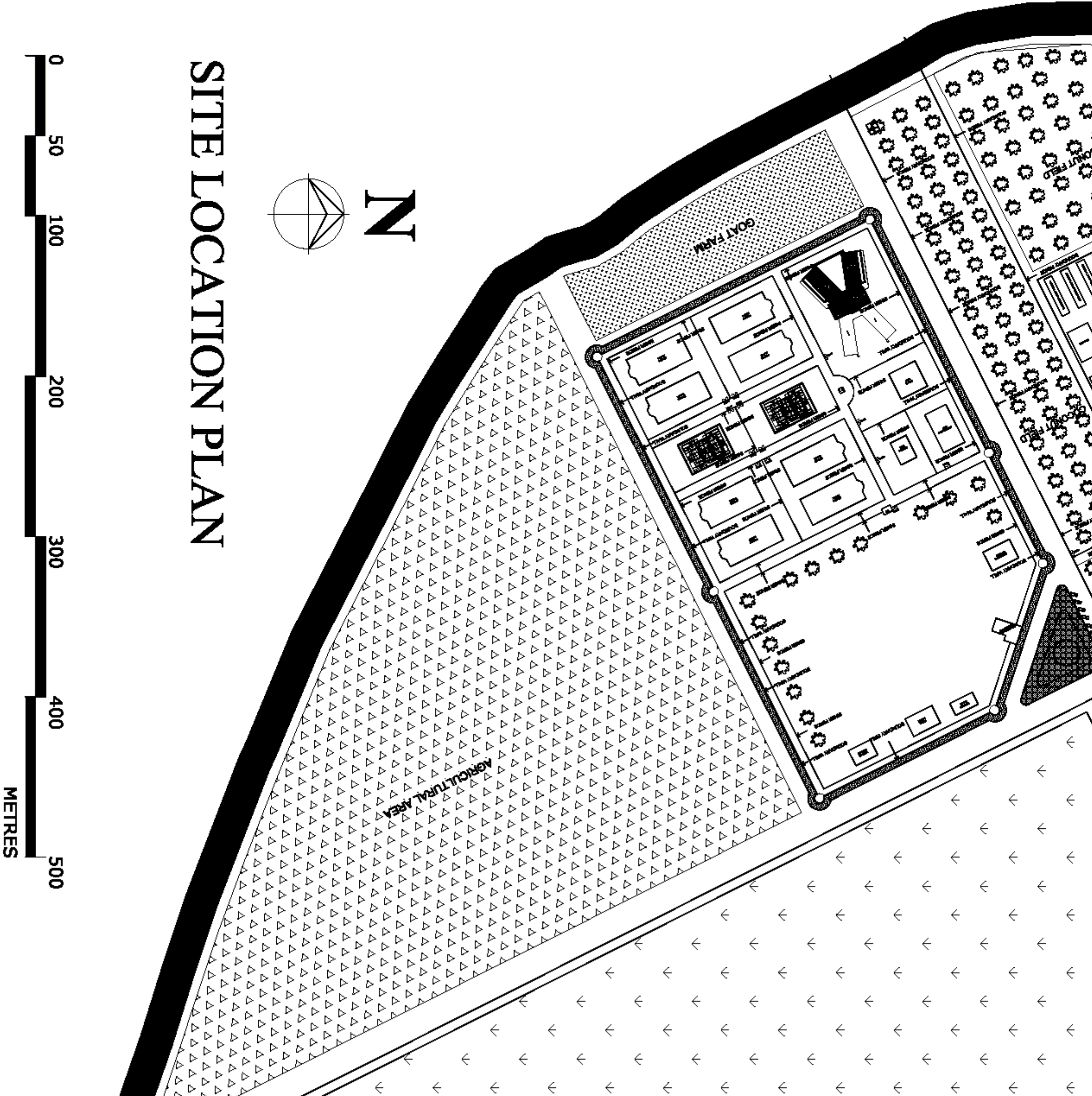
USACE 2001, *US Army Coastal Engineering Manual*, USACE

Rincon Consultants Inc 2004, Viginia Court Condominium Project Final Environment Impact Report

Annex 1 – Terms of Reference

Annex 2 – Site Area


Legend
Existing
Proposed
N
MASTER PLAN


SITE LOCATION PLAN
N
0
50
100
200
300
400
500
METRES
GOAT FARM
AGRICULTURAL AREA

Annex 3 – Stakeholder Consultation Information

Annex 4 – Water Quality tests

Annex 5 – Proponent Commitment