Environmental Impact Assessment

For

Clearing the Proposed Housing Area of

K.Thulusdhoo (REPORT 1)

Proposed by

Housing Infrastructure Redevelopment Unit (HIRU) of

National Disaster Management Centre.

Signature:

Prepared by

Abdul Aleem, Ahmed Zahid & Hassan Shah.

For Water Solutions Pvt. Ltd., Maldives

Table of Contents

Table of Figures

List of Tables

EXECUTIVE SUMMARY

This EIA Report will highlight the major findings and impacts of the proposed land clearing work to be performed by Housing Infrastructure Redevelopment Unit of National Disaster Management Centre. This EIA report was prepared to execute the land clearing work of the proposed housing area, whereas a detailed EIA will be prepared addressing the impacts of the proposed housing project and its mitigation measures. This EIA is developed in consultation with project proponent, contractor and also in accordance with Environmental Impact Assessment Regulation issues by Ministry of Environment, Energy and Water in 2007.

The proposed work will be carried out in Thulusdhoo, Male' Atoll, whereas more than 300 internally Displaced Population of Dh. Rinbudhoo is still living in temporary shelters. Providing better housing units and facilities are one of the objectives of the "Build Better Policy" of the government under tsunami recovery and reconstruction programme.

The main major negative impacts of the project will be due to clearing of more than 400 mature trees from the proposed housing area of the island. The proponent has already made plans to re-plant more trees on the green zone of the island which will be completed once the island is reclaimed. Therefore, long term tree plantation programme will be developed and implemented in association with concerned agencies. The proposed trees to be cleared have been compensated and the government has already provided more than MRf 1.5 million as compensation for the community.

The benefits of the project are manifold. The project will help to provide better housing facilities for the tsunami affected population, it will help to achieve the objectives of the tsunami recovery and reconstruction programme and this project will also help to reach the goals of the Population Consolidation Programme.

The project work will be closely monitored by site supervisors and officials of HIRU to avoid any environment and social issues.

1 INTRODUCTION

1.1 Introduction

The Indian Ocean tsunami of December 2004 has caused huge damage to the islands of Maldives. The disaster has taken lives of more than 100 people and has caused enormous damages to the livelihood, economy and resources of the country. The tsunami has made more than 10,000 internally displaced population (IDP) living in temporary shelters built by the government. As to date most of them have not been able to return to permanent homes due to slow progress in building homes for them.

Economic consequences of the tsunami were severe. Physical damage relative to the size of the economy was the highest among affected countries; the cost of reconstructing housing and infrastructure is estimated at US$375 million (about 50 percent of 2004 GDP) (IMF, 2006).

The government of the Maldives has received assistance from various donor agencies and friendly governments towards its tsunami rehabilitation and reconstruction prorgramme. The “Build Better” policy of the government outlines several endowers and measures to provide better services and facilitate after the tsunami considering the National Development Agenda.

This Environmental Impact Assessment report (EIA) has been prepared to full fill the requirements of the Environmental Protection and Preservation Act, law no. 4/93 for the proposed land clearing for building 100 houses in Thulusdhoo, Kaafu Atoll. The proponent of the project is Housing Infrastructure Redevelopment Unit (HIRU) of National Disaster Management Centre.

This report will identify the potential impacts (both positive and negative) of the proposed land clearing for building the houses. The report will however, provide a detailed description of the proposed work, existing environmental conditions, justifications given by the proponent for undertaking the proposed project components and alternatives. Alternatives to proposed components or activities in terms of location, design and environmental considerations are also suggested in the report. A

mitigation plan and monitoring programme before, during and after the works is also included. This will ensure that the proposed activities are undertaken with caution and appropriative care so as to protect and preserve the natural environment of the island

The proposed housing project is part of government's ongoing efforts to provide housing facilities for the tsunami affected population. The project aims to provide housing facilitates for the tsunami affected population of Dh. Ribudhoo, and thereby building 100 houses in Thulusdhoo.

The project aims to clear the land area required for building the 100 houses. This includes clearing of vegetation and demolition of buildings existing in the area. This will also include sound management of waste generated after the work by stockpiling and shipping to Thilafushi land filling site.

Therefore, this EIA report will only focus on environmental impact, management and mitigation measures to be taken by the proponent on clearing an area of 201,600 ft^2 from Thulushoo for building the proposed houses.

1.2 Aims and Objectives of the EIA

Environmental Impact Assessment (EIA) is gradually becoming one of the most effective tools for incorporating environmental consequences into decision-making. EIA is intended to prevent or minimize potentially adverse environmental impacts and enhance the overall quality of a project. EIA is, ideally, an integral part of the overall planning process for development projects. It assists, but does not control project planning and implementation; ensuring that environmental considerations are incorporated into decision-making, along with technical and economic factors.
Environmental impact assessment was made mandatory for all major developments under article 5 of the Environmental Protection and Preservation Act of 1993. Since then environmental impact studies have been carried out for all major development projects, mainly in the tourism sector.

The development of Environmental Impact Assessment Regulations, 2007 by Ministry of Environment, Energy and Water (MEEW), may reflect towards improving

the current EIA regulations and enforcement procedures and address better environmental planning in development projects.

EIA in general

- Allows better project planning;
- Promotes informed and environmentally sound decision making;
- Is an investment for the future;
- Initial expenditure is less costly than subsequent expenditure on environmental control;
- Complements traditional project planning and assessment methods;
- Provides an important link throughout the project life cycle.

This EIA is intended to prevent or minimize potentially adverse environmental impacts and enhance the overall quality of the project. The EIA process allows environmental issues to be addressed in a timely and cost-effective way during project design, preparation and implementation.

The EIA more specifically helps to attain the following goals:

- lower project costs in the long-term (fewer costly changes or add-ons at advanced stages of the project; lower probability of environmental disasters, court cases and/or costly clean-ups);
- increased project acceptance by the public and key stakeholders;
- improved project design/siting;
- informed decision-making;
- more environmentally sensitive decisions;
- increased accountability and transparency during the development process;
- improved integration of projects into their environmental and social setting;
- Reduced environmental damage (mitigation measures planned and implemented in time to minimize adverse impacts on the environment).

1.2 Methodologies

This environmental evaluation and assessment report is prepared based on common and internationally recognized methods not entailing excessive costs. These are briefly discussed below.

EIA methodologies developed over the years which include screening, scoping and preliminary assessments have been employed. More specifically, the recently enforced EIA regulations 2007 has been followed beginning with the application to undertake an "Environmental Impact Assessment Regulations, 2007" issued by Ministry of Environment, Energy and Water. Due to time constraints, this impact assessment has also been based on what is sometimes referred to as "ad hoc" methods which rely on expert opinion. In fact, most EIA methodologies, qualitative or quantitative, rely on expert judgment, based on the experience gained by EIA consultants over the past years.

This EIA is based mainly on data collected during field investigation missions carried out in 10th and 17th December 2007, by a team of consultants and field officers from Water Solutions Private limited to Thulusdhoo Island.

The data collection methods are described in detail later. The field investigation and data collection was mainly based on land clearing and vegetation of the proposed housing area. Conditions of the existing environment were analyzed using appropriate scientific methods. Additionally, impact predictions have been based on experience gained by the consultants from similar projects.

1.3 EIA Implementation

This EIA has been prepared for Housing Infrastructure Redevelopment Unit (HIRU) of National Disaster Management Centre (NDMC) by Water Solutions (WS) private Limited of Maldives. HIRU has selected WS as the environmental consultant for this project. WS has engaged a multidisciplinary team of consultants to carry out this assessment. The team members included specialists in environmental impact assessment, environmental management, mapping and GIS and environmental engineering.
The team members were:

- Abdul Aleem, BSc, MPH – Environmental Impact Assessment, Mapping and GIS expert,
- Hassan Shah, BSc. – Environment management consultant,
- Ahmed Zahid, BSc, MSc (ongoing)
- Mohammed Waheed, Diploma. – Environmental and Water Resource Management consultant., (Data Collection)

1.4 Terms of Reference

The Environment Research Centre (ERC) of the Ministry of Environment, Energy and Water has prepared the Terms of Reference for the EIA. The officials of ERC, HIRU and WS have held number of meetings to finalize the terms of reference of the EIA report and it was decided that this EIA will only focus on land clearing. However, a separate full EIA is to be submitted that will include the findings of this report as well as other aspects.

Therefore this EIA report is a supplement to a full EIA to be prepared for construction of 100 houses in Thulhusdhoo Island. The terms of reference for this EIA report have been provided in the annex.

2 DESCRIPTION OF THE PROPOSED PROJECT

1.3 EIA Implementation

This EIA has been prepared for Housing Infrastructure Redevelopment Unit (HIRU) of National Disaster Management Centre (NDMC) by Water Solutions (WS) private Limited of Maldives. HIRU has selected WS as the environmental consultant for this project. WS has engaged a multidisciplinary team of consultants to carry out this assessment. The team members included specialists in environmental impact assessment, environmental management, mapping and GIS and environmental engineering.
The team members were:

- Abdul Aleem, BSc, MPH – Environmental Impact Assessment, Mapping and GIS expert,
- Hassan Shah, BSc. – Environment management consultant,
- Ahmed Zahid, BSc, MSc (ongoing)
- Mohammed Waheed, Diploma. – Environmental and Water Resource Management consultant., (Data Collection)

1.4 Terms of Reference

The Environment Research Centre (ERC) of the Ministry of Environment, Energy and Water has prepared the Terms of Reference for the EIA. The officials of ERC, HIRU and WS have held number of meetings to finalize the terms of reference of the EIA report and it was decided that this EIA will only focus on land clearing. However, a separate full EIA is to be submitted that will include the findings of this report as well as other aspects.

Therefore this EIA report is a supplement to a full EIA to be prepared for construction of 100 houses in Thulhusdhoo Island. The terms of reference for this EIA report have been provided in the annex.

2 DESCRIPTION OF THE PROPOSED PROJECT

2.1 General Overview of the Project

This project aims to construct 100 new houses for the Internally Displaced Population (IDP) of Dh. Ribundhoo, and who has migrated to K. Thulusdhoo after the tsunami. Rinbdudhoo was one of the heavily affected islands during the tsunami causing damages to properties and facilities of the island.

Ribudhoo is one of the smallest islands in Dh. Atoll in terms of population. Prior to tsunami, Ribudhoo has a registered population of less than 700 people. The availability of limited economic opportunities and services from the island is believed to be the main reason behind the migration of many people from Rinbudhoo to Male' even before the tsunami.

Prior to tsunami, the government was promoting population development consolidation policy without achieving much progress. This policy aims to relocate people from smaller island to larger islands with more economic opportunities.

After the tsunami, the government has taken initiatives to relocate people from smaller islands to larger islands where growth and economic opportunities prevail. Under this programme more than 300 people from Ribundhoo has been moved to Thulushoo, where more economic and other facilities are available. The migrated IDP of Ribundhoo is currently living in temporary shelters of Thuludhoo. Most of these shelters are abandoned garment factories which have only limited facilitates.

The main objective of the project is to provide better housing facilities for the families migrated to Thulusdhoo after the tsunami. This project is targeted to construct 100 new housing units for the migrated families from Ribundhoo. The houses will be constructed in different areas of the island designated for the purpose. The existing land areas including available facilities and tress have been compensated by the government. The construction of the houses has been delayed mainly due to financial difficulties and it was later confirmed that the government will receive financial assistance from Saudi Charity Fund for construction of 100 housing units at Thulusdhoo.

As the project is behind schedule, ERC has agreed to execute the EIA report of the project in (2) two parts as follows.

1- Report 1: The client is to submit an EIA only for the land clearing component that is required;
2- Report 2: the client is to submit a full EIA incorporating the land clearing component and other items outlined with the scope.

Therefore, this EIA report will address the land clearing component only and this has been developed in accordance with the ToR agreed by ERC on 9th of December 2007.

2.2 Project Proponent

The project is proposed by HIRU of National Disaster Management Centre (NDMC) of the government of Maldives. NDMC was formed on 25th of December 2004, immediately after the tsunami of December 2004. NDMC has different units which are mainly attached to the existing government agencies. HIRU is the leading agency for executing the project. The project involves clearing of an area of 201600 ft^2 land area for construction of 100 houses in Thulusdhoo for IDP from Dh. Ribudhoo.

2.3 Background of the Proponent

The project proponent is the Housing Infrastructure Redevelopment Unit (HIRU) of National Disaster Management Centre (NDMC). HIRU is formed to provide housing and infrastructure facilities for the internally displaced population of tsunami 2004. HIRU is liaising with all donor agencies and government authorities to provide housing units and related facilities for more than 10,000 people displaced after the tsunami. HIRU' s work is mainly coordinated by Ministry of Planning and National Development. HIRU and other units of NDMC are attached to the existing government agencies.

The National Disaster Management Centre was established on the 26th December 2004, immediately after the tsunami. A Public Notice was issued by the President's Office (Directive No: 2004/77 of 30th December 2004).

On 26th December 2005, The President of the Republic of Maldives has declared, , that the National Disaster Management Centre, which has been formed on a temporary basis, is established as a permanent organization, in accordance with the power conferred on to the President as stipulated in Section 42(e) of the Constitution of the Republic of Maldives and in accordance with the authority vested in the President as stipulated in section 2 of Chapter 1.

It was mentioned that the, the reasons for setting up this institution were mainly due to difficulties arising from the absence of any such institution in the Maldives with a mandate to coordinate disaster activities; also because Maldivians have to live in a vulnerable environment and the need for a state of preparedness to coordinate activities is becoming urgent. Furthermore, the President has assigned Ministry of Defense and National Security to temporarily supervise and execute the work. Since the establishment of the NDMC as a permanent institution, the work carried out previously under the temporary institution is vested in the new institution forthwith. The mandate of NDMC is give below:

1. Coordinate the activities the nation faces in any disaster;
2. Provide relief assistance to all those in need in a natural disaster, as well as other crises and events;
3. Provide temporary shelters and coordinate the repair and restoration of damaged houses and social infrastructure. In addition, manage the temporary shelters and internally displaced people;
4. Coordinate the aid received in response to disasters;
5. Formulate and conduct programmes to be prepared for any natural disasters and create awareness among the government institutions as well as the public/individuals;

2.4 Project location and study area.

This project will be taken place at Thulusdhoo island of Kaafu Atoll. Thulusdhoo is the capital island of Kaafu Atoll. The project boundaries are illustrated on the site map attached as an annex.

2.4.1 Setting

Thulusdhoo is located at 28.2 km away from the capital Male and has geographic coordinates of 73˚ 38' East 04˚ 23' North. The total land area of the island is 33.5 hectares with a length of 975 m and width of 650 m. The closest inhabited islands to Thulusdhoo are Huraa (estimated at 4 and ½ miles), Dhifushi (estimated at 5 and ½) and Hinmafushi, (estimated at 6 and ½ miles). Thulusdhoo is an average island with huge lagoon.

2.4.2 Population

Thulusdhoo has a population of 867 people. In terms of population density Thulusdhoo is at is at 26 persons per hectare.

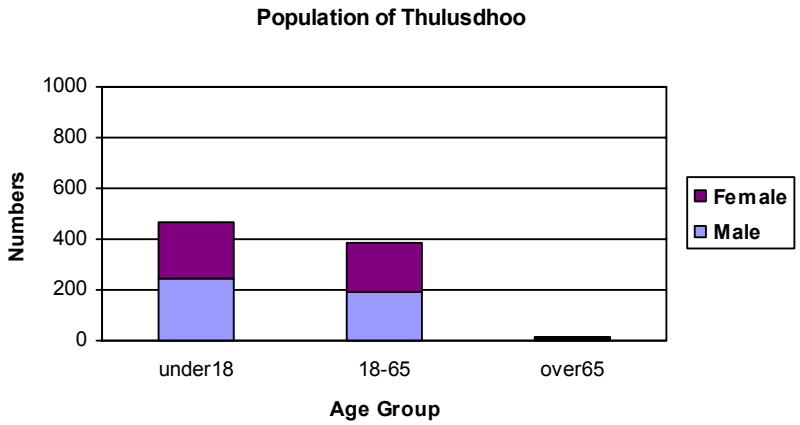
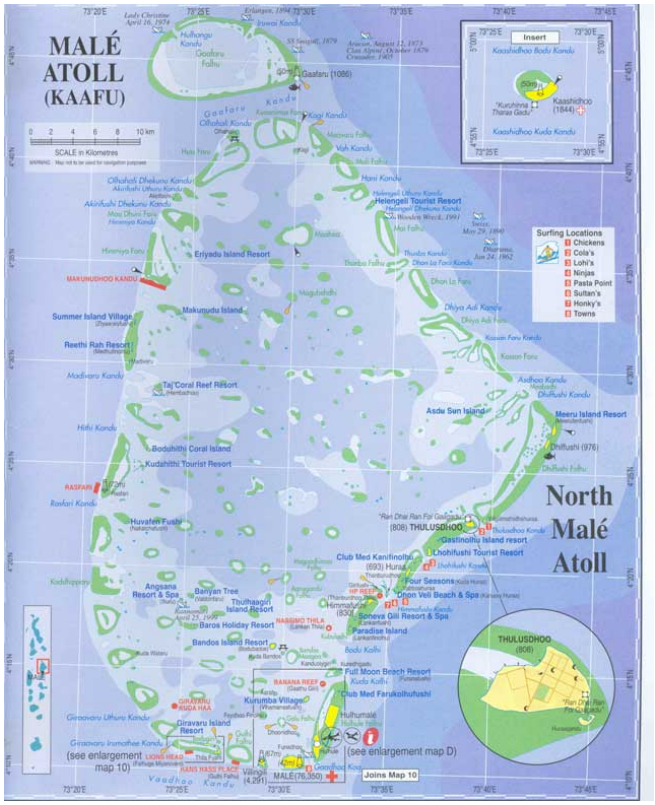


Figure 1: Population by age and sex in Thulusdhoo

Figure 2 : Location of Thulusdhoo



2.4.3 Employment

The main occupation and major income earning activities of Thulusdhoo are recorded as fishing, tourism, construction work, working at bottling plant, trade and retail trade. In addition a number of people are working in fixed salary job as civil servants and running and working in tailor shops. Thulusdhoo has 3 merchandised fishing Dhonis and 4 boats which travels between Male and the island. There is 1 pubic shop, 13 private shops, 2 tea shops and 2 carpentries operate in the island.

2.4.4 Health

Thulusdhoo has Health Centre with more than 16 health professionals. There are 1 doctor, 9 nurses, 1 family health workers, 2 community health workers, 1 pharmacist and 2 midwives working in the health centre. The island has one community pharmacy.

2.4.5 Education

Thulusdhoo has one government run school which teaches up to grade 10, one pre-school run by the island community, one private Quran class and a campus of Maldives College of Higher Education.

2.4.6 Housing

Thulusdhoo has 135 fully built households. There are 154 boundary marked house plots and 76 houses with no boundaries. Among which 148 houses are fully or half built. There are 11 house holds which has not been fully built. It was found that no additional plots can be allocated from the island without reclamation or allocating more land from the economic zone of the island. Thulusdhoo has total number of 5 mosques, and three of them are for men and two are for women.

2.4.7 Utilities

Thulusdhoo is one of the islands with all major utilities available and provided by the government. The island has 24 hour electricity provided by STELCO. Private rain water tanks are available in all houses of the island. The island has an RO plant donated by IFRC after the tsunami and which is rarely operated due to availability of community and private rain water harvesting facilities. Sewerage is collected via on site sanitation systems with septic tanks and community operated outfall into the island lagoon. Waste is collected in a waste management center built by the government after the tsunami. As being the atoll capital Thulusdhoo has more utilities and facilities compare to other inhabited islands of the atoll.

2.5 Project Boundary

The project is limited to land clearing of the proposed housing area of Thulusdhoo. The land use of the island is provided as an annex. The proposed land area of Thulusdhoo will be cleared and waste generated from the area will be segregated as green, construction and demolition waste, and hazardous waste. The waste will be carefully segregated and managed in accordance with the information provided in the following chapters.

It is estimated that a total area of 201, 600 ft^2 will be cleared from the propped housing areas of Thulusdhoo, most of which are from the economic zone of the island. The project is targeted to construct 100 housing units of each contain an area of 63 X 32 ft (2016 ft2) sized plots. Therefore, This EIA report is limited to site clearing of the proposed housing units for building the 100 houses.

2.6 Need and Justification of the project

The project aims to provide housing units for more than 300 IDP of Dh. Rinbundhoo who has been migrated to Thulusdhoo after the Indian Ocean Tsunami of December 2004. The IDP's are living in temporary shelters of Thulusdhoo for the past 03 years with few facilities. These shelters were mainly built as garment factories and have been abandoned for more than 05 years. The shelters were mainly constructed using roofing materials and this causes difficult living conditions due to poor ventilation and unavailability of basic services. Therefore building permanent housing units are an urgent and immediate need for the sake of 300 Ribudhoo tsunami displaced people migrated to Thulusdhoo.

Ribundhoo is one of the smallest inhabited islands in Dhaahlu Atoll with compare to island size and it is among the lowest populated islands compare to most inhabited islands of the Maldives. Ribundhoo has an area of only 16 hecteres with population of less than 700 people. This has caused many people being migrated to the capital Male' and other islands for better jobs and other economic benefits. The tsunami disaster has caused huge damages to the island this include damages to properties and facilities.

Population development consolidation has was one the policies of the government to relocate people from smaller islands to larger islands with more economic activities. The policy has achieved less due to mainly poor planning and lack of political commitment. After the tsunami the government has taken more initiatives to relocate people from smaller islands to larger islands with more economic opportunities. This has been part of the governments "built better" policy to rehabilitate the damages caused by the tsunami. The policy has also reflected in the goals, objectives and strategies of the National Recovery and Reconstruction Programme and Seventh National Development Plan.

Therefore, this project aims to provide better opportunities for the IDP population of Ribudhoo in an island with more economic opportunities and better facilities. The project, if completed in the planned manner will help more people from small islands to take the same path.

2.7 Project Duration

The project is expected to be completed within 12 months time. This includes three months for clearing of sites and mobilization work and the remaining 8 months will be spent on construction of hosing units. A detailed work plan for the project is attached in the annex.

2.8 Project Activities

The proposed project activities of this EIA report is limited to land clearing and management of waste generated from land clearing work. The following activities will take place in the island under the project.

Activity 1: Clearing Trees

Under this activity a land area of 201,600 ft^2 will be cleared and all large trees available in the area will be cut. The clearing work will include cutting down of more than 400 large to medium size tree ranging from 3 m to 10 m. The trees will be cut by using chain saws and bulldozers. The trees will be first cut into parts by using chain saws and will be taken to sites to be designated in the clearing area. The trees and tree parts will be segregated and made available for the public under the supervision of island office for two weeks. Tree parts are allowed to be taken by the contractor to utilize for future site works. The remaining parts will be taken to the near by area of the island waste management centre designated to handle the clearing waste and will be burnt on the site.

Activity 2: Demolition of Existing Building Blocks

Existing building blocks on the area B as marked in figure 6 will be demolished. The area contains large blocks mainly built as ware houses. The buildings are constructed from hollow blocks and coral (lime) stones. The roofing materials of the areas are constructed from ordinary roofing materials. There was no asbestos used for roofing. It is expected that the construction and demolition waste generated from the area will contain an estimated quantity of 2100 m^3 of Demolition Waste. The waste will be segregated and allowed to be taken by island community and remaining will be stockpiled and send to Thilafushi.

Activity 3: Management of clearing and demolition waste.

The waste generated from clearing the trees and demolition waste will be sorted to green, demolition wastes. The segregated waste is allowed to be taken by the island community under the supervision of island office. The green waste will be taken to the areas designed for waste management and will be burnt. It is estimated that an amount of 7000 m^3 green waste will be generated after cutting down the tress. The demolition waste will be stockpiled and taken to Thilafushi by barges to be hired by the contractor.

2.9 Construction Schedule and Methodology

The project work will be undertaken under the guidance of supervisors to be fielded in the island from HIRU. The clearing work will be closely monitored by Island Office in close collaboration of Island Development Committee. HIRU and Island Office will also work closely to solve any community issues during the clearing work. The project work will be commenced as soon as the EIA report is approved. HIRU will work with the contractor to finalize the detailed work plan and also inform the island office about the details. Mobilization of the workforce will begin from then onwards (transporting materials and arranging other logistics). The contractor will establish a temporary site office and hire houses from the island for the accommodating the workers. Temporary facility will also be established for storing the equipments and vehicles to be used in the work. An initial survey team will be deployed to accurately survey the roads and plots to be demolished and will provide respective survey marks. The site will then be cleared with the use of a Back Load loader and 1.5 ton Lorry. Alia construction proposed to take 3 months to carry out the work and will employ a workforce as follows:

- 3 Drivers,
- 2 Supervisors
- 1 Engineer
- 20 Laborers

The demolition material will be stored on site, within the project boundaries, before being sorted. Demolished material will be sorted in that which may be able to be used for the future reclamation project, and that which is allowed to be burned at a designated burning site. All remaining material will be transported via barge to Thilafushi on a weekly basis.

2.9.1 Land clearing

Land clearing will be done by starting areas which has less vegetation and also in consultation with the island office. The trees will be cut down by using chain saws and trucks will be removed by using bull dozers. The tree parts will be sorted by the workers and stored near the site area as it will be allowed to take by island community under the supervision of island office. The remaining tree parts will then be taken to waste management site area of the island by Lorries burned.

2.9.2 Demolition of existing blocks

The existing building blocks of the proposed housing area will be demolished by using proper equipments and facilities. The roofs will be taken first after removing the roofing materials and wooden parts. The workers will sort the waste and stored near the designated areas. Demolitions of the blocks will be done by the workers and using bulldozers and excavators. The sorted waste will be stockpiled after allowing community to take it first, and then will be transported to Thilafushi by barge.

2.10 Project Inputs and Outputs

2.10.1 Project Inputs

The types of resources that will be used during the propose project work and from where and how these will be obtained are given in

Table 1.

Table 1: Matrix of major inputs during construction period

INPUT RESOURCE(S)	SOURCE/TYPE	HOW TO OBTAIN RESOURCES
Construction workers (26+)	Maldivians and expatriates	Utilizing the existing work force of the contractor and obtain locals after advertising in the island and local daily papers.
Water supply	Well water/ Existing Desalination plant in the island	10 m^3/day desalination plant and Community wells (designated by island office)
Electricity/Energy	STELCO power house.	110 and 80 kVA, generator sets
Machinery	Backload loaders, lorries, pick-up, excavators, barges, general construction tools and crane,	Already available with the contractor and hiring from Local suppliers.
Telecommunications	Mobile and land telephones, Fax Machines, E-mail and internet facilities	This is already available with the contractor and land lines will be connected from Dhiraagu
Transport	Transfer by dhoni and speed boats. Materials to be transported in carrier vessels and barges.	Already available with contractor, barges and carrier vessels will be hired from local suppliers
Food and Beverage	Most of the food items are available in the island.	local purchase
Fuel, Kerosene and LPG	Light Diesel, LPG Gas, Petrol, Lubricants	Local suppliers
Insecticides, pesticides, etc.	Imported pesticides	Import/local suppliers

2.10.2 Project outputs

The type of outputs (products and waste streams) and what is expected to happen to the outputs are given in Table 2.

Table 2: Matrix of major outputs of environmental significance during site clearance phase

PRODUCTS AND WASTE MATERIALS	ANTICIPATED QUANTITIES	METHOD OF DISPOSAL
Demolition and green waste.	2100m^3 of demolition waste, 7000 m^3 of green waste. Additional 1 kg of domestic waste per person per day	Demolition waste will be sorted and stockpiled prior to sending to Thilafushi, and green waste will be re-used and burned near the waste management site of the island. Domestic waste will be taken to waste management site of the island on daily basis.
Hazardous waste	Approximately 100 litres of diesel and oils per month	Barrelled and stored until disposal. Final disposal to landfill in Thilafushi
Noise	Only localised to the island environment	Insignificant noise pollution will only occur since the site is located far from the main residential area.
Air pollution	Limited quantities of dust in only designated areas	Mainly arising as a result of dust emission from cutting trees and demolition of building moving machinery and vehicles. Only localised to project boundary.

3 LEGISLATIVE AND REGULATORY CONSIDERATIONS

3.1 Overview

The project conforms to the requirements of the Environmental Protection and Preservation Act of the Maldives, Law no. 4/93. The EIA has been undertaken in accordance with the EIA Regulation 2007 of the Maldives by registered consultants. Furthermore, it adheres to the principles underlined in the regulations, action plans, programmes and policies of the following Government Ministries.

- Ministry of Environment, Energy and Water
- National Disaster Management Centre.

These are discussed in the following sections.

3.2 Applicable Policies, Laws and Regulations

3.2.1 Environmental Protection and Preservation Act

The Articles of the Environmental Protection and Preservation Act (Law No. 4/93) addresses the following aspects of environmental management:

- Guidelines and advice on environmental protection shall be provided by the concerned government authorities.
- Formulating policies, rules and regulations for protection and conservation of the environment in areas that do not already have a designated government authority already carrying out such functions shall be carried out by MEEW.
- Identifying and registering protected areas and natural reserves and drawing up of rules and regulations for their protection and preservation.
- An EIA shall be submitted to MEEW before implementing any developing project that may have a potential impact on the environment.
- Projects that have any undesirable impact on the environment can be terminated without compensation.
- Disposal of waste, oil, poisonous substances and other harmful substances within the territory of the Maldives is prohibited. Waste shall be disposed only in the areas designated for the purpose by the government.
- Hazardous / Toxic or Nuclear Wastes shall not be disposed anywhere within the territory of the country. Permission should be obtained for any trans-

boundary movement of such wastes through the territory of Maldives.

- The Penalty for Breaking the Law and Damaging the Environment are specified.
- The government of the Maldives reserves the right to claim compensation for all damages that are caused by activities that are detrimental to the environment.
- The proposed project will fully abide to the Environmental Preservation and Protection Act. Disposal of oil, chemicals and other hazardous materials will be strictly controlled and managed. Such materials will not be disposed in to the local or the regional environment, but will be transported to designated waste disposal site, such as Thilafushi.

3.2.2 Second National Environment Action Plan (1999)

The aim of NEAP II is to protect and preserve the environment of the Maldives and to sustainable management of its resources for the collective benefit and enjoyment of present and future generations.

Main strategies of the NEAP II are:

- Continuous assessment of the state of the environment in the Maldives, including impacts of human activities on land, atmosphere, freshwater, lagoons, reefs and the ocean; and the effects of these activities on human well-being
- Development and implementation of management methods suitable for the natural and social environment of the Maldives, and maintain or enhance environmental quality and protect human health, while at the same time using resources on a sustainable basis
- Consultation and collaboration with all relevant sectors of society to ensure stakeholder participation in the decision making process
- Preparation and implementation of comprehensive national environmental legislation in order to provide for responsible and effective management of the environment
- Adhering to international and regional environmental conventions and agreements and implementation of commitments embodied in such conventions.

NEAP II specifies priority actions in the following areas.

- Climate change and sea level rise; coastal zone management;
- biological diversity conservation; integrated reef resources management;
- integrated water resources management;
- management of solid waste and sewerage;
- Pollution control and management of hazardous waste;
- sustainable tourism development;
- land resources management and sustainable agriculture
- Human settlement and urbanization.

NEAP II contains environmental policies and guidelines that should be adhered to in the implementation of the proposed project activities.

3.2.3 National Biodiversity Strategy and Action Plan

The goals of the National Biodiversity Strategy and Action Plan are:

- Conserve biological diversity and sustainable utilization of biological resources.
- Build capacity for biodiversity conservation through a strong governance framework, and improved knowledge and understanding.
- Foster community participation, ownership and support for biodiversity conservation.

In implementing the proposed project activities due care has to be given to ensure that the national biodiversity strategies are adhered. The proponent has committed fully on conservation and protection of the environment while undertaking this proposed project. More specifically, the protected flora species of the site will be unharmed.

3.2.4 By Law about the cutting down, uprooting, digging out and export of trees and palms from one island to another

In pursuant to law number 4/93 (Environment Protection and Preservation Act of Maldives 1993), the Ministry of Environment, Energy and Water has made a by law with the purpose of educating developers about the importance of trees including best management practices for maintaining trees and provide standards for preservation of trees in the Maldives and set down rules and regulations to be adhered to prior to commencing felling, uprooting, digging out and exporting of trees and palms from one island to another in Maldives. The by law states that the cutting down, uprooting, digging out and export of trees and palms from one island to another can only be done if it is absolutely necessary and there is no other alternative. It further states that for every tree or palm removed in the Maldives two more should be planted and grown in the island.

The by law prohibits the removal of the following tree types;

- The coastal vegetation growing around the islands extending to about 15 meters into the island are protected by this by law;
- All the trees and palms growing in mangrove and wetlands spreading to 15 meters of land area is protected under this by law;
- All the trees that are in a Government protected area;
- Trees that are being protected by the Government in order to protect species of animal/organisms that live in such trees;
- Trees/palms that is abnormal in structure.

Therefore, the overall project execution work will be carried out in line with the above stated regulation.

3.2.5 Waste management policy

The Ministry of Environment, Energy and Water has developed the framework for a national waste management policy. The key elements of the policy include:

- Ensure safe disposal of solid waste and encourage recycling and reduction in waste generated.
- Develop guidelines on waste management and disposal and advocate to

enforce these guidelines through inter-sectoral collaboration.

- Ensure safe disposal of chemical, industrial and hazardous waste.

The key objective of the waste management policy would be the formulation and implementation of guidelines and means for solid waste management to maintain a healthy environment.

In this regard all waste management work under the project will be carried out in line with the existing waste management policy of the government.

3.2.6 Framework for Environmental Assessment

The enforcement of EIA regulation in the country began with the formulation of the Environmental Protection and Preservation Act (Law 4/93) in April 1993 in order to protect, preserve and safeguard the fragile environment of the country. The Environmental Act gives very high prominence towards safeguarding the environment with regard to all the development activities and is currently being implemented by the Environment Research Center of the Ministry of Environment, Energy and Water. The Ministry has been formed recently and its mandate includes:

- organizing, developing and managing systems for environmental monitoring, including periodically evaluating the actual state of the environment, and forecasting environmental changes;
- evaluating environmental impact assessment reports of new projects and monitoring reports for existing facilities;
- issuing and revoking certificates based on compliance with environmental standards;

According to article 5 (a) of the Act, an Environmental Impact Assessment shall be submitted to the Ministry of Environment, Energy and Water according to guidelines formulated by the Ministry before implementing any activity that may have an adverse impact on the environment. The Ministry shall determine projects that need such assessment. This umbrella law gives the Ministry the right to terminate projects that have undesirable impacts or claim compensation for damages caused by activities that are detrimental to the environment. This project fully complies with this law as all necessary permits have been undertaken and this report is submitted in order to obtain the necessary EIA Decision Note.

3.2.7 Environmental Impact Assessment Regulation 2007

The Ministry of Environment, Energy and Water has issued new EIA regulation on May 2007, which guides the process of undertaking the Environmental Impact Assessment in the Republic of Maldives – This guideline also provides a comprehensive outline of the EIA process, including the roles and responsibilities of the consultants and the proponents. This regulation outlines every step of the IEE/EIA process beginning from application to undertake an EIA, details on the contents, minimum requirements for consultants undertaking the EIA, format of the EIA/IEE report and many more. The guidance provided in this Regulation was followed in the preparation of this EIA report. The EIA has also been prepared by registered consultants.

3.2.8 Post EIA Monitoring, Auditing and Evaluation

The environmental monitoring programme given in EIA reports is an important aspect of the EIA process. The monitoring programme outlines the objectives of the monitoring; the specific information to be collected; the data collection program, and managing the monitoring program. Managing the monitoring programme requires assigning institutional responsibility, reporting requirements, enforcement capability, and ensuring that adequate resources are provided in terms of funds, skilled staff, etc. The monitoring programme outlined in this report will comply with the EIA Regulations 2007.

4 EXSISTING ENVIRONMENT AND DATA COLLECTION METHODOLOGY

This section covers the existing environmental condition of the projects site general methodologies used to collect data on assessing the existing situation.

4.1 Terrestrial Survey

The baseline terrestrial environment of the project location was studied in detail by counting trees existing in the area, and also gathering information available at island office. The terrestrial environmental survey was strictly focused on proposed housing areas as of the islands vegetation and identifying their abundance and occurrence in the island.

4.1.1 Vegetation Cover

The vegetation cover of the area is mainly dominated by matured *Cocos nucifera* (coconut palms) *Hibiscus tiliaceus* (Dhiggaa) and *Terminalia catappa* (Midhili) trees. The average height of trees range between 3m to 10 m. There are few fruit trees such as Papaya, Banana and Stone apple available in the area. A detailed information on the results of the transects and tree counts under taken in the island are provided as an annex.

4.1. 2 Existing Vegetation Cover of the proposed site

The vegetation cover of the proposed environment is assessed by dividing the area into 10 zones. The detailed information of the each area is described below. Refer to attached annex.

Zone (A): the area has 9 coconut palms (Cocos nucifera) of average height of 5m to 10 m, 1 Dhiggaa ((Hibiscus tiliaceus) tree of 8 m, 1 Muranga gas (Moringa oleifera) of 5 m and 1 Kunnaru (Zizyphus mauritinia) of 5 m.

Zone (B): This zone has only buildings and only few young coconut palms (5 around 3 m.) are available. The area has ware houses

Zone (C): The bottom of this zone contains bushy and young vegetation of grassy nature. There are 10 coconut palms of 6 to 8m, 1 Dhigaa tree of 7m, 1 Helenbeli tree *(Tamarindus idica)* of 7 m, and 1 Dhuburi tree (*Ocrosia borbonica)* of 6 m height.

Zone (D): The bottom vegetation of the area consists of bushy grass and other young vegetation. There are 10 coconut tree of 8 to 10 m, I Hirundhu (Thespesia populnea) of 8 m and 1 Dhigaa tree of 8 m.

Zone (E): This zone conatains 24 coconut trees, and 1 Midhili tree (*Terminalia cattappa*) of 8 m.

Zone (F): the bottom area of the zone contains thick grassy shurubs and weeds. There are 40 coconut palms of 8 to 10 m. available in the area.

Zone (G): the bottom of the area contains dense and thick grassy shrubs and weeds. There are 25 coconut palms and 6 Midhili trees of 10 m. available in the area.

Zone(H) : This area contains 10 coconut palms of 9 m. height

Zone (I): This area contains varieties of thick vegetation of large trees. This includes 44 coconut palms of 10 m height , 12 Midhili trees of 8 m, 10 papaya trees *(Carica papaya)* of 3 m, 1 Banana tree *(Musa paradisiacal)* of 4 m, and 1 Kunnaru tree *(Ziziphus mauritinia)* of 5 m. height.

Zone (J): this area contains mature and thick conconut trees and Midhili trees. Ther area has 173 coconut palms of 8 to 10 m height, 7 Midhili trees of 6 to 8 m height and 16 Dhigaa trees of 6 to 8 m. height. The area also contains grassy shrubs.

A detailed pictorial illustration of the zones and its vegetation is provided in the above page (Figure 2)

4.2 Ground Water

Groundwater assessment was conducted to assess the ambient conditions of groundwater at the proposed project locations. Ground water samples were collected

from the existing wells of the areas and analyzed in the National Health Laboratory. The ground water was analyzed for the following parameters as outlined below.

Table 3: results of the groundwater quality of Lily Beach resort.

Parameter tested	Sample 1	Sample 2	Sample 3
Physical Appearance	Pale Yellow	Pale Yellow	Pale Yellow
Dissolved Solids (mg/L)	8.6	8.1	8.9
Turbidity (NTU)	15	11	13
Nitrates (mg/L)	0.44	0.88	5.76
Phosphates (mg/L)	2.5	0.58	0.69
pH	7.1	7.1	6.9

4.3 Socio-economic date collection

The social economic date collection was based on the available date from the island office and meetings held with island chiefs on 10th of December 2007. The information used for preparing the social and geographical information about the island and highlighted in the above chapters.

4.4 Faunal Survey

This EIA report is limited to conduct a site clearing of trees and demolition of building for construction of houses, therefore no detailed faunal survey was not assessed during preparation of the report. It is targeted to include a basic faunal survey in the full EIA report.

5 ENVIRONMENT IMPACTS AND MITIGATION MEASURES

5.1 Impact Identification

The proposed clearing work for building 100 houses in Thilusdhoo is expected to bring impacts on the existing vegetation of the island. Therefore, all necessary measures shall be taken to mitigate the impacts causes to the vegetation of the island. It has to be mention that economic development opportunities can be enhanced with proper environmental management and mitigation.

5.2 Assessing Impacts

Environmental impacts of the proposed project have been examined through a number of processes. These include consultations with the stakeholders, field surveys, observations and assessment, and field experience gained from similar development projects implemented throughout the country. Potential positive and negative impacts on the environment have been considered. The impacts of the proposed project on the terrestrial environment of the proposed area have been looked into and are considered to be significant and need to be mitigated with proper planning and appropriate mitigation measures. The impacts are categorized into short-term and long-term. Most of the short-term impacts are related to constructional phase, while the long-term impacts are associated with the operational phase. Possible negative impacts on the environment have been considered in worst-case scenario to recommend mitigation measures in the best possible ways so that these impacts would be minimized and perhaps eliminated in both constructional and operational phases. This EIA identifies and quantifies the significance of adverse impacts on the environment from the proposed project. Impacts on the environment were identified and described according to their location/attribute, extent (magnitude) and characteristics (such as short-term or long term, direct or indirect, reversible or irreversible) and assessed in terms of their significance according to the following categories:

- Negligible – the impact is too small to be of any significance;
- Minor adverse – the impact is undesirable but accepted;

- Moderate adverse – the impact give rise to some concern but is likely to be tolerable in short-term (e.g. construction phase) or will require a value judgment as to its acceptability;
- Major adverse – the impact is large scale giving rise to great concern; it should be considered unacceptable and requires significant change or halting of the project
- Moderate adverse – the impact give rise to some concern but is likely to be tolerable in short-term (e.g. construction phase) or will require a value judgment as to its acceptability;
- Major adverse – the impact is large scale giving rise to great concern; it should be considered unacceptable and requires significant change or halting of the project.

5.3 Uncertainties in impact prediction

Environmental impact prediction 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, geomorpholical or social conditions in a particular place. There is also limited data and information regarding the particular site under consideration, which makes it difficult to predict impacts. However, the level of uncertainty, in the case of this project is expected to be low due to the availability of necessary data, limited activities in the which harms the environment and experience of in similar projects carried out in the Maldives after the tsunami. Nevertheless, it is important to consider that there will be uncertainties and to undertake voluntary monitoring of natural processes as described in the monitoring programme given in this report.

5.4 Significance of the impacts

Impacts that will arise from activities of the proposed project were categorized into the following characteristics in the table and the significance of impacts was determined based on these characteristics and analysis of the impacts from this project and other analogous projects. These impacts correspond in the worst case scenario and after mitigation measures were taken. The following table shows the main impacts that will arise from the proposed project activities and their significance based on impact characteristics.

Table 4: Summary of impacts of the propose work

Impact characteristic	**Project activities**	
	Clearing of proposed site	**Waste disposal/management**
Nature of impact	Cumulative, long term	Cumulative, long term
Magnitude of impact	Minor adverse	Minor negative
Geographical range of impact & environmental attribute	Direct impact on 201,600,ft² from the island Indirect impact on the total land area of the island (33.50 hecters) Direct impact on 300 people of the island Indirect impact on 900 people of the island	Direct impact due to generation of 2100 m3 of demolition waste and 7000 m3 of green waste. Indirect impact on the total land area of the island.
Duration of impact	Long-term on vegetation	Short-term
Reversible/Irreversible of impact	Reversible over long-term	Irreversible impacts.
Impact significance	Significant	In significant to moderate

5.5 Mitigation measures

Early planning is one of the most important steps in reducing and eliminating any adverse impact from the proposed project. Environmental concerns are considered concurrently with technical planning of the project and precautions will be applied from the outset of the planning process through all phases of the project activities.

The project development has considered minimizing the negative impacts through prior planning, allocation of appropriate ways and means for executing the project, and consultations. Environmental surveys were conducted to identify these and means of impact mitigations. Supervision and inspection of the project activities are imperative to minimize adverse impacts.

Therefore, competent environmental consultants with experienced in same or similar work in the local environment will be consulted and allowed to inspect and monitor the work activities of the project life-cycle. Coordination and communication among the environmental consultants, contractors and the proponent is vital to minimize adverse impacts on the environment and enhance the positive impacts. Hence this process will be followed. Following are the specific mitigation measures that will be taken to mitigate predicted impacts on the marine environment arising from the project activities.

HIRU will hire qualified site supervisor who will be based in the island during execution of all project related activities. Moreover frequent visits will be carried out to the island. The project work will be implemented in close collaboration with island office and island development committee of Thulusdhoo. Machinery, equipment and vessels used in the project activities will be maintained in good condition and operated in a manner that they do not pose a risk of the environmental degradation.

All work activities will be kept to the minimum period of time to reduce impacts on the environment. Work will be inspected and supervised in whole lifecycle of the proposed project. Supervision of work will be carried out by a competent and independent party with experience of similar work and its possible impacts to the environment. Supervising party will not be in anyway related to the contracted party

to ensure that mitigation measures were taken even at extra project costs. Supervisors will carry out compliance monitoring and reporting to ensure that the predicted impacts are not exceeded. If predicted impacts were exceeded, the work will be halted and impacts re-assessed and reported. All the project activities will be completed within the shortest possible time to minimize negative impacts on the environment.

Table 5: impacts, mitigation measures and costs of the proposed system

Impacts	Mitigation	Cost of mitigation
Loss of vegetation due to Clearing of 400 tress from the proposed site	Compensation of trees and re- plantation of 800 trees in green zones of the island and proposed reclamation area. The housed when will built each home owner will be provided with two trees to be planted within the plot. The plants will be brought from nurseries to be established in the island and also from nurseries of Ministry of Agriculture.	Compensation already provided to owners and re-plantation cost included in the project design phase.
Accumulation of demolition waste.	Demolition waste will be segregated and allowed to be taken by the community under supervision of island office, the balance will stockpiled before transferred to Thilafushi.	Already included in the contract document.
Accumulation of green waste	Green waste will be sorted out and allowed to be taken by the locals and contractor, and remaining balance will be burnt near the island waste management centre.	Already included with the contract.
Noise pollution due to use of vehicles and demolition equipments.	Noise pollution will be limited, since the area is far from existing settlements.	The tasks are already included in the contract.
Air pollution due to dusts	The pollution is limited to the working area and workers will wear appropriate gear	The contractor will provide the gears as it is part of the contract.

Impacts	Mitigation	Cost of mitigation
water pollution	The machineries and equipments will be maintained properly to avoid any spillage or pollution. The site supervisors will be checking the matter on regular basis.	The contractor will be responsible for any such an act and shall be compensated in accordance with the existing laws and regulations.
injuries and accidents	The workers will be provided with protective gear. Any emergency will be referred to health centre.	Already included in the contract.
Poor quality work.	HIRU will hire supervisors to monitor the work. There will be regular visits to the site by HIRU officials	The supervision cost is already available for HIRU

5.6 Monitoring during site clearing

Monitoring is an essential tool to identify potential negative environmental impacts and take measures to mitigate those impacts before severe environmental damage occurs. Hence, monitoring forms an integral and important part of the Environmental Impact Assessment process. If relevant environmental, social and economic parameters are adequately monitored important lessons can be learnt at relatively little cost with the advantage of having solid bases on which to identify guidelines for future developments. The proposed monitoring programme will help to reduce any environmental and social impacts during the proposed site clearing work. The proposed programme is limited to the site clearing work only.

5.7 Cost of monitoring

The proponent has fully committed to perform a highest level of commitment for proper management of the project. The lessons learned from other such a projects in all parts of the country as part of the tsunami recovery and reconstruction work will be taken into consideration during monitoring. The proponent has hired qualified locals and expatriate supervisors for monitoring the work. Moreover regular site visits will be carried out by the proponent during the project period.

Table 6: cost break down for monitoring the work

DESCRIPTION	**TOTAL (MRF)**
Transport to Thulusdhoo via speed boat (total of 2 trip within the 5 week clearing period, 2 trips at MRF 5000 per trip).	10,000.00
Food (3 persons X 2 days X 75)	450.00
Supervising consultants (2 supervisors X 3000 (all inclusive, for the clearing period).	10,000.00
Miscellaneous	2000.00
Total cost of supervision during site clearing (twenty two thousand four hundred fifty)	**22,450.00**

6 CONCLUSION

This EIA Report has identified the major impacts and mitigation measures of the proposed site clearing work of the proposed housing project of Thulusdhoo. The highlighted impacts of the proposed project can be mitigated by proper planning and allocation of appropriate funds. The major impacts of the project as outlines in the report are loss of vegetation from the proposed housing area of the island. This can be mitigated by planting more trees on the green zone of the island and also taking initiates to plant two trees in each house of the house when houses are built. However, public education especially promotion of tree planting can be done by involving the island community. The proponent of the project shall develop necessary plans and implement the mitigation measures in association with relevant agencies for future plantation of the island.

The project will benefit more than 300 Internally Displaced Population of the Dh. Ribudhoo who are still living in bad conditions in temporary shelters. The project will help to provide better services, facilities and opportunities of the IPD who has spent more than 3 years on temporary shelters.

The proposed project work will be monitored by HIRU of NDMC in consultation with atoll and island office. This will help to reduce environmental and social impacts during project implementation.

7 DECLARATION OF THE CONSULTANT

This EIA has been prepared according to the EIA Regulations 2007, issued by the Ministry of Environment, Energy and Water. The EIA was carried out by a multidisciplinary consulting team representing Water Solutions Private Ltd. In preparing this report, no data has been manipulated. All data has been collected by field visits.

I certify that the statements in this Environmental Impact Assessment study are true, complete and correct.

1- Name: Abdul Aleem (EIA 09/07)
Signature:
Date:

2- Name: Ahmed
Signature:
Date:

Information Sources

Ministry of Environment and Construction (2004), *State of the Environment 2004*, Maldives

Ministry of Planning and National Development (April 2006), *Maldives Population and Housing Census 2006, Preliminary Results.*

Ministry of Planning and National Development (March 2005), *National Recovery and Reconstruction Plan, Programmes and Projects.(second edition)*

Official website of National Disaster Management Centre.(www.ndmc.gov.mv)

Official website of Ministry of Atolls Development (www.atolls.gov.mv)

Ministry of Environment, Energy and Water, (2007) *Environmental Impact Assessment Regulations*

Mohammed Ibrahim Luthufee, **G.Soasanee, (1995),** *Dhivehi Rajjege Geographyge Vanavaru, Part 1 and 2,*

Ministry of Environment, Energy and Water, (2006), *By law about the cutting down, uprooting, digging out and export of trees and palms from one island to another*. (Unofficial translation,

Personnel contact with **Mr. Hussein Saeedh Mohammed**, Male' Atoll Chief.

Personnel contract with **Mr. Ibrahim Shareef**, Assistant Atoll Chief, Male' Atoll.

Personnel contract with **Mr. Mohammed Vidhadh**, Deputy Island Chief, Thulusdhoo

Personnel contact with **Mr. Jeremy**, Project Manager, HIRU- National Disaster Management Centre

Personnel contact with **Mr. Ahmed Hassan**, General Manager, Alia Groups.

Ahmed Zahid, et al of Water Solutions Private Limited, (June 2007), *Environmental Impact Assement for the Proposed Redevelopment of Lily Beach Resort (Huvehendhoo), South Ari Atoll, Maldives*

Minivan News, 8 December 2005, Governemt Accuesed of Constrcting Tsunami Shelters for DRP Votes

Appendix 1: Terms of Reference

Environment Research Centre
Ministry of Environment, Energy & Water
Male', Republic of Maldives

Terms of Reference for Environmental Impact Assessment

The following is the TOR is based on the points discussed in the scoping meeting held on the 9th of December 2007, for undertaking the **Environmental Impact Assessment (EIA) for the proposed construction of 100 housing units at Thulusdhoo**, Kaafu Atoll, Maldives.

The project is currently behind schedule and if the project is to be implemented after the issuance of an EIA decision statement, then there would be considerable delays and other difficulties. Hence, due to time constraints it was agreed between ERC and the client to undertake the EIA in 2 (two) parts as follows

1. **REPORT 1**: The client to submit an EIA only for the land clearing component that is required.
2. **REPORT 2:** The client to submit a full EIA incorporating the land clearing component and other items outlined in the scope.

REPORT 1: *A preliminary report focused for land clearing.*

1. Introduction – Describe the proposed project to be assessed and narrow the focus only on land clearing. It should be clearly indicated that this report is a supplement to a full EIA and is being focused for land clearing.

2. Study Area - Describe the project boundary clearly indicating the area on a clearly labelled site plan.

3. Scope of Work - The following tasks will be performed:

Task 1. Description of the Proposed Project - The EIA report shall properly describe the proposed development including duration of the project, need and justification and brief description of the Proponent.

The EIA shall also provide a clearly labeled site plan of the location for land clearing. The report shall also provide a detailed description of how the clearing activities will be undertaken including work methods, inputs, outputs, how waste from land clearing will be managed, what measures are taken to comply with the ***Regulation on Cutting Down, Uprooting, Digging Out and Export of Trees and Palms from One Island to Another*** *including (but not limited to) locations for relocating trees, source of obtaining new plants to comply with planting 2 or more trees for each mature tree cut down, compensation plan if any trees owned by the local community needs to be cut down.*

Task 2. Description of the Environment – Describe the project site, the area where land clearing will be undertaken for construction of the houses.

An assessment of the quality of the ground water shall be undertaken within this project boundary. Terrestrial environmental conditions including the local flora and fauna in the project boundary should be considered.

The report should also outline the detail methodology of data collection utilized to describe the existing environment.

The reports shall also include testing of ground water quality and these data will be used as baseline data. The ground water quality testing will be limited to the parameters of appearance, taste and odour, pH, turbidity, nitrates and phosphates.
The data collection locations should be clearly marked on a site map.

Task 3. Legislative and Regulatory Considerations - Describe 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. Identify impacts related to vegetation clearance with a particular reference to the ***Regulation on Cutting Down, Uprooting, Digging Out and Export of Trees and Palms from One Island to Another*** *and their importance for decision-making.*

Task 4. Determine the Potential Impacts of the Proposed Project –identify the impacts for both construction and operational phase. Distinguish between significant impacts that are positive and negative, direct and indirect (= triggering), and short and long term. Identify impacts that are cumulative, unavoidable or irreversible. Identify any information gaps and evaluate their importance for decision-making. Special attention shall be paid to:

- *impacts of constructional noise to noise sensitive locations such as schools;*
- *impacts shall be outlined for construction technology and site preparation technology;*
- *impacts related to constructional waste;*
- *impacts related to vegetation clearance; and*

Task 5. Mitigation and Management of Negative Impacts – The EIA report shall provide mitigation measures that are proposed to minimize the impacts during construction phase (land clearance) of the proposed development. Measures to mitigate impacts which arise due to the use of construction technology and site preparation technologies shall be presented. Mitigation measures for land clearance shall be clearly outlined. The report shall also outline the cost of mitigation measures and the commitment of the proponent to undertake the mitigation measures.

Presentation - The environmental impact assessment report, to be presented in digital format, will be concise and focus on significant environmental issues. It will 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 Report, 2007.

REPORT 2: The client to submit a full EIA incorporating the land clearing component and other items outlined in the scope.

1. Introduction - Identify the development project to be assessed and explain the executing arrangements for the environmental assessment. Describe the rationale for the development and its objectives

2. Study Area - Specify the boundaries of the study area for the assessment.

3. Scope of Work - The following tasks will be performed:

Task 1. Description of the Proposed Project - The EIA report shall properly describe the proposed development including duration of the project, need and justification and brief description of the Proponent.

The EIA shall also provide a clearly labeled site plan of the project location. The report shall also provide a detailed description of how the project activities will be undertaken including work methods for the construction of the housing units, and how construction materials and workers will be obtained,

how solid wastes and emissions will be managed and how additional demands on existing system be managed.

The report shall provide detailed account of the water supply, electricity, wastewater management during construction and operation phase of the proposed development at its maximum capacity. The report shall also provide references to the existing regulations and policies regarding the utilities and constraints to service providers of HDh. Nolhivaranfaru. And the relocation plan

Task 2. Description of the Environment - The EIA report shall properly describe the project site environment, where the proposed project will be undertaken.

An assessment on the quality of the ground water shall be undertaken with focus on areas that are likely to be impacted by the construction phase of the proposed project.

Terrestrial environmental conditions including coastal flora and fauna shall be considered and the issues of migration of people from other islands to this island shall be discussed in the EIA report. The report shall also provide description of the population density issues and comparisons will be made to the existing densely populated island of the Maldives. Possible traffic issues that may arise due to this project also shall be discussed in the report.

The report should also outline the detail methodology of data collection utilized to describe the existing environment.

The reports shall also include testing of ground water qualities and these data will be used as baseline data. The ground water quality testing will be limited to the parameters of Appearance, taste and odour, pH, turbidity, nitrates and phosphates.

Task 3. Legislative and Regulatory Considerations - Describe 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. Identify impacts related to vegetation clearance with a particular reference to the ***Regulation on Cutting Down, Uprooting, Digging Out and Export of Trees and Palms from One Island to Another*** *and their importance for decision-making.*

Task 4. Determine the Potential Impacts of the Proposed Project –identify the impacts for both construction and operational phase. Distinguish between significant impacts that are positive and negative, direct and indirect (= triggering), and short and long term. Identify impacts that are cumulative, unavoidable or irreversible. Identify any information gaps and evaluate their importance for decision-making. Special attention shall be paid to:

- *impacts of constructional noise to noise sensitive locations such as schools;*
- *impacts shall be outlined for construction technology and site preparation technology;*
- *impacts of water, wastewater and electricity supply including the additional burden on the existing networks in Nolhivaranfaru;*
- *impacts related to constructional waste;*
- *impacts related to vegetation clearance; and*
- *psycho-social impacts.*

Task 5. Analysis of Alternatives to the Proposed Project. – Describe the alternatives examined for the proposed project that would achieve the same objective including the "no action alternative. This includes alternative *construction methodologies*; *alternative technologies, material, locations and mitigation options. Distinguish the most environmentally friendly alternatives.*

Task 6. Mitigation and Management of Negative Impacts – The EIA report shall provide mitigation measures that are proposed to minimize the impacts during construction and operational phase of the proposed development. Measures to mitigate impacts which arise due to the use of construction technology and site preparation technologies shall be presented. Mitigation measures to water supply, sewerage and electricity related impacts shall be described. The report shall also outline the cost of mitigation measures and the commitment of the proponent to undertake the mitigation measures.

Task 7. Development of a Monitoring Plan – a reasonable time frame should be outlined for monitoring during construction and operational phase. Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan. The report should also provide a detailed cost breakdown for implementing the monitoring plan. Identify appropriate mechanisms for providing information regarding the progress of the project to stakeholders. Provide commitment of the proponent to conduct the monitoring programme.

Task 8. Stakeholder Consultation – major stakeholder consultation to include Ministry of Housing and Urban Development, Ministry of Planning and National development, Ministry of Atolls Development and Ministry of Environment, Energy and Water. Since socioeconomic assessments have already been undertaken by various agencies including the government and other donors, the EIA is required to outline the major findings from these assessments.

In describing the outcomes, focus should be made on the most relevant and significant issues, such as possible conflicts that may arise between migrant population and the community of the island.

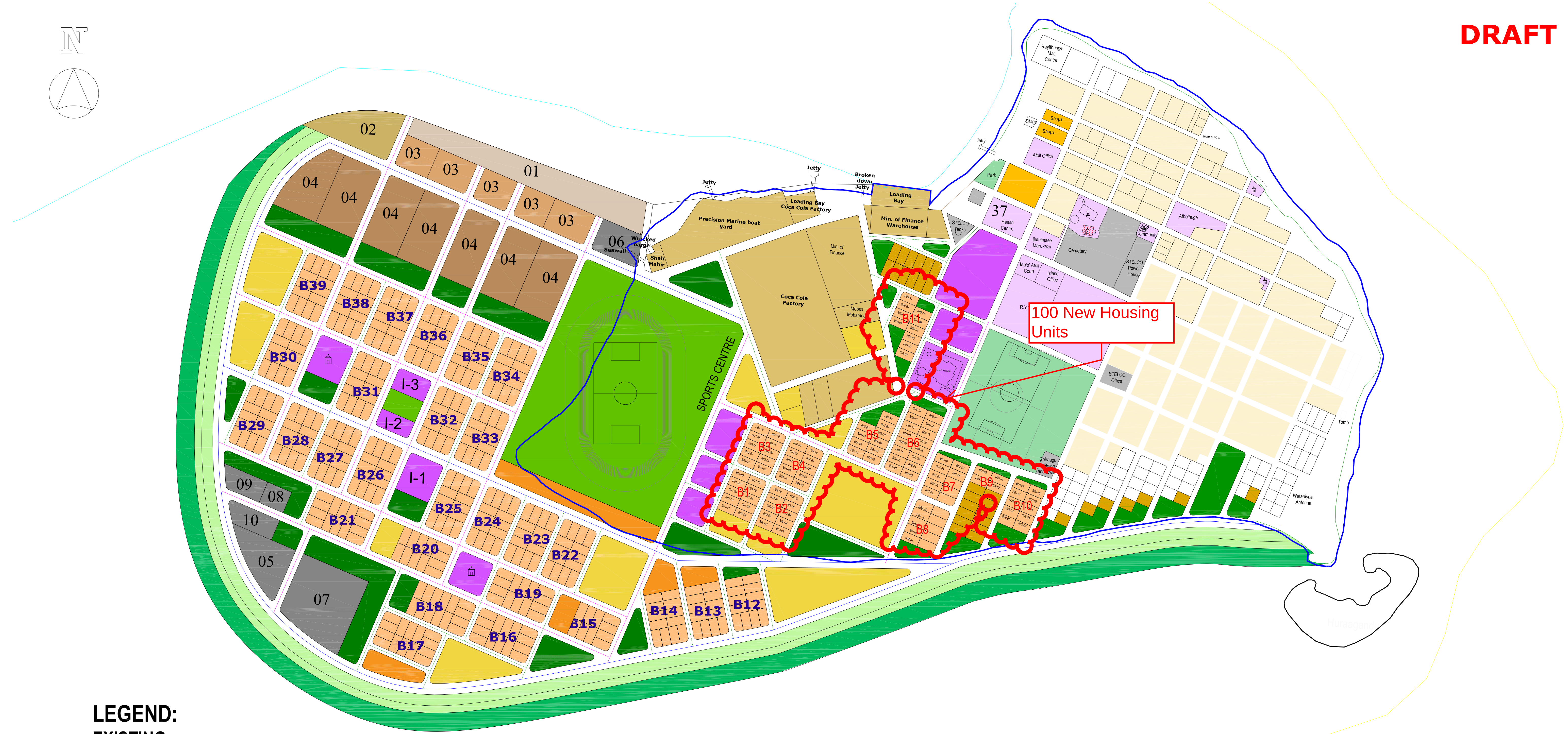
Presentation - The environmental impact assessment report, to be presented in digital format, will be concise and focus on significant environmental issues. It will contain the findings, conclusions and recommended actions supported by summaries of the data collected and citations for any references 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 Report, 2007.

……

10 December 2007

Appendix 2: Site plan and project boundary

DRAFT



LEGEND:

EXISTING:

- RESIDENTIAL
- INSTITUTIONAL & COMMUNITY FACILITIES
- COMMERCIAL
- INDUSTRIAL
- C CONSERVATION SITE 'GHAZEE MISKIY'
- PUBLIC SPACES
- LANDS NOT IN USE (Allocated for Industrial use)

PROPOSED:

RESIDENTIAL PLOTS
B1-B11 - TO BE BUILT BY SAUDI CHARITY RELIEF
FUTURE RESIDENTIAL PLOTS (B12 TO B40) (REQUIRES LAND RECLAMATION)

INSTITUTIONAL & COMMUNITY FACILITIES
I-1 - PRIMARY SCHOOL
I-2 - PRE-SCHOOL
I-3 - POLICE SERVICE
- NEIGHBORHOOD MOSQUES

COMMERCIAL ZONE

HARBOUR AREA ACTIVITIES
01 - LOADING AND UNLOADING
02 - BOAT REPAIR

STORAGE & WARE HOUSING
03 - STORAGE AND WAREHOUSING

LIGHT INDUSTRIAL
04 - LIGHT INDUSTRIAL

UTILITY & MUNICIPAL SERVICES
05 - WASTE MANAGEMENT SITE
06 - POWER HOUSE
07 - CEMETERY
08 - DESALINATION PLANT
09 - SEWAGE TREATMENT PLANT
10 - TELECOMMUNICATION SERVICES

RESERVED FOR FUTURE USE

PARK / RECREATIONAL AREA

ENVIRONMENTAL PROTECTION ZONE (EPZ):
- GREEN AREA / BUFFER ZONE
- 2.4M HIGH GREEN BELT
- LOWER DRAINAGE AREA (WITH RECREATIONAL FACILITIES)

PEDESTRIAN ROUTE

EXISITING ISLAND SHORELINE

ROAD NETWORK
12m PRIMARY ROAD
9m SECONDARY ROAD
6m SECONDARY ROAD

PROPOSED LANDUSE PLAN
K. THULUSDHOO

MINISTRY OF HOUSING AND URBAN DEVELOPMENT

DATE: 6th AUGUST 2007

0 50 100 200 300 400 500

SCALE 1:4000

Appendix 3: Photos of project site






Above photos illustrates the areas from where trees will be removed and housing units are to be constructed.

Appendix 4: Construction schedule for land clearing

The following is a tentative construction schedule for land clearing.

• Initial survey complete 5 January 2008
• Mobilise to site by 4 January 2008
• Start site clearing works 6 January 2008
• Finish site clearing works 6 April 2008
• Start house construction 6 April 2008
• Finish house construction 6 April 2009

Appendix 5: Results of the tree transect of the project boundary.

Results of the transects and tree counts undertaken in Thulusdhoo, 10 December 2007

A

1 x Dhiggaa (*Hibiscus tiliaceus*), height approx 8m
1 x Muran'ga gas (*Moringa oleifera*), height approx 5m
1 x Coconut (*Cocos nucifera*), height approx 5m
8 x Coconut (*Cocos nucifera*), height approx 7 to 10m
1 x Kunnaaru (*Zizyphus mauritinia*), height approx 5m

B

No trees, only buildings.

C

9 x Coconut (*Cocos nucifera*), height approx 8m
1 x Coconut (*Cocos nucifera*), height approx 6m
1 x Dhiggaa (*Hibiscus tiliaceus*), height approx 7m. Very mature tree
1 x Helenbeli (*Tamarindus indica*), height approx 7m
1 x Dhunburi (*Ochrosia borbonica*), height approx 6m
Bottom of this zone mainly consists of bushy and young vegetation mainly of grassy nature.

D

10 x Coconut (*Cocos nucifera*), height approx 8 to 10m
1 x Hirundhu (*Thespesia populnea*), height approx 8 m
1 x Dhiggaa (*Hibiscus tiliaceus*), height approx 8m.
Bottom vegetation consists of mainly bushy grass and other young vegetation

E

24 x Coconut (*Cocos nucifera*), height approx 8 to 10m
1 x Midhili (*Terminalia catappa*), height approx 8 m

F

40 x Coconut (*Cocos nucifera*), height approx 8 to 10m
Bottom consists of mainly thick grassy shrubs and weeds.

G

25 x Coconut (*Cocos nucifera*), height approx 9 to 10m
6 x Midhili (*Terminalia catappa*), height approx 10 m
Bottom consists of mainly dense and thick grassy shrubs and weeds.

H

10 x Coconut (*Cocos nucifera*), height approx 9 m

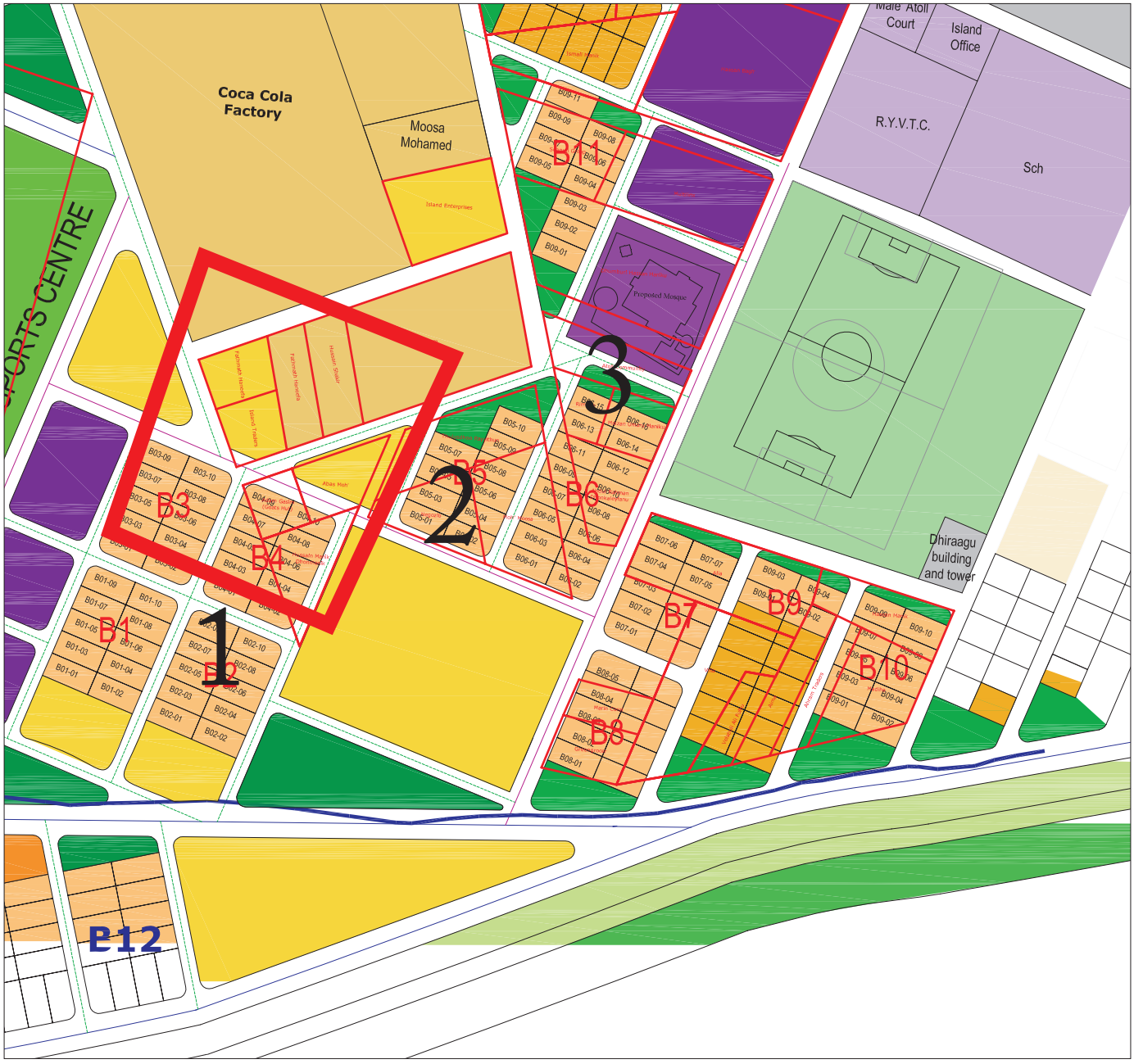
I

44 x Coconut (*Cocos nucifera*), height approx 10m
12 x Midhili (*Terminalia catappa*), height approx 8 m
1 x Bannana (*Musa paradisiaca sapientum*), height approx 4 m
10 x Papaya (*Carica papaya*), height approx 3 m
1 x Kunnaaru (*Zizyphus mauritinia*), height approx 5m

J

This area consists of mainly mature and thick coconut and Midhili trees. According to the statistics provided by the island office, this area consists of 173 mature coconut trees (*Cocos nucifera*), (approx 8m),7 Midhili (*Terminalia catappa*), trees and 16 Dhigga (*Hibiscus tiliaceus)* trees

Groundwater Sampling locations



Appendix 6: Names and Registration Certificate Number of EIA Consultants

Abdul Aleem – EIA Registration no: EIA09/07

Hassan Shah – EIA Registration no: EIAT 02/07

Ahmed Zahid - EIA Registration no: EIA08/07