

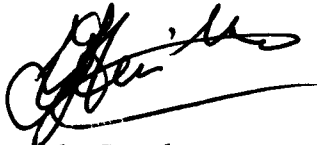
**Advice on Terms of Reference
for the EIA of Land Reclamation
Vilufushi, Thaa Atoll
- Maldives-**

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**Advice on Terms of Reference for the EIA of Land Reclamation
Vilufushi, Thaa Atoll, Maldives**

**Advice submitted to FMO, Finance for Development, by a working group of
the Commission for Environmental Impact Assessment in the Netherlands.**

the technical secretary



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the chairman



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Utrecht, 4 July 2005

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1. INTRODUCTION

1.1 The Initiative: Land Reclamation Thaa Atoll Vilufushi, Maldives

A Netherlands dredging company applied for ORET¹-grants for a dredging and land reclamation project on the tsunami stricken Vilufushi Island at the Thaa atoll in the Maldives (see map, appendix 5). This has been done at the request of the Ministry of Finance and the Ministry of Planning and Development in the Maldives.

The proposed project aims at creating a safer and larger island, thus providing viable communities for the Vilufushi residents, who were temporarily evacuated to Buruni island, as well as for the population of some other smaller nearby islands. The project involves increasing the level of a part of the existing island and the reclamation of a part of the surrounding shallow reef flats, to provide extra land for residential purposes. The surface of the island will be increased to over 4 times its present size. In addition, construction of about 2000 m. of revetment around the island is planned, as well as a new fishing harbour. The harbour will include 350 m. of breakwater and 350 m. of quay wall. The required amount of sand is estimated at about 1.1 million m³. The required equipment comprises a medium sized cutter suction dredger, a pipeline system and various bulldozers and wheel loaders.

1.2 Current situation

An Initial Environmental Evaluation (IEE) has been prepared in March 2005. This has been submitted to the Maldives authorities and to FMO Finance for Development², as the ORET-programme is executed by FMO, on behalf of the Dutch Ministry of Foreign Affairs. FMO assesses ORET applications on financial, technical and organizational feasibility, as well as the investment's contribution to sustainable economic development of the country. This implies that FMO requires a proper assessment of environmental and social impacts of the proposed project. To obtain this assessment, FMO solicited assistance from the Netherlands Commission for Environmental Impact Assessment (EIA).

1.3 Request of FMO and involvement of the Commission

In March 2005, FMO invited the Netherlands Commission for EIA³ (see letter appendix 1), to advise on the process and contents of the EIA for the proposed project. The Commission submitted a so-called Advice of the Secretariat in April 2005 (see appendix 2). Based on this advice, and in consultation with

¹ Development Related Export Transactions

² Netherlands Finance Company for Developing Countries

³ Henceforth referred to as 'the Commission'

the dredging company, FMO decided to invite the Commission to field a mission to the Maldives to draft Terms of Reference (ToR) for an EIA-study. These ToR will have to be ready before 1 July 2005, as this is the planned contract date. FMO will then provide a conditional approval for the dredging company to start preparatory work, including a.o. sand surveys. These ToR can be used at the same time by the Ministry of Planning and the Ministry of Finance to comply with the Maldives Environmental legislation, which requires that 'the proponent shall determine the scope of the proposed project and submit ToR (for the EIA) to the Ministry of Environment for approval'. By the end of August, the final decision is planned to be taken by FMO to start dredging and land reclamation works. By then, there will have to be an approved EIA-report and Environmental Management Plan. This implies a review by the Ministry of Environment of the EIA-report. The Commission for EIA has been asked by FMO to perform a review as well. It is intended to align both requirements to the maximum extent.

In order to prepare an advisory report on this specific request, the Commission formed a working group of experts, representing the Commission, which comprises the following disciplines: dredging, civil and hydraulic engineering, (marine) ecology, nature conservation, social impacts, EIA application. The working group members of the Commission are listed in appendix 3.

This working group visited the Maldives from 20-23 June 2005 (see appendix 4, programme). The purpose of this visit was to collect project- and site specific information (see appendix 6, list of documents) and discuss matters with several government authorities and local population. The visit included Vilufushi and Buruni Islands, to observe the current situation onshore and offshore. More specifically, the visit was organised to:

- Discuss the procedure for EIA with the relevant authorities in the Maldives as a follow-up on the Initial Environmental Examination. Balancing on the one hand speedy execution to provide rehabilitation quickest and on the other hand exercising due caution to prevent environmental and social mistakes;
- Scope the relevant environmental and social requirements to be taken into account;
- Define the target groups for proper consultation, to be aligned with speedy execution of the EIA process;
- Look at alignment with other initiatives and ongoing programmes and setting the stage for follow-up initiatives.

The next chapters provide the ToR as a result of the field visit. It is recommended to make use of the information already available in the IEE and of information available in EIA reports prepared for other land reclamation projects already executed in the Maldives (for instance Hulhumale land reclamation)

2. PROBLEM ANALYSIS AND PROJECT OBJECTIVES

2.1 Problem analysis

In the EIA report, the problems which are assumed to be solved by realisation of the project should be stated in clear terms and the underlying causes should be analysed. In the problem analysis at least the following aspects should be addressed:

- Relationship with the National Recovery and Reconstruction Plan, in particular the New Host⁴ Islands Project, which has been developed to address the problems of anticipated accelerated sea level rise and increased extreme weather conditions, while at the same time aiming at concentrating population to provide better services and infrastructure (economy of scale);
- Justification for the selection of Vilufushi as a pilot host island, including criteria such as expandability, strategic location nearby other islands, efficiency of scale, potential for successful economic activities (e.g. fisheries), population pressure (carrying capacity);
- Whether and how environmental considerations played a role in the selection;
- Description of the living conditions (public health situation, safety aspects), demonstrating that the temporary settlement of affected Vilufushi residents to other islands is either not sustainable or not desirable;
- Direct and indirect damages as a result of the tsunami.

2.2 Project objectives

According to the project documents, the main objective of the initiative is to create a safer and larger island for the Vilufushi residents, who were temporarily evacuated to Buruni island, as well as for the population of some other smaller nearby islands. The planned activities for this phase of the project however are restricted to dredging and land reclamation. Therefore, the EIA report should clearly address preconditions for successful implementation of the project (such as timely clearing of the project site), but also indicate required follow up activities to fully contribute to the solution of the problems as identified in the preceding section.

The EIA report must contain a clear definition of the objectives of the proposed activity to enable identification and formulation of alternatives and to furnish criteria for monitoring and evaluation. Objectives should be formulated in such a way that identification of alternatives – meeting the same objectives- remains possible. Finally, the objectives should be specific and if possible quantified (eg. number of beneficiaries).

⁴ As a synonym for Host Island, also the concept of safe island or focus island is being used.

3. PROJECT SETTING

3.1 Legislative and regulatory considerations and policies

The EIA report must describe national laws, rules, regulations and policies governing the proposed activity and if relevant, international conventions and regulations. These include the following:

- Policies, legislation, regulations and standards on environmental quality (water, soil, air, noise and solid waste), health and safety and protection of sensitive areas. The IEE already mentioned the most important national environmental legislation;
- International conventions which are ratified by the Maldives, such as the United Nations Convention on the Law of the Sea, International Convention for the Prevention of Pollution from Ships (MARPOL), the Convention on Biological Diversity and the Convention Climate Change.

The EIA report should assess the probability of compliance of the intended activity with the above mentioned legislative and regulatory considerations and policies.

3.2 Institutional framework

The EIA report must give a clear description of the legal and administrative framework in the Maldives, including competent (licensing) authorities directly involved in the execution of the project and in the control of the executed works. This includes the Ministry of Environment and Construction charged with the responsibility for EIA. A description of the EIA procedures to be followed is provided in the Environment Act 4/93 and in the EIA guidelines (2004).

The EIA report must also indicate which competent (licensing) authority is committed to the follow-up activities once project activities are finished and how maintenance of the works will be secured.

3.3 Public and agency involvement

The EIA report must contain a description of the stakeholders in the project and how their opinions and interests did influence the contents of the EIA report. The views of the following stakeholders should be taken into account:

- Project beneficiaries, men as well as women (former inhabitants of Vilufushi Island and the migrants⁵ from nearby islands);
- Population of Buruni island;
- Local fishermen possibly affected by dredging works;
- National, regional (atoll and island) government agencies with formal responsibilities in environment and social welfare;

⁵ migrants can be consulted only in case it is already known which islands are potentially interested in resettlement, eg. Ghadifushi

- National and international organizations (including NGOs) involved in the implementation of the project and follow up activities, such as the Red Cross, UNDP, UNEP etc.

The EIA report must indicate in which way the Vilufushi inhabitants are involved in the project design and the development of alternatives as well as project execution.

4. DESCRIPTION OF THE PROJECT AND ALTERNATIVES

4.1 General

The IEE and feasibility study, both of March 2005, give an overview of project activities as part of the reconstruction of Vilufushi Island, namely:

- Dredging from a nearby borrow area of approximately 1.000.000 m³ of coral sand and pumping the material into the reclamation area;
- Dredging of a harbour to a depth of -4 m. and pumping the dredged material (about 100.000 m³) into the reclamation area;
- Finishing the reclamation area to the required levels, including the elevated zone surrounding the island based on the 'safe island' concept;
- Construction of revetments over a length of about 2000 m.;
- Detailed design and construction of quay wall (350 m.) and breakwaters (350 m.) in the harbour;
- Construction of temporary and auxiliary works related to the above;
- Environmental monitoring during construction activities;
- Measures to protect environmental values during construction and once the new island has been established.

The project execution is expected to take about 6-8 months.

4.2 Project activities and alternatives

4.2.1 Site preparation

The Commission has understood that site clearance is not part of the project. UNEP is at the moment providing technical advice on how site clearance best can be executed. The Red Cross will subsequently undertake the debris removal. The dredging company has a provisional budget item to assist in debris removal, in case the removal is not finished in time. Although strictly speaking site preparation is not part of the project activities, there are some aspects which are relevant for project start up. The EIA report must therefore describe:

- Timing and coordination of the works;
- Supply and demand aspects of the debris: can or will debris be used e.g. in revetment or breakwater construction? Can debris (especially coral blocks which are now banned to be mined) be valuable material for construction of tourist resorts?
- Whether certain constructions (e.g. mosque, school) can be conserved;
- Treatment of asbestos and other hazardous materials;

- Guarantees for removal of all debris (including e.g. concrete floors) to allow for better infiltration to fasten desalination of used marine deposits.

4.2.2

Dredging

Proposed activity

The EIA report must describe the following aspects of the dredging activities:

- Location and size of sand borrow area(s) on a map (scale 1:10.000);
- Justification for the selection of this location;
- Quantity and quality of fill material (indicating place, date and depth of sampling, accompanied by laboratory analysis (with the signature of an authorized supervision official). It is recommended taking samples equally distributed over the borrow area, covering the depth of the layer that will be dredged;
- Indication of guarantees for sufficient availability of fill material, including measures to be taken if it turns out that the quantity is not sufficient;
- Method and equipment used for dredging, including description of positioning system, depth control system and operational control procedures;
- The arguments which form the basis for choosing this technical alternative;
- Way of operation; from which side and how will the dredging equipment be positioned in the designated borrow area (including depth of access channel, anchoring);
- Duration of the dredging activity;
- Labour requirements and (local) labour availability;
- Housing of temporary labour (housing boat, work camps);
- Number and route of shipping movements for supply of food and fuels;
- Emergency plan in case of spills (diesel, grease, oil).

Alternatives

The EIA report should study promising alternatives such as:

- Operation and positioning options;
- Alternative borrow-locations: have these been considered (see IEE) and if so, give arguments why these alternative locations were not selected;
- Lay out of borrow pits, large shallow pits versus small deep pits to allow quick recovery of the seabed.

4.2.3

Land reclamation by filling

Proposed activity

The EIA report must describe:

- Design of the reclamation area (on a map with a scale of 1:5000), including a justification (both from a social as well as from an environmental point of view) for the choice of the shape and potential connection with two nearby small islands etc.;
- Planning and timing of sub-activities (order of the works, clearance, dredging and reclamation, to accelerate the start of construction of new houses);

- Method and equipment for transport of fill material and hydraulic filling, including floating and land-based pipelines, and equipment used for the spreading of the fill material;
- Distance of transport (by ship and/or pipeline);
- Need for and location of temporary stockpile(s);
- Location and design of the external bunds and revetments for the containment of the sand, together with a description of their stability against waves and current attacks (durability to minimize maintenance);
- Measures to be taken for the maintenance of the revetments;
- Description of safety measures during the construction phase;
- Labour requirements and (local) labour availability.

Alternatives

The EIA report should investigate possibilities for alternative:

- Location, routing and design of pipelines;
- Design of revetments, including materials used.

4.2.4

Harbour related activities

The EIA report should indicate:

- Design criteria (dimension, depth, accessibility) for actual use and for future expected use, including possible induced development;
- Planning (phased approach) for construction of the new harbour and filling of the existing harbour basin;
- Foreseen facilities in transition period, such as temporary anchoring for fishing boats;
- Dredging activities required in the new harbour;
- Sheet piling and construction of quay wall;
- Construction of breakwaters, including possible re-use of debris;
- Methods and equipment used for construction.

4.2.5

Mitigating measures and alternatives

Mitigating measures

Mitigating measures to prevent or reduce negative environmental or social effects during the implementation of the project must be described. These may include environmentally friendly dredging methods, minimize interference with others users (shipping, fishing), measures to diminish risks (eg. safety precautions), phasing, such as the preferred season in relation to fish migration and sediment dispersal and measures to prevent disturbance, pollution or smothering of valuable ecosystems.

Implementation alternatives

The Commission understands that decisions on land reclamation of Vilufushi already have been taken. Therefore, the question whether another island would be more suitable has been decided upon already. This implies that only implementation alternatives have to be described.

The EIA report must describe at least two alternatives:

- The preferred alternative developed by the proponent;
- An alternative which contributes maximally to sustainable development, which may be a combination of the environmentally most favourable implementation with least hindrance for stakeholders.

5. DESCRIPTION OF THE NATURAL AND SOCIO-ECONOMIC ENVIRONMENT AND ITS AUTONOMOUS DEVELOPMENT

5.1 General

The EIA report must contain a description of the current situation of the natural and socio-economic environment and its development if no project will be established (the autonomous development or reference situation). This serves as a basis for comparison of the impacts of various alternatives. It is recommended to make use of the information already contained in the IEE. The Commission is of the opinion that initial surveys should be undertaken of current velocities and directions, sediment transport and ecological baseline conditions. The Commission realizes that given the limited timeframe and data availability, extensive hydrodynamic modelling is not possible and advises to make use of expert judgement and local knowledge as much as possible.

5.2 Natural environment

The EIA report must address the following aspects:

Climate:

- Temperature, precipitation, evaporation and wind (including extreme situations);
- Risks of hurricanes and storm surges;

Geology and geomorphology:

- Offshore/coastal geology and geomorphology;
- Bathymetry (bottom morphology);
- (Seasonal) patterns of coastal erosion and accretion;
- Characteristics of the seabed sediments;

Hydrography/hydrodynamics:

- Tidal ranges and tidal currents;
- Wave climate and wave induced currents;
- Wind induced (seasonal) currents;
- Turbidity/sediment concentrations;
- Sediment transport patterns by currents and waves;
- Nutrient content of the water and bed sediments;

Ground water:

- Quantity and quality (physical/chemical characteristics);

Soil:

- Infiltration characteristics of top soil;
- Composition and properties of the soil of the project area;

Ecology:

- Protected areas, protected or endangered species;
- Ecosystems and their characteristic flora and fauna (terrestrial, coastal zone and marine environment, including the benthic layer);
- Identification of vulnerable ecosystems and environmentally valuable areas (eg. coral reefs, sea grass fields, spawning sites for fish, nursery areas for crustaceans or specific sites for marine mammals, sharks, and turtles);

- Ecological conditions required for sustainable fisheries; Landscape integrity.

5.3 Socio-economic environment

The EIA report must describe (for pre-tsunami⁶ situation):

Demography:

- Total population at Vilufushi island;
- Population structure, sex ratio, density, growth;
- Population pressure on land and marine resources;

Economic:

- Income situation and distribution;
- Economic activities of both men and women (e.g. fisheries, home gardening, fish processing);
- Fishing methods deployed;
- Seasonal changes in activities;
- Land use planning, natural resource use and zoning of activities at sea;
- Land tenure and land allocation;
- Accessibility and (public) transport to other islands;

Social and living conditions:

- Social cohesion and stratification;
- Present inequities;
- Political and power structures (formal and informal);
- Services quality and accessibility (water supply, waste/water disposal, energy supply, social services like health and education);
- Living conditions (e.g. size of plots, houses and households);
- (In)formal social organization of the inhabitants, including role of women;
- Sites with historical or cultural interest or sacred places (eg. graveyard, mosques).

6. IMPACTS

6.1 General

The potential impacts must be described per alternative considered and must cover the complete affected area. This area may differ per aspect. Negative as well as positive impacts have to be described. Also impacts of the project activities after finalization of the construction phase have to be described.

6.2 Impacts on the natural environment

The EIA-report must describe:

⁶ the post tsunami situation is very different now, but as it is temporary, not necessary to describe in this chapter referring to the current situation

- Changes in flow velocities/directions, resulting in changes in erosion/sedimentation patterns, which may impact shore zone configuration/coastal morphology;
- Loss of marine bottom habitat, both in the borrow area as due to enlargement of Vilufushi Island, resulting in (temporary) loss of bottom life, which may impact fish stocks and species diversity and density of crabs, shellfish etc.;
- Sediment dispersal in water column (turbidity at the dredging site, the reclamation areas (overflow) and related to harbour construction activities), possibly resulting in changes in visibility, smothering of coral reefs and benthic communities and affecting fish and shellfish etc.;
- Impacts of noise, vibration and disturbance;
- Impacts on ground water table and quality as a result of reclamation (leaching of salts in the deposited sediments and change in groundwater quantity);
- Estimated time required to reach water quality of acceptable levels and soil conditions suitable for home gardening;
- Impacts on unique or threatened habitats or species (coral reefs, sea grasses, sea turtles etc.);
- Impacts on landscape integrity/scenery, by creation of an artificial island.

6.3 Impacts on the socio-economic environment

The EIA-report must describe for the proposed activity:

- Impacts of the works on fishing activities (disturbance);
- Impacts on employment and income, potential for local people to have (temporary) job opportunities (and what kind) in the execution of the works;
- Impacts of reclamation works on (diminished) access to groundwater and risks of covering up hazardous materials;
- Level of protection against natural hazards like sea level rise, storm surges etc.

The follow-up activities of the proposed activity will also have socio-economic impacts, which are beyond the scope of this EIA report, but which require due attention in the follow-up phase (and which could be reported in an addendum to this EIA report), such as:

- Size and allocation of the houses and plots, including possibilities for home gardening;
- Impacts on food and nutrition security (fisheries, agricultural activities, supply of other food);
- Social services like health and education;
- Impacts of resettlement; risks of conflicts between Vilufushi residents and 'new' residents;
- Employment and economic opportunities and diversification;
- Increased demands on natural resources and services: domestic water supply, waste water disposal and treatment systems, solid waste disposal systems, energy supply etc.;
- Impact equity (economic activities, employment, income);
- Social destabilization of the island community;
- Measures to be taken to anticipate potential socio-economic problems at Buruni island after departure of Vilufushi residents;

- Monitoring of socio-economic and demographic development (5000 people in 2020?).

6.4 Construction related hazards and risks

The EIA report should describe:

- Pollution of the natural environment (eg. oil spills, discharge of untreated waste water and solid waste, including construction waste);
- Impacts of noise, risks (accidents) and pollution on workers and local population;
- Impacts of presence of workers of dredging company on local population.

7. COMPARISON OF IMPLEMENTATION ALTERNATIVES

Environmental and socio-economic impacts of implementation alternatives must be compared, leading to at least the preferred alternative of the proponent and the alternative contributing maximally to sustainability. It is recommended to present the comparison in the form of tables and diagrams⁷. All alternatives must be compared according to international and commonly accepted standards as much as possible. The comparison must yield the preferred alternative for implementation. For comparison, selection and valuing of alternatives discriminating economic, technical, ecological and social criteria have to be identified.

8. GAPS IN INFORMATION AND KNOWLEDGE

Large scale infrastructure projects like dredging and land reclamation should specifically account for long term aspects related to irreversibility, vulnerability and sustainability. Therefore an adequate risk assessment should be part of the EIA report, especially in the case that a lack of information and knowledge may significantly influence impacts and the consequent need for mitigation measures. The EIA report should also indicate in which way and through which means serious knowledge gaps can be filled in or alleviated, now and in the course of the project.

9. MONITORING AND EVALUATION

In the EIA report an environmental monitoring plan must be presented, for both the construction phase and long term. This plan must include monitoring of at least:

- Current patterns and velocities;
- Turbidity;
- Sedimentation rates on nearby coral reefs, benthic system and sea grass beds;
- Condition of the sensitive ecosystems and marine resources;

⁷ For reference, see Maldives EIA guidelines

- Re-colonisation of the benthic organisms in the borrow areas;
- Erosion and accretion;
- Ground water quality;
- Soil salinity;
- Environmentally sound site clearance;
- Environmentally sound removal of dredging and other equipment including construction materials;
- Employment of available local labour force.

The monitoring plan must indicate the institutions responsible for its implementation and the way implementation is funded. This is especially relevant because this is a pilot project. It must also include a description of where, how and when (duration and frequency) the sampling and monitoring should be conducted. Possibly use can be made of a monitoring data obtained (if any) for the island that was constructed for the airport or other land reclamation projects.

A project evaluation plan has to be included in the EIA report, indicating which institution will be responsible for evaluation. The main item of evaluation will be to which extent project objectives have been fulfilled.

10. FORMAT AND PRESENTATION OF THE EIA REPORT

It is suggested that the EIA report is written in the same format as this advice for ToR. The use of maps and tables may considerably increase comprehensiveness and is therefore recommended. It is also recommended to use annex D of the EIA guidelines of the Maldives, that provide a guide to prepare the EIA report.

A non-technical summary must be included. This must address the major subjects of the EIA report and be written in such diction that it provides non-technicians with a clear insight in the issues treated.