

**Advisory Review of the EIA
for Land Reclamation
Vilufushi, Thaa Atol
-Maldives-**

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Advisory Review of the EIA for Land Reclamation Vilufushi,
Thaa Atoll, Maldives

Advice submitted to FMO, Finance for Development ORET Programme to Mr.
A. van Elteren and Mr. R. van den Berg by a working group of the
Commission for Environmental Impact Assessment in the Netherlands.

the technical secretary

Ineke Steinhauer

the chairman



Klaas Jan Beek

Utrecht, 18 December 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. 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 Request of FMO and Involvement of the Commission

In March 2005, FMO invited the Netherlands Commission for EIA² (see letter appendix 1) to advise on the process and contents of the EIA for the proposed project. The Commission fielded a mission to the Maldives to draft Terms of Reference (ToR) for an EIA-study. These ToR have been published in July 2005³. In November 2005, the Commission has been asked by FMO to perform a review of the EIA-report. This review advice has been prepared by the same experts involved in drafting the ToR (see appendix 3).

The aim of the review is to check whether the EIA study contains sufficient information to guarantee the full integration of environmental and social considerations in decision-making. If shortcomings are found, the seriousness of this lack of information for decision-making will be assessed and recommendations will be given for supplementary information.

¹ Development Related Export Transactions

² Henceforth referred to as 'the Commission'

³ Advice on Terms of Reference for the EIA of Land Reclamation Vilufushi, Thaa Atoll, Maldives, 4 July 2005

2. FINDINGS

The Commission is of the opinion that the EIA report on the Post-Tsunami Reconstruction of Vilufushi Island in the Thaa Atoll is well written, well illustrated and fairly complete. A lot of information has been collected and analysed in a short period of time. The Commission nevertheless concludes that the EIA report shows some essential shortcomings and recommends to provide additional information on specific issues in a supplement to the EIA report **before** decision-making on licence granting. The Commission feels that it is not a very time-consuming task to prepare such a supplement, since most of the information is already available in other documents. Chapter 3 contains these issues which are considered essential for decision-making. The findings are presented per chapter of the EIA report in order to facilitate easy correction/adaptation.

Chapter 4 contains information gaps and shortcomings that can be addressed **after** decision making on the licence, and can be included as part of the socio-economic addendum or monitoring programme.

Minor observations are listed in Appendix 2.

3. ESSENTIAL SHORTCOMINGS AND RECOMMENDATIONS

3.1 Chapter 2, Problem Analysis and Need of the Project

The EIA report briefly addresses the justification for the selection of Vilufushi as a host island (p. 22), but mentions mainly social and economic arguments. Whether or not environmental criteria played a role is not dealt with. Therefore the EIA report does not provide sufficient information to determine whether Vilufushi is indeed the best option for enlargement in the Thaa atoll.

■ **Recommendation:** convincingly demonstrate that Vilufushi is the best option in comparison to other islands of Thaa atoll, from a technical, social, economic and environmental viewpoint. The Commission feels that the information can easily be obtained from the numerous already available documents, developed in the last years.

A clear statement of the objective of the project is not given (ToR 2.2). Therefore it will not be possible to determine whether the project will be successful and will contribute to the solution of problems. The EIA report describes the project as it has been designed and sums up the reconstruction activities.

■ **Recommendation:** add a chapter which clearly states the objectives of the initiative (and not just of the construction contract) as asked for in par. 2.2 of the ToR.

3.2 Chapter 3, Policy, Planning and Legal Framework

The Ministry of Planning and National Development is mentioned as proponent and licensing agency. Not mentioned is MEC as competent authority who has to give environmental clearance before licences can be given.

- **Recommendation:** clearly indicate the role (and timeframe) of MEC in review of the EIA report and the related public notice and comments requirements (if any) according to Maldives law.

Apart from interviews with fishermen (App. 16), public and agency involvement (3.3 of the ToR) is not addressed in this chapter. The EIA report does not show whether consultation took place with international organisations like Red Cross and UNDP and relevant government departments, involved in the implementation of the project and follow-up activities. During the visit of the Commission to the Maldives in June 2005, the Red Cross (and UNEP) were planning to be involved in debris removal. According to the EIA report, this will now be undertaken by the contractor. The Red Cross planned to have 'extensive consultation' with the local population on the size of plots and houses. It was recommended to make use of these consultation rounds when undertaking public consultation during the drawing up of the EIA report.

- **Recommendation:** give evidence of coordination with other parties working on the same initiative because of its vital importance for successful implementation of the project (preparation and follow-up).

3.3 Chapter 4, Description of the Project

In relation to the site preparation (debris removal), the EIA report does not provide any information on what has been done already and by whom. Volumes and treatment of hazardous materials remain unclear.

- **Recommendation:** provide information on the state of affairs in relation to debris removal and specific information on the treatment of hazardous materials.

In relation to dredging, the EIA report states that the borrow area will be protected with a temporary bund, when re-suspension levels become too high, without specifying what is too high. Bunding is one possibility to limit dispersion of suspended solids during dredging, but in itself may result in high suspended matter concentrations during construction and removal or when subject to erosion. As such, temporary bunds may have significant environmental impacts.

- **Recommendation:** indicate when re-suspension levels are considered to be too high (norms/standards) and provide information on other possibilities (e.g. the use of silt screens or the use of sand-cement bags, that can later be used for revetments or breakwater construction) to prevent dispersal of re-suspended sediments. Additional information should at least pay attention to how the temporary bunds will be constructed and removed and how impacts of (the construction and removal of) these bunds on the environment can be prevented.

The EIA report does not give a justification for the shape of the new island and does not provide information on a potential connection with the two nearby small islands (and their potential for home gardening) (ToR 4.2.3).

- **Recommendation:** give an explanation on the design of the reclamation area (social arguments in relation to dimension and environmental arguments in relation to erosion prevention).

3.4 Chapter 5, Baseline Conditions- Physical Environment

Page 75 of the EIA report states that the reef plane is important in reducing the wave height by dissipating energy. Not given is the width of the reef needed to 'smooth' waves to an acceptable level and whether or not the remaining width of the reef flat (after project implementation) is sufficient for the required reduction.

■ **Recommendation:** give information on potential risks of accelerated erosion of the newly constructed area and possible consequences for its design.

Figure 5.7. and table 5.4. do not clearly show what is indicated for each location: the variation in size distribution of samples taken at different depths? If so, the remark on page 77 that 'the material was relatively uniform over the entire height of drilling and in each of the boreholes was relatively uniform' is not valid. Between and within the boreholes variation is considerable.

The same figure and table represent only four boreholes in the extreme eastern part of the borrow area. Given the variation within this small area, there might be much more variation over the total borrow area and information on size distribution in the central and eastern part should be presented as well. Therefore, the EIA report does not give indications of guarantees for sufficient availability of fill material (ToR 4.2.2) nor measures to take if the quantity would not be sufficient.

■ **Recommendation:** give information which guarantees the availability of sufficient suitable material for land reclamation.

3.5 Chapter 8, Assessment of Impacts and Mitigating Measures

Related to groundwater and soils, the Commission has a number of remarks:

- (8.2.2) It is stated that chemical waste damaged the aquifer and is still a significant problem. What is the proof for this statement (analysed samples?) and what kind of chemical waste are we talking about?
- (8.3.2) 'The rains of 2005 have already replenishednormal'. What is the proof for this statement ?
- (8.3.2) Groundwater in existing land area, 2nd paragraph, last line. What is the proof for this statement, how big is the rainfall surplus? 'It may take up to some years to wash out salinity and create a bigger fresh water aquifer for the new island': How many years? 3? 5? 10?
- (8.3.2) Groundwater in existing land area, 3rd paragraph. Even if there is no salt process water, the sand will be saline and salt will leach, unless all the salt leached while the sand is in stockpile. This seems an optimistic assumption.

The Commission finds that the information on desalinisation of soils and groundwater is insufficient to be able to answer the following essential questions: When is the groundwater expected to be clean and free of salt? When the island will be enlarged, will the groundwater aquifer increase accordingly? How much and will this be sufficient to guarantee sustainable groundwater amounts of sufficient quality (for 5000 people in 2020?). Important is also to know whether or not it is intended to use the groundwater as drinking water. If so, the building activities should only start after the salts have been leached from the soils and the groundwater has become fresh. If not, building may start when the soils are still con-

taining salt. This last question is only important if groundwater will be (the only) source of drinking water.

- **Recommendation:** provide additional information on the above mentioned issues to be able to determine the correct time schedule for reconstruction activities and to plan the timely availability and quality of fresh water (in order to also plan for providing rain water collectors or desalinisation plants, in case this proves to be necessary).

3.6 Chapter 9, Summary Evaluation and MEA

This chapter does not state what the preferred alternative is. Or is the MEA also the preferred alternative? Moreover, some alternative options have not yet been decided upon (e.g. on revetments or one or two settling basins).

- **Recommendation:** describe the preferred alternative of the proponent, as compared to the alternative contributing maximally to sustainability.

4. OTHER SHORTCOMINGS AND RECOMMENDATIONS

4.1 Social and Economic Information

The socio-economic impacts of the project are compared with doing nothing, which is obviously not very favourable for the island residents. However, the issue is not so much ‘if’ the project should take place (obviously something needs to be done), but rather ‘how’ the project and the follow-up should take place. This will be the most important information to be provided in the socio-economic addendum to the EIA-report (see also remarks in appendix 2, page iv on ‘land use plan summary’).

The socio-economic *baseline information* has been partly dealt with in the EIA-report. However, it does not contain information (as was advised by the Commission, ToR 5.3) on:

- Economic activities of women
- Present land & natural resource use
- Present practice of land tenure and land allocation
- Social cohesion and stratification
- Present inequities
- Informal political and power structures
- (In)formal social organisation, including role of women

The socio-economic *impacts* of follow-up activities of the proposed activities have not been dealt with in the EIA report but are planned to be part of the socio-economic addendum.

- **Recommendation:** include these items (remaining parts of ToR 5.3 and second part of ToR 6.3) in the socio-economic addendum in close collaboration with the Red Cross (and UNDP?) and the relevant government departments, especially the ones who developed the resettlement plan. Pay special attention to the involvement of the local inhabitants while drawing up the socio-economic addendum as transparency on ‘what happens when’ is of the utmost importance to the local population.

4.2 Environmental Monitoring Program

The EIA report does not provide information on monitoring once project activities are finished and how maintenance of the works will be secured.

■ **Recommendation:** provide information on who takes care of monitoring once the new island is established and once the contractor has left the Maldives, including the way implementation of this monitoring is funded.

Turbidity/sediment concentrations, sediment transport patterns and nutrient contents of the water and bed sediments (ToR 5.2) are not addressed.

■ **Recommendation:** as this base-line information is required for monitoring purposes, data should be gathered before project works start.

On turbidity and sedimentation, a literature review by Kuijper, 1991, revealed that the critical turbidity value can be as low as 10 mg/l, while sedimentation rates of 0.01 to 0.1 kg/m²/day already cause slight to moderate damage, whereas sedimentation rates of 0.1 to 0.5 kg/ m²/day cause moderate to severe damage, while sedimentation of more than 0.5 kg/ m²/day will result in severe to catastrophic damage.

■ **Recommendation:** provide references that support the given critical values.

In relation to changes in flow velocities and directions (8.4.3), the Commission agrees that changes in flow velocities will probably be very limited. The exception may be the flow velocities in the channel between Vilufushi and Hodelifushi Island. Unfortunately flow measurements have only been made on the reef flat in the area that will be reclaimed, and not in the area that will remain sea. As such, a comparison between before and after implementation of the project is not very well possible.

■ **Recommendation:** monitor flow velocities in this area after implementation. Increased flow velocities might increase erosion on the northern tip of Hodelifushi Island. This should be monitored as well.

Figure 11.1 presents monitoring locations for the corals. These are well spread around the dredging and land reclamation area. The number of monitoring locations in the sea grass (e.g. for sedimentation monitoring) is too limited. Impacts of construction on the east side of the reclamation area could be monitored, however impacts near the borrow area might easily remain unnoticed. Monitoring sites are too far away and would not take into account a situation in which the predominant flow is from the south, west or north.

■ **Recommendation:** additional monitoring sites should be installed east, south, west and north of the borrow area and to the southeast and southwest of the reclamation/harbour construction area.

In relation to parameters, the Commission has a number of observations:

- Page 139, Parameters to be measured in the laboratory: why and how should/can sedimentation rates be established in the laboratory?
- Page 140, 11.2.3 Soil salinity: what critical value will be applied?

- Page 140, 11.2.4, Groundwater quality: what water quality parameters will be assessed, what is the normal (reference) situation?

- **Recommendation:** include this information on these questions.

All monitoring will be carried out by the Boskalis Environmental Monitoring team and consists of physical and chemical measurements.

- **Recommendation:** involve the local population in the monitoring in a simple way, e.g. by asking them to report any changes they notice (see, hear, smell, feel), in fauna, flora, currents, flow patterns, turbidity, visibility, etc. Also the monitoring results of the Environmental Monitoring team could be explained in a simple way to the local chief on a regular basis. This could give them a feeling of being serious partners in the development of their island (not just as labourers).