Addendum III
to

Environmental Impact Assessment for the Development of a 200 bed Tourist Hotel on G. Dh. Magudhdhuvaa

Proposed by:

Ahmet Aydeniz Maldives Pvt. Ltd.

Signature:

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Thomas Le Berre

SEAMARC
Systems Engineering
And Marine Consulting

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1 Introduction

Since the beginning of the construction phase of the 200 bed resort project by Ahmet Aydeniz Pvt. Ltd. authorized by the MHTE (MEEW at the time) through a decision note (88-ES/NI-MAG/2008/3), a number of issues have arose and a number of changes in the site plan have been made. Since some of these have an implication in terms of environmental impacts, MTDC, Ahmet Aydeniz Pvt. Ltd. and the environmental consultant were notified during a meeting with EPA that an amendment to the initial EIA should be submitted to get an authorization for these new developments. The present addendum is the third for this project, and deals with three major issues:

- Due to a mis-location in the opening of the reef for the unloading area during construction works, the harbor shape has to be changed slightly to avoid a second opening in the reef crest on the eastern side
- 13 additional bungalows have been granted by the Ministry of Tourism, Arts and Culture, and located on the eastern side of the island
- The jetty on the northern side of the island will be enlarged to allow for a refreshment area

The present addendum III first presents the changes brought about in the design, followed by a discussion on the environmental consequences of these changes. A summary table giving the pros and cons of the changes is finally given before concluding on the environmental appropriateness of the changes.

2 New Layout

The new layout of the resort in Magudhdhuvaa is presented below (Fig. 2), as well as the layout previously submitted in Addendum II, are included here for reference (Fig. 1).

The main differences in the two layouts are the ones outlined above

a) Harbour basin shape modification
b) 13 additional bungalows on the eastern side
c) Jetty enlargement and refreshment area on the northern reef flat

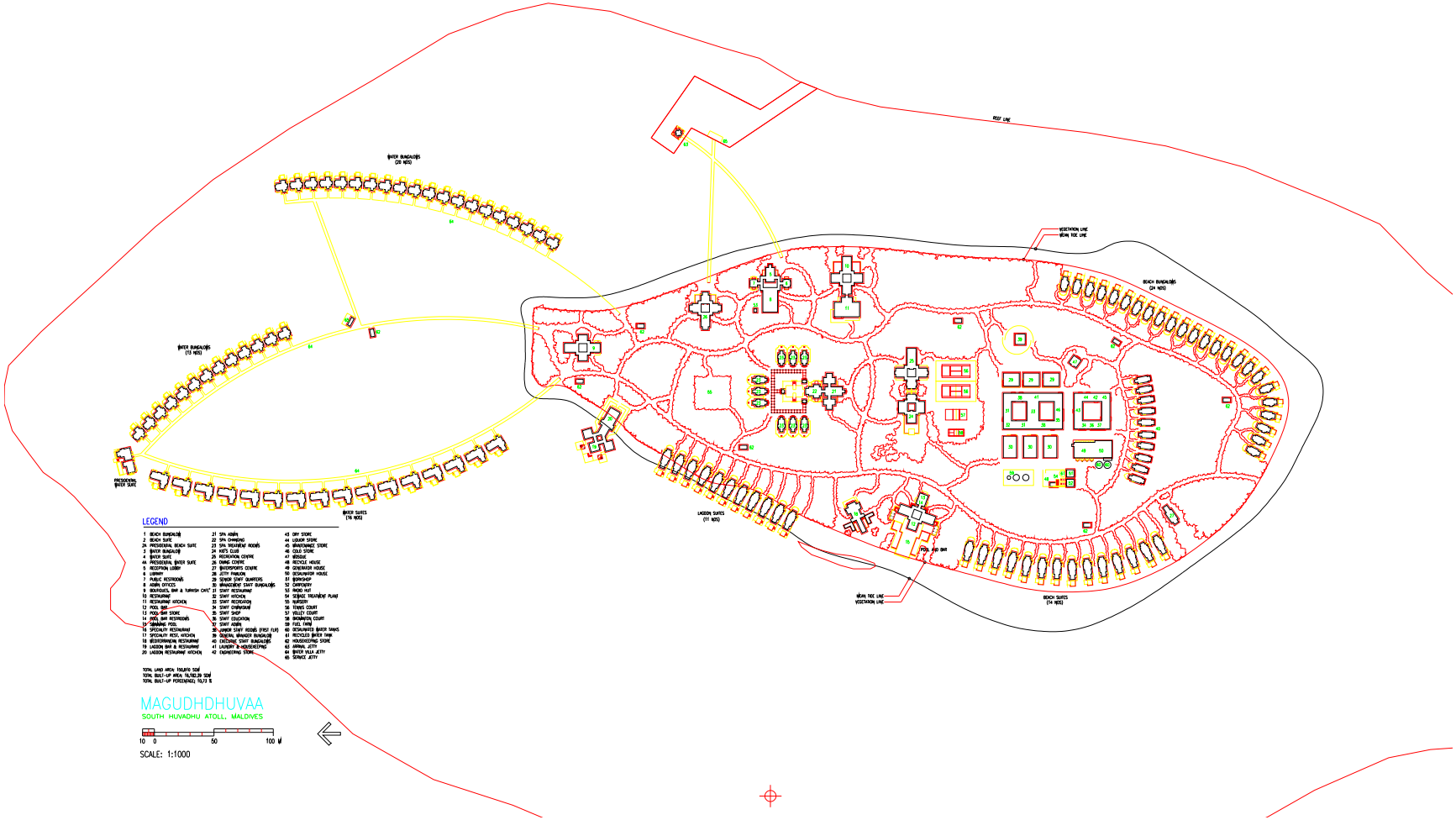

Figure 1: Layout proposed in addendum II for the resort in G. Dh. Magudhdhuva

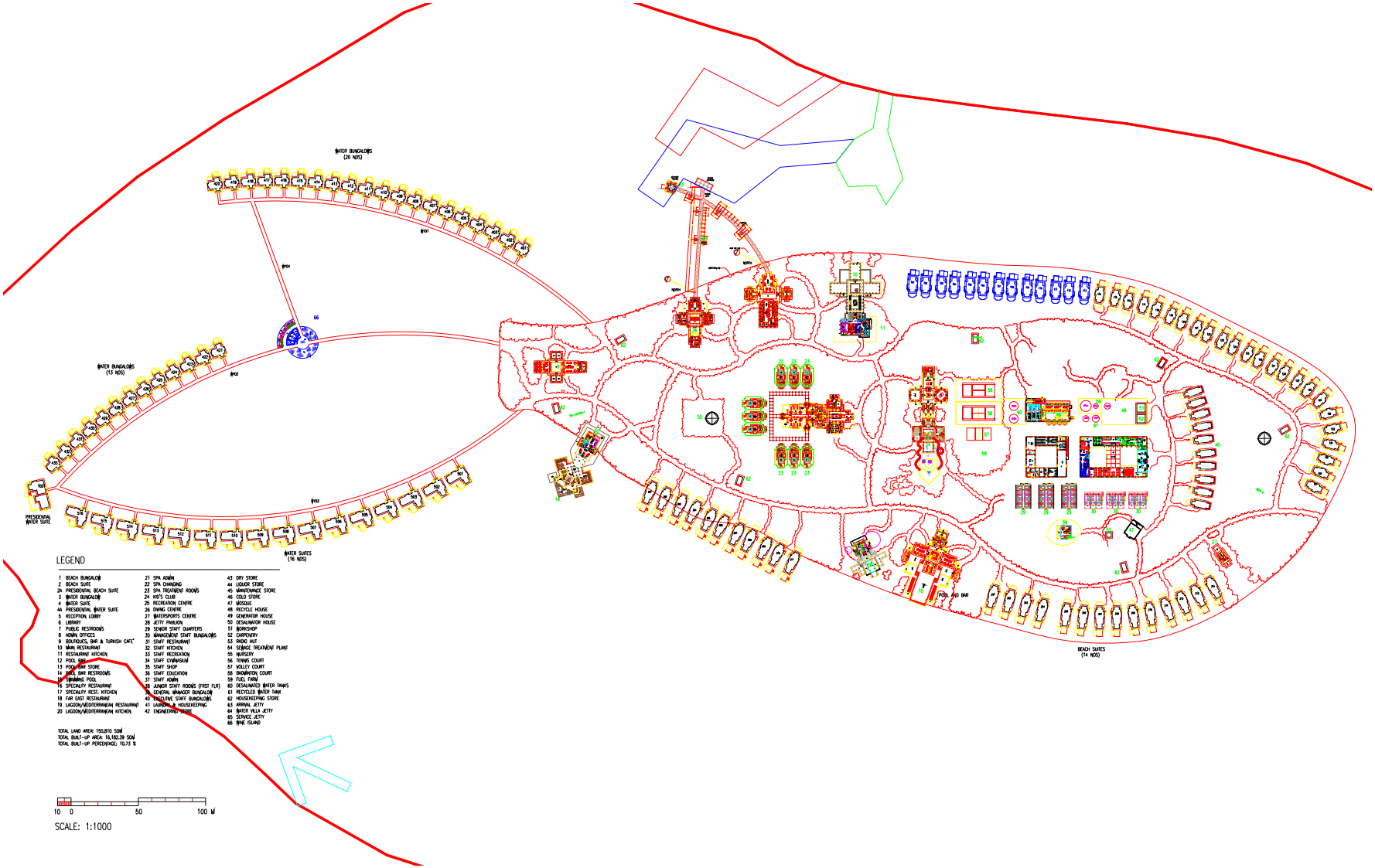

Figure 2: proposed layout of the resort at G. Dh. Magudhdhuvaa with major changes from previous approved designs highlighted in blue.

3 Description of proposed changes

3.1 Change in harbor basin design

Due to a mistake in the location of the channel during the construction phase, the channel which was open on the east side of the reef to allow for boats to come inside the lagoon is too far south. In order to avoid the creation of another channel very close by, which would further weaken the island by enabling larger amount of wave energy to enter the inner lagoon and the shoreline; it is proposed to revise the shape of the harbor before it is excavated.

The arrival jetty has been shortened in the latest design, which allow for the harbor basin to be located closer to the shore. This has rather positive environmental implications, as the harbor basin will therefore be located further from the reef crest and live coral areas.

The following drawing (Figure 3) compares the situations in the two drawings, and shows in addition, the present temporary harbor dredged area, and the previous shape of the harbor with the extended jetties.

During the excavation of the new harbor, the existing harbor will be partly refilled, while the rest of the material will be stock piled on the island for future use. It is in particular expected that some of this material will be used in the preopening period to spread on the roads and fill the dips to enable smooth buggy rides. Some of the rocky material will also be used to consolidate the coastline in places, in particular in the area fronting the channel, as it is expected that the increased wave energy reaching the shore will have a negative impact on the erosion of the coastline in that area.

The overall surface area remaining to be excavated is 4700 m2, to a depth of approximately 2.5 m below MSL. The volume of sand excavated is approximately 9000 m3. This compares with the 3700 m2 of the previously proposed harbor, which would in fact yield more material and especially more rocks given that the crest is shallower and rockier than the internal lagoon. The previous approved design would have required excavation of 8000 m3. It is expected that the filling of the existing basin as proposed in figure 3 will require 1000 m3 of material.

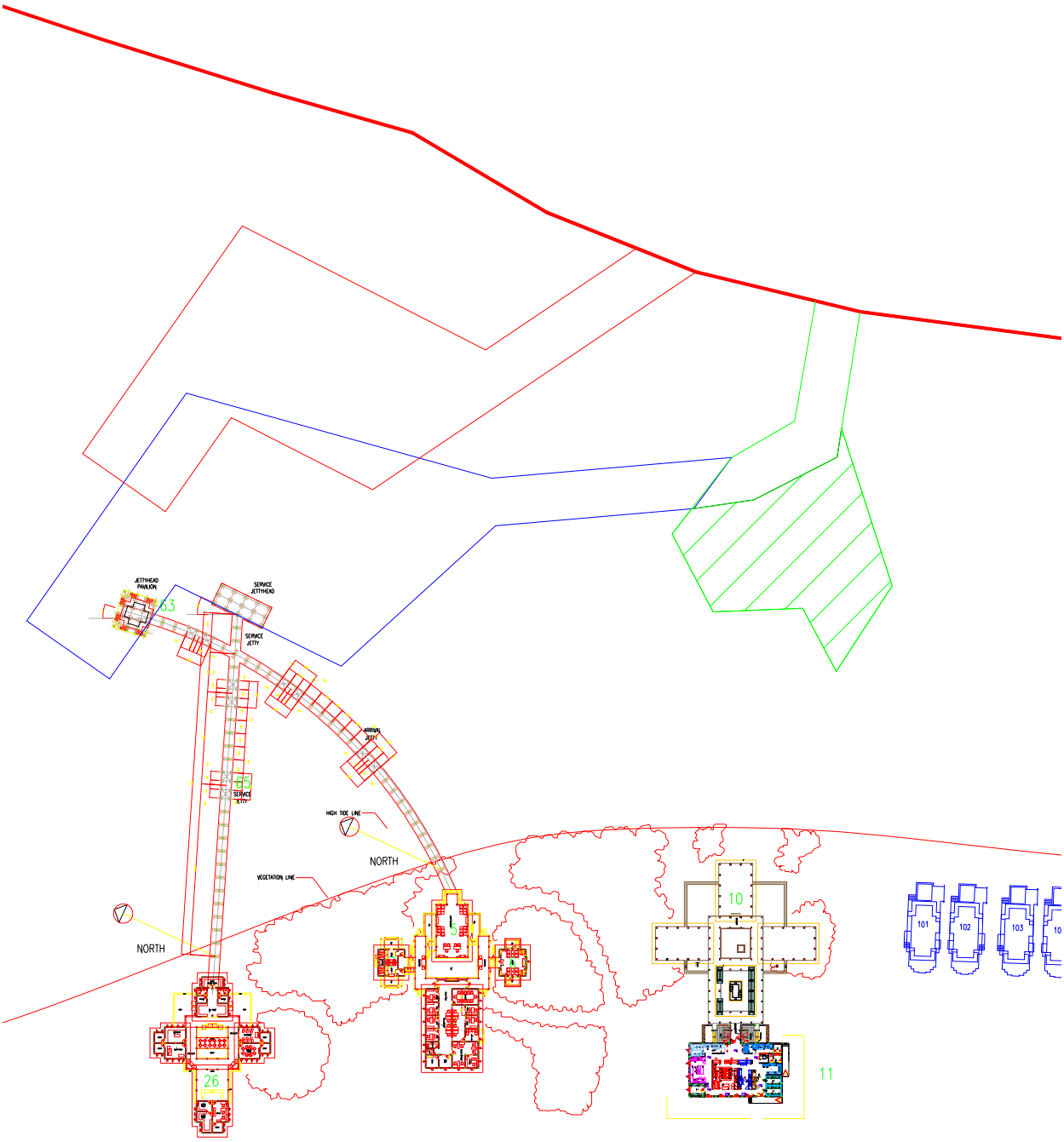

Figure 3: Changes to the harbor basin, in red the previously proposed harbor, in blue the proposed new harbor shape in green the existing temporary harbor, and hatched green, the area which will be filled before opening.

3.2 Additional 13 bungalows on the eastern side

Pending the approval of the additional 13 bungalows by the Ministry of Tourism, Arts and Culture, an area was left without construction on the eastern side of the island. The MoTAC has now approved of the additional 13 bungalows which have been located in this area (Fig 4).

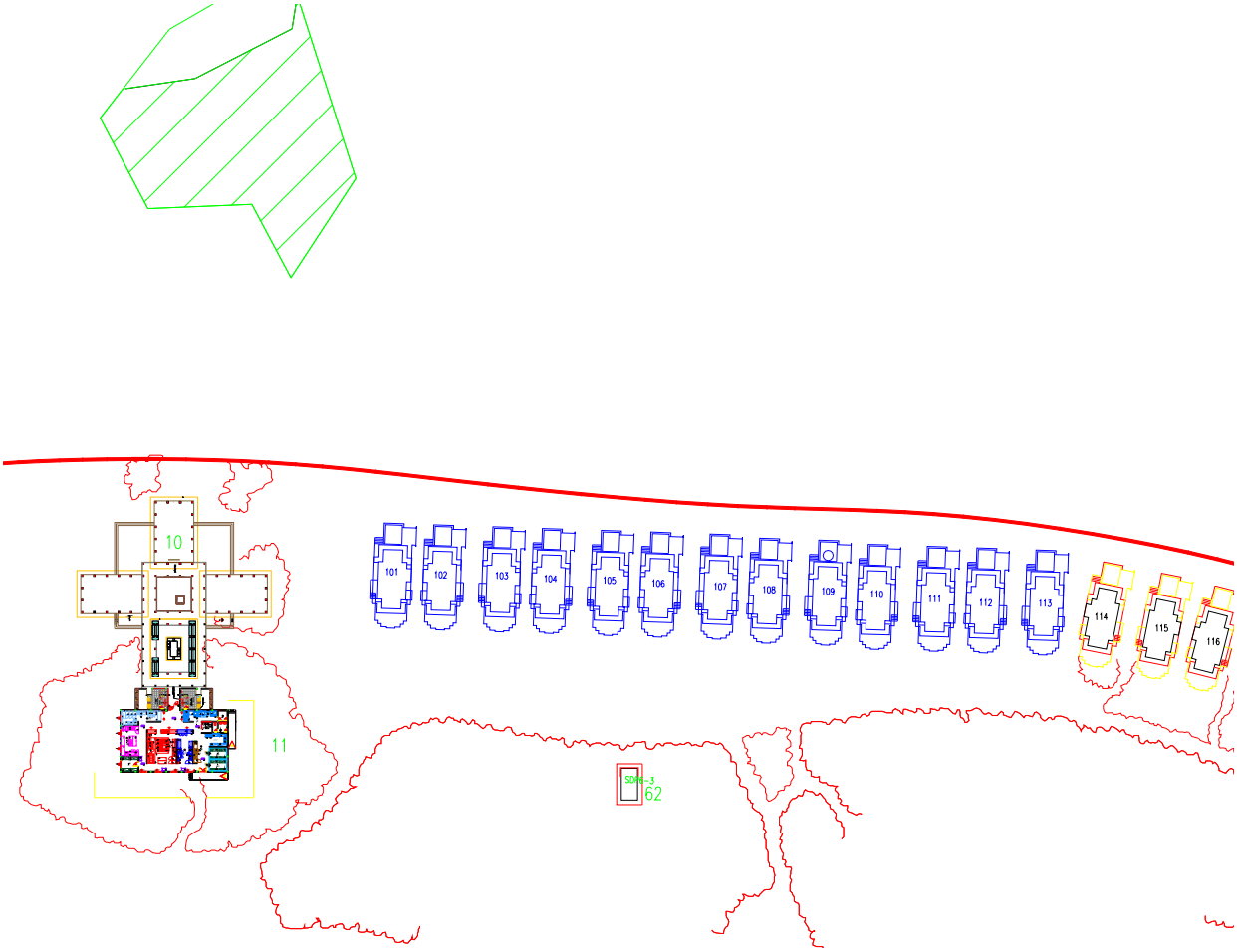

Figure 4: the 13 additional bungalows located on the eastern beach between the previously built bungalows and the main restaurant.

The construction method replicates that of the other bungalows located on the eastern side of the island where the vegetation buffer zone has been preserved.

4 Jetty enlargement and refreshment area

In order to provide a break to the people moving back to their water villa, Ahmet Aydeniz Maldives proposes to enlarge the deck area where the two jetties from the string of water villas meet. Refreshments will be proposed in this area, which will also be planted with greenery. To achieve this, some large concrete pots will be incorporated. The structural and architectural designs for this development are presented below (Fig. 5, 6 and 7).

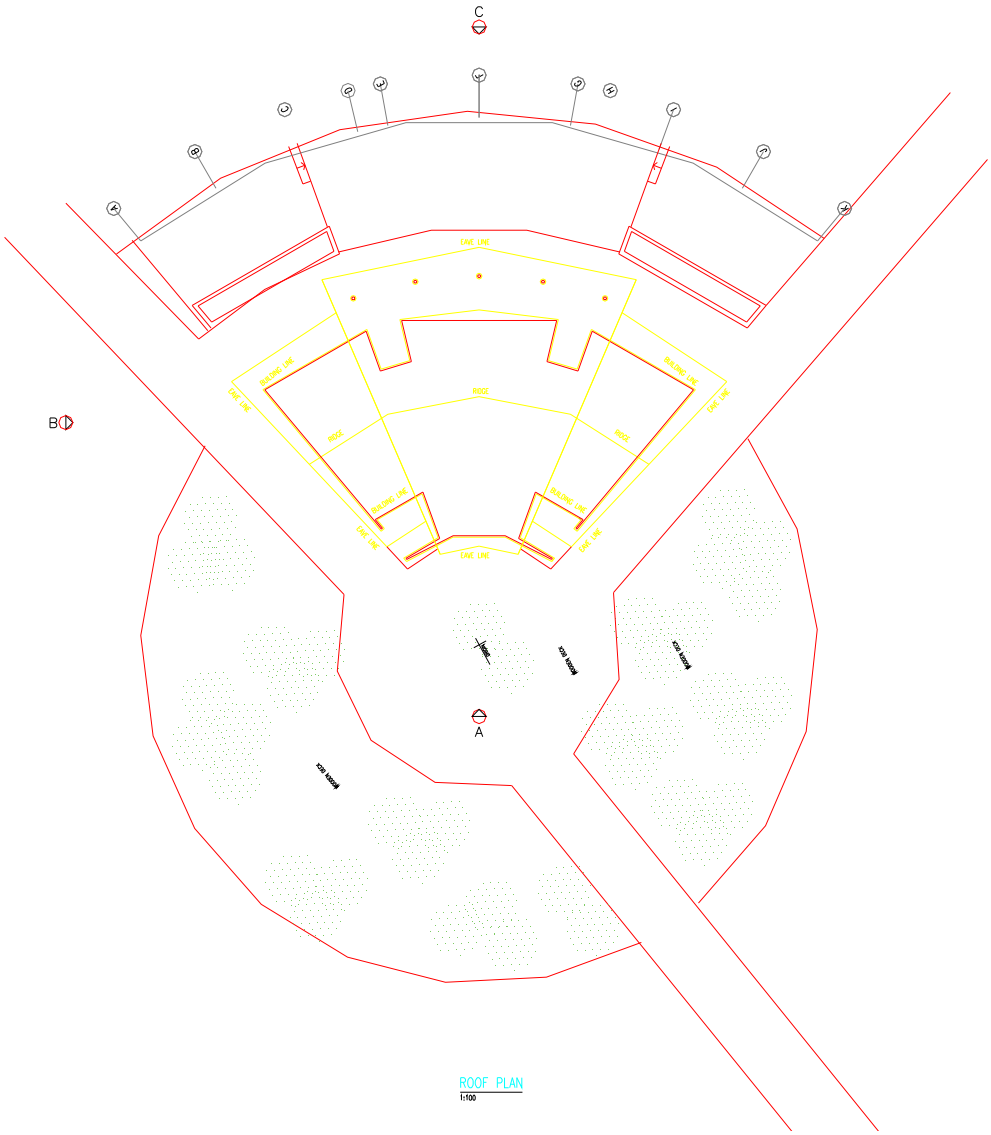

Figure 5: Top view of the jetty enlargement area

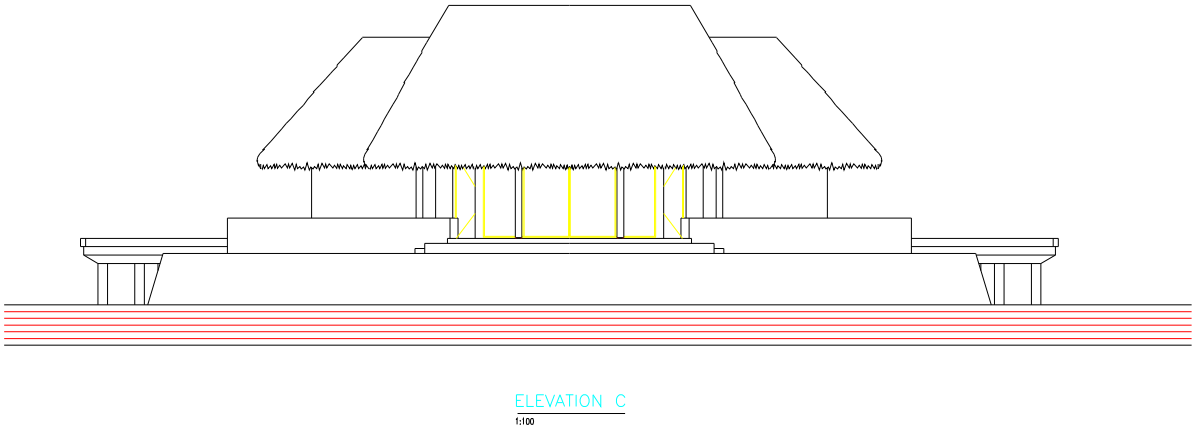

Figure 6: Elevation of the building on the jetty enlargement area

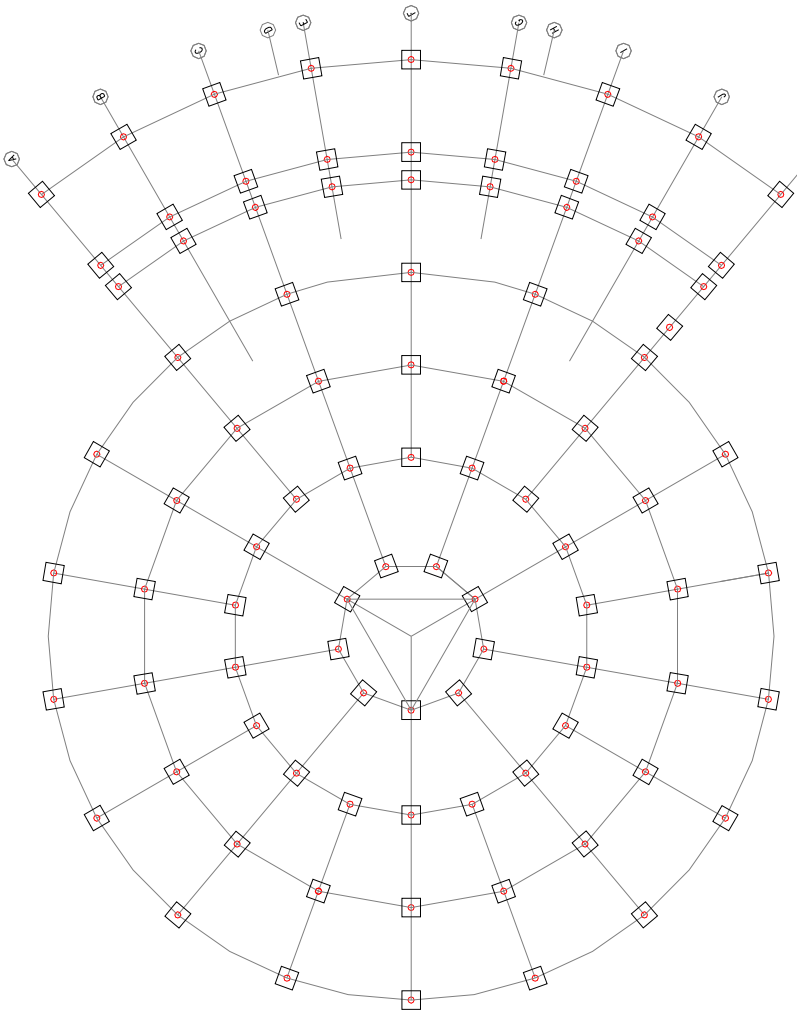

Figure 7: layout of the additional footings in the area

100 pillars will be added to the ones already approved. The design of the pillars is provided in figure 8. Similarly, the piles will be laid in a pit excavated in the sea bed. The machinery used is a heightened version of a usual excavator. With this, the operator can drive and operate the bucket in depth of around 1.5 m present in this area.

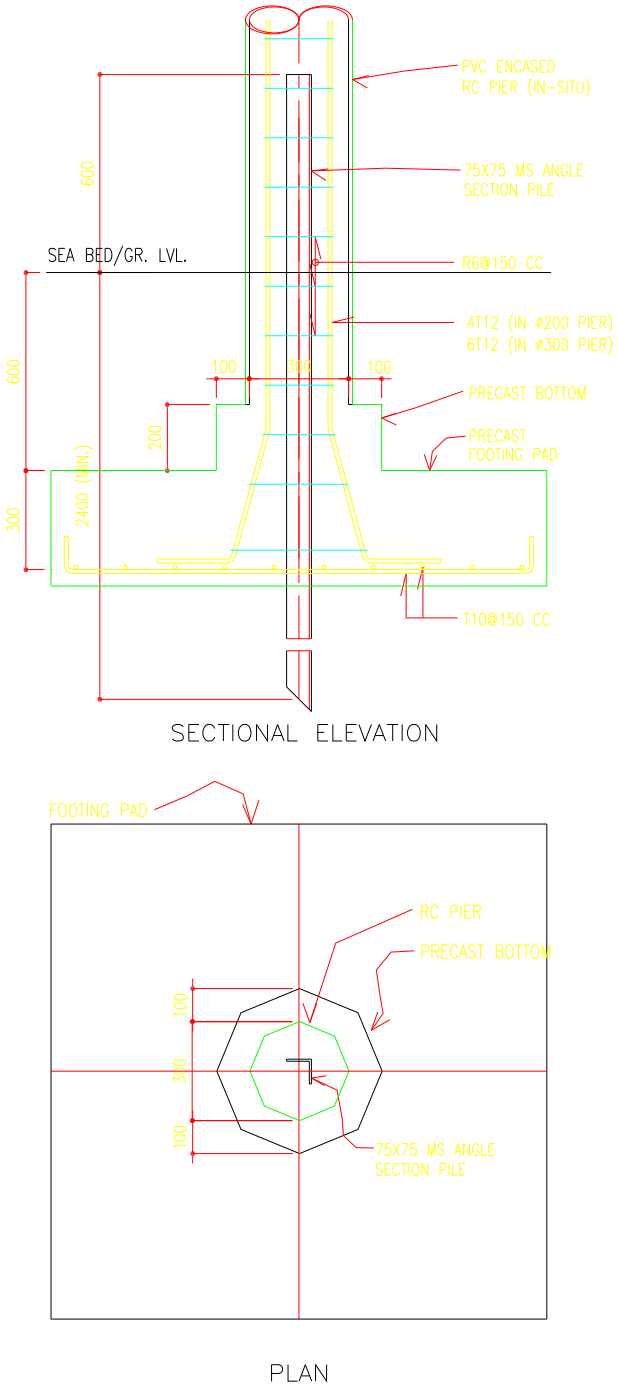

Figure 8: details of the footings and installation

5 Environmental impacts

The forecast environmental impacts of the proposed changes are described in the paragraphs below.

5.1 Change in harbor basin design

Given that the reef crest has already been dredged in order to allow for the cargo boats and barges to enter the inner lagoon, keeping the harbor basin as designed will entail creating a second opening to allow the boats to enter the inner lagoon in another area during operations. The reef crest is the part of the reef where most of the incoming wave energy will be dissipated and therefore such actions are creating weaknesses for the long term maintenance of the islands especially on an erosion and sand transport point of view. Therefore, creating a second opening will be detrimental to the island. Restoring the reef crest where it has already been destroyed can be envisaged, but eventually costly and the result will never be as effective as a preserved reef crest, at least for the first few years.

Being located very near one to the other, it is not expected that the change in the entrance will have much of an impact in terms of sediment transport.

It is proposed as a mitigation measure for this location of the harbor, that when refilling the existing temporary harbor basin, the sea bed is made slightly higher than the surrounding inner lagoon in order to dissipate some of the wave energy entering the lagoon through the opening. This will protect the coastline and prevent major erosion under the main restaurant.

The sediment plume is likely to move out through the already dug channel, the surroundings of which have already been exposed to quite high degree of sedimentation. Opening a new channel seems a bad option.

As for the works proposed in the initial EIA, the coral present in the area will be removed and propagated to enhance the reef and restore some of the areas which have been physically damaged during construction time.

5.2 Additional 13 bungalows on the eastern side

The 13 additional bungalows will increase the overall consumption of the island in terms of diesel burnt, laundry used, sewerage treatment and food consumption, including fish. The infrastructures of the resort had been designed to cater for this, and therefore will not need resizing. It also has to be noted than with a perspective of creating more tourist beds in the Maldives, allowing for more rooms in each island is a better environmental strategy than creating new islands.

The vegetation in the area is very similar to that which was cut to allow for the construction of the other bungalows in a more southern location along the east coast. It has to be noted that all the major trees, mostly coconut trees, which are not directly under the building are preserved in order to keep a natural shading of the decks and buildings.

The *heylhi* or coastal vegetation will also be maintained in the 5 m buffer zone to avoid erosion which could threaten the bungalows structures.

5.3 Jetty enlargement and refreshment area

The major impacts triggered by the construction of water structures on stilts are the physical damage caused to the substrate when constructing the structures, and the possible alteration to the water flow and sediment transport by the alteration of the hydrodynamic regime around the island.

The refreshment area is located 150 m from the shoreline, and therefore the 100 additional piles will not have a dramatic incremental impact. The impact of piles on the water flow is generally limited.

The site has already been rolled over by the excavator at numerous times to lay the piling of the jetty and water villas. The damage caused by the additional piles to the area appears limited in comparison to the authorized changes which have already occurred.

It is proposed, as a mitigation measure, to propagate corals in this area in order to restore the aesthetics in this area using the corals salvaged during the construction phase as per the EIA requirements. In fact, the presence of this refreshment area entices additional effort for the restoration of the sea bed as well as for the plantation of a number of trees, which will have a positive effect as compared to a plain jetty.

6 Summary table of environmental impacts

The following table gives a summary of the change in magnitude of the environmental impacts between the approved scenario and proposed development. This means that the ratings is positive when the impacts are less than the one associated with the initial site plan, even though the overall impact remains negative, and negative if the situation is worse than previously described.

Table 1: Impact Ratings

Activity	Site of Impact	Component	Impacts	Rating	Mitigation	Final rating
Change of harbor shape design	Excavated area	Excavation	Physical damage to less corals as the reef crest is avoided	+	Coral translocation	+
			Disturbances to the sea bed will affect less fish life and invertebrates, as the reef crest is where more territorial species are located.	+		+
			Loss of Habitat	+	The translocated reef will create additional habitat	+
	Beach (operation phase)	Erosion	The existing opening will increase erosion once the temporary jetty is removed.	++	The dredged area will be filled with a higher seabed level to reduce wave energy on the shore	++
	Area where sediment plume will drift		The corals concerned have already been submitted to high turbidity and sedimentation, and this should be avoided in other areas	+		+
Additional 13 bungalows	Footprints of Buildings	Land Clearing	Loss of Vegetation	-	Relocation of the most significant trees and creation of nursery area / adaptation when setting out	-
			Loss of Habitat	-		-
			Burning of green wastes, smoke and green house gazes emitted	-	Continue to implement composting	-

Additional 13 bungalows		Digging	Open conduct for contamination of Groundwater	-	Proper planning and swift operation is requirred at this stage	-
		Dewatering	Possible depletion and salinization of the groundwater	-	Proper planning and swift operation is requirred at this stage	-
		Concrete Pouring	Leachate of chemicals in to the ground	-		-
	Vicinity of building	Construction	Construction wastes	=	Waste management practices have to be strictly implemented	=
	Overall consumption	Operation	Diesel consumption, sewerage production etc…will be incrased	-		-
Jetty enlargement	Jetty area	Footings excavation	Physical damage to corals	=	Coral translocation	+
			Disturbances to the sea bed will affect fish life and invertebrates	=		=
			Loss of Habitat	=	The translocated reef will create additional habitat	improvement
			Plantation of greenery on the jetty	+		+

7 Conclusion

Overall, the component which attracts the most negative impacts is the construction of the building, as it will increase the overall consumption of the resort. Although largely negative on an environmental point of view, the economic benefit is substantial in regards to the increase in environmental disturbances, making this additional profit “greener” than the rest. Therefore in a context of increase of the number of tourist beds on a regional scale is a good strategy.

Given the bad initial positioning of the channel to the arrival jetty, it appears necessary to change the shape of the harbor basin to have a channel linking the basin to the existing entrance. This option scores high compared to the alternative of breaking a new entrance through the reef crest, even if significant effort were made to restore the temporary harbor channel.

The location of the jetty refreshment area is relatively far from the island and would not affect the island in the long run as far as sediment transport is concerned. As the area has already undergone near to total damage due to the movement of the excavator on the sea bed, the additional work for the piles will have little consequence in the final outcome. On the contrary, the refreshment area is meant to add to the aesthetics of this area and the restoration efforts will be an improvement compared to an otherwise less interesting jetty.

8 Declaration of the Consultant

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

Name: Mariyam Rozlyn Saleem

Signature:

Date: 08/09/2010

Appendices

Environmental Protection Agency
Ministry of Housing and Environment
Male', Republic of Maldives

Terms of Reference for Addendum to Environmental Impact Assessment

The following is the TOR based on the scoping meeting held on 02nd September 2010 for undertaking the Addendum III to the EIA for the Proposed development of a 200 bed Tourist Resort in Madudhdhuva, Gaafu Dhaalu Atoll , **Maldives.** *This TOR is for an addendum to the EIA for the proposed development of additional 13 beach suites on the eastern side of the island, changing the shape of the harbor, development of a refreshment area on stilts and extension of the jetty.*

1. Introduction - *provide details of the objective of the report and the objectives of the prpoposed development and description of the proponents of this project;*

Study Area - *Specify the boundaries of the study area for the assessment as well as any adjacent areas that should be considered with respect to the project.*

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

Task 1. Description of the Proposed Project– *Provide a full description of the relevant part and nature of the project, using maps at appropriate scales where necessary. This is to include: justification of the proposed project, a clearly labelled site plan and architectural drawings giving estimated area of the island (changes in size, width and length) detailed description of how the project activities will be undertaken including work method for constructing structures (Change in harbour design, Additional 13 bungalows and jetty enlargement)*

Task 2. Description of the Environment - *Where baseline data is to be collected, careful consideration must be given to the design of the survey and sampling programme. Data collection must focus on key issues needing to be examined for the EIA. Consideration of likely monitoring requirements should be borne in mind during survey planning, so that the data collected is suitable for use as a baseline to monitoring impacts.*

Assemble, evaluate and present baseline data on the relevant environmental characteristics of the study area (and disposal sites).

- *Sea water quality parameters for the locations for the proposed development shall specifically include: dissolved oxygen, salinity, pH, temperature, turbidity, nitrates, phosphates, BOD and COD.*
- *Description of the coral reef, flora and fauna of the proposed locations*

All survey locations shall be referenced with Geographic Positioning System (GPS) including sampling points, reef transects, vegetation transects, manta tows and soil sampling sites. All water samples shall be taken at a depth of 1m from the mean sea level or mid water depth for shallow areas. At least two benchmarks shall be used when undertaking the baseline assessments. The report should outline the detailed methodology of data collection utilized to describe the existing environment.

Where references are made to earlier EIA reports, please provide exact sections of the report and also provide a copy of the EIA report refered to.

Task 3. Determine the Potential Impacts of the Proposed Project – The addendum should identify all the impacts and shall determine and analyze all the significant impacts for the proposed redevelopment for both construction and operational phases. This should include Impacts on coral reef, reef flora and fauna from project activities.

It should also describe the methods used identify the significance of the impacts outlined. The report should outline the uncertainties in impact prediction and also outline positive and negative: short and long-term impacts. Identify impacts that are cumulative and unavoidable.

Task 4. Mitigation and Management of Negative Impacts – Identify possible measures to prevent or reduce significant negative impacts to acceptable levels for both construction and operation phase_Discuss the feasibility and cost effectiveness of each mitigation measure and provide the costs of mitigation and the commitment to it.

Task 5. Environment Monitoring – A reasonable timeframe should be outlined for monitoring during construction and operational phase. Identify the critical issues requiring monitoring to ensure compliance to mitigation measures. The report should also provide a detailed cost breakdown for implementing the monitoring plan. Provide a commitment letter of the Proponent to conduct the monitoring programme.

Timeframe for submitting the EIA report – The developer must submit the completed addendum within 3 months from the date of this Term of Reference.

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06 September 2010