Gladonia Maldives Pte Ltd

1st Addendum to the EIA Report

Resort Development Project at Fushivelavaru

NOONU ATOLL

January 2012

Gladonia Maldives Pvt. Ltd.

Fushivelavaru Island Development Project

17th January 2012

Ref No: 001/GMPL/2012

Mr. Ibrahim Naeem
Environment Protection & Research-Director
Environmental Protection Agency
Ministry of Housing & Environment
Ameenee Magu,
Malé,
Republic of Maldives

Dear Mr. İbrahim Naeem

Subject: Addendum to the EIA report for proposed Resort Development at Noonu Fushivelavaru

Reference is made to your letter number 203-FINHUM/PRIV/2011/480 dated on 11 December 2011.

As the proponent of the proposed project, we guarantee that we have read the report and to the best of our knowledge all non-technical information provided here are accurate and complete. Also, we hereby confirm our commitment to finance and implement all mitigation measures and the monitoring program as specified in the report.

Yours Sincerely,

Mohamed Nihaj
Owners Representative

GLADONIA MALDIVES PRIVATE LIMITED
C-0661/2010

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Declaration of the Consultant

I certify that statements made in this 1st Addendum to the Environment Impact Assessment Report for Resort Development at N. Fushivelavaru, to best of my knowledge are true, complete and correct.

Name: Hussein Zahir

Consultant Registration Number: 04-07

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1 EXECUTIVE SUMMARY

This first addendum to the EIA report for the Resort Development Project at N. Fushivelavaru looks into the proposed changes to the design concept of the resort. Major changes include the change in number of Villas from 50 to 48, revised categories or Villas and change in orientation and location of over water structures as well as location of structures on land. Back of House area is now proposed to be constructed in the already existing cleared area rather than throughout the island as previously planned. Proposed changes are as follows:

- Change in direction and shape of Water Villas Jetty
- Service Buildings and support facilities moved to center of Island
- Signature Restaurant moved to the south east corner of the lagoon
- Detached Romantic Villa included and moved to east corner of the lagoon
- Location of Ocean Spa revised and moved more north east of the lagoon
- Service Jetty expanded
- Included an Arrival Pavilion on the Northern side
- Modification to the Arrival Pavilion on the Southern side
- All day dining restaurant moved to the opposite side
- Kids Club moved to the opposite side
- Wine Cellar moved to shore near first client villas
- Yoga Deck moved to shore

All baseline data collected during the initial survey were seen to be sufficient for the purpose of the addendum, thus cancelling the need for further data collection. Impact assessment due to the changes were also observed to be the same, thus no further impacts are envisaged due to the proposed changes. Positive impacts such as minimized vegetation clearance (due to move of BoH area to existing cleared areas) and minimized excavation (due to extension of jetties upto reef edge) are foreseen.

2 INTRODUCTION AND RATIONALE

This first addendum to the EIA report for Resort development project at N. Fushivelavaru is prepared to address the changes to the development concept plan of the resort. The changes to the concept plan was made to streamline the design of the over water structures and to relocate the Back-of-House (BoH) area components within the existing cleared farm plots. The reason for relocation is to separate the BoH area from rest of the island and to minimize requirement for vegetation clearance. The general location of over water structures remains as it is in the initial concept except for the romantic villa which has been relocated to the eastern corner of the lagoon. The existing locations of water bungalows and walkways were reoriented by the architect to harmonize the design.

3 STUDY AREA

The island of N. Fushivelavaru is located on the northwestern quadrant of Noonu Atoll, close to Maavelavaru (resort under development) (Figure 1). The reef system hosting Fushivelavaru is a circular shape reef, which has a length of 1,272m and width of 908m. The area of reef system is 887,604m^2. The reef flat is wider at the western side while narrowest at southern side. The island of Fushivelavaru is approximately 585m long and 490m wide (inside beach toe). The area inside vegetation at Fushivelavaru is 170,310m^2, while inside beach toe is 206545m^2 (based on shoreline map dated 3rd October 2010). The island occupies approximately 23% of moat of the reef. The western and southern lagoon areas are deeper compared to the rest of the reef.

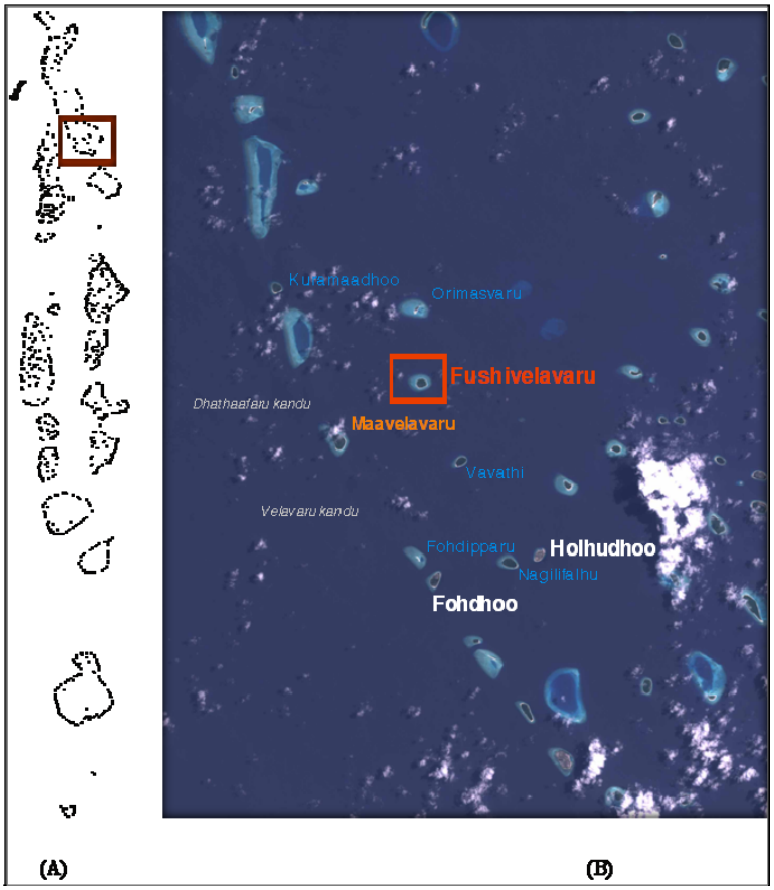

Figure 1 Maldives archipelago, B- Satellite image of western side of N. Atoll and location of Fushivelavaru

4 SCOPE OF WORK

This addendum to the EIA is prepared due to the changes brought to the concept plan of the resort. An EIA application form was submitted to EPA briefing the changes to the concept plan. Scoping meeting was held at EPA on 17th November 2011 with personnel from EPA, representatives from the proponent and EIA consultant. In the scoping meeting it was agreed that no major changes have been made to the concept plan apart from changes to orientation of the over water structures and reorganization of BoH area to existing cleared farm plots. Therefore it was agreed that additional environmental data is not required. Based on the discussions at the meeting, a ToR was finalized and approved by EPA on the 11th of December 2011 (ToR attached in Appendix 1).

Land and Marine Environmental Resource Group Pte Ltd have been engaged by Gladonia Maldives Pvt Ltd to prepare the addendum to the EIA and to provide assistance in other environment related activities. This addendum to the EIA is prepared in accordance with the Environmental Impact Assessment Regulations 2007 and the Government of Maldives' Environmental Policy and Guidelines.

4.1 DESCRIPTION OF THE PROPOSED PROJECT

N. Fushivelavaru will be developed as a 5 star 100 bed luxury resort offering a unique and exclusive product (see Appendix 2 for revised site plan and previous site plan). The project will involve construction of land villas, water villas, service facilities, support facilities and dredging of a small basin and cutting entrance at the northern side. Details of key structures are given in Table 1.

Table 1 Key Structures for N. Fushivelavaru

Item	Building/Facility	Qty	Unit area	Total area
1.00 GUEST LODGING				
1.1.1	Owners Villa	1	527.7	527.7
1.1.2-3	Client Villa	2	527.7	1055.4
1.2	Beach Residence	2	450.24	900.48
1.3	Two Bedroom Family Villa	6	233.52	1401.12
1.4	One Bedroom Beach Villa	9	101.05	909.45
1.5	One Bedroom Deluxe Beach Villa	9	144.95	1304.55
1.6	Water Villa	8	93.06	744.48
1.7	Deluxe Water Villa	8	100.77	806.16
1.8	Ocean House	1	229.59	229.59
1.9	Romantic Villa	1	254.18	254.18
1.10	Beach House	1	249.1	249.1
	TOTAL (Rooms)	***48***		
2.00 PUBLIC AREA				
2.1	All Day Dining Restaurant	1	750	750
2.2	Lounge Bar	1	378.58	378.58
2.3	Signature Restaurant	1	1056.9	1056.9
2.4	Ocean Spa	1	676.87	676.87
2.5.1&2.5.2	Tower Deck Pool Club and Wine Cellar	1	283.53	283.53
2.6.1&2.6.2	Kids Club and Recreation Centre	1	708.19	708.19
2.7.1	Yoga Deck	1	62.65	62.65
2.7.2	Reception	1	267.18	267.18
2.7.3	Library	1	78	78

2.7.4	Day Rooms	1	39.9	39.9
2.7.6	Boutique	1	36.29	36.29
2.8	Beach Hut	1	28.09	28.09
2.9	Turtle Hatchery	1	36.59	36.59
2.1	Dive Pavilions and Clinic	1	307.75	307.75
2.11.1	Arrival Pavilion North	1	31.98	31.98
2.11.2	Arrival Pavilion South	1	31.98	31.98
2.12	Water Sports Centre	1	55.87	55.87
3.00 SUPPORT FACILITY & SERVICES INFRASTRUCTURE				
3.1	General Manager's Bungalow	1	165.81	165.81
3.2	Exec. Staff Bungalow	1	717.86	717.86
3.3.A	General Staff Quarters - Block A	1	667.05	667.05
3.3.B	General Staff Quarters - Block B	1	667.05	667.05
3.3.C	General Staff Quarters - Block C	1	667.05	667.05
3.4	Staff Recreation, Restaurant & Kitchen	1	690.21	690.21
3.5	Staff Café' and Shop	1	293.29	293.29
3.6	Resort Administrative Offices	1	293.29	293.29
3.7	Staff Laundry, Clinic and Stores	1	690.21	690.21
3.8	Cold Store, Freezer and Liquor store	1	293.29	293.29
3.9	General Stores	1	293.29	293.29
3.10	Mosque	1	62.6	62.6
3.11	Radio Hut	1	13.07	13.07
3.13	Bakery and Carts Parking	1	160.56	160.56
3.14	Technical Infrastructure and Services Area	1	676.13	676.13
3.14.1	Landscape Store and Carpentry Building	1	136.9	136.9
3.14.2	Fuel Farm	1	187.75	187.75
3.14.3	Over Ground RO Water Tank 1	1	28.27	28.27
3.14.4	Over Ground RO Water Tank 2	1	28.27	28.27
3.14.5	Over Ground Recycled Treated Water Tank 1	1	28.27	28.27
3.14.6	Over Ground Recycled Treated Water Tank 2	1	28.7	28.7
3.14.7	STP Container 1	1	14.58	14.58
3.14.8	STP Container 2	1	14.58	14.58

3.14.9	STP Container 3	1	14.58	14.58
3.14.10	STP Container 4	1	14.58	14.58
3.14.11	Under Ground Water Collection Tank	1	103.4	103.4
3.14.12	Incoming Feed Water Collection Tank	1	14.58	14.58
3.14.13	RO Tank 1	1	14.58	14.58
3.14.14	RO Tank 2	1	14.58	14.58
3.14.15	Fresh Water Reticulation Pump	1	14.58	14.58
3.14.16	Recycled Water Reticulation Pump	1	14.58	14.58
3.14.17	Rain Water Reticulation Pump	1	14.58	14.58
3.14.18	Waste Water Discharge Pump	1	14.58	14.58
3.14.19	Under Ground Rain Water Collection Tank	1	103.4	103.4
3.15	Service Jetty Pavilion	1	32	32
3.16	Service Building	18	22.72	408.96
	TOTAL BUILT UP AREA			***20809.62***
	TOTAL LAND AREA			***206550***
	TOTAL BUILT UP PERCENTAGE			***10.07***

4.1.1 PROPOSED CHANGES TO THE CONCEPT PLAN

The project involves changes to the proposed concept plan. The proposed changes are mainly changes in the orientation and to some extent, the location of the structures. The proposed changes include:

- **Shape of Water Villas Jetty and direction is changed**
  The water bungalows which were previously located on the western side have now been changed to the northwestern corner of the island, with a change to the design and shape of the jetty as well as categories of the water villas.

- **Service Buildings and support facilities moved to center of Island**
  All the service buildings and support facilities have been moved to the centre of the island, where land had previously been cleared for farming. This will minimize the need for vegetation clearance and also gives a more structured and neater plan for the island.

- **Signature Restaurant moved to the south east corner of the lagoon**

The Signature restaurant which was previously together with the wine cellar and was located on the northern side of the lagoon is now located on the south east corner of the lagoon together with the Champagne lounge.

- **Detached Romantic Villa included and moved to east corner of the lagoon**
  A new addition labeled as the Detached Romantic Villa has been included and is located on the eastern side of the lagoon.

- **Location of Ocean Spa revised and moved more north east of the lagoon**
  The spa facility has also been moved and is now on the northeastern side of the lagoon.

- **Service Jetty expanded**
  The service jetty has now been expanded up to the reef edge, so as to minimize excavation work.

- **Included an Arrival Pavilion – North**
  An additional arrival pavilion has also been added to the northern side.

- **Arrival Pavilion - South without lagoon bar**
  The access to the island remains the same as earlier, from the southern and northern side of the reef. As before, the arrival pavilion is on the southern side and the service pavilion is on the northern side. The lagoon bar which was previously located at the arrival pavilion on the southern side has now been removed and will not be constructed. The arrival pavilions will also be extended up to the reef edge, both on the northern and southern side so as to minimize excavation. A small harbor basin will still be dredged as before, between the northern side service jetty and arrival pavilion.

- **All day dining restaurant moved to the opposite side**
  The All-Day Dining Restaurant which was previously located on the eastern half of the island have now been moved to the western half of the island.

- **Kids Club moved to the opposite side**
  The kids club which was previously located on the eastern half of the island have now been moved to the western half of the island.

- **Wine Cellar moved to shore near first client villas**
  The Wine Cellar is now located on land on the western side of the island near the 1st Client Villas.

- **Yoga Deck moved to shore**
  Yoga deck has now been moved on land.

- **Number of villas reduced from 50 to 48**
- **Floor plan and categories of villas revised**
- **Location of villas re arranged**

Over all, the numbers of villas have changed from 50 to 48 (inclusive of Beach Villas). Furthermore the categories of villas as well as the floor plan and location of villas have also changed. The change in location of Water villas have been explained in section above. While the locations of the Beach Villas remain the same, their categories have changed and the new categories are detailed in Table 1.

4.2 DESCRIPTION OF THE ENVIRONMENT

The majority of the proposed changes involve changes in the orientation of the structures such as shape and direction, whereas the location of the structures remained fairly consistent as that of the original concept plan. Similarly, all the developmental changes described fall onto footprints that have been previously surveyed for baseline data. Thus, assessments of both baseline marine and terrestrial assessments are covered in the original EIA report. No additional environmental data was collected for the report as agreed in the scoping meeting. Environmental data provided in this report is derived from the EIA report for Resort Development at N. Fushivelavaru as stated in the ToR task 2.

4.2.1 CLIMATOLOGY AND OCEANOGRAPHY

4.2.1.1 WIND CLIMATE

Details of Wind Climate are provided in section 6.2.1 of the EIA report for Resort Development at N. Fushivelavaru. Due to the absence of site specific data for wind, this section is not detailed further in the addendum.

4.2.1.2 TIDE

Tides experienced in the Maldives are mixed semi-diurnal and diurnal with a strong diurnal inequality. Since the nearest Meteorological centre is at Hanimadhoo, data from this station (continuous records of tide for over the past 12 years) is used to compare with tida data collected on site at Fushivelavaru (Figure 2). Since the only permanent tide station near Fushivelavaru is at Hanimaadhoo Airport it was assumed that the tidal signal at Hanimaadhoo will be the same as that at Fushivelavaru. This assumption was verified by the data collected on site using the tide gauge. Further details of tide data at Hanimadhoo are shown in section 6.2.2. of the EIA report for resort development at N. Fushivelavaru.

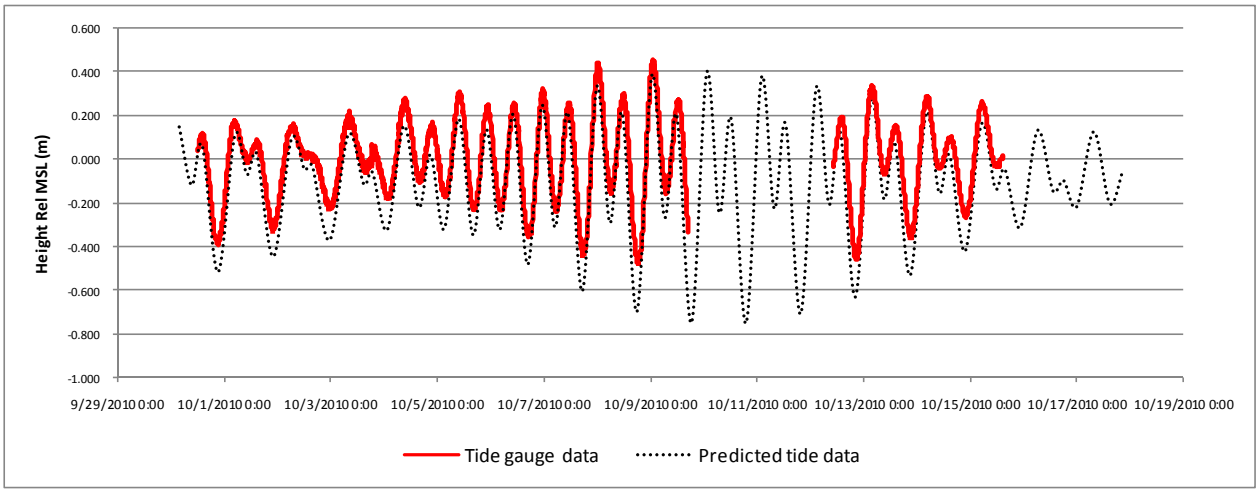

Figure 2 Tide data collected at N. Fushivelavaru for the period 30th September to 15th October 2010. The dashed lines are predicted tide data from Hanimaadhoo tide station for the same period

4.2.1.3 WAVE

DHI (1999) reported that in the southern regions of the Maldives higher waves generally occur in the middle of the SW-monsoon (June-August) with a predominant wave direction of S (180^{o}), and in shorter periods during October-December with wave directions varying from S and W (180-270^{o}) (Figure 3). In the NE-monsoon, the waves are relatively small with directions in the sector NE-S.

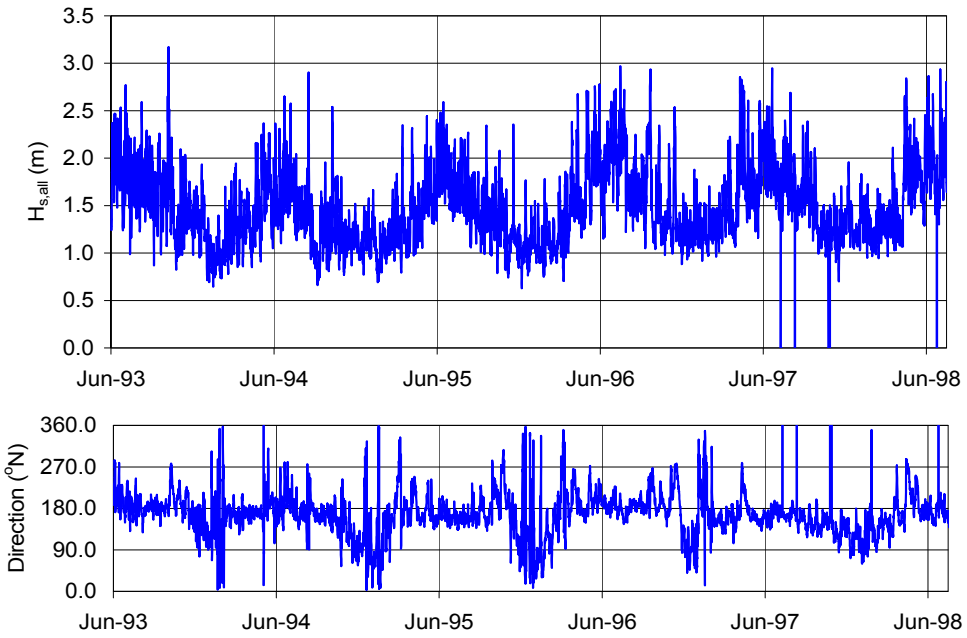

Figure 3 Wave height, Hs and corresponding mean wave direction. 1993 -1998 (Source: DHI 1999)

Wave conditions at the reef hosting N. Fushivelavaru were recorded for the period 30th September to 15th October 2010. The wave/tide gauge was deployed at the western side of the island approximately 170m away from the island at the lagoon. The wave data were measured at a frequency of 2Hz at different tidal stages. Harmonic analysis of the wave data enabled classification of the waves reaching N. Fushivelavaru.

These data (Table 2) showed that during the period at which wave data were collected, waves received at the western side was dominated by wind waves. The averaged percentage of swell waves on the western side of N. Fushivelavaru was 16.37% with an averaged wave period of 4.69s. Occurrence of wind generated waves at the western side of this reef was 51.85%.

Table 2 Results of wave data from wave gauge set at western side of the island

Burst No	Hs	Hrms	Hmax	H10	Ts	Tz	Tmax	T10
B1	0.20	0.15	0.30	0.24	3.79	3.13	2.50	4.01
B2	0.18	0.15	0.38	0.21	3.84	3.28	5.00	4.18
B3	0.21	0.16	0.33	0.24	3.99	3.29	5.50	4.15
B4	0.20	0.16	0.32	0.23	4.00	3.36	4.00	4.47
B5	0.21	0.16	0.34	0.24	3.70	3.27	4.50	3.76
B6	0.23	0.18	0.40	0.27	3.91	3.33	3.00	4.22
B7	0.26	0.20	0.51	0.31	3.99	3.33	4.50	4.45
B8	0.28	0.22	0.56	0.33	4.08	3.38	2.50	4.48
B9	0.32	0.26	0.56	0.36	3.98	3.50	2.50	4.06
B10	0.30	0.27	0.60	0.34	4.44	3.73	2.50	4.66
B11	0.33	0.28	0.74	0.38	4.00	3.46	3.00	3.87
B12	0.34	0.28	0.63	0.39	4.04	3.48	3.50	4.10
B13	0.34	0.29	0.77	0.39	4.23	3.58	3.50	4.33
B14	0.36	0.32	0.75	0.40	4.03	3.73	2.50	4.38
B15	0.37	0.34	0.86	0.41	4.37	3.78	5.50	4.80
B16	0.38	0.34	0.69	0.44	4.03	3.68	4.00	4.55
B17	0.37	0.33	0.67	0.42	4.32	3.79	3.50	4.30
B18	0.43	0.36	1.05	0.48	4.14	3.57	3.00	4.37
B19	0.40	0.35	0.75	0.45	4.33	3.74	4.50	4.74
B20	0.38	0.33	0.76	0.43	4.24	3.66	5.50	4.95
B21	0.37	0.33	0.81	0.42	4.27	3.72	5.00	4.57
B22	0.32	0.31	0.71	0.37	4.22	3.93	5.50	4.63
B23	0.31	0.30	0.76	0.35	4.44	4.08	5.50	5.06
B24	0.32	0.30	0.72	0.36	4.30	3.89	3.00	5.09
B25	0.32	0.27	0.59	0.37	4.14	3.56	3.50	4.68
B26	0.31	0.29	0.70	0.35	4.64	3.99	7.00	5.44
B27	0.28	0.25	0.56	0.31	4.06	3.84	2.50	4.23
B28	0.29	0.25	0.64	0.32	4.13	3.64	4.50	4.12
B29	0.31	0.24	0.55	0.36	3.84	3.30	4.50	3.92
B30	0.32	0.24	0.73	0.38	3.95	3.29	3.50	4.31
B31	0.25	0.21	0.57	0.29	3.89	3.54	6.50	4.03

B32	0.28	0.24	0.60	0.32	4.15	3.56	6.50	4.43
B33	0.27	0.24	0.67	0.29	4.06	3.73	3.50	4.05
B34	0.30	0.28	0.69	0.34	4.11	3.86	6.00	4.21
B35	0.27	0.24	0.61	0.29	4.04	3.76	4.00	3.76
B36	0.27	0.24	0.66	0.30	4.26	3.81	5.00	4.45
B37	0.29	0.25	0.57	0.32	4.00	3.70	7.00	4.43
B38	0.28	0.26	0.63	0.31	4.07	3.81	8.00	4.09
B39	0.30	0.27	0.60	0.33	4.15	3.87	7.50	4.16
B40	0.25	0.24	0.57	0.28	4.36	3.94	8.50	4.69
B41	0.34	0.27	0.72	0.39	4.00	3.33	5.00	3.70
B42	0.29	0.25	0.54	0.33	4.06	3.60	5.50	4.10
B43	0.28	0.24	0.58	0.31	4.26	3.70	3.00	4.05
B44	0.27	0.23	0.51	0.31	4.36	3.60	3.00	4.18
B45	0.24	0.21	0.48	0.28	4.31	3.60	3.00	4.20
B46	0.24	0.21	0.43	0.27	4.18	3.69	3.50	4.74
B47	0.24	0.20	0.43	0.28	4.22	3.50	5.00	3.94
B48	0.25	0.20	0.43	0.29	3.80	3.44	3.50	4.10
B49	0.28	0.21	0.52	0.35	3.82	3.13	2.50	4.13
B50	0.24	0.20	0.44	0.27	4.00	3.41	3.00	4.50
B51	0.25	0.21	0.41	0.27	4.14	3.61	7.50	4.47
B52	0.24	0.20	0.46	0.28	4.06	3.44	3.00	4.11
B53	0.23	0.18	0.38	0.27	3.91	3.29	3.50	4.00
B54	0.23	0.20	0.48	0.26	3.90	3.60	4.50	4.10
B55	0.24	0.20	0.44	0.27	4.15	3.51	4.50	4.60
B56	0.28	0.22	0.58	0.32	3.95	3.36	3.00	4.08
B57	0.27	0.22	0.48	0.31	4.01	3.44	2.50	4.23
B58	0.26	0.23	0.63	0.29	4.01	3.67	4.00	3.90
B59	0.27	0.22	0.48	0.31	4.08	3.46	6.00	4.44
B60	0.27	0.23	0.52	0.30	4.34	3.68	4.50	5.17
B61	0.30	0.27	0.65	0.34	4.47	3.87	4.00	5.20
B62	0.30	0.28	0.87	0.33	4.22	3.84	3.50	4.73
B63	0.30	0.28	0.71	0.33	4.38	3.89	5.50	4.54
B64	0.30	0.28	0.62	0.34	4.72	3.83	3.00	4.70
B65	0.34	0.30	0.66	0.38	4.23	3.76	5.00	4.33
B66	0.36	0.34	0.88	0.40	4.02	3.85	7.50	4.16
B67	0.37	0.36	0.78	0.42	4.37	4.12	9.00	5.12
B68	0.37	0.36	0.88	0.42	4.21	4.02	6.50	4.65
B69	0.40	0.37	0.95	0.45	4.25	3.87	3.00	4.55
B70	0.39	0.38	1.05	0.45	4.51	4.04	6.00	5.06
B71	0.34	0.33	0.78	0.39	4.24	3.96	3.00	4.15
B72	0.31	0.29	0.68	0.35	4.21	3.94	4.00	3.93
B73	0.34	0.31	0.79	0.39	4.41	3.64	3.00	5.19
B74	0.32	0.31	0.75	0.36	4.44	4.04	6.00	4.78
B75	0.32	0.29	0.68	0.36	4.17	3.81	3.50	4.32
B76	0.32	0.29	0.66	0.35	4.06	3.78	4.00	4.29
B77	0.33	0.30	0.74	0.36	4.12	3.81	10.00	4.34
B78	0.35	0.30	0.68	0.40	4.13	3.57	4.00	4.13

B79	0.34	0.33	0.78	0.38	4.05	3.97	5.00	4.30
B80	0.31	0.28	0.63	0.36	4.23	3.83	6.00	4.20
B81	0.34	0.30	0.68	0.39	4.26	3.61	4.50	4.52
B82	0.40	0.31	0.69	0.46	3.78	3.25	6.00	4.26
B83	0.34	0.28	0.68	0.38	3.92	3.49	3.50	4.55
B84	0.36	0.30	0.70	0.42	4.03	3.46	3.50	4.53
B85	0.33	0.28	0.61	0.37	4.00	3.53	7.00	3.82
B86	0.33	0.29	0.67	0.39	4.02	3.56	3.00	4.10
B87	0.35	0.29	0.81	0.39	4.08	3.43	2.50	4.82
B88	0.34	0.29	0.62	0.39	4.24	3.50	2.50	4.39
B89	0.35	0.29	0.69	0.39	4.09	3.48	9.00	4.45
B90	0.36	0.32	0.98	0.41	3.93	3.65	3.50	4.02
B91	0.33	0.30	0.69	0.36	4.03	3.72	3.00	4.14
B92	0.33	0.28	0.64	0.38	3.93	3.52	4.00	4.35
B93	0.35	0.30	0.68	0.38	4.11	3.65	5.00	4.07
B94	0.33	0.29	0.64	0.36	4.33	3.85	3.50	4.34
B95	0.32	0.27	0.61	0.36	3.92	3.50	7.00	3.77
B96	0.31	0.27	0.61	0.34	3.93	3.62	7.00	4.15
B97	0.31	0.27	0.61	0.35	3.98	3.60	7.00	4.32
B98	0.29	0.25	0.61	0.32	3.84	3.59	7.00	4.00
B99	0.28	0.24	0.61	0.32	3.97	3.60	7.00	4.23
B100	0.26	0.22	0.61	0.29	3.99	3.61	7.00	3.85
B101	0.28	0.22	0.61	0.32	3.92	3.34	7.00	4.00
B102	0.26	0.20	0.46	0.31	3.89	3.29	5.50	3.80
B103	0.25	0.21	0.44	0.28	4.15	3.52	4.50	4.65
B104	0.27	0.22	0.49	0.31	3.89	3.38	3.50	4.53
B105	0.26	0.21	0.49	0.30	4.00	3.37	3.00	4.25
B106	0.27	0.22	0.48	0.31	3.85	3.34	4.50	4.30
B107	0.29	0.23	0.52	0.34	4.09	3.33	3.00	4.33
B108	0.28	0.24	0.58	0.32	4.17	3.54	5.00	4.53
B109	0.29	0.24	0.56	0.34	3.98	3.43	7.00	4.11
B110	0.31	0.27	0.67	0.35	4.22	3.65	5.50	4.55
B111	0.32	0.29	0.64	0.36	3.97	3.70	3.50	3.90
B112	0.32	0.28	0.68	0.35	4.18	3.70	5.00	4.36
B113	0.34	0.30	0.64	0.38	4.37	3.74	3.00	4.53
B114	0.36	0.34	0.79	0.41	4.44	3.90	8.00	4.84
B115	0.39	0.36	0.93	0.43	4.42	3.92	8.00	4.96
B116	0.37	0.37	0.98	0.42	4.57	4.12	5.00	4.79
B117	0.34	0.33	0.83	0.38	4.51	4.09	7.00	5.44
B118	0.36	0.34	0.77	0.42	4.32	3.92	6.00	4.93
B119	0.36	0.33	0.75	0.40	4.26	3.81	6.00	4.98
B120	0.34	0.32	0.69	0.38	4.44	4.04	8.00	4.39
B121	0.35	0.34	0.75	0.40	4.71	4.04	6.00	4.78
B122	0.36	0.32	0.73	0.39	4.52	3.79	7.50	4.52
B123	0.33	0.31	0.70	0.36	4.22	3.97	4.50	4.61
B124	0.31	0.28	0.57	0.34	4.36	3.76	3.50	4.98
B125	0.31	0.28	0.59	0.35	4.39	3.90	7.50	4.70

B126	0.32	0.29	0.66	0.35	4.12	3.79	4.00	4.32
B127	0.32	0.28	0.62	0.35	4.56	3.74	4.50	4.50
B128	0.31	0.27	0.62	0.35	4.41	3.73	5.00	5.12
B129	0.30	0.26	0.59	0.34	4.22	3.68	2.50	4.69
B130	0.25	0.22	0.47	0.29	4.03	3.67	4.00	4.16
B131	0.25	0.23	0.48	0.29	4.02	3.66	5.00	4.29
B132	0.26	0.21	0.47	0.29	4.00	3.40	4.50	4.36
B133	0.24	0.19	0.43	0.27	4.07	3.37	2.50	4.02
B134	0.27	0.22	0.48	0.31	3.90	3.41	3.00	3.98
B135	0.26	0.21	0.49	0.29	3.89	3.54	3.00	4.43
B136	0.27	0.25	0.51	0.30	3.90	3.98	6.00	4.17
B137	0.30	0.27	0.71	0.33	3.97	3.73	4.00	3.81
B138	0.30	0.26	0.53	0.34	4.17	3.72	6.00	4.16
B139	0.30	0.29	0.64	0.33	3.89	4.00	3.00	4.11
B140	0.35	0.31	0.72	0.39	3.86	3.73	7.50	4.83
B141	0.31	0.30	0.81	0.35	4.17	4.05	3.50	4.26
B142	0.30	0.27	0.74	0.33	4.26	3.84	3.00	4.66
B143	0.29	0.26	0.56	0.33	4.04	3.65	7.00	4.33
B144	0.34	0.31	0.72	0.38	4.17	3.77	5.50	4.40
B145	0.29	0.28	0.72	0.33	4.31	4.02	7.00	4.89
B146	0.28	0.25	0.57	0.32	4.15	3.79	5.50	4.46
B147	0.28	0.25	0.50	0.31	4.13	3.88	4.00	4.45
B148	0.28	0.25	0.57	0.30	4.15	3.90	3.00	4.64
B149	0.29	0.25	0.55	0.34	3.93	3.65	5.00	4.12
B150	0.27	0.25	0.59	0.30	4.34	3.95	8.50	4.93
B151	0.28	0.23	0.49	0.31	4.13	3.54	2.50	4.17
B152	0.23	0.20	0.48	0.27	4.01	3.61	9.00	3.97
B153	0.24	0.22	0.48	0.27	4.05	3.81	6.50	4.45
B154	0.23	0.21	0.47	0.26	3.98	3.76	4.50	4.43
B155	0.25	0.22	0.48	0.28	3.95	3.64	6.00	4.43
B156	0.22	0.20	0.46	0.25	4.18	3.71	3.00	4.34
B157	0.24	0.21	0.48	0.27	4.13	3.72	4.50	4.52
B158	0.25	0.22	0.49	0.29	3.99	3.56	2.50	4.25
B159	0.28	0.23	0.47	0.32	4.26	3.56	2.50	4.62
B160	0.28	0.25	0.57	0.32	4.19	3.71	3.00	4.41
B161	0.29	0.25	0.55	0.32	4.08	3.74	7.00	4.40
B162	0.28	0.25	0.54	0.31	4.16	3.73	7.00	4.38
B163	0.29	0.27	0.60	0.33	3.80	3.76	5.50	3.91
B164	0.31	0.28	0.59	0.35	3.93	3.80	4.00	4.61
B165	0.30	0.28	0.70	0.33	4.36	4.04	3.50	5.37
B166	0.32	0.31	0.77	0.36	4.42	4.08	6.50	5.15
B167	0.33	0.31	0.71	0.36	4.17	4.04	5.00	4.76
B168	0.34	0.32	0.71	0.39	4.22	3.95	7.50	5.19
B169	0.33	0.32	0.75	0.38	3.98	3.94	5.00	3.72
B170	0.33	0.32	0.73	0.37	4.35	4.02	3.50	5.26
B171	0.34	0.32	0.75	0.38	4.27	3.92	4.50	5.05
B172	0.35	0.30	0.72	0.41	3.91	3.54	5.00	3.68

B173	0.32	0.28	0.67	0.36	4.31	3.77	7.00	4.64
B174	0.30	0.26	0.61	0.34	3.91	3.66	3.00	4.26
B175	0.29	0.26	0.68	0.34	4.22	3.69	3.50	4.50
B176	0.29	0.27	0.68	0.33	4.18	3.81	3.50	4.55
B177	0.29	0.25	0.50	0.33	4.32	3.64	6.50	4.81
B178	0.26	0.22	0.48	0.30	4.13	3.55	4.00	4.68
B179	0.25	0.20	0.43	0.28	4.00	3.38	6.50	4.73
B180	0.23	0.19	0.40	0.26	3.96	3.50	7.50	4.10
B181	0.21	0.17	0.39	0.25	3.88	3.45	4.50	3.77
B182	0.20	0.18	0.38	0.22	4.30	3.87	8.00	4.73
B183	0.22	0.18	0.38	0.25	4.08	3.50	6.50	4.39
B184	0.23	0.20	0.44	0.27	4.32	3.70	4.00	4.33
B185	0.26	0.21	0.59	0.29	3.95	3.46	3.50	4.05
B186	0.26	0.24	0.55	0.30	4.13	3.81	3.00	5.04
B187	0.26	0.22	0.47	0.29	3.99	3.55	3.50	4.33
B188	0.29	0.25	0.61	0.33	4.26	3.61	5.00	4.62
B189	0.32	0.29	0.61	0.35	4.12	3.87	5.00	4.55
B190	0.33	0.29	0.71	0.38	3.85	3.66	3.00	3.97
B191	0.33	0.29	0.64	0.38	3.98	3.72	6.00	3.97
B192	0.33	0.31	0.70	0.38	4.33	3.81	3.00	4.68
B193	0.29	0.27	0.65	0.32	4.28	3.96	8.50	4.56
B194	0.30	0.28	0.57	0.34	4.11	3.93	9.50	4.11
B195	0.32	0.31	0.73	0.36	4.48	4.10	3.00	4.37
B196	0.30	0.28	0.65	0.34	4.42	3.96	7.00	5.00
B197	0.29	0.28	0.61	0.32	4.43	4.09	5.00	4.77
B198	0.30	0.27	0.57	0.33	4.28	3.86	3.00	4.71
B199	0.28	0.23	0.54	0.32	3.88	3.40	4.00	4.42
B200	0.25	0.22	0.50	0.28	3.98	3.69	3.00	4.03
B201	0.23	0.20	0.45	0.26	4.12	3.59	7.00	4.47
B202	0.22	0.20	0.47	0.24	4.11	3.89	4.50	4.95
B203	0.22	0.19	0.40	0.26	3.90	3.49	3.00	4.00
B204	0.22	0.19	0.49	0.25	4.11	3.60	4.00	4.33
B205	0.22	0.18	0.39	0.26	4.27	3.38	6.50	4.75
B206	0.22	0.18	0.38	0.25	4.37	3.57	4.50	4.27
B207	0.22	0.18	0.44	0.25	3.92	3.38	5.50	4.25
B208	0.23	0.19	0.51	0.26	4.02	3.45	3.00	4.06
B209	0.24	0.19	0.47	0.27	4.03	3.46	5.00	4.40
B210	0.26	0.22	0.51	0.29	4.01	3.51	4.50	4.15
B211	0.26	0.21	0.57	0.29	4.06	3.43	3.00	4.39
B212	0.29	0.25	0.55	0.33	4.11	3.59	6.50	4.50
B213	0.30	0.25	0.62	0.33	4.19	3.62	3.00	4.22
B214	0.33	0.30	0.65	0.37	4.32	3.84	4.50	4.63
B215	0.34	0.30	0.73	0.39	4.28	3.64	4.00	5.03
B216	0.29	0.25	0.61	0.33	3.96	3.55	3.00	4.22
B217	0.28	0.25	0.52	0.31	3.97	3.69	3.50	3.93
B218	0.28	0.27	0.65	0.31	4.13	4.06	7.00	4.46
B219	0.28	0.25	0.62	0.31	3.87	3.84	3.00	3.75

B220	0.29	0.26	0.64	0.32	4.24	3.84	3.00	4.02
B221	0.27	0.27	0.62	0.30	4.17	4.19	5.00	5.10
B222	0.30	0.29	0.65	0.34	4.30	3.99	6.00	4.76
B223	0.26	0.24	0.57	0.30	4.23	3.84	7.00	4.14
B224	0.26	0.22	0.54	0.29	4.18	3.61	4.00	3.97
B225	0.24	0.21	0.49	0.28	3.92	3.61	3.00	4.03
B226	0.23	0.19	0.42	0.26	4.28	3.48	3.00	4.39
B227	0.20	0.16	0.37	0.23	4.04	3.32	8.00	4.22
B228	0.17	0.14	0.34	0.19	4.16	3.38	5.00	4.47
B229	0.15	0.13	0.34	0.17	4.34	3.55	5.00	4.72
B230	0.13	0.11	0.34	0.16	3.95	3.35	5.00	4.17
B231	0.13	0.11	0.34	0.15	4.08	3.29	5.00	4.39
B232	0.14	0.11	0.27	0.17	3.97	3.17	2.50	4.22
B233	0.13	0.11	0.29	0.15	4.22	3.49	4.50	4.37
B234	0.17	0.14	0.30	0.19	4.16	3.53	6.50	4.30
B235	0.18	0.15	0.35	0.21	4.09	3.35	3.50	4.02
B236	0.21	0.18	0.40	0.24	3.89	3.59	4.50	4.08
B237	0.26	0.20	0.47	0.31	3.68	3.20	3.00	4.24
B238	0.28	0.23	0.59	0.32	3.90	3.38	5.00	3.94
B239	0.26	0.23	0.59	0.30	3.88	3.54	7.00	4.50
B240	0.28	0.25	0.63	0.31	3.96	3.68	4.50	4.71
B241	0.32	0.28	0.67	0.36	3.98	3.76	3.00	4.33
B242	0.31	0.30	0.67	0.34	4.29	4.05	5.50	4.56
B243	0.34	0.32	0.75	0.38	4.18	3.96	3.50	4.41
B244	0.33	0.33	0.83	0.38	4.38	4.24	5.50	4.63
B245	0.30	0.28	0.63	0.33	4.19	3.96	2.50	4.76
B246	0.29	0.28	0.68	0.33	4.15	4.05	4.00	4.48
B247	0.32	0.30	0.63	0.35	4.21	3.92	2.50	4.15
B248	0.31	0.29	0.63	0.34	4.14	4.15	2.50	4.48
B249	0.29	0.26	0.63	0.33	3.99	3.81	2.50	4.27
B250	0.28	0.25	0.55	0.31	4.06	3.70	3.00	4.90
B251	0.25	0.23	0.52	0.28	4.10	3.68	5.50	4.62
B252	0.25	0.21	0.55	0.29	4.28	3.45	2.50	4.87
B253	0.25	0.20	0.47	0.28	4.00	3.50	3.00	3.90
B254	0.23	0.20	0.47	0.26	4.12	3.62	3.00	4.15
B255	0.23	0.19	0.47	0.26	3.73	3.54	3.00	3.58
B256	0.23	0.19	0.47	0.27	4.11	3.38	3.00	4.41
B257	0.23	0.19	0.47	0.27	3.98	3.42	3.00	4.02
B258	0.25	0.20	0.47	0.29	3.86	3.36	3.00	3.95
B259	0.27	0.23	0.52	0.30	3.99	3.58	6.00	4.80
B260	0.27	0.23	0.53	0.31	4.17	3.59	5.00	4.30
B261	0.27	0.23	0.53	0.30	4.19	3.68	3.50	4.45
B262	0.28	0.26	0.67	0.32	4.17	3.73	3.00	4.57
B263	0.30	0.27	0.59	0.33	4.30	3.93	3.50	5.07
B264	0.31	0.29	0.63	0.35	4.18	4.01	4.50	4.50
B265	0.34	0.31	0.71	0.37	4.16	3.88	5.00	4.04
B266	0.33	0.33	0.76	0.36	4.41	4.35	4.00	4.78

B267	0.32	0.32	0.65	0.35	4.59	4.33	5.50	5.12
B268	0.29	0.28	0.63	0.32	4.19	4.09	6.50	4.63
B269	0.30	0.29	0.65	0.33	4.32	4.10	8.50	4.38
B270	0.30	0.29	0.61	0.33	4.36	4.07	5.00	5.02
B271	0.29	0.26	0.69	0.33	4.11	3.66	3.50	4.03
B272	0.29	0.26	0.59	0.32	4.12	3.93	7.00	4.78
B273	0.28	0.24	0.55	0.31	3.98	3.61	4.50	4.40
B274	0.24	0.20	0.47	0.28	3.90	3.39	3.00	4.59
B275	0.20	0.17	0.47	0.22	3.93	3.42	3.00	4.06
B276	0.17	0.14	0.47	0.19	3.99	3.50	3.00	4.29
B277	0.15	0.12	0.47	0.18	4.00	3.33	3.00	4.20
B278	0.14	0.10	0.24	0.17	3.99	3.10	5.50	3.87
B279	0.11	0.09	0.21	0.13	3.85	3.24	5.50	4.23
B280	0.11	0.09	0.21	0.13	3.95	3.28	5.00	3.77
B281	0.13	0.09	0.19	0.15	3.81	2.98	2.50	3.61
B282	0.12	0.10	0.23	0.14	3.85	3.34	2.50	3.81
B283	0.14	0.11	0.27	0.15	3.93	3.24	3.00	4.52
B284	0.16	0.13	0.31	0.18	3.83	3.24	6.00	4.11
B285	0.21	0.18	0.38	0.24	3.84	3.37	5.50	4.17
B286	0.24	0.21	0.56	0.27	3.73	3.50	4.50	3.82
B287	0.28	0.27	0.76	0.32	4.20	3.83	5.50	4.52
B288	0.31	0.28	0.64	0.35	3.94	3.66	5.00	4.09
B289	0.30	0.28	0.70	0.35	3.95	3.72	3.50	4.33
B290	0.34	0.32	0.81	0.38	3.79	3.89	4.00	3.86
B291	0.32	0.33	0.94	0.36	4.17	3.97	5.50	4.22
B292	0.34	0.35	0.95	0.39	3.94	4.14	5.50	3.98
B293	0.30	0.32	0.93	0.34	4.22	4.27	5.00	4.26
B294	0.31	0.30	0.82	0.37	3.97	3.69	3.50	4.03
B295	0.31	0.31	0.80	0.35	3.99	3.95	3.50	4.26
B296	0.32	0.30	0.82	0.36	3.96	3.74	4.00	4.10
B297	0.28	0.27	0.64	0.32	3.92	3.76	2.50	4.09
B298	0.27	0.25	0.60	0.31	4.04	3.72	4.00	4.57
B299	0.30	0.27	0.67	0.34	3.95	3.66	4.00	3.86
B300	0.28	0.25	0.48	0.31	4.04	3.61	5.50	3.87
B301	0.26	0.24	0.61	0.29	4.10	3.71	8.50	3.60
B302	0.22	0.21	0.48	0.24	3.78	3.64	3.50	3.87
B303	0.23	0.20	0.52	0.26	4.02	3.49	4.50	4.47
B304	0.23	0.20	0.44	0.26	3.85	3.37	5.00	4.22
B305	0.22	0.20	0.40	0.25	4.10	3.54	4.50	4.00
B306	0.24	0.21	0.45	0.28	3.75	3.36	3.00	4.31
B307	0.25	0.21	0.49	0.30	3.75	3.29	3.50	4.02
B308	0.25	0.21	0.52	0.28	3.97	3.45	4.00	4.42
B309	0.24	0.22	0.50	0.27	4.08	3.65	3.00	3.90
B310	0.27	0.25	0.56	0.30	4.37	3.77	5.00	4.57
B311	0.28	0.25	0.52	0.31	4.15	3.65	5.00	4.10
B312	0.32	0.30	0.69	0.36	4.05	3.77	5.00	4.09
B313	0.32	0.28	0.69	0.37	3.92	3.50	5.50	4.15

B314	0.33	0.31	0.73	0.37	4.04	3.71	8.00	4.64
B315	0.32	0.32	0.67	0.36	3.87	3.96	3.00	3.67
B316	0.33	0.33	0.82	0.37	4.02	3.85	4.00	4.09
B317	0.31	0.28	0.72	0.35	4.08	3.74	3.50	4.26
B318	0.31	0.29	0.71	0.34	4.32	3.90	7.00	4.96
B319	0.27	0.27	0.77	0.30	4.17	3.97	4.00	4.65
B320	0.29	0.26	0.80	0.33	4.21	3.60	3.00	4.10
B321	0.27	0.25	0.58	0.31	4.15	3.62	4.50	4.43
B322	0.25	0.23	0.54	0.28	4.26	3.77	5.00	4.47
B323	0.22	0.19	0.47	0.25	3.84	3.58	5.00	4.00
B324	0.18	0.15	0.32	0.21	3.83	3.36	4.00	3.91
B325	0.15	0.13	0.32	0.17	3.89	3.42	4.00	4.39
B326	0.13	0.10	0.26	0.14	3.78	3.20	2.00	3.92
B327	0.11	0.09	0.19	0.13	3.88	3.07	4.00	3.91
B328	0.08	0.07	0.19	0.10	3.93	3.29	2.50	4.33
B329	0.08	0.06	0.19	0.09	3.85	3.19	2.50	3.97
B330	0.08	0.07	0.19	0.10	3.88	3.20	2.50	3.98
B331	0.11	0.08	0.19	0.12	3.80	3.10	8.50	3.68
B332	0.12	0.10	0.25	0.14	3.73	3.24	1.50	4.20
B333	0.16	0.13	0.33	0.19	3.70	3.14	6.00	3.87
B334	0.20	0.17	0.42	0.23	4.07	3.38	2.50	4.23
B335	0.24	0.20	0.49	0.28	3.87	3.38	4.50	4.03
B336	0.27	0.24	0.60	0.30	3.74	3.54	6.50	4.02
B337	0.30	0.27	0.61	0.34	4.22	3.64	6.50	4.69
B338	0.32	0.31	0.67	0.37	3.96	3.84	4.50	4.09
B339	0.33	0.32	0.79	0.37	3.91	3.98	7.00	4.52
B340	0.34	0.33	0.72	0.39	4.03	3.89	4.00	4.11
B341	0.39	0.38	0.88	0.44	4.23	4.01	4.00	4.31
B342	0.38	0.38	1.09	0.42	3.96	4.09	3.50	4.10
B343	0.38	0.38	0.90	0.43	4.02	3.96	3.50	4.26
B344	0.39	0.38	0.85	0.45	4.46	4.01	4.00	4.56
B345	0.35	0.36	0.85	0.40	4.10	4.12	5.50	4.38
B346	0.35	0.33	0.86	0.38	4.23	3.81	4.50	4.77
B347	0.34	0.35	0.92	0.38	4.17	4.14	4.50	4.27
B348	0.30	0.30	0.69	0.34	4.13	3.98	4.50	4.20
B349	0.32	0.30	0.65	0.36	4.12	3.80	4.50	4.57
B350	0.28	0.26	0.72	0.32	4.07	3.68	3.00	4.17
B351	0.28	0.24	0.58	0.31	3.98	3.48	3.50	4.44
B352	0.26	0.24	0.56	0.30	4.23	3.61	5.00	4.58
B353	0.27	0.23	0.51	0.31	4.02	3.43	6.00	4.35
B354	0.27	0.22	0.47	0.31	3.93	3.40	4.50	3.95
B355	0.26	0.22	0.59	0.31	3.89	3.24	7.00	4.35
B356	0.26	0.24	0.61	0.29	4.01	3.59	5.00	4.82
B357	0.27	0.24	0.59	0.31	3.86	3.53	7.00	4.33
B358	0.27	0.25	0.60	0.32	3.84	3.50	7.00	3.89
B359	0.30	0.26	0.59	0.34	3.93	3.55	7.00	3.95
B360	0.29	0.26	0.65	0.33	4.12	3.55	3.00	4.58

B361	0.33	0.29	0.77	0.38	4.08	3.47	5.00	4.42
B362	0.27	0.26	0.62	0.31	4.11	3.83	7.00	4.46
B363	0.27	0.28	0.64	0.30	3.93	4.19	7.00	4.88
B364	0.27	0.28	0.64	0.30	3.81	4.09	7.50	4.15
B365	0.25	0.26	0.61	0.29	4.27	4.06	5.50	4.80
B366	0.27	0.28	0.61	0.30	4.08	4.10	5.00	3.96
B367	0.25	0.24	0.59	0.29	3.88	3.90	7.00	4.04
B368	0.26	0.25	0.68	0.28	4.17	3.77	3.00	4.45
B369	0.25	0.24	0.59	0.29	4.04	3.76	7.00	4.26

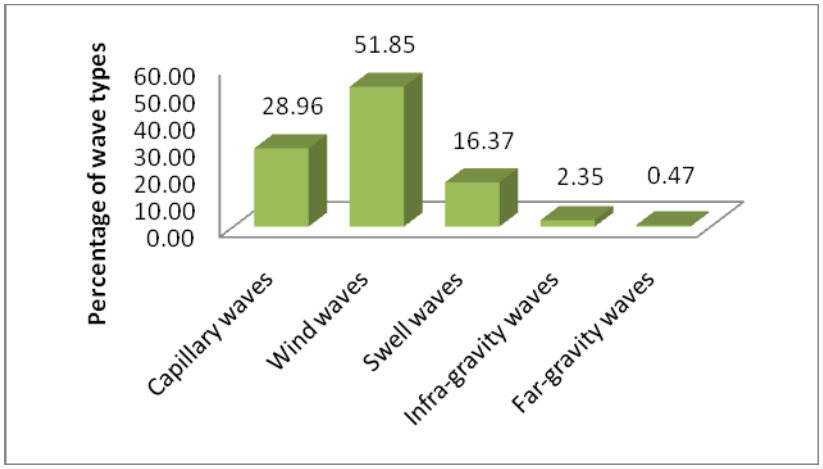

Figure 4 Percentage of wave types recorded at the western side of Fushivelavaru lagoon

Based on the wave data it can be concluded that the western side experiences strong monsoonal wind waves, especially at the SW monsoon. During the SW monsoon dominant wind direction is westerly, which is perhaps the reason for high erosion scarps and severe erosion at western quadrant of the island.

4.2.1.4 BEACH ENVIRONMENT

The beach environment of N. Fushivelavaru was assessed during the field visit to the island and by assessing satellite images purchased from Digital Globe®. Six beach profiles were taken around the island where permanent bench marks (BM) are established. These established BMs will be used during the monitoring program and during the long term monitoring program after construction stage. Details of the Beach Environment are provided in the original EIA report (section 6.2.4) and not detailed further in this addendum as no further surveys were conducted for the purpose of this addendum.

4.2.2 MARINE SURVEYS

The island of N. Fushivelavaru is located at the western side of Noonu Atoll, about 5km east of the periphery of the atoll. The reef system is circular in shape, while the island sits almost at central area of the reef. The lagoon is wider at the western and northern side, and narrower at the southern side. The lagoon on the western side is comparatively deeper than rest of the lagoon. The reef slope is wider and gradual at the western and eastern side, while the southern side is narrower and steeper. Two manmade entrances are located at the southern side of the reef; these entrances are manually cleared entrances by removing large rocks and corals.

Live coral cover at the reef system near N. Fushivelavaru is relatively good. The southern side of the reef is dominated by soft coral and branching forms of Porites species. Compared to this the western side was observed to be relatively flat at the reef flat area, mostly colonized by massive to submassive forms. In comparison the northern side was dominated by digitate and tabulate forms of acropora. Numerous small colonies of acropora tabulate forms were observed at the reef flat area at northern side. The lagoon area at the western side was dominated by sand and rubble, while the eastern side was rock and sand. Few acropora branching corals were observed at the lagoon area at the eastern side.

Reef surveys were carried out at six sites (4 quantitative and 2 qualitative) on the Fushivelavaru reef system (see Figure 5 and Table 3). These surveys were also sufficient to address the changes to the concept plan; hence no additional surveys were conducted to address the proposed changes.

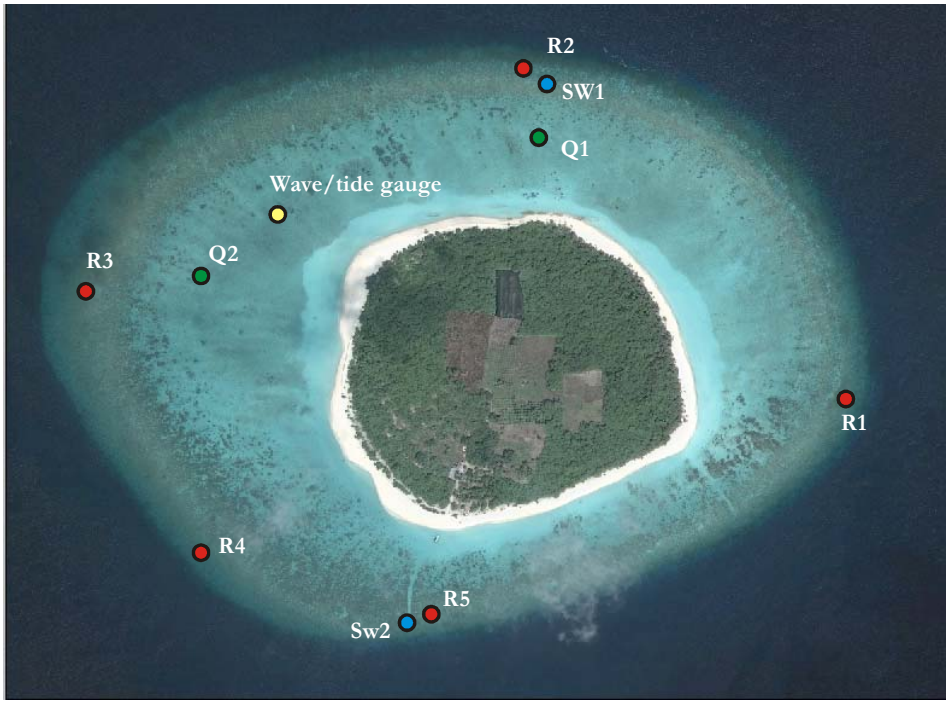

Figure 5 Reef survey locations at N. Fushivelavaru

Table 3 GPS coordinates of survey sites

Site	Latitude	Longitude
R1	5°49'49" N	73°12'49" E
R2	5°50'08" N	73°12'33" E
R3	5°49'54" N	73°12'13" E
R4	5°49'45" N	73°12'18" E
R5	5°49'41" N	73°12'32" E
Q1	5°50'05" N	73°12'34" E
Q2	5°49'56" N	73°12'18" E
SW1	5°49'42" N	73°12'13" E
Sw2	5°50'07" N	73°12'34" E
Wave gauge	5°49'58" N	73°12'21" E

4.2.2.1 CORAL COMMUNITY

The reef of N. Fushivelavaru appears to be in good condition at the time of the surveys. It is in the process of recovery from a major disturbance (e.g. 1998 bleaching event). Live coral and fish life abundance is highest at the northern side of the island. The Visual assessment of the reef showed abundance of table corals (acropora) and massive coral colonies of several coral genera including faviids, poritids, and agariciids. Several size classes of these corals are present at the reef somewhat indicating the resilience of this reef and its ability to recover from disturbances such as bleaching.

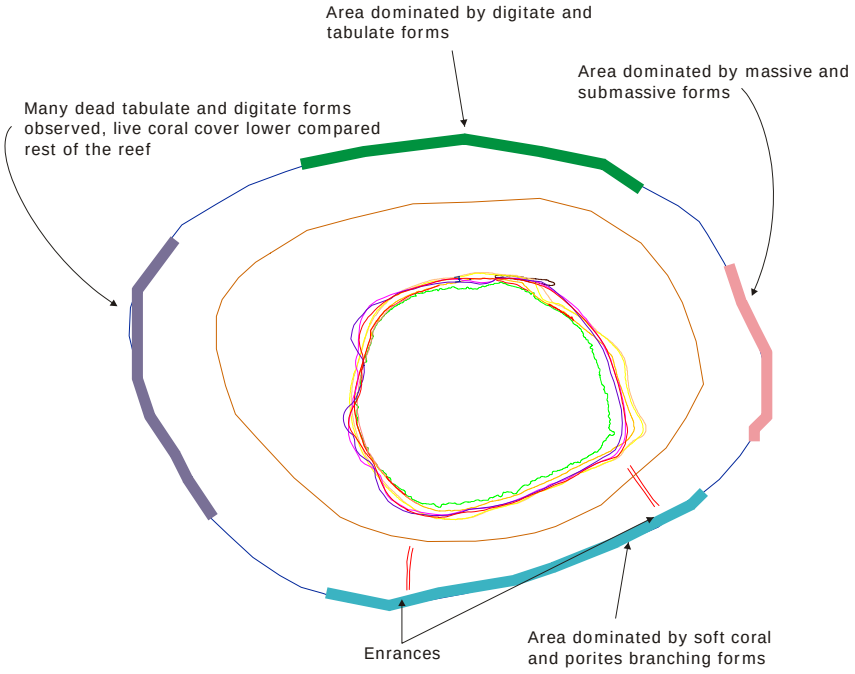

Figure 6 Schematic showing major observations made during the reef survey

The reef survey site R1 is located at the eastern side of the island. The dominant substrate observed at the site was live coral (39.31%) followed by rock, 23.06%. Dominant live coral genera recorded at the area was acroporids followed by poritids. Numerous small colonies of tabulate form of acroporids were observed at the reef flat area.

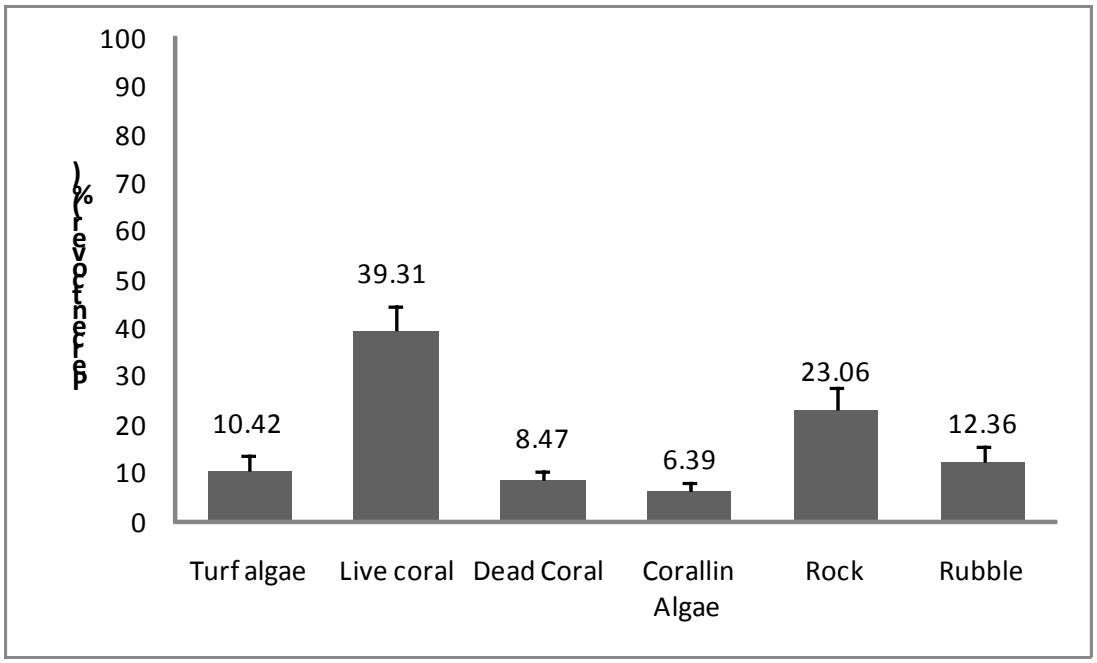

Figure 7 Benthic community at reef survey site R1

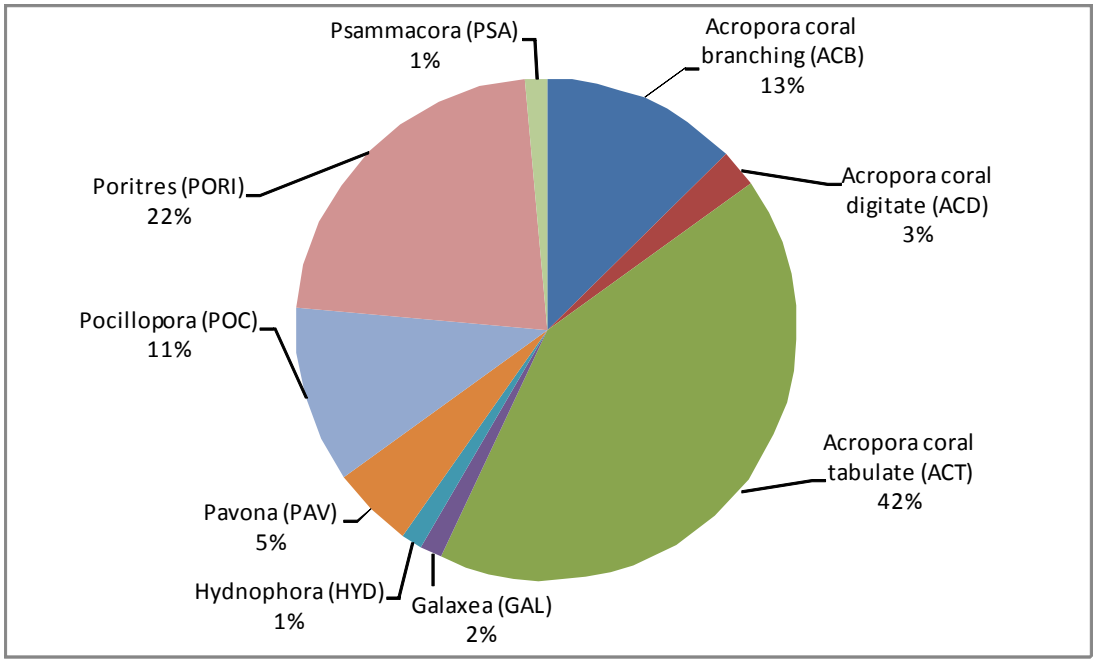

Figure 8 Generic composition of live coral community at R1 (39.31% of total substrate cover)

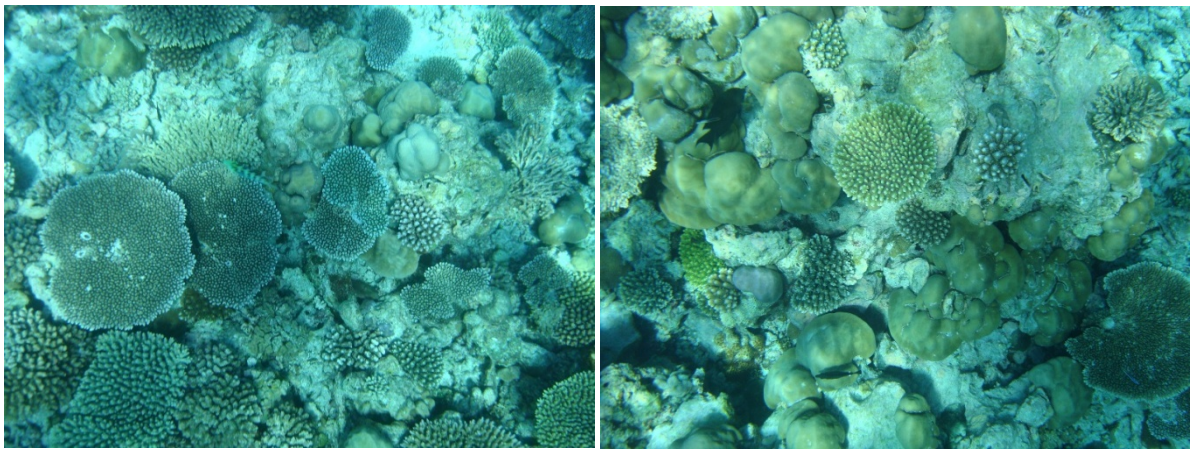

Figure 9 Acropora tabulate forms and porites massive forms observed at the site R1

Coral cover in the reef survey site R2, located at the northern side of the reef was higher (44.72%) than site R1. Abiotic substrate accounted for 33.47% of the benthic substrate; rubble (9.72%) and rock (23.75%). Turf algae were at approximately 7% of the benthic cover which was lower than site R1. The coral community at this site is similar to R1 and is dominated by Acropora table corals. Other genera were observed in low abundance.

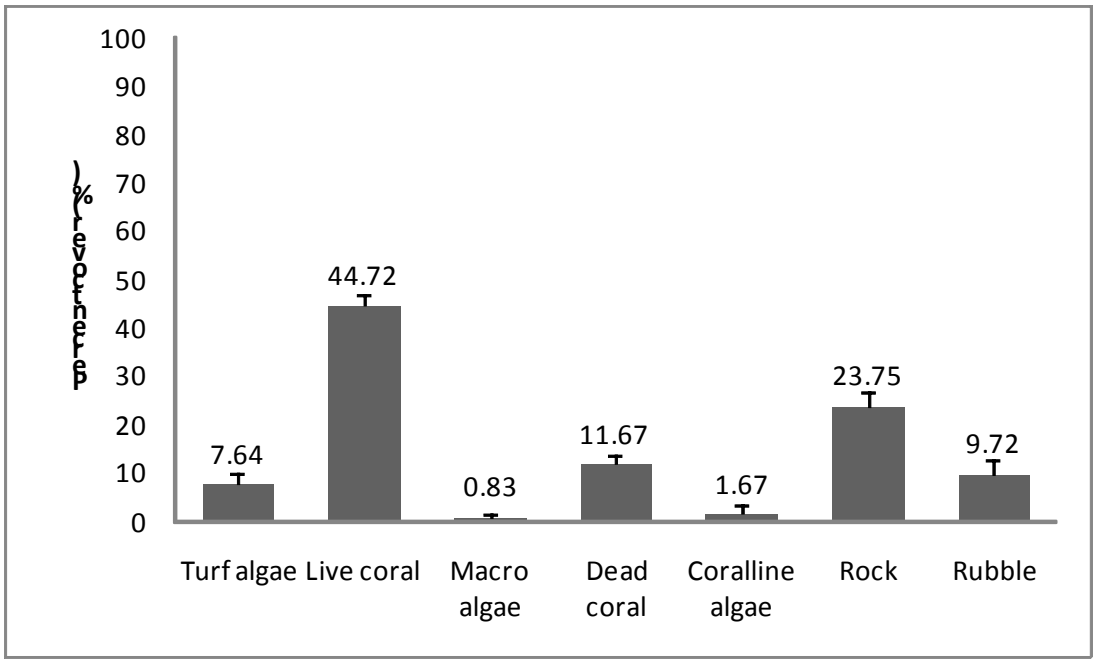

Figure 10 Benthic community structure at the reef survey site R2

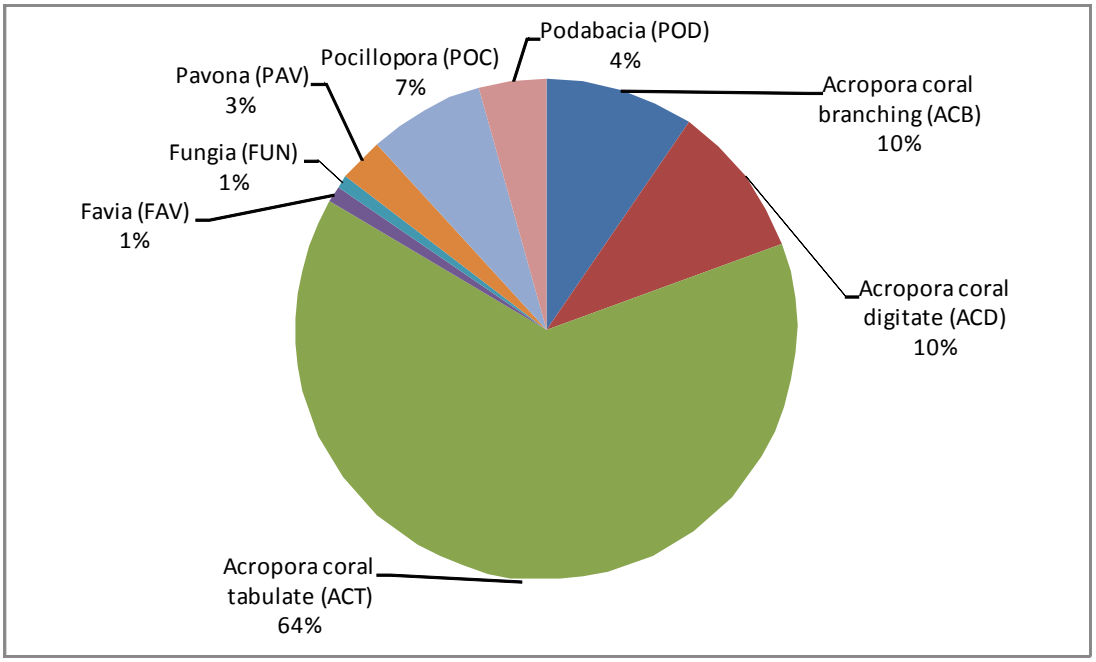

Figure 11 Generic composition of live coral community at R2 (44% total substrate cover)

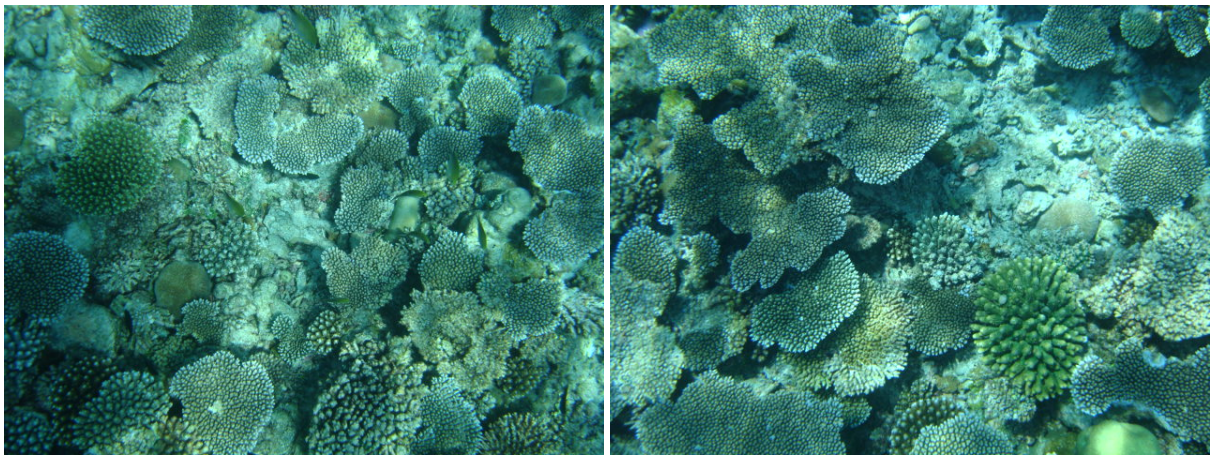

Figure 12 Dominant live coral species (belonging to acroporid genus) observed at the site R2

Coral cover in the reef survey site R3 which is located at the western side of the reef was lowest (6.39%) amongst the sites surveyed at Fushivelavaru, The survey site was observed with low visibility. Abiotic substrate accounted for 33.47% of the benthic substrate; rubble (33.33%) and rock (38.61%). Turf algae were at approximately 13% of the benthic cover. Unlike sites R1 and R2, live coral composition at R3 was dominated by poritids. Number of genera recorded was also low compared to other sites.

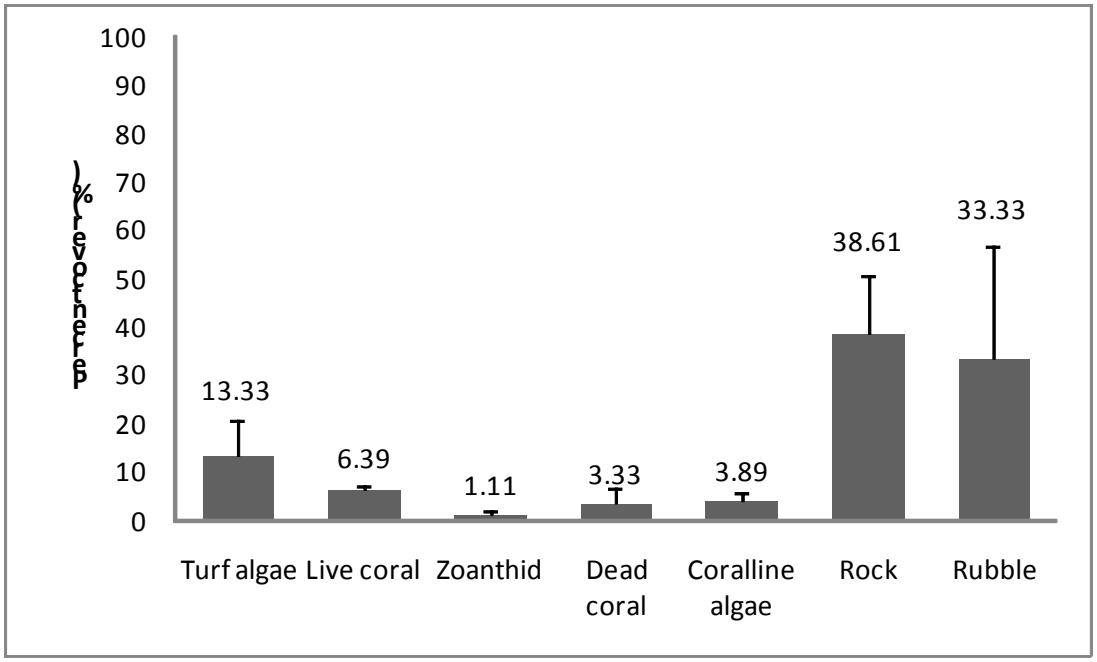

Figure 13 Benthic community structure at the reef survey site R3

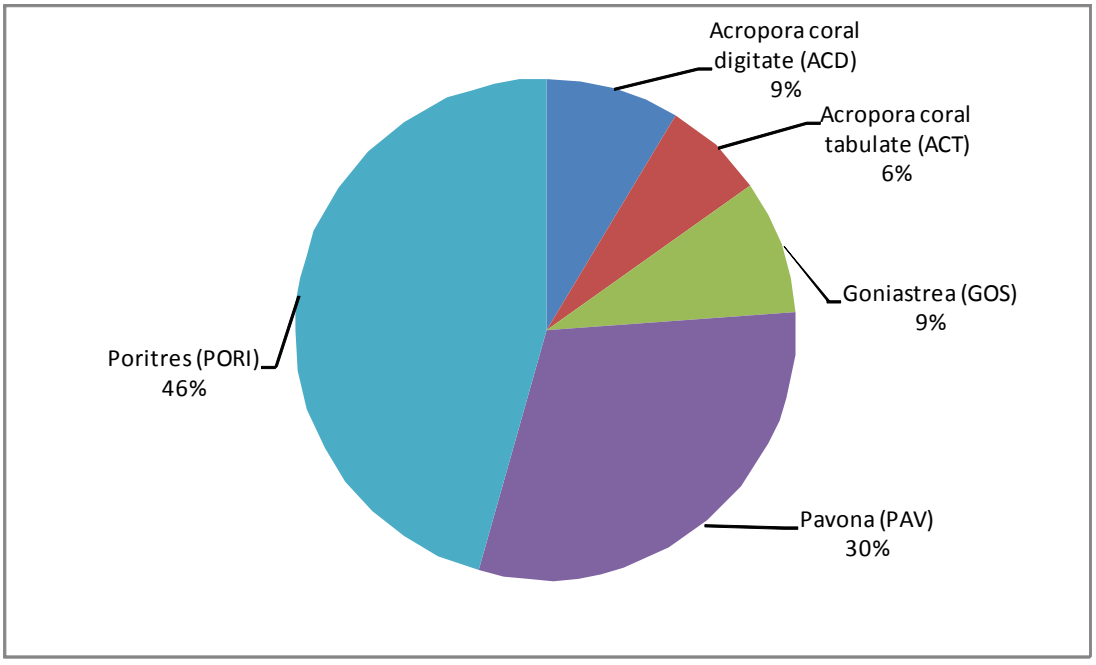

Figure 14 Generic composition of live coral community at R3 (6.39% total substrate cover)

Figure 15 Small colonies of porites massive life form and tabulate acroporids near the reef slope area at site R3

Coral cover in the reef survey site R4, which is located at the South western side of the reef was second highest (40.83%) amongst the sites surveyed at Fushivelavaru. Abiotic substrate accounted for 37.40% of the benthic substrate; rubble (14.33%) and rock (23.33%). Turf algae were at approximately 6.11% of the benthic cover. During the field survey many dead tabulate corals were observed at the site, mostly near the reef flat area. Dominant live coral genera recorded at the site are poritids and acroporids. Amongst the poritids observed, branching forms such as *Porites cylindrica* and *Porites rus* were abundant.

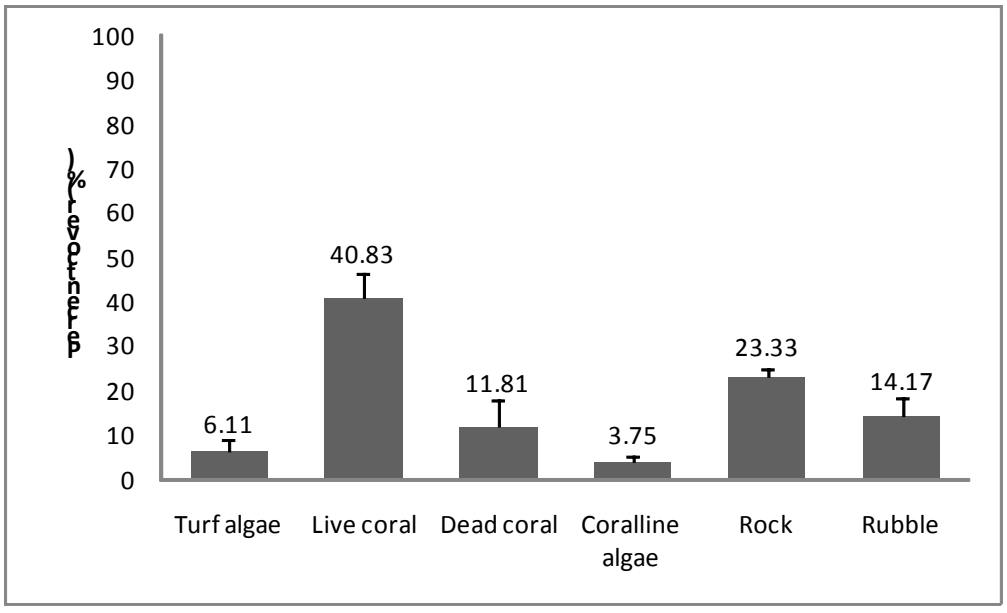

Figure 16 Benthic community structure at the reef survey site R4

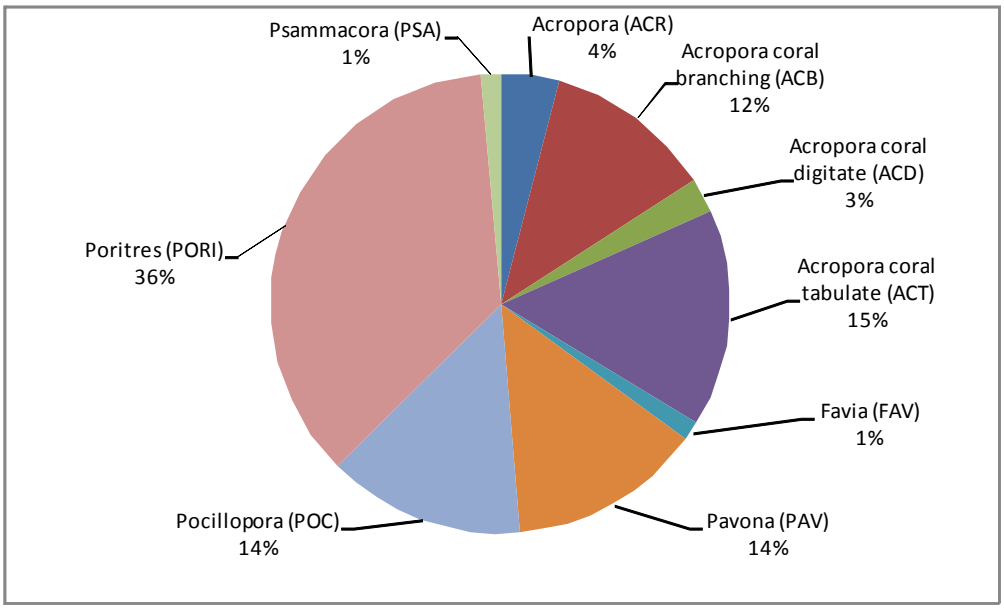

Figure 17 Generic composition of live coral community at R4 (40.83% total substrate cover)

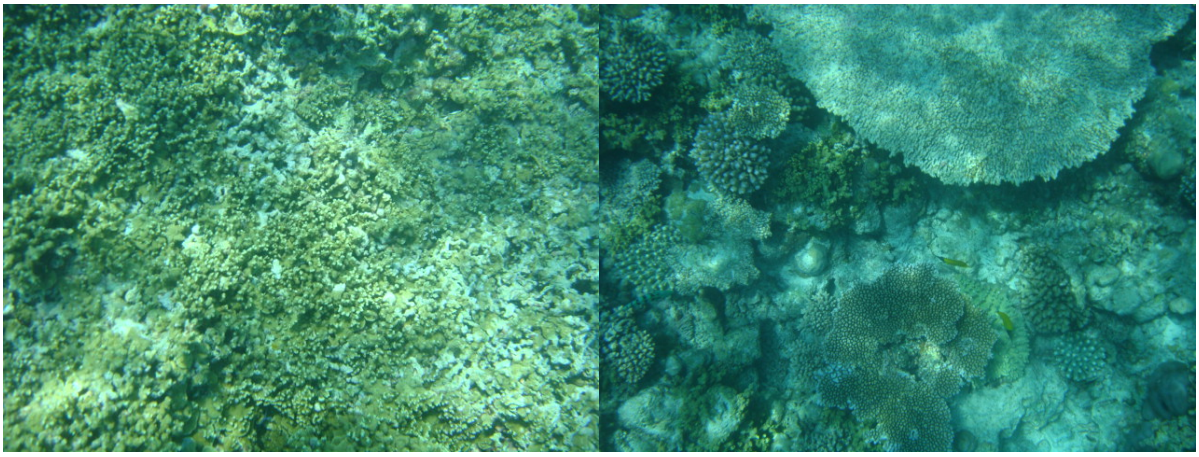

Figure 18 *Porites rus* colony observed at site R4 (left), large dead acropora table coral and numerous small tabulate corals

Coral cover in the reef survey site R5, which is located at the southern side of the reef east of the entrance channel was fourth highest (33.19%). Two species of soft coral (*Sarcophytum sp* and *Sinularia sp*) and *Porites Cylindrica* formed the dominant biotic substrate recorded at site. Abiotic substrate accounted for 44.44% of the benthic substrate; rubble (17.22%) and rock (27.22%). Turf algae were at approximately 5.5% of the benthic cover. Dominant live coral genera recorded at the site was poritids of which, branching forms such as *Porites cylindrica* and *Porites rus* were abundant.

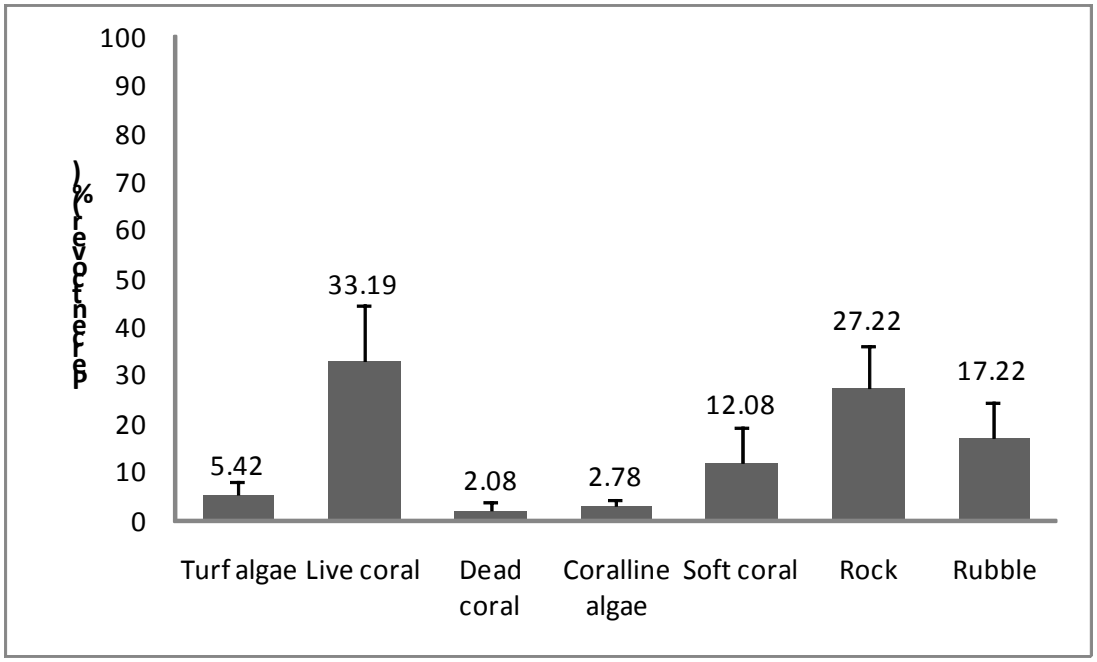

Figure 19 Benthic community structure at the reef survey site R5

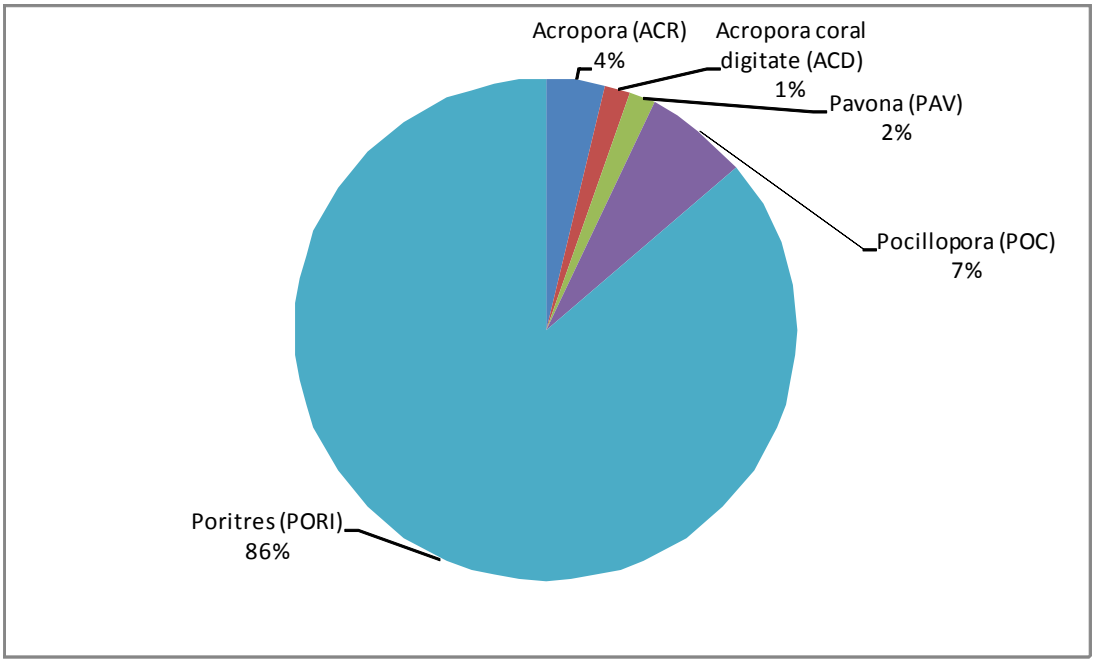

Figure 20 Generic composition of live coral community at R5 (33.19% total substrate cover)

Figure 21 *Sinularia sp* observed at the reef slope area at site R5 (left), *Porites cylindrica* colonies observed just at the edge of the reef (right)

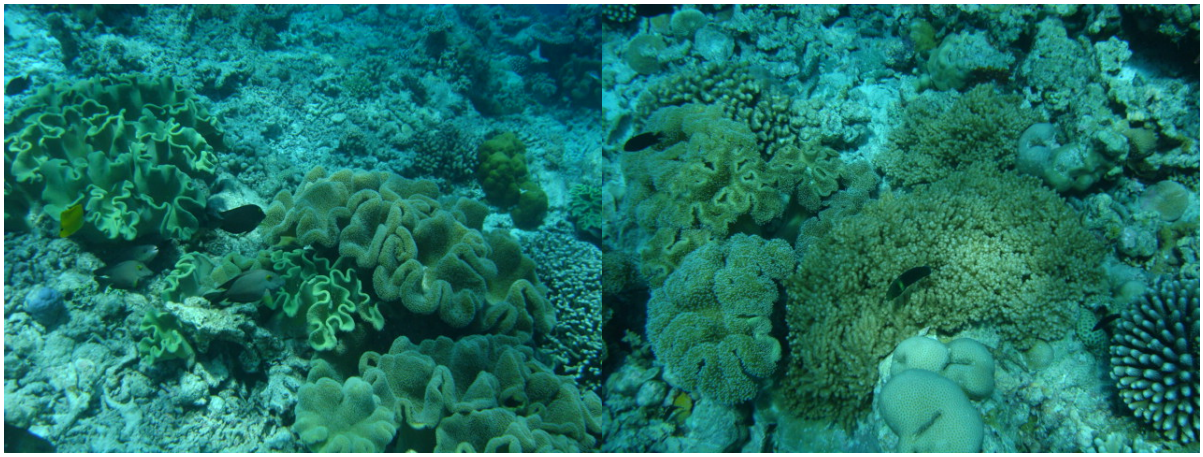

Figure 22 *Sarchophytum sp* and *Sinularia sp* observed at site R5

Q1 (northern side lagoon)

The northern side lagoon area was surveyed by visual assessment method. The dominant substrate at the area observed was rubble and sand. Very few live coral colonies were observed at the area and live coral cover increased towards the back reef area. Estimated cover of live coral at the area is less than 1%, which composed of mainly small porites and pocillopora colonies. Reef fish at the area was dominated by Pomacentrids and Labrids. No Chaetodons were observed during the snorkel survey.

Q2 (western side lagoon)

The western side lagoon area, where the proposed water bungalows will be constructed was dominated by rubble and sand, and more rocky towards the west (back reef side). Estimated live coral cover at the area was less than 2%, which was dominated by small digitate acroprids, pocilloporids and small colonies of poritid massive forms. Few microatoll forms were also observed. Fish life at the area was dominated by Pomacentrids and Labrids. Other fish families

observed at the area are Acanthuridae (3 species), Chaetodontids (1 species), Balistidae (1 species) and Nemipteridae (1 species).

Figure 23 Substrate condition at survey site Q1

Figure 24 Substrate condition at the water bungalow area

4.2.2.2 FISH COMMUNITY

Reef fish surveys were carried out at sites R1, R2, R3, R4 and R5 using the same transects as that used for the reef survey. Reef fish diversity and abundance was highest at the sites R2 and R4. Reef fish species at all five sites were dominated by algal grazers (Pomacentridae and Acanthuridae). This correlates to the high abundance of algae in the reef benthic survey.

Dominant species observed at site R1 were *Pomacentrus nagasakiensis* and *Acanthurus lineatus*, *Thalassoma Hardwicke* and *Lutjanus gibbus*. The latter was observed in large groups at the reef edge area. Numerous schooling bannerfish (*Heniochus diphreutes*) and Black Pyramid Butterflyfish

(*Hemitaurichthys zoster*) were observed at the slope area of site R1. Survey site R2 was dominated by Pocamentrids (*Pomacentrus nagasakiensis*) and Acanthurids (*Ctenochaetus striatus*). Dominant Butterflyfish species recorded was *Chaetodon trifasciatus*. Survey site R3 was dominated by pomacentrids (*Pomacentrus nagasakiensis*), Acanthurids (*Ctenochaetus striatus*) and Labrids (*Thalassoma Hardwicke*). Similar to sites R1, R2 and R3, dominant species recorded at R4 was *Pomacentrus nagasakiensis* representing the family pomcentrids, while Acanthurids were dominated by *Ctenachaetus striatus* and *Zebrosoma scopus*. The Survey site R5 was dominated by pomacentrid *Chrysiptera brownriggii*, while *Acanthurus lineatus* dominated the family Acanthuridae. Altogether 67 species were recorded from the five sites (See figures 25 to 29 for details of various families observed at the sites. Details of species are given tables 15 to 19 in the original EIA). Aetherinidae, are not included in the Figures 25 to 29, as these were observed in schools.

All together 10 species of Chaetodontids (butterfly fishes) were recorded at the survey sites. Dominant species recorded was *Chaetodon triangulum* which was observed at all five sites.

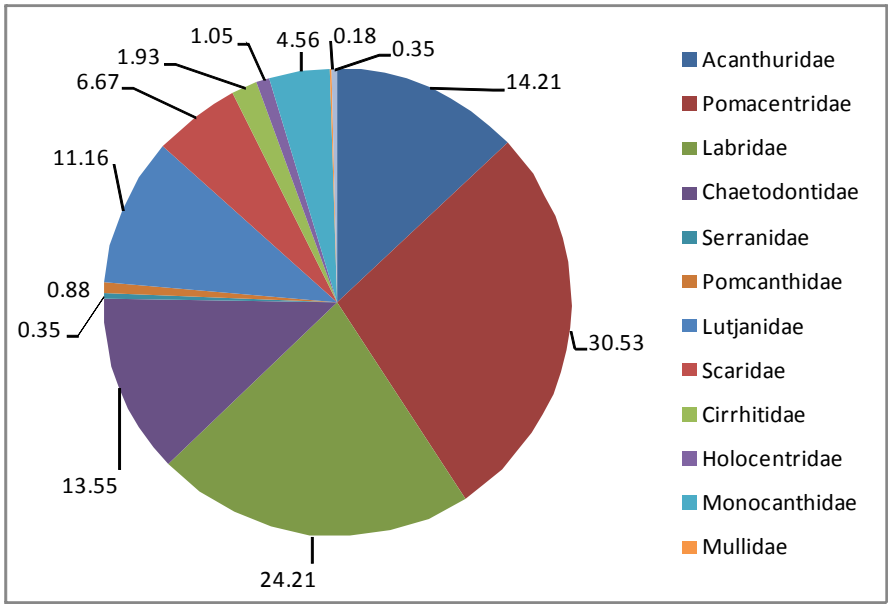

Figure 25 Reef fish composition at survey site R1

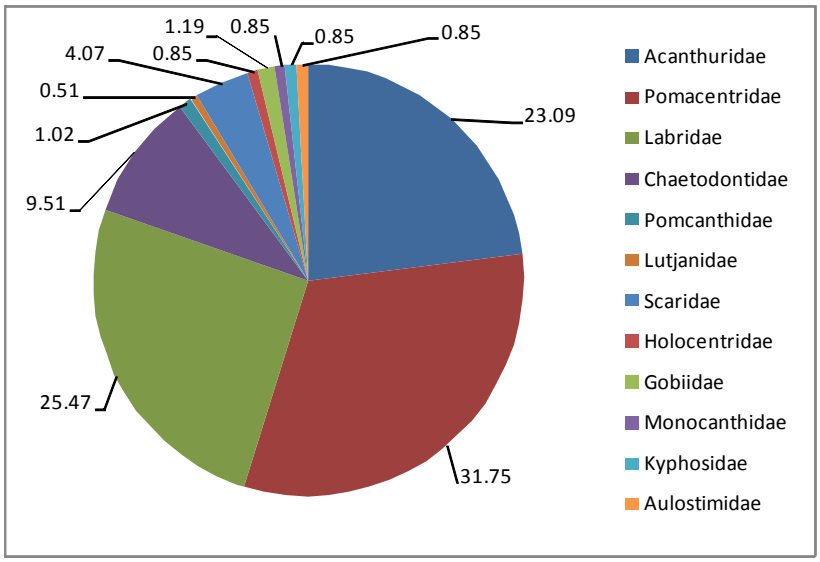

Figure 26 Reef fish composition at survey site R2

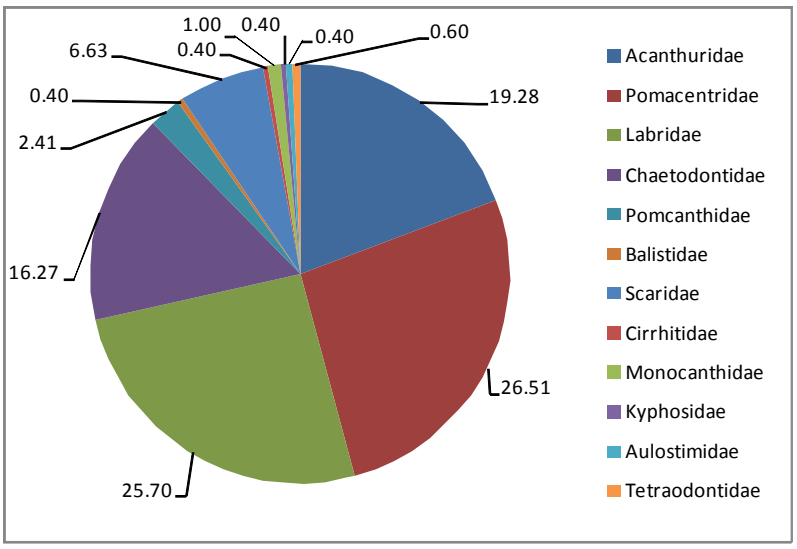

Figure 27 Reef fish composition at survey site R3

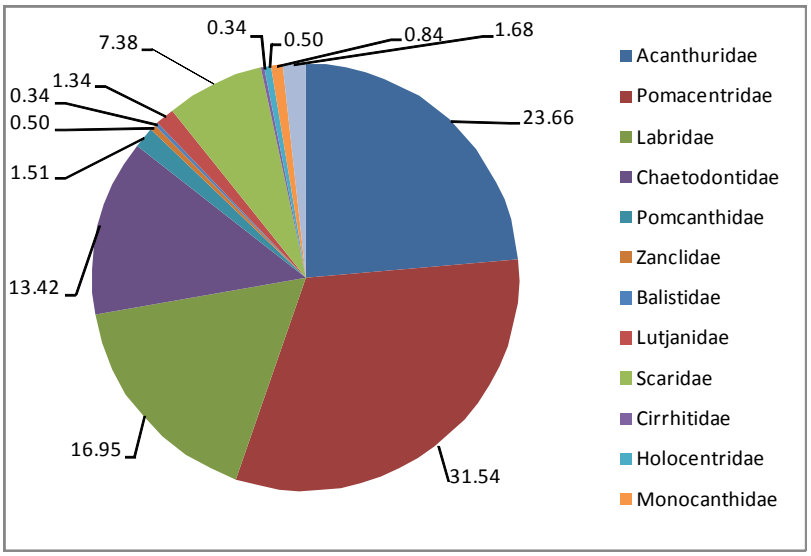

Figure 28 Reef fish composition at reef survey R5

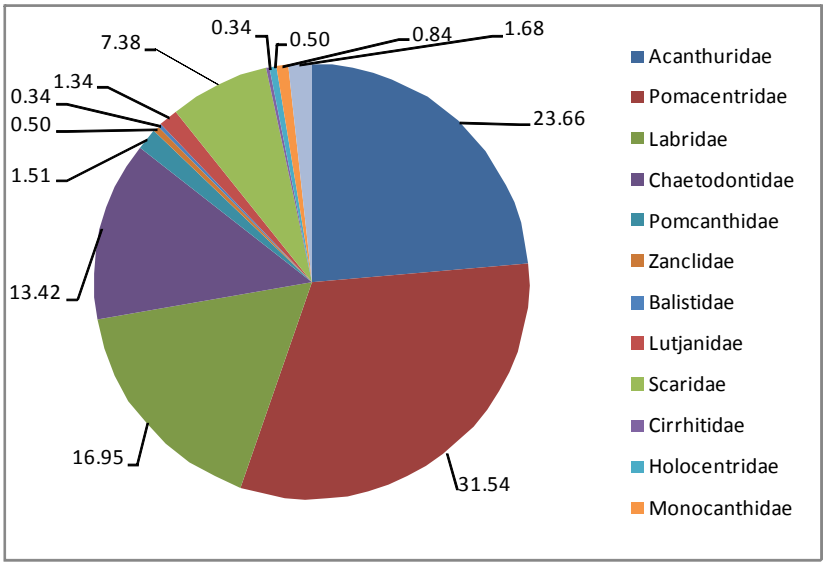

Figure 29 Reef fish composition at survey site R5

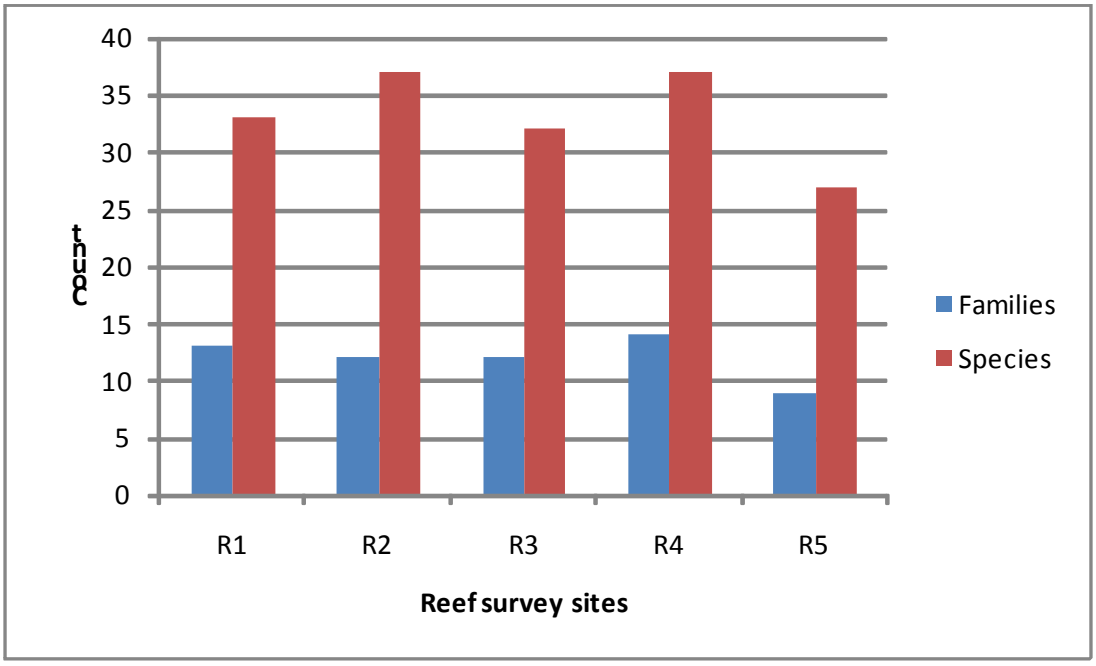

Figure 30 Reef fish diversity among the sites surveyed

4.2.2.3 SEAWATER QUALITY

Additional data for seawater quality was not obtained during the work on the addendum as areas previously surveyed were observed to be sufficient for the purpose of reporting in the addendum. Details of seawater testing and results are reported in section 6.3.4 of the original EIA report.

4.2.3 TERRESTRIAL ENVIRONMENT

4.2.3.1 FLORA

The central area of the island is cleared for agricultural purposes by the previous owners of the island. Approximately 19% of the vegetation at the central area of the island is cleared (approximately 32,800m^2). Seven Banyan trees were recorded during the vegetation survey (only large prominent trees were recorded using precision GPS). The Banyan trees recorded was mostly found in groups of 2. Large sea trumpet trees were recorded at the southern side of the island. The western and northern side of the island is composed of low canopy vegetation such as Sea hibiscus, Sea lettuce and Pandanus trees. Only juvenile coconut trees were observed at this area. Mature trees are observed at the central area (area left undisturbed by agriculture), southern side and eastern side. Coconut groves are restricted to the eastern and southern side. Tree survey map is provided in Appendix 8 of the EIA report.

The proposed changes to the concept plan now house the BoH area in the existing cleared area in comparison to earlier where it was throughout the island. Hence the impact on vegetation is now minimized, due to the lesser need for vegetation clearance.

4.2.3.2 GROUNDWATER

Additional data for groundwater quality was not obtained during the work on the addendum as areas previously surveyed were observed to be sufficient for the purpose of reporting in the addendum. Details of groundwater testing and results are reported in section 6.4.2 of the original EIA report.

4.3 POTENTIAL IMPACTS

The changes to the concept plan involve reorientation of jetties and over water structures while location is largely changed only for the Detached Romantic Villa. Therefore potential impacts are already covered in the EIA report. Considering changes to the land structures; positive impacts are envisaged since BoH buildings are relocated to existing cleared areas (farm plots) at the island therefore minimizing the need for vegetation clearance.

4.4 MITIGATION AND MANAGEMENT OF NEGATIVE IMPACTS

Mitigation provided in the EIA report is sufficient for mitigating significant impacts identified in the EIA report; since additional impacts are not envisaged mitigation provided in the initial EIA is assumed to be sufficient.

4.5 DEVELOPMENT OF MONITORING PLAN

No additional monitoring is required as a result of the proposed changes in the concept plan. As described in the original EIA, monitoring work during the operational phase will be carried out according to the Environmental Management Plan (EMP) and the Terms of Reference. Cost for the monitoring (data collection) activities will be covered by Client and commitment for this was provided in the EIA report. The EMP will include monitoring of waste generation and disposal.

APPENDICES

Appendix 1 Terms of Reference for Addendum for Proposed Changes

Environmental Protection Agency
އެންވަޔަރަންމަންޓަލް ޕްރޮޓެކްޝަން އޭޖެންސީ

بسم الله الرحمن الرحيم

EPA

ނަންބަރު: 203-FINHUM/PRIU/2011/480

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11 ޑިސެމްބަރ 2011

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ޑެޕިއުޓީ ޑިރެކްޓަރ ޖެނެރަލް

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މާލެ، ދިވެހިރާއްޖެ

UNEP
WORLD ENVIRONMENT DAY
5 JUNE

Environmental Protection Agency
Min. of Housing & Environment Compound
Ameenee Magu
Male', Rep. of Maldives, 20392
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އަމީނީ މަގު
މާލެ، ދިވެހިރާއްޖެ، 20392
ފޯނު :
އީމެއިލް :

بسم الله الرحمن الرحيم

Environmental Protection Agency

އެންވަޔަރަމަންޓަލް ޕްރޮޓެކްޝަން އެޖެންސީ

EPA

Terms of Reference for Environmental Impact Assessment (Addendum)

The following is a terms of Reference as addendum to the existing EIA of Fushivelavaru pro the proposed changes to the concept. This ToR is therefore formed on the basis of the scoping meeting held at EPA on 17th November 2011 in consultation with representatives from the proponent, EPA Ministry of Tourism and representatives from other institutions. As part of the improving and upgrading the existing facility a sheet piled quay walled portion, trimming of the berth area and ranking piles for outer harbor berthing area.

The proposed changes to the proposed concept plan are;

- Shape of Water Villas Jetty and direction is changed
- Service Buildings and support facilities moved to center of Island
- A.2.3 Signature Restaurant moved to the south east corner of the lagoon
- A.1.9 Detached Romantic Villa included and moved to east corner of the lagoon
- A.2.4 Location of Ocean Spa revised and moved more north east of the lagoon
- A.3.15 Service Jetty expanded
- A.2.11.1 Included an Arrival Pavilion – North
- A.2.11.2 Arrival Pavilion - South without lagoon bar
- A.2.1 All day dining restaurant moved to the opposite side
- A.2.6.1 Kids Club moved to the opposite side
- A.2.5 Wine Cellar moved to shore near first client villas
- A.2.7.1 Yoga Deck moved to shore
- Number of villas reduced from 50 to 48
- Floor plan and categories of villas revised

While every attempt has been made to ensure that this TOR addresses all of the major issues associated with development proposal, they are not necessarily exhaustive. They should not be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them, or matters currently unforeseen, that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIA report

1. **Introduction and rationale** – Describe the purpose of the project and, if applicable, the background information of the project/activity and the tasks already completed. Objectives of the development activities should be specific and if possible quantified. Define the arrangements required for the environmental assessment including how work carried out under this contract is linked to other activities that are carried out or that is being carried out within the project boundary. Identify the donors and the institutional arrangements relevant to this project.

2. **Study area** – Submit a minimumA3 size scaled plan with indications of all the proposed changes. Specify the agreed boundaries of the study area for the environmental impact assessment highlighting the proposed development location and size. The study area should include adjacent or remote areas, such as relevant developments and nearby environmentally sensitive sites (e.g. coral reef, sea grass, mangroves, marine protected areas, special birds site, sensitive species nursery and feeding grounds). Relevant developments in the areas

must also be addressed including residential areas, all economic ventures and cultural sites

3. **Scope of work** – Identify and number tasks of the project including preparation, construction and decommissioning phases.

Task 1. Description of the Proposed Project - Provide a full description the proposed changes to the concept in the context of the original concept. Describe the changes to the original footprint of the project with respect to the changes. Provide Justification for the proposed changes.

Task 2. Description of the Environment – Describe the expected changes to the existing environment in the context of the proposed changes to the concept giving due consideration to the baseline data collected in the original EIA. If any development takes place at a footprint which was not surveyed in the original EIA report, baseline assessment of such areas must be provided. This includes assessments for both baseline marine and terrestrial assessments. If covered in the original EIA report relevant sections of the report shall be included in the addendum report. This includes coral reef assessments, currents data, fish censes, vegetation survey etc. The baseline data needs to be analyzed based on the proposed changes.

Task 4. Determine the Potential Impact: Identify any impacts associated with the change to the concept in terms of impact area and their magnitude. Impacts during construction phase and operation phase, direct and indirect impacts and cumulative impacts needs to be analyzed.

Task 6. Mitigation and Management of Negative Impacts- Any mitigation measures that may be associated with the proposed changes and reflect this as additional information giving reference to the original EIA.

Task 7. Development of monitoring plan (see appendix)– Any additional monitoring that is required as a result of the proposed changes need to be analysed. Reference needs to be made to the monitoring program of the original EIA report.

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 f or 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 Regulations, 2007

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

.....

11th December 2011

Appendix-1

1. PHYSICAL MONITORING

1.1. WATER QUALITY TESTING

These parameter guideline triggers have been adopted from the Great Barrier Reef Marine Park Authority (GBRMPA, 2009). The marine ecology in the Maldives is so vulnerable that it should be compared to that in the GBRMP. This will help maintain healthy ecosystems to preserve valuable natural resources that are directly or indirectly part of all people's livelihoods.

Take 3 control water samples away from the project site, 3 water samples from the project site and a representative number of water samples from different locations around the project site. All water samples shall be taken at a depth of 1m from the mean sea level or mid water depth for shallow areas. Record the GPS coordinates of each water sample taken. Analyze the following parameters and check the water quality standards to evaluate the status of the sample.

1.1.1. Temperature: The optimum temperature for coral reef growth ranges between 18^0C and 32^0C. Changes should not surpass 1^0C above the average long term maximum (GBRMPA, 2009). Temperatures above or below the local range can cause stress to coral reefs and seagrass beds.

1.1.2. Salinity: It is recommended that salinity ranges between 3.2% - 4.2% for optimum coral reef and seagrass ecosystems to blossom. Surface salinity can decrease when fresh water is added e.g. floods or pollution from industry, or increase if surface water evaporates. Changes may cause stress to corals and seagrasses (GBRMPA, 2009).

1.1.3. pH: Seawater pH is usually 8.0-8.3. Levels below 7.4 pH stress corals and calcifying seagrasses by decreasing calcification processes.

1.1.4. Turbidity: Corals and seagrasses need UV light for photosynthetic processes. If turbidity is high then these ecosystems will become stressed. Studies suggest that long term turbidity levels which are >3 NTU lead to sublethal stress. However, long term turbidity levels higher than 5 NTU cause severe stress on coral at shallow depth (Cooper *et al.*, 2008).

1.1.5. Sedimentation: Sedimentation is the sediment load that arrives onto the reef which can reduce light availability for photosynthesis, deplete dissolved oxygen and cause smothering of organisms. Sedimentation rates are measured using sediment traps. The maximum mean annual rate for coral reef and seagrass ecosystems is 3mg/cm^2/day, and a daily maximum of 15mg/cm^2/day (GBRMPA, 2009).

1.1.6. Nitrates: Nitrate is an essential nutrient for aquatic plants and seasonal fluctuations can be caused by plant growth and decay (UNESCO/WHO/UNEP, 1996). Natural concentrations, which seldom exceed 0.1 mg l^{-1} NO_3^-N, may be enhanced by municipal and industrial waste-waters, including leachates from waste disposal sites and sanitary landfills (UNESCO/WHO/UNEP, 1996). In islands where there is significant agricultural activity, the use of inorganic nitrate fertilizers can be a significant source.
When influenced by human activities, surface waters can have nitrate concentrations up to 5 mg l^{-1} NO_3^-N, but often less than 1 mg l^{-1} NO_3^-N. Concentrations in excess of 5 mg l^{-1} NO_3^-N usually indicate pollution by human or animal waste, or fertilizer run-off. In cases of extreme pollution, concentrations may reach 200 mg l^{-1} NO_3^-N.

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Ameenee Magu
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1.1.7. Ammonia: Unpolluted waters contain small amounts of ammonia and ammonia compounds, usually <0.1 mg l^{-1} as nitrogen. Total ammonia concentrations measured in surface waters are typically less than 0.2 mg l^{-1} N but may reach 2-3 mg l^{-1} N. Higher concentrations could be an indication of organic pollution such as from domestic sewage, industrial waste and fertilizer run-off. Ammonia is, therefore, a useful indicator of organic pollution. Natural seasonal fluctuations also occur as a result of the death and decay of aquatic organisms, particularly phytoplankton and bacteria in nutritionally rich waters (UNESCO/WHO/UNEP, 1996).

1.1.1. Phosphates: Phosphates exist in three forms: orthophosphate, metaphosphate (or polyphosphate) and organically bound phosphate each compound contains phosphorous in a different chemical arrangement. These forms of phosphate occur in living and decaying plant and animal remains, as free ions or weakly chemically bounded in aqueous systems. In the marine environment, phosphorus limits algal growth therefore when in excess causes euthophication and slower reef growth (UNESCO/WHO/UNEP, 1996). In most natural surface waters, phosphorus ranges from 0.005 to 0.020 mg l^{-1} PO_4^-P (UNESCO/WHO/UNEP, 1996).

1.1.2. Sulphate: Sulphate is naturally present in surface waters as SO_4^{2-}. It arises from the atmospheric deposition of oceanic aerosols and the leaching of sulphur compounds, either sulphate minerals such as gypsum or sulphide minerals such as pyrite, from sedimentary rocks. Industrial discharges and atmospheric precipitation can also add significant amounts of sulphate to surface waters. Sulphate can be used as an oxygen source by bacteria which convert it to hydrogen sulphide (H_2S, HS^-) under anaerobic conditions. Sulphate concentrations in natural waters are usually between 2 and 80 mg l^{-1}, although they may exceed 1,000 mg l^{-1} near industrial discharges or in arid regions where sulphate minerals, such as gypsum, are present (UNESCO/WHO/UNEP, 1996).

1.1.3. BOD: The biochemical oxygen demand (BOD) is an approximate measure of the amount of biochemically degradable organic matter present in a water sample (UNESCO/WHO/UNEP, 1996). It is defined by the amount of oxygen required for the aerobic micro-organisms present in the sample to oxidise the organic matter to a stable inorganic form. BOD measurements are usually lower than COD measurements. Unpolluted waters typically have BOD values of 2 mg l^{-1} O_3 or less (UNESCO/WHO/UNEP, 1996).

1.1.4. COD: The chemical oxygen demand (COD) is a measure of the oxygen equivalent of the organic matter in a water sample that is susceptible to oxidation by a strong chemical oxidant, such as dichromate (UNESCO/WHO/UNEP, 1996). The COD is widely used as a measure of the susceptibility to oxidation of the organic and inorganic materials present in water bodies and in the effluents from sewage and industrial plants.The concentrations of COD observed in surface waters range from 20 mg l^{-1} O_2 or less in unpolluted waters to greater than 200 mg l^{-1} O_2 in waters receiving effluents (UNESCO/WHO/UNEP, 1996).

Table 1. Water quality parameter optimum conditions.

PARAMETER	OPTIMAL RANGE	REFERENCE
TEMPERATURE	18^0C and 32^0C *Changes should not surpass 1^0C above the average long term maximum	GBRMPA, 2009
SALINITY	3.2% - 4.2%	GBRMPA, 2009

PH	8.0-8.3 *Levels below 7.4 pH cause stress	
TURBIDITY	3-5 NTU >5 NTU causes stress	Cooper *et al.* 2008
SEDIMENTATION	Maximum mean annual rate 3mg/cm^2/day Daily maximum of 15mg/cm^2/day	GBRMPA, 2009
NITRATES	<5 mg l^{-1} NO_3^-N	UNESCO/WHO/UNEP, 1996
AMMONIA	Max. 2-3 mg l^{-1} N	UNESCO/WHO/UNEP, 1996
PHOSPHATE	0.005 - 0.020 mg l^{-1} PO_4^-P	UNESCO/WHO/UNEP, 1996
SULPHATE	2 mg l^{-1} and 80 mg l^{-1}	UNESCO/WHO/UNEP, 1996
BOD	< 2 mg l^{-1} O_3	UNESCO/WHO/UNEP, 1996
COD	< 20 mg l^{-1} O_2	UNESCO/WHO/UNEP, 1996

1.2. TERRESTRIAL MONTIORING

Terrestrial environments in the Maldives play an important role in sustaining island shapes and many indigenous species. Vegetation maintains the soil on the ground and hosts 70 bird species, many interesting reptiles and amphibians and mangrove communities. In Environmental Impact Assessments, terrestrial monitoring should include evaluating the damages caused by the project development on the following flora and fauna:

- Land clearance activities including removal of trees, shrubs, seedlings, forest litter;
- Reptiles and amphibians including species, population size, location;
- Birds including species, population size and location;
- Soil texture changes, and,
- Garbage description.

A general procedure for collecting island data is through focus group discussions where islanders can identify the major changes in flora and fauna. All stakeholders should attend this meeting.

Finally, the legislation states that:

- No trees shall be felled for tourism ventures (Regulation on the Protection and Conservation of the Environment in the Tourism Industry)
- The maximum area for construction allowed for tourism ventures is 20%.
- The buffer zone between the high water mark and the first construction is 20 metres minimum.

2.4 NOISE LEVEL MONITORING

Monitoring shall be undertaken during daytime and nighttime to determine adherence to these standards. Standards are categorized based on the nature of the urban environment.

	Standard value	
Type of area	Daytime	Nighttime
A	50 dB or less	40 dB or less
B	55 dB or less	45 dB or less
C	60 dB or less	50 dB or less
D	65dB or less	55dB or less

In terms of the time category, daytime shall be the period from 6:00 a.m. to 6:00 p.m. and nighttime shall be the period from 6:00 p.m. to 6:00 a.m.

Category Definition

1. **Category A** refers to special areas where noise levels needs to be especially low, such as schools, hospitals and mosques.
2. **Category B** refers to areas used exclusively for residential development.
3. **Category C** refers to mixed residential developments and residential developments near major roads.
4. **Category D** refers to areas used exclusively for commercial and industrial developments.

2. SOCIO-ECONOMIC MONITORING

Public consultation is an important part of the project assessment since stakeholders will influence the success or failure of the project. If stakeholders and members of the public fully support the development activities will process much easier and benefits by both parties will be apparent. The following is important in all consultations:

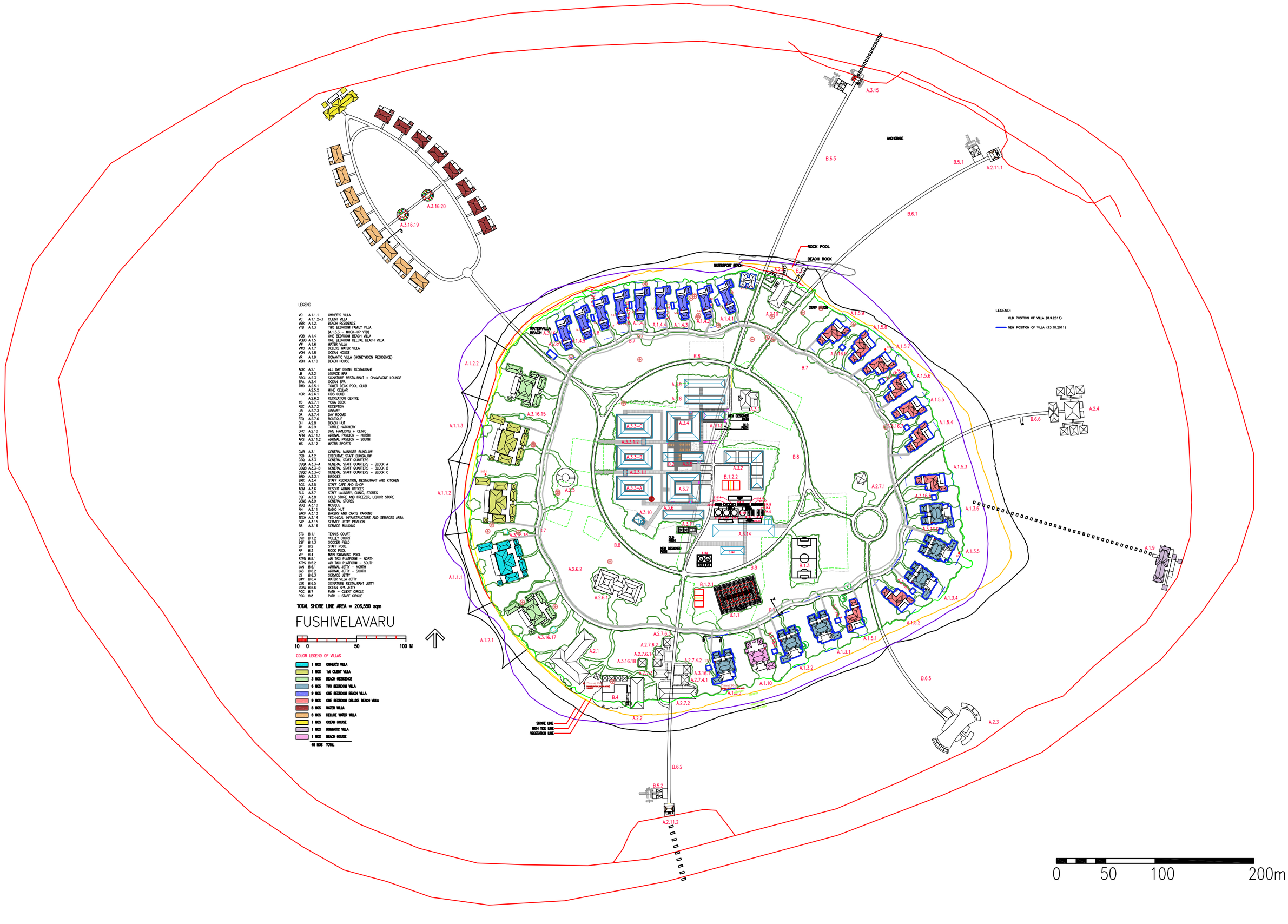
- List of stakeholders and key informants, describe chronological plan of interviews and meetings and key points of discussions;
- Apply for all the necessary permits for project development;
- Census of the economic activities in the area (project island and neighbouring islands);
- Employment and economic opportunities and diversification in the area;
- Impacts on ground water from construction and operational phase and water availability for locals;
- Increased demands for natural resources and services in the area, e.g. water supply, energy, waste water treatment, solid waste generation, health services, population pressure, space availability, food and nutrition security –fisheries, agriculture, other- etc.
- Impacts on tourism, and

- Social destabilization of the island community.

The key outcomes from each stakeholder and key informant consultation ought to be included in the EIA. Follow up consultation will validate the success of the project, failures and suggest improvements.

Appendix 2 Revised Site Plan and previous site plan

New Master Plan (December 2011)



LEGEND

VO	A.1.1.1	OWNER'S VILLA
VC	A.1.1.2–3	CLIENT VILLA
VBR	A.1.2.	BEACH RESIDENCE
VTB	A.1.3	TWO BEDROOM FAMILY VILLA (A.1.3.3 – MOCK–UP VTB)
VOB	A.1.4	ONE BEDROOM BEACH VILLA
VOBD	A.1.5	ONE BEDROOM DELUXE BEACH VILLA
VW	A.1.6	WATER VILLA
VWD	A.1.7	DELUXE WATER VILLA
VOH	A.1.8	OCEAN HOUSE
VR	A.1.9	ROMANTIC VILLA (HONEYMOON RESIDENCE)
VBH	A.1.10	BEACH HOUSE
ADR	A.2.1	ALL DAY DINING RESTAURANT
LB	A.2.2	LOUNGE BAR
SRCL	A.2.3	SIGNATURE RESTAURANT + CHAMPAGNE LOUNGE
SPA	A.2.4	OCEAN SPA
TWD	A.2.5.1	TOWER DECK POOL CLUB
	A.2.5.2	WINE CELLAR
KCR	A.2.6.1	KIDS CLUB
	A.2.6.2	RECREATION CENTRE
YD	A.2.7.1	YOGA DECK
REC	A.2.7.2	RECEPTION
LIB	A.2.7.3	LIBRARY
DR	A.2.7.4	DAY ROOMS
BTQ	A.2.7.6	BOUTIQUE
BH	A.2.8	BEACH HUT
TH	A.2.9	TURTLE HATCHERY
DPC	A.2.10	DIVE PAVILIONS + CLINIC
APN	A.2.11.1	ARRIVAL PAVILION – NORTH
APS	A.2.11.2	ARRIVAL PAVILION – SOUTH
WS	A.2.12	WATER SPORTS
GMB	A.3.1	GENERAL MANAGER BUNGLOW
ESB	A.3.2	EXECUTIVE STAFF BUNGALOW
GSQ	A.3.3	GENERAL STAFF QUARTERS
GSQA	A.3.3–A	GENERAL STAFF QUARTERS – BLOCK A
GSQB	A.3.3–B	GENERAL STAFF QUARTERS – BLOCK B
GSQC	A.3.3–C	GENERAL STAFF QUARTERS – BLOCK C
BRD	A.3.3.1	BRIDGES
SRK	A.3.4	STAFF RECREATION, RESTAURANT AND KITCHEN
SCS	A.3.5	STAFF CAFE AND SHOP
ADM	A.3.6	RESORT ADMIN OFFICES
SLC	A.3.7	STAFF LAUNDRY, CLINIC, STORES
CSF	A.3.8	COLD STORE AND FREEZER, LIQUOR STORE
GENS	A.3.9	GENERAL STORES
MSQ	A.3.10	MOSQUE
RH	A.3.11	RADIO HUT
BAKP	A.3.13	BAKERY AND CARTS PARKING
TECH	A.3.14	TECHNICAL INFRASTRUCTURE AND SERVICES AREA
SJP	A.3.15	SERVICE JETTY PAVILION
SB	A.3.16	SERVICE BUILDING
STC	B.1.1	TENNIS COURT
SVC	B.1.2	VOLLEY COURT
SSF	B.1.3	SOCCER FIELD
SP	B.2	STAFF POOL
RP	B.3	ROCK POOL
MP	B.4	MAIN SWIMMING POOL
ATPN	B.5.1	AIR TAXI PLATFORM – NORTH
ATPS	B.5.2	AIR TAXI PLATFORM – SOUTH
JAN	B.6.1	ARRIVAL JETTY – NORTH
JAS	B.6.2	ARRIVAL JETTY – SOUTH
JS	B.6.3	SERVICE JETTY
JWV	B.6.4	WATER VILLA JETTY
JSR	B.6.5	SIGNATURE RESTAURANT JETTY
JSPA	B.6.6	OCEAN SPA JETTY
PCC	B.7	PATH – CLIENT CIRCLE
PSC	B.8	PATH – STAFF CIRCLE

TOTAL SHORE LINE AREA = 206,550 sqm

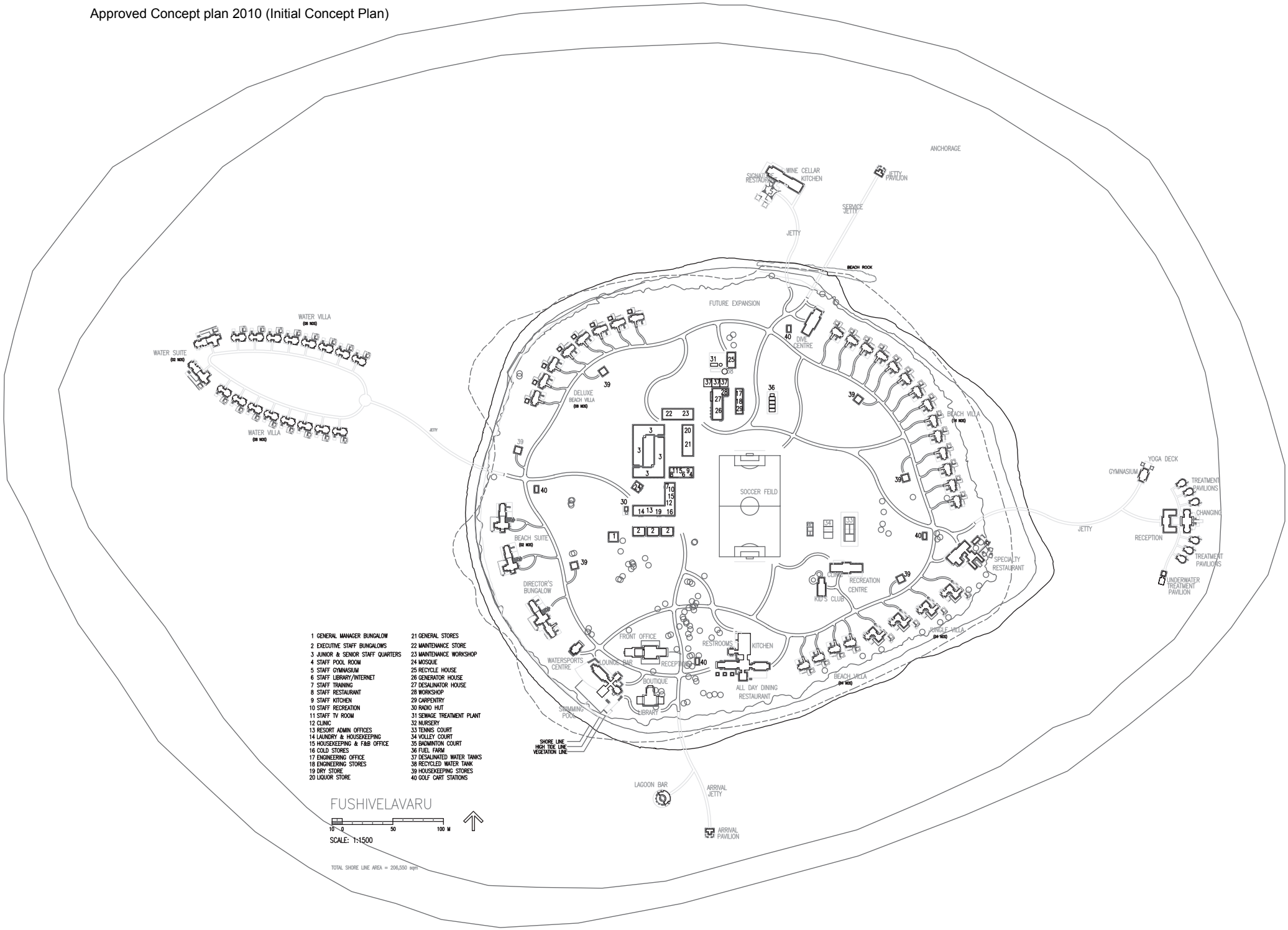
FUSHIVELAVARU

10 0 50 100 M

COLOR LEGEND OF VILLAS

1	NOS	OWNER'S VILLA
1	NOS	1st CLIENT VILLA
3	NOS	BEACH RESIDENCE
6	NOS	TWO BEDROOM VILLA
9	NOS	ONE BEDROOM BEACH VILLA
9	NOS	ONE BEDROOM DELUXE BEACH VILLA
8	NOS	WATER VILLA
8	NOS	DELUXE WATER VILLA
1	NOS	OCEAN HOUSE
1	NOS	ROMANTIC VILLA
1	NOS	BEACH HOUSE
48	NOS	TOTAL

Approved Concept plan 2010 (Initial Concept Plan)



Appendix 3 CVs

بسم الله الرحمن الرحيم

CURRICULUM VITAE

1. POSITION: Environmental Specialist/EIA Consultant

2. NAME OF FIRM: LaMer Group

3. NAME: Hussain Zahir

4. DATE OF BIRTH: 10th February 1966

5. NATIONALITY: Maldives

6. EDUCATION:

Masters of Philosophy (MPhil) in Coral Reef Ecology
University of Newcastle upon Tyne. Newcastle Upon Tyne, United Kingdom
2006

Marine Biology B.Sc. (Hon)
University of Newcastle Upon Tyne.
Newcastle Upon Tyne,
United Kingdom
1993-1996

7. MEMBERSHIP OF PROFESSIONAL SOCIETIES:

8. OTHER TRAINING:

1988. Marine Science Institute, University of Philippines
Certificate of completion of training course on Scleractinian Coral Taxonomy

1989. Chulalongkorn University. Bangkok. Thailand
Certificate of Completion of training Course on Coral Taxonomy, Ecology and Management

1998 Okinawa International Centre, Okinawa, Japan
Certificate of participation on training course on Conservation and Sustainable Management of Coral Reefs

1999 Korean Research and Development Institute, Seoul, South Korea
Certificate of Completion of the Training Course on marine coastal zone conservation and management

1990. Department of Marine Sciences. Chulalongkorn University. Bangkok. Thailand
Workshop on Taxonomy of Soft Bottom Invertebrates (ASEAN-Australian Coastal Living Resources Project)

1991. Mc Master University, Hamilton, Ontario. Canada.
Training on Boring Sponges of Coral reefs in Maldives

1996 Turtle Specialist Group, Convention on the Conservation

of Migratory Species of Wild Animal (CMS) and government of India. Bhubaneshwar, India

Workshop and Strategic Planning Session for the Conservation of Sea Turtles of the Northern Indian Ocean

1999. United Nations Environment Program. Environment for South Asia and Pacific, organized by SACEP and Ministry of Home Affairs, Housing and Environment.

National Training for State of the Environment and Data Collection and Reporting

9. COUNTRIES OF WORK EXPERIENCE:

10. LANGUAGE AND DEGREE OF PROFICIENCY:

Dhivehi -Mother Tongue
English -Proficient

11. EMPLOYMENT RECORD:

Nov 2007- Present	Senior Reef Ecologist Marine Research centre, Ministry of Fisheries Agriculture and Marine Resources Male', Maldives.
Feb 2006- October 2007	Reef biologist Marine Research centre, Ministry of Fisheries Agriculture and Marine Resources Male', Maldives.
July 2001- January 2006	Senior Research Officer Marine Research centre, Ministry of Fisheries Agriculture and Marine Resources Male', Maldives.
June 2000 to Present	Marine Biologist/ Director (Part Time) Land and Marine Environmental Resource Group of Pte Ltd
July 1996 to July 2001	Research Officer Marine Research Centre , Ministry of Fisheries Agriculture and Marine Resources
1988 to 1992	Biological Aid Marine Research Centre , Ministry of Fisheries Agriculture and Marine Resources
1986 to 1988	Marine Research Centre , Ministry of Fisheries Agriculture and Marine Resources Trainee

12. DETAILED TASKS ASSIGNED:	WORK UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE TASKS:
Marine Research Centre, Ministry of Agriculture and Marine Resources	**National coordinator of Global Coral Reef Monitoring Network** *Responsibilities:* Including Implementation and management of the programme activities in the country through the GCRMN Regional Node for south Asian Region in Srilanka. Current programme of activities include, establishing and monitoring of coral reefs to assess the recovery processes after the 1998 Bleaching and to monitor the temporal changes to the reef system. Responsibilities also include coordination and implementation of socioeconomic monitoring at designated pilot sites to asses the livelihood and their dependence on coral reef resources. Coordinating the establishment national reef database to share information at national, regional, and global level is also part of the program of activities. **Coral Reef Degradation in the Indian Ocean (CORDIO) Programme** *Responsibilities:* include implementation and management of the identified projects/ Studies funded by CORDIO. Currently involved biophysical studies designed to understand the reef recovery processes after a severe disturbance in coral reefs **Catalogue of Common Coral Reef of Maldives, 1996** *Year: 1996* *Location:* Maldives.
Task Undertaken Independent Consultant	**Initial Environmental Evaluation, Tsunami Emergency Assistance Project, Maldives** *Year: 2006* *Location:* Ha. Filladhoo, HDH. Nolhivaranfaru, Sh. Maroshi, N. Maafaru, DH. Meedhoo, M. Kolhufushi and Th. Madifushi, Maldives *Client: ADB* *Project features:* Rehabilitation of damaged infrastructures (electricity)due to the tsunami of December 2004 in the Maldives financed by ADB under Tsunami Emergency Assistance project *Positions held:* Domestic Environmental Specialist *Responsibilities:* Initial Environmental Evaluation for the Repair and Reconstruction of Diesel powered generator housed in the above 7 island communities. Environmental issues specific of diesel power generation in the local and national context were addressed following ADB environmental guidelines. I **Initial Environmental Evaluation, Tsunami Emergency Assistance Project, Maldives** *Year: 2005* *Location:* Ugoofaaru, Manadhoo , Dhidhdhoo, Maldives *Client: ADB* *Project features:* Rehabilitation of damaged infrastructures (harbours)due to the tsunami of December 2004 in the Maldives financed by ADB under Tsunami Emergency Assistance project *Positions held:* Domestic Environmental Specialist *Responsibilities:* Initial Environmental Evaluation of the project sites; Ugoofaaru, Manadhoo and Dhidhdhoo for the tsunami

emergency assistance project: TA-0001 (MLD). Specific Task include rapid environmental assessment of the project sites, prepare environmental evaluations based on filed data and community Consultants, predict environmental impacts and propose an environmental monitoring plan for the project activities.

Marine Biodiversity assessment, Faafu atoll, Maldives,
Year: 2003
Location: Faafu atoll, Maldives
Client: ADB
Project features: Identification of potential biodiversity hotspots (sites/species) as part of identifying priority areas for an MCPA planning project funded by ADB. Project involves assessment of socioeconomic and biophysical assessment of the short listed sites identified for the project.
Positions held: Biodiversity Environmental Specialist
Responsibilities: Marine Biodiversity assessment Faafu atoll Maldives. ADB regional technical assistance for coastal and Marine resource management and poverty reduction in south Asia. (ADB RETA 5974). A project implemented by Ministry of Fisheries, Agriculture and Marine Resources. Assignment involves detail preparation of marine biodiversity and Coastal management issues with special reference to grouper fishery and resource management.

Environmental Impact Assessment Report for the Development of Fish Processing Plant at Ha. Huvahandhoo, Maldives,
Year: 2002
Location: Maldives
Client: Jausa Fishery Links
Project features: Construction of a tuna processing plant
Positions held: Marine Biologist
Responsibilities: The EIA report involves collection and assessment of baseline and secondary environmental data both at the marine and terrestrial environment of the project site. It also involved a risk assessment and evaluation report. An environmental management plan was also developed as part of the EIA.

Task Undertaken as an employee o f Land and Marine Environmental Resource Group Pte Ltd

Replacement of wastewater collection, septic tanks and disposal systems in Ga.Villingili, Ga.Dhaandhoo, Gdh.Gahdhoo
Year: 2007-Ongoing
Location: Ga.Villingili, Ga.Dhaandhoo, Gdh.Gahdhoo
Client: American Red Cross
Project features: Design and construction of wastewater disposal systems in the specific islands
Positions held: EIA Specialist
Responsibilities: Environmental Impact Assessment research and analysis.
Preparation and submission of the Environmental Impact Assessment Report.

Environmental Impact Assessment for Reethi Rah Resort Redevelopment
Year: 2005
Location: Reethi Rah Resort
Client: Kersner International, Hotel Group
Resort development at Reethi Rah Resort
Positions held: Marine Biologist
Responsibilities: The EIA involves collection and assessment of baseline and secondary environmental data and marine and terrestrial environment of the project site. This is one of the largest reclamation project for resort development and assessment of impact of dredging and reclamation on the coastal marine habitats was a major component of this study

Environmental Impact Assessment Report for Villa Hakatha at Thilafushi, Male Atoll
Year: 2001
Location: Male Atoll
Client: Villa Hakatha,Maldives
Positions held: Project Biologist
Responsibilities: The EIA report involves collection and assessment of baseline and secondary environmental data both at the marine and terrestrial environment of the project site. It also involved a risk assessment evaluation report. An environmental management plan was also developed as part of this EIA.

Development at Baa. Landaagiraavaru, Maldives
Year: 2000
Location: Baa. Landaagiraavaru, Maldives
Client: Club mediterranee *Project features:*
Positions held: Project Biologist
Responsibilities: The EIA involved collection of Oceanographic data, Study of the beach environment, Vegetation, reef quality and reef water quality. The study examined the impacts of the island and mitigation measures where appropriate. The study also forms the baseline data for future monitoring of the environmental changes due to the resort development

Environmental state for the proposed channel dredging & associated Barrier Island at Sun Island Resort.
Year: 2000
Location: Sun Island Resort, Maldives
Client: Tekton Design Associates Pvt. Ltd
Positions held: Project Biologist
Responsibilities: The Study involved assessment of the potential environmental impact on the coastal shoreline of the island and on to the reef environment within close proximity of the proposed project site.

Tasks undertaken as an employee of Riyan Design and Management Pte Ltd

Environmental Statement for the Proposed Redevelopment of Reethi Rah Resort
Year: 2000
Location: Reethi Rah Resort
Client: Reethi Rah Resort
Positions held: Project Biologist
Responsibilities: This Study Involved assessment of the existing

status of the islands environment and identification of potential environmental impact areas related to the proposed redevelopment plans. Formulation of an environmental monitoring plan that would enable the client to record the environmental changes that may be related to anthropogenic activities or natural.

Environmental Statement for the Proposed Redevelopment of Reethi Rah Resort
Year: 2000
Location: Reethi Rah Resort
Client: Reethi Rah Resort
Positions held: Project Biologist
Responsibilities: This Study Involved assessment of the existing status of the islands environment and identification of potential environmental impact areas related to the proposed redevelopment plans. Formulation of an environmental monitoring plan that would enable the client to record the environmental changes that may be related to anthropogenic activities or natural.

Proposed Beach Nourishment at M. Medhufushi. An assessment of Environmental Design Parameters
Year: 2000
Location: M.Medhufushi
Client: Vaaly Brothers Pte.Ltd
Positions held: Project Biologist
Responsibilities: The study involved examination of the beach characteristic
Including the sediment properties, beach profiles. Identification of a borrow site by Comparing the borrow sediment characteristics of the borrow site and the native beach sand.

Environmental Evaluation of Small-bore Sewer System (SBS) in Lh. Hinnavaru and K. Gulhi
Year:1999
Location: Lh. Hinnavaru and K. Gulhi
Client: Maldives Water and Sanitation Authority
Project features: The Study Involved ground water/ Seawater analysis of sewage pollution; reef surveys hydro graphic /oceanographic surveys and survey of the slopes of the sewage lines.
Positions held: Project Environmental Analyst

Assessment of Oil Contamination in Male' Groundwater from Vehicle Garages and Petrol Stations.
Year:1999
Location: Male', Maldives
Client: Maldives Water and Sanitation Authority
Positions held: Project Environmental Analyst
Responsibilities: The study involved Ground water analysis of oil contamination and assessment of general working conditions and practices in the vehicle garages and petrol stations in male'.

Environmental Impact Statement for the Proposed Beach Protection Works at Nika Island Resort
Year:1999

Location: Male', Maldives
Client: Nika Island Resort
Positions held: Project Biologist
Responsibilities: The project involves assessment of physical environmental condition such as the wave, current sediment characteristics, bathymetry at the project site (Nika Island Resort). Assessment of the status of the reef at the project site and an evaluation of the possible impacts on the reef and the physical environment as a result of the proposed beach protection work.

Environmental Monitoring of F. Filitheyo Resort Development
Year:1999
Location: F.Filitheyo
Client: AAA Trading Company Pvt.Ltd
Positions held: Project Biologist

Environmental Monitoring of M. Medhufushi Resort Development
Year:1999
Location: M. Medhufushi, Maldives
Client: Vaally Brothers Pte Ltd
Position Held: Project biologist

Environmental Monitoring of Lh. Kanuhuraa, Maldives
Year:1999
Location: Lh. Kanuhuraa
Client: SIMDI Hotel Management Pte Ltd
Positions held: Project Biologist

Environmental Monitoring of R. Meedhupparu Resort Development
Year:1999
Location: R. Meedhupparu
Client: Cowrie Investment Pvt Ltd, Maldives
Positions held: Project Biologist
Responsibilities: The Monitoring programmes involved periodic measurements of the beach profiles around the islands, reef quality surveys, ground water/ seawater analysis and environmental auditing

Tasks Under Taken as a Freelance Consultant

Environmental impact Assessment for the F. Filitheyo Resort Development
Year:1998
Location: F.Filitheyo
Client: AAA & Trading Company, Maldives
Positions held: Project Biologist

Environmental Impact Assessment for Lh. Madhiriguraidhoo Resort Development
Year:1997
Location: Lh. Madhiriguraidhoo
Client: Guardian Agency Pte Ltd
Positions held: Marine Biologist

Environmental Impact Assessment for B. Fonimagoodhoo Resort Development
Year:1997
Location: B. Fonimagoodhoo, Maldives
Client: Thasmeen Ali, M. Sheeraazeege, Maldives
Positions held: Marine Biologist

Environmental Impact Assessment for M. Hakuraahuraa Resort Development
Year:1997
Location: M. Hakuraahuraa
Client: Fantasea Pte Ltd, Maldives
Project features:
Positions held: Marine Biologist
Responsibilities: The EIA studies Involved collection of oceanographic data studies of the beach environment, vegetation, reef quality and ground water / Seawater quality. These studies examined the impacts of the development on the island and mitigation measures where appropriate. The studies also form the baseline data for the future monitoring of the environmental changes due to the resort development

13. Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

_____ Date: 7 May 2008
[*Signature of staff member or authorized representative of the staff]* *Day/Month/Year*

Full name of staff member Hussain Zahir
Full name of authorized representative:

Shahaama Abdul Sattar

Personal Information

Date of birth:	30 September 1980
Address:	G. Helengeli Aage, Apt 2 B Rahdhebai Magu Male' Republic of Maldives
Contact No:	+ 960 7904985 (m)
Email:	shahaama@lamer.com.mv (LaMer Pvt Ltd) shahaama.sattar@gmail.com
Work Address:	Currently working independently

Education

Graduate and Postgraduate

Aug 2004 - Jun 2006 Master of Science in Fisheries Biology and Fisheries Management
University of Bergen
Department of Biology
Postbox 7800
N-5020 Bergen, Norway

Feb 1999 - Dec 2001 Bachelor of Science
The Flinders University of South Australia
GPO Box 2100
Adelaide 5001, South Australia

Secondary

Apr 1997 – Jul 1998 G.C.E A'Level (London)
Kolej Damansara Utama
Damansara Jaya
Selangor,
Malaysia

Jan 1994 – Dec 1996 G.C.E O'Level (London)
Aminiya School
Male',
Republic of Maldives

Work experience

Feb 2002 Volunteer work at Seal Bay, Kangaroo Island, South Australia.
Work involved helping researchers with catching seals and removing tracking devices from the seals.

Dec 2001 – Feb 2002 Work experience at the South Australian Aquatic Sciences Centre
Work involved dealing with sea urchins, mainly cleaning their tanks, doing dissections on sea urchins and helping researchers with different aspects of the research.

May 2008 Participated in the Biodiversity Valuation survey of Baa Atoll Maldives carried out by AEC project and IUCN

Employment Record

May 2011 - Present Consultant, Darwin Reef Fish Project
Marine Research Centre, Maldives / Marine Conservation Society, UK

- Consultant to the Darwin Reef Fish Project (4 year joint collaboration between MRC and MCS, UK), which assesses the various reef fisheries (grouper, aquarium and food fisheries) of the Maldives and aims to establish management plans for these fisheries. Provision of technical support and assistance to the project staff and MRC in implementing the project and formulation of the management plans.

June 2011 – Present LaMer Pvt Ltd

- Work part time in report writing for the various Environmental Impact Assessment projects conducted by the group.

July 2011 – Present BOBLME Sharks Working Group Coordinator, Bay of Bengal Large Marine Ecosystem Project

- Coordinator for the Sharks WG of BOBLME project, and work with the focal points in the member countries, to assist in the formulation and implementation of their National Plans of Action for Sharks.

June 2002 – May 2011 Fisheries Biologist (At time of resignation)
Marine Research Centre
Ministry of Fisheries and Agriculture
Male', Republic of Maldives

Line of work at MRC included:

- Conduct field surveys to monitor the reef fishery and fish species behaviour
- Compilation and analyses of the reef fisheries data, in particular the grouper and food fishery data
- Write reports and regular reviews on the status of fisheries including recommendations for management.
- Focal point for the IUCN funded project on identification of reef fish spawning aggregations in the Maldives through fishermen interviews (2007)
- Secretariat – Indian Ocean Cetacean Symposium 2009
- Project Partner for Maldives for the Darwin Initiative Coral Reef Fish Project, Maldives
- MRC Focal point for the Atoll Ecosystem Conservation Programme, Ministry of Housing and Environment (2009 – 2011)

Workshops/Seminars Participated

15-21 March 2003 - Training Workshop on the Implementation of Multilateral Agreements in the Conservation of Biodiversity with special focus on Marine Biodiversity. Kushiro, Japan

14-16 November 2006 – Sixth William R. and Lenore Mote International Symposium – Life history in Fisheries Ecology and Management. Sarasota, Florida

03-05 March 2008 – Olhugiri and Dhigalihaa Protected Areas Management Planning Workshop. Eydhafushi, Maldives

11 March 2008 – Applying the Ecosystem Approach to managing Atoll Ecosystems in the Maldives. Hulhule Island Hotel, Maldives

24-26 March 2008 – Regional Consultation on Preparation of Management Plans for Shark Fisheries. Beruwela, Sri Lanka

17-19 June 2008 – Workshop on Assessment and Management of the Offshore Resources of South and Southeast Asia. Bangkok, Thailand

22-23 March 2009 – BOBP-IGO National Workshop on Monitoring, Control and Surveillance in Marine Fisheries. Male', Maldives

18 – 20 July 2009 – Indian Ocean Cetacean Symposium 2009. Paradise Island Resort and Spa, Maldives.

09-11 August 2009 – Second Regional Consultation on Preparation of Management Plans for Shark Fisheries. Kulhudhuffushi, Maldives

24-25 February 2010 – BOBLME Project – National Inception Workshop, Male', Maldives

2-3 June 2010 – BOBP-IGO Technical Advisory Committee – 5th Meeting, Male', Maldives

13-14 September 2010 – BOBLME Fisheries Assessment Working Group – 1st Meeting, Bangkok, Thailand

14-16 December 2010 – EWS-WWF 2nd Marine Conservation Forum for the Gulf Region In partnership with the Pew Environment Group – Local Actions for Global Challenges, Abu Dhabi, United Arab Emirates

18-19 January 2011 – Bay of Bengal Large Marine Ecosystem Project – Workshop on the Status of Marine Managed Areas in the Bay of Bengal, Penang, Malaysia

5-7 July 2011 –Bay of Bengal Large Marine Ecosystem Project – First meeting of the BOBLME Sharks Working Group, Male', Maldives

7-8 September 2011 – Workshop to formulate the Grouper Fisheries Management Plan, DRFP/MRC, Male', Maldives

15-17 September 2011 – SEAFDEC Special Meeting on Sharks Information Collection in Southeast Asia, Bangkok, Thailand

Publications

Sattar, S. A., Amir, H. and Adam, M. S. (2011) Reef fish tagging programme – Baa Atoll Pilot project (in press)

Sattar, S. A., Andréfouët, S., Ahsan, M., Adam, M. S., Anderson, R. C. and Scott, L (2011) Status of the Coral Reef Fishery in an Atoll under tourism development: the case of Central Maldives (in press)

Saleem, M., Sattar, S. A. (2009) Study on post-tsunami restoration and conservation projects in Maldives, *Prepared for the International Union for Conservation of Nature*.

Tamelander, J., Sattar, S., Campbell, S., Hoon, V., Arthur, R., Patterson E. J.K., Satapoomin, U., Chandi, M., Rajasuriya, A. and Samoilys, M. (2009) Reef fish spawning aggregation in the Bay of Bengal: Awareness and Occurrence, *Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008,* Session 22

Sattar, S. A., Jørgensen, C., Fiksen, Ø. (2008) Fisheries Induced Evolution of Energy and Sex Allocation. *Bulletin of Marine Science*, 83(1): 235-250

Sattar, S. A. (2008) Review of the Reef fishery of the Maldives, Marine Research Centre, Male', Maldives. 62 pp

Sattar, S. A. and M. S. Adam (2005) Review of the Grouper fishery of the Maldives with additional notes on the Faafu Atoll fishery. Marine Research Centre, Male', Maldives. 54 pp

Referees

Dr. Mohamed Shiham Adam, PhD
Marine Research Centre
Ministry of Fisheries, Agriculture and Marine Resources
Male', Republic of Maldives
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MARIYAM ZARANA RASHEED

PERSONAL DETAILS

NAME: MARIYAM ZARANA RASHEED
SEX: Female
DATE OF BIRTH: 03 May 1981
NATIONALITY: Maldivian (Maldives)
ID CARD NO. : A 064700
PASSPORT NO.: G 0300450
PERMANENT ADDRESS: Ma. Dhunbuge, Saimaa Goalhi,
Male', 20245, Republic of Maldives.
CURRENT ADDRESS: Ma. Kosheege, Kudhiraiymaa Goalhi,
Male', 20199, Republic of Maldives.
TEL: +9607750254
EMAIL: mxarar@hotmail.com

EDUCATION

MASTERS DEGREE - January 2010 till present – Completed and awaiting for results
Master of Science (Environmental Science) by full research
University of Malaya, Kuala Lumpur, Malaysia

HONOURS DEGREE - April 2009
Bachelor of Science Honours (Biological Sciences)
University of KwaZulu-Natal, Republic of South Africa

BACHELORS DEGREE - April 2008
Bachelor of Science (Biological Sciences)
University of KwaZulu-Natal, Republic of South Africa

HIGHER SECONDARY - June 2000
General Certificate of Education, Advanced Level
University of London, United Kingdom
/ Science Education Centre, Male', Republic of Maldives

ENGLISH LANGUAGE - December 1999
First Certificate in English
University of London, United Kingdom
/ Science Education Centre, Male', Republic of Maldives

HONOURS AND AWARDS

- Merit Certificate
  For outstanding performance during 2008 in Biology/Ecology Research Project

- Poster Award
  Honorable mention at the 51st IAVS Conference - Frontiers of vegetation science: an evolutionary angle - 07 to 12 September 2008 - Stellenbosch, South Africa.
  Title : Host specificity and bird dispersal in the parasitic mistletoe *Tapinanthus natalitius* (Loranthaceae). (Author: Desale Okubamichael. - Co-authors: D. Ward, M. Griffiths-Ward, M.Z. Rasheed, University of KwaZulu-Natal, Scottsville, South Africa)

- Merit Certificate
  For outstandingly good work during 2006 in Education Studies 224

WORK EXPERIENCE

May 2010 to April 2011

Research Assistant

Institute of Biological Science, University of Malaya, Kuala Lumpur, Malaysia

Work Profile:

The main responsibilities of the research assistant (RA) to Associate Professor Dr. Rozainah Mohamed Zakaria, include providing intellectual and physical assistance on the research projects on coastal protection and rehabilitation; mangrove biodiversity and ecology; and assess climate change impacts on mangrove ecosystems of west Malaysia.

January 2008 to Dec 2008

Demonstrator

School of Biological and Conservation Science, University of KwaZulu-Natal, South Africa

Work Profile:

As a demonstrator, first year students at under graduate level was assisted and supervised during practical sessions at various field sites and laboratory. Demonstrators work with the supervision and explicit guidelines from the lecturers to ensure that the students gain maximum subject knowledge during practical session. Marking and assessing the academic reports presented by the students was also part of the job.

July 2001 to December 2004

Clinical Assistant

Indhira Gandhi Memorial Hospital, Male', Republic of Maldives

Work Profile:

Major responsibilities include assisting doctors at the Out Patient Department and casualty consultations with translation and minor clinical procedures.

February 1998 to May 1998

Clinical Assistant

ADK Hospital, Male', Republic of Maldives

Work Profile:

Assist doctors at the Out Patient Department with translation and minor clinical procedures.

Part Time Work Experience

June 2004 to December 2005

Tutor

Kieveni Tuiton Center, Male', Republic of Maldives

Work Profile:

Teach Biological Science to grade 8 and 9 students.

PROFESSIONAL EXPERIENCE

- Participated in the Klang Island Expedition, 2010. Organized by the University of Malaya and the Mangrove Research Centre in Carey Island – Malaysia to assess biodiversity and ecology of the mangrove forests of Klang Islands.

- Poster presentation at the 51st IAVS Conference - Frontiers of vegetation science: an evolutionary angle - 07 to 12 September 2008 - Stellenbosch, South Africa.

  Title: Host specificity and bird dispersal in the parasitic mistletoe *Tapinanthus natalitius* (Loranthaceae). (Author: Desale Okubamichael. - Co-authors: D. Ward, M. Griffiths-Ward, M.Z. Rasheed, University of KwaZulu-Natal, Scottsville, South Africa)

PUBLICATIONS

- Okubamichael, D. Y., Rasheed, M. Z., Griffiths, M. E. & Ward, D. (2010). Avian consumption and seed germination of the hemiparasitic mistletoe *Agelanthus natalitius* (Loranthaceae) Journal of Ornithology, 1-7.

LANGUAGES

English (fluent spoken and written) and Dhivehi (Mother Language - fluent spoken and written)

INTERESTS AND ACTIVITIES

Gardening, Traveling and Hiking.

Appendix 4 Reference

Allison, W.R., (1996) 'Methods for surveying coral reef benthos'. Prepared for IMS, Zanzibar, 18 pp.

Coleman, Neville (2000). Marine Life of Maldives.

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DHI (1999). Physical modelling on Navigation conditions and wave disturbance Maaneru site. Danish Hydraulic Institute.

Doodson, A. T. (1922). "The harmonic development of the tide-generating potential," Proceedings of the Royal Society, A, 100, 305.

English, S., Wilkinson, C. and Baker, V. (1997).Survey Manual for Tropical Marine Resources.Australian Institute of Marine Science, Townsville, Australia. 390pp.

Fernandes, L. (1989). Biases associated with the use of the manta tow, a rapid reef surveillance technique, with particular application to the crown-of-thorns starfish (Acanthasterplanci), M.Sc. Dissertation, James Cook University, Townsville, 128pp.

Gischler, E. (2006). Sedimentation on Rasdhoo and Ga. Atolls, Maldives, Indian Ocean.Facies (2006) 52: 341–360.

Gourlay M.R., (1998). Coral cays: Products of wave action and geological processes in a biogenic environment. Proceedings of the 6th International Coral Reef Symposium, Australia. 2, 491 – 496.

IMO, International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). From the website http://www.imo.org/Conventions/contents.asp?doc_id=678andtopic_id=258

Kench, P. S .and Brander, R. (2005). Sensitivity of reef islands to seasonal climate oscillations: South Maalhosmadulu atoll, Maldives. Submitted to Coral Reefs.

Kench, P.S. and Cowell, P.J. 2001.The Morphological Response of Atoll Islands to Sea Level Rise. Part 2: Application of the Modified Shoreline Translation Model (STM). Challenges for the 21st Century in Coastal Sciences, Engineering and Environment, Journal of Coastal Research, Special Issue, 34: 645-656.

Kench, P.S. and McLean, F.R. (2004). Hydrodynamics and sediment transport fluxes of functional Hoa in an Indian Ocean Atoll. School of Geography and Environmental Science, The University of Auckland, New Zealand.

Kuiter R. H. (1998). Photo guide to Fishes of the Maldives

Leopold, L. B., Clarke, F. E., Hanshaw, B. B. and Balsley, J. R. (1971) A procedure for evaluating Environmental Impact. Geological Survey Circular 645. U.S. Geological Survey, Washington. 30 pp

Loya, Y. (1978). A Plotless and transect methods. In: Stoddart, D.R. and R.F. Johannes (eds). Coral Reefs: research methods. UNESCO, PGa.s: pp197-217.

Malone, M. J., Baker, P. A., Burns, S. J. and Swart, P. K. (1990).Geochemistry of platform carbonate sediments, Leg 115, Site 716 (Maldives Archipelago, Indian Ocean). Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 115.

Maniku, H. A., 1990, "Changes in the topography of the Maldives", Forum of Writers on Environment, Male

Miller, I.R. and Muller, R. (1997). A quality control procedure for observer agreement of manta tow benthic cover estimates. In Proceedings of 8th International Coral Reef Symposium, Panama. Smithsonian Tropical Research Institute, Balboa, Republic of Panama, 2, 1475-1478

Ministry of Construction and Public Works (1999) Environmental/Technical Study for Dredging/Reclamation Works Under the Hulhumale Project, Maldives – Draft Final Stage 1 Report.

Moran, P.J. and De'ath, G. (1992). Suitability of the manta tow technique for estimating relative and absolute abundances of crown-of-thorns starfish (Acanthasterplanci L.) and corals. Australian Journal of Marine and Freshwater Research 43:357-78.

Naseer, A. and Bruce, G. H. (2004). Inventory of the Maldives coral reefs using morphometrics generated from Landsat ETM+ imagery. Coral Reefs.

Naseer, A. and Bruce, G. H. (2004). Inventory of the Maldives coral reefs using morphometrics generated from Landsat ETM+ imagery. Coral Reefs.

Ohlhorst SL, Liddle WD, Taylor RJ and Taylor JM.(1988). Evaluation of reef census techniques. Proceedings of 6th International Coral reef Symposium. Australia. 2: 319-324

Pescares Italia Srl (2001).Environmental Impact Assessment Report for Regional Port Development Project in the Maldives.Prepared for Kuwait Fund for Arab Economic Development and Ministry of Transport and Civil Aviation.

Segal, B. and Castro, C.B. (2001). A Proposed Method for Coral Cover Assessment: A case study in Abrolhos, Brazil. Bulletin of Marine Science 69 (2): 487-496.

Shore Protection Manual, (1994) US Government Printing Office, Washington, DC.

UNDP (2006).Developing a Disaster Risk Profile for Maldives. Volume 1: Main Report.

UNDP (2006).Developing a Disaster Risk Profile for Maldives. Volume 1: Main Report.

Veron, JEN (John Edward Norwood) (2000). Corals of the World

Woodroffe, C.D. (1992). Morphology and evolution of reef islands in the Maldives.Proc 7th Int Coral Reef Symp. 2: 1217 – 1226.