ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED ARTIFICIAL BEACH IN GA VILLINGILI, NORTH HUVADHU ATOLL

PREPARED FOR
GA. Villingili
Council

Prepared by :
MAHMOOD RIYAZ (PHD) (EIA03/07)
M. S. ADAM (PHD) (EIA 01/07)

November 2016

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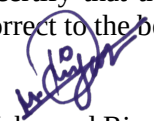
Declaration of the Consultant:

I certify that the statements made in this Environmental Impact Assessment are true, complete and correct to the best of my knowledge and available information at the time of writing this report.



Mahmood Riyaz (EIA03/07)
November 2016

Declaration of the Proponent

بسم الله الرحمن الرحيم

Secretariat of the Viligili Council
North Huvadhu Atoll
GA. Vilingili,
Republic of Maldives.

ދުވެރަށްޓަ ތަކެތި ވިއްކާ ފަރާތް
ކ.ގ.ގ.ވިލިނގިލި
ދިވެހިރާއްޖެ

VISIT MALDIVES YEAR 2016

ކ.ގ.ގ.ވިލިނގިލި ތަކެތި ވިއްކާ ފަރާތް - ކ.ގ.ގ.ވިލިނގިލި ތަކެތި ވިއްކާ ފަރާތް

Declaration of the Proponent:

As the proponent of the proposed environmental impact assessment for the proposed artificial beach in GA Villingili, North Huvadhu Atoll, I guarantee that I have read the Environmental Impact Assessment report thoroughly and that to the best of my knowledge all information provided here is accurate and complete.

Fathuhee moosa
GA Villingili Council member

Secretariat of Villingili Council
GA Villingili, Republic of Maldives

Acronyms used in the text

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
FOH	Front of the House (guest rooms, reception restaurant, arrival pavilion etc)
DNP	Department of National Planning
EPA	Environmental Protection Agency
EPAA	Environmental Protection and Preservation Act
MHTE	Ministry of Housing, Transport and Environment
MSL	Mean Sea Level
NPC	National Planning Council
MYS	Ministry of Youth and Sports

1 ސާރާ ހުލާސާ

-1 މިއީ ހުވަދު އަތޮޅު އުތުރުބުރީ ވިލިނގިލީގައި އާއްމު ތަރިއްޔަތުން ދޫދަރު އުނދުމަލާއި ފުޅުމާއި ގޮނޑުދޮށުގެ އުޅި ކުޅިވަރުތަކާއި މުނިފޫހި ފިލުވުމުގެ ގޮތުން އެކިބައިބަޔަކާތަކުގެ ހިނގުމަށްޓަކައި ހުރިގޮސް ދަނޑުއް އެތަކުގެ އިރު އުޅުނު ފަރާތް ކަންމަތީގައި ތަރައްޤީކުރުމަށް ކުރެވޭ މަސައްކަތުގެ ސަބަބުން ތިމާވެށްޓަށް އަސަރު ފޯރާނެވަރު ބަލައި ވަޒަންކުރުމަށްޓަކައި ގއ. ވިލިނގިލި ކައުންސިލްގެ ފަރާތުން ތައްޔާރުކުރި އީއައިއޭ ރިޕޯޓެވެ. މިމަޝްރޫއުގެ އެދިލާރަކީ ގއ. ވިލިނގިލި ކައުންސިލެވެ. ގއ ތަރިވެއްޓާ އަވާ، ގއ ވިލިނގިލިޔާއިން ދުރަށް ބާސްކޮށް ދިއުމަށް ބޭރުން ކުރި ތަރުކާވެ. ނަމަވެސް އެރަށް މިހާރު ވަނީ މަސްވެރިކަމާއި ގުޅުން ހުރި މަޝްރޫޢެއް ތަރައްޤީ ކުރުމަށްޓަކައި އެންސިސް ފިޝަރީޒް އަށް ދޫކުރެވިފައެވެ. މިމަޝްރޫ މިރަށުގައި ހިންގުމަށް ކައުންސިލާއި ތަރައްޤީކުރާ އެއްބަސްވުމުގެ ދަށުން އެންސިސް ފިޝަރީޒް ތަނަވަސްކޮށް ވިލިނގިލީގައި ސީ އެސް އާރު (އިޖްތިމާޢީ ޒިންމާގެ ދަށުން) ގެ ދަށުން އެންސިސް ފިޝަރީޒް ޕވޓ. ލޓޑ އިން ތަރައްޤީ ކުރުމަށް ސަޕޯޓްކޮށްދެއެވެ. މިއެންމެހާ މިމަޝްރޫއަށް އެންސިސް ފިޝަރީޒް ޕވޓ. ލޓޑ. ގެ ޚަރަދުގައި ތަރުން ހިންގާ މަޝްރޫއެއް އެވެ.

-2 ގއ. ވިލިނގިލީގައި ހުށަހެޅޭ ތަރައްޤީ ކުރުމުގެ މިމަޝްރޫއުގައި ހިމެނޭ ބައިގެ އިރުއުތުރުފަރާތު ކަންމަތީ ފަޅުތެރެއިން 3859 އަކަމީޓަރުގެ އޭރިއާ އެއް އާއްމުން މޫދަށް އެރުމަށްޓަކައި ފުންކާތު ނުގެ ފަސް ބޯނބުރުވަރުގެން އަތިރާމަ ގޮނޑުދޮށު ވެލިން މީހުންނަށް ކުޅުމާއި އިސްތިރާހަތު ކުރުމަށް ބޭރިފަ ބޯނބުރުވަރުގެން ބޯރު ތަރުބާއި ފުރާއި އިސްތިރާހަތުގެ ދުރުން އެކި ފަހިކަން ބޯނބު ތަރުމާ ކުރުމަށް ކުރުމަކޮށްތަކާއި ފުޅާކޮށް ކޮންކްރީޓް ތަރުމާ ހުރުމަށް. އިރު.އަރާ. ރިޓުޖަހަ ފަޅުތެރޭގެ ތަނުތަން ކޮނޑު ފިލުވާގެން ފަދަ މަސައްކަތް ފުރުމުގެ ކުރުމަށް ނަގަވާނެ ހުއްދަތަށް ނުގެމަށް ކައުންސިލުގެ ފެހި ތިސް އެމްސީ ރޮށުކަރަ ދެމުން ގެނެސް އަދި ދިފުރިކާއްޖެގެ ތިމާވެރި ތަރައްކާތިރާކޮން ރިސާލުތަކެގެން ބައްސާ ނަނބަރު (93/4) ބަޔާގެން ތަރައްޤީގެ މަޝްރޫއުތަށް ފުރުމުގެ ކުރުން އަމަޝްރޫއުއްގެ ސަބަބުން ތިމާވެއްޓަށް އަސަރުފުރާ މިންވަރުބަލައި ވަޒަންކުރަމުންދަނީއެވެ.

-3 މިރިޕޯޓް ތަރުހާރު ކުރެވިފައިވަނީ 2012 ވަނައަހަރު މިނިސްޓްރީ އޮފް އެންވަޔަރަންމަންޓް އެންޑް އެނަރޖީއިން ގެޒެޓްކުރައްވާ ތިމާވެއްޓަށް އަސަރު ފޯރާ މިންވަރު ބެލުމާ ބެހޭ ގަވާއިދާއި 2016 ވަނަ އަހަރު އެގަވާއިދަށް ގެނެވުނު އިސްލާހު ތަކާއި އެއްގޮތްވާގޮތުގެ މަތިންނެވެ. ގއ. ވިލިނގިލީގައި ހިނގާ މަޝްރޫޢުތަކުގެ ސަބަބުން ތިމާވެށީގެ ގޮތުންނާއި ތަނި އިޖްތިމާޢީ-އިޤްތިޞާދީ ގޮތުންކުރާ ރަނގަޅު އަދި ނުރަނގަޅު އަސަރުތައް މިރިޕޯޓުގައި ވަޒަންކޮށް ހިމަނާފައިވާނެއެވެ. މިރިޕޯޓުގެ މައިގަނޑު ހޯދުންތައް ބިނާވެފައިވަނީ ވިލިނގިލީގައި މިކާމުގެ ގޮތުން ކުރެވުނު ސާވޭތަކާއި ހޯދުނުމުޢުލޫމާތާއި ، އެކަނުގެ ތިމާވެށީގެ ހާލަތާއި، ކާބޯތަކެއްޗާއި ފަރާތްތަކާ އެކު ކުރެވުނު މަޝްވަރާތަކާއި ފަރާތްތަކުގެ ވިސްނުމަށް މަޝްރޫއުން މިފަދަފާހަގަކުރެވުނު ފަރާތްތަކުގެ ހިޔާލާއި ތަފާސީލުގެމަށްޓަކައި ތަރުސާވުމުގެ ކަމުގެ ނަސޭހަތްތަކާއެވެ.

-4 ހުރަހަގާފައިވާ ފުރަތަމަ ހަމައިގެ ތިމާވެއްޓަށް ހިފާ ގއ ވިލިނގިލީގައެވެ. ވިލިގިއްލަޔާ ހުވަދުއަތޮޅު އުތުރުބުރީ އިރުއުތުރު ބިމުގައި އަތޮ 20 ކިލޯމީޓަރު ދުރު ފުޅާއިގައި އޮންނަ ރަށެކެވެ. ވިލިނގިލި އޮންނަ ފަރުގެ ބޮޑުމިނަކީ 25 އަކަކިލޯމީޓަރެވެ. ވިލިނގިލި ފަރުގެ ވަށައިގެން ގޮތުގައި ވަނީ 43 ކިލޯމީޓަރެވެ. ރަށުގެ އިރުމަތީފަރާތުގެ ފަރު މަތީގެ އުޑުރެ ފުންމިނަކީ ގޮތުގައި ވަނީ 1.5-0.5 މީޓަރެވެ. ވިލިނގިލިފަރުގައި ވިލުގަނޑުގެ އިތުރުން 3 ރަށެއް އޮވެއެވެ. ވިލިނގިލީގެ ބޮޑުބައެއް މިހާރު ވަނީ ހިއްކާފައެވެ. ފަޅުތެރެއިން 40 ހެކްޓަރަށްވުރެ ބޮޑުބައެއް ހިއްކާ ކުރިގައި އޮތް ރަށައި މިހާރު ވަނީ

ގުދުގަނޑުވެގެންދާ. ތަނެއް ހިއްސާކުރާ ތަންތާ ދިވެހިބަހުގައި ލިޔެފައިވާ ގޮތް ފާހަގަ ކުރުމަށް 160-200 ސާހަރުގެ ތެރެއިން ގަބޫލުކުރާ ގޮތް ފާހަގަ ކުރުމަށް 200 ސާހަރު.

-5 ހުނަރުވެރިކަން ދަށްކުރުމުގެ ހުރިހާ ތަކެއްޗެއް ހިއްސާކުރާ ގޮތަށް ކަންކަން ކުރުމަށް ވިދާޅުވާ ތަނެއް ނަމަ ވިދާޅުވާ ގޮތަށް ބަލައިގަތުމަށް ކަމަށް ދެ ގޮތަކުން ގަބޫލުކުރާ ގޮތް ފާހަގަ ކުރުމަށް 40 ވިދާޅުވާ ގޮތަށް ބަލައިގަތުމަށް ކަމަށް ދެ ގޮތަކުން ގަބޫލުކުރާ ގޮތް ފާހަގަ ކުރުމަށް 80 ވިދާޅުވާ ގޮތަށް ބަލައިގަތުމަށް ކަމަށް ދެ ގޮތަކުން ގަބޫލުކުރާ ގޮތް ފާހަގަ ކުރުމަށް 120 ވިދާޅުވާ ގޮތަށް ބަލައިގަތުމަށް ކަމަށް ދެ ގޮތަކުން ގަބޫލުކުރާ ގޮތް ފާހަގަ ކުރުމަށް 160 ވިދާޅުވާ ގޮތަށް ބަލައިގަތުމަށް ކަމަށް ދެ ގޮތަކުން ގަބޫލުކުރާ ގޮތް ފާހަގަ ކުރުމަށް 200

9- ގޮނޑުދޮށް ތަރައްޤީ ކުރުމަށް ފަހު އެސަރަހައްދު ބޭނުން ކުރާއިރު އުފެދޭ ކުނި ރަނގަޅު ގޮތުގައި ނުކުރެވިއްޖެ ނަމަ ތިމާވެށީގެ ގޮތުން ގިނަ މައްސަލަ ތަކެއް ކުރިމަތިވެދާނެތީ އަޅަން ފިޔަވަޅުތަކެއް ވަނީ މިރިޕޯޓުގައި ފާހަގަ ކޮށްފައެވެ. އެގޮތުން އެސަރަހައްދު ބެލެހެއްޓުމަށްޓަކައި މުވައްޒަފުން ބޭއްވުމާއި އެކަށީގެންވާ އަދަދަކަށް ކުނި ޑަސްޓްބިން ބަހައްޓައިގެން އުފެދޭ ކުނި ނައްތާލުމުގެ ނިޒާމެއް ގާއިމު ކުރުމުން މިމަޝްރޫޢުގެ ސަބަބުން އިޤްތިޞާދީ މަންފާއާއި އަދި ތިމާވެށީގެ މަސްލަހަތަށް ބަދަލު ކުރެވޭނެ ކަމަށް ފާހަގަ ކުރެވެއެވެ.

10- ހުށަހަޅާފައިވާ މަސައްކަތް ކުރުމުގައި ބަދަލުގެނުވުމަށް ކަމަށް ތަފާތުކުރާ [illegible] މިރިޕޯޓުގައި ބަހުސްކޮށް ވަޒަންކުރެވިފައިވެއެވެ. މިމަޝްރޫޢު ނުހިންގައި، މިހާރު މި މަޝްރޫޢުގެ ހިންގުމަށް ހުށަހަޅާފައިވާ ސަރަހައްދުގެ ބަދަލުގައި ބޭނުންކުރެވިދާނެ އެހެން ތިންސަރަހައްދެއް [illegible] [illegible] ވާނެއެވެ. މިގޮތުން މިދިރާސާއިން ބަލައިލުމުން މިހާރު ގޮނޑުދޮށެއް ހެދުމަށް ހުށަހަޅާފައިވާ ސަރަހައްދުގެ 500 މީޓަރު ދުރުމިނުގައި ބޭރަށް ނުކުމެފައި އޮންނަ ސަރަހައްދުގައި އާޓިފިޝަލް ބީޗް ހަދައިފިނަމަ އިޖްތިމާޢީ-އިޤްތިޞާދީ، ތިމާވެށީގެ ގޮތުންނާއި ކުރިމަގުގައި ތަރައްޤީކުރުމުގެ ފުރުސަތުތަކާއި ހުރި ގޮނޑުދޮށް ބޭނުން ކުރުމުގައި ފަސޭހަތަކާއިން ކަމަށްވެ. މިހެންކަމުން މިދިރާސާގައި ބެލި ބިން ތަކަށް ބަލާއިރު އެސަރަހައްދަކީ ވިލިނގިލީގައި އާޓިފިޝަލް ބީޗް ހަދަން އެންމެ އެކަށީގެންވާ ތަނެވެ. އެސަރަހައްދުގައި އެކަން ކުރާއިރު ތިމާވެށީގެ ގޮތުން ކުރާ ނޭދެވޭ އަސަރުތައް ކުޑަކުރުމަށް އަޅަން ފިޔަވަޅުތަކެއްވެސް މިރިޕޯޓުގައި ފާހަގަކޮށްފައިވާނެއެވެ.

11- މިދިރާސާއިން ދައްކާ ގޮތުން މިމަޝްރޫޢު ކުރިއަށް ގެންދިޔުމުގައި ރާއްޖޭގެ ޤާނޫނުތަކާއި ސަރުކާރުގެ ސިޔާސަތުތަކާއި، އެންވަޔަރަންމަންޓަލް އިމްޕެކްޓް އެސެސްމަންޓް (އީ.އައި.އޭ.) އަދި ދިވެހިރާއްޖޭގެ ތިމާވެށީގެ ޤާނޫނާއި، މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ އިން ފާސްކޮށްފައިވާ ވިލިނގިލީގެ ލޭންޑްޔޫސް ޕްލޭން އާއި އެއްގޮތްވާގޮތުގެމަތިންނެވެ.

12- ތިމާވެށްޓަށް އަސަރު ފޯރާމިންވަރު ވަޒަންކޮށް ބެލި މިރިޕޯޓުގައި ފާހަގަ ކޮށްފައިވާ ކަންތައްތަކުގެ މައްޗަށް ބިނާކޮށް ތިމާވެށްޓަށް އަސަރުފޯރާ މިންވަރު ކުޑަކުރުމަށް އަޅަން ހުށަހަޅާފައިވާ ފިޔަވަޅުތައް އަދި ރިޕޯޓުގައި ފާހަގަ ކޮށްފައިވާ ސަރަހައްދުގައި ފާހަގަ ކޮށްފައިވާ ކަންތައްތަކަށް ފުރިހަމައިން ޢަމަލުކުރުމުން [illegible] [illegible] ގޮތުން ގއ ވިލިނގިލީގައި އާޓިފިޝަލް ބީޗް ބިނާކުރުމުގެ މަސައްކަތަކީ ކުރުން ތިމާވެށްޓަށް ބޮޑެތި އަސަރު ނުކުރާނެކަމަށް ފެނެއެވެ. މިހެންކަމުން ހުށަހަޅާފައިވާ ގޮތަށް ފާހަގަ ކޮށްފައިވާ ސަރަހައްދުގައި މިމަޝްރޫޢު ކުރިއަށް ގެންދިޔުމުން އިޖާބީ ގޮތުން ގިނަ ފައިދާތަކެއް ލިބި ތިމާވެށީގެ ގޮތުން ވެސް ގެއްލުމެއް ނެތި ކުރެވިދާނެ ކަމަށް ފާހަގަކުރެވެއެވެ.

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2 NON-TECHNICAL SUMMARY

1- This is the Environmental Impact Assessment (EIA) report carried out for GA Villingili Island Council to develop a public recreation area for swimming and picnics on the north eastern end of Villingili Island. The project is funded by the Ensis Fisheries Pvt. Lts as part of their Cooperate Social Responsibility (CSR) related to the proposed fisheries development in GA Raaverehaa. The island was used by locals for picnics. The project involves deepening 3859m^2 swimming area, and sources the material for beach replenishment, coastal protection work and construction of toilets showers and changing rooms in the beach area. The EIA was prepared as fulfillment of the requirement by the Environmental Protection Agency under the dredging and reclamation regulation (Regulation 2013/R-15) for granting permission for the project. Environmental Impact Assessment (EIA) of development projects is a requirement by the Environmental Protection and Preservation Act (EPPA) (law 4/93) of the Government of the Republic of Maldives.

2- This report has been prepared in accordance with the Environmental Impact Assessment Regulations published by the Ministry of Environment and Energy in 2012 and covers both negative and positive environmental and socio-economic impact arising from the proposed project in GA Villingili Island. Major findings of this report are based on information gathered during the field inspection of both the existing environment and possible effects of the project activities, through extensive literature review and experiences gained from similar projects elsewhere in the Maldives.

3- The proposed project activity will take place in GA Villingili Island. Villingili is the capital of GA Atoll and lies in Huvadhu Atoll in a 20 km long elongated N-S oriented reef located on the north eastern periphery of GA Atoll. Villingili is an elongated-oval shape, N-S oriented island large part of the island has been reclaimed. Average depth of the reef flat is on the eastern side of the island is between less than -0.5 to -1.5m m from MSL. Reef perimeter is 43km and the area is approximately 25sqkm. The reef is shared by three more islands including Villingili Island. The distance from the edge of the reclaimed beach to the reef edge in both eastern and western sides is fairly consistent measured approximately 160-200m on the east and 200m on the western side.

5- The proposed development will take place on the north eastern coastal area of the Villingili. The coastal environment of GA Villingili has been extensively modified, particularly the eastern and western sides of the island. Over 40 hectares of land has been reclaimed from the eastern side under the land reclamation project. With the extensive reclamation and expansion and subsequent urbanisation the two marshy lands that exists on the northern and southern side of the island has significantly decreased in size and the natural environment has been altered. The eastern shoreline has been protected by a rock boulder revetment. Two harbours are developed on the western side of the island. The harbours are protected with a rock boulder breakwater and a quay wall has been constructed at the inner edge of the harbour. Three entrance channels have been cut through the reef flat into the inner atoll lagoon on the western side.

6- The proposed project involves deepening of 3859m^2 area to a depth of 1-2m and source the dredged material, approximately 5788.5-7718m^3 sand, for beach replenishment. 182m long coastal protect made of rock boulders will be constructed around the swimming and beach replenished area. The area proposed for dredging a very shallow (0.5-1.5m exposed at low tide) on the eastern reef flat of Villingili Island. The area is covered with sand, seagrass and rubble. There are numerous coral patches and individual coral colonies on the reef flat.

7- During the preparation of the EIA report an impact matrix, which is a standard tool for identifying the possible impacts of project activities, has been created for proposed development project in GA Villingili Island. The activities carried out during the construction and post-construction or operational phases are arrayed against a selection of environmental factors that may be affected directly or indirectly as a result of project activities.

The environmental impact assessment study for proposed development of artificial beach in GA Villingili shows there are two main activities that would cause significant negative environmental impacts are lagoon dredging, beach nourishment and coastal structures and impacts of solid waste during the operational phase

Of these a long term impact would be from lagoon dredging and beach nourishment activity to create a beach and deepen the swimming area. Potential erosion/accretion and adjustment of the existing beach to create a new equilibrium with the surrounding environmental conditions are likely to extend to medium to long term. These impacts would be cumulative occurring over long period of time and so can be managed through proper monitoring and addressing them in a timely manner. Based on the scale of dredging and beach nourishment work projects that is taking place in Maldives, impacts associated with the proposed dredging activity is insignificant.

Inadequate methods of solid waste management during the operation phase of the artificial beach will generate marine pollution in the surrounding area, which in turn will have detrimental impacts on coral reefs as well as on reef fish populations and coastal vegetation. Thus, the beach will become aesthetically unattractive and unpleasant, which can tremendously affect the prime use of the beach as a recreational area. These impacts could be managed through adoption of proper garbage management practices such as a permanent staff to look after the beach and placement of adequate number of dustbins and other relevant management measures. However, the positive socio economic impacts from the proposed development outweigh the temporary negative impacts of lagoon dredging beach replenishment and coastal protection work.

The study has evaluated alternative locations for the project and found that the extended beach, five hundred meters south of the proposed area would be a more preferable option for the proposed artificial beach development in GA Villingili Island. Based on the similar project activities elsewhere in the Maldives the published report found, that the lagoon will recover from the impacts of dredging, reclamation and coastal modifications and will re-establish a new ecological balance soon. Even though there is no very significant impact from this project after the report has come-up with an extensive monitoring programme that will keep on monitoring coastal and marine environmental changes associated with dredging and make necessary adjustment based on the findings of various measured environmental parameters suggested in the monitoring plan.

The study found that the proposed project is in line with key legal and policies maintained by the Government authorities and EPA including Environmental Protection and Preservation Act (4/93), EIA Regulations 2012, and land-use plans developed by the Ministry of Housing and Infrastructure.

Therefore, on the basis of this environmental impact assessment study and the impact mitigation measures proposed in the report will be duly implemented and recommendations are given due consideration, it is concluded that the benefits of development of artificial beach and swimming area in the selected location in this study in GA Villingili will substantially outweigh its imposition on the environment.

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3 INTRODUCTION

3.1 BACKGROUND

GA Raiverehaa, located 300m north of GA Villingili was used as a local picnic island in the past by the inhabitants of Villingili Island. When Raiverrehaa Island was leased to Ensis Fisheries Pvt Ltd. for fisheries development one of the major concerns raised by the people of Villingili was to establish an alternative picnic facility in Villingili or a nearby island. The EIA report prepared for the development of Raiverehaa addressed this issue and the management of Ensis Fisheries Pvt. Ltd agreed to provide financing under its CSR to develop an artificial beach in Villingili Island in any location within a limited budget. At the Raiverehaa EIA preparation stage, a concept for the development of picnic facility in a small island between Raiverehaa and Villingili was tabled but it was decided to select the location of the beach in a later stage. Therefore, the aim of the proposed project is to develop a public recreation area for swimming and picnics on the north eastern end of Villingili (Lovers point) selected by the Islands Council, where an artificial beach will be created by extending beach nourishment and a swimming area by deepening the shallow lagoon.

3.2 PURPOSE OF THE EIA

Given the potentially adverse environmental impacts associated with artificial beach development project in GA Villingili, the proponent contracted the consultant to prepare and submit the Environmental Impact Assessment (EIA) report to EPA to comply with the Environmental Protection and Preservation Act (4/93) and EIA Regulations 2012.The objective of the EIA study is:

a) To provide an assessment of the potential environmental effects of the proposal and to determine which of these, if any are likely to result in a significant effect on the environment and to propose ways and means of avoiding, mitigating and/or compensating the perceived negatives effects of the project;

b) To provide necessary information to EPA applicable to the proposed development; and

c) To assess how the proposals have been developed to achieve a satisfactory level of environmental performance in line with the EIA Regulations.

3.3 EIA REPORT AND EIA IMPLEMENTATION PROCESS

In general the objective of an EIA report is to address the environmental concerns of the development project. The EIA will help to achieve efficient planning, aid in identifying impacts and their potential mitigation measures. The EIA report will also help to promote informed environmental and sound decision making during the development of the project.

The aim of the EIA is to identify, describe and assess in an appropriate manner, proposed development, in accordance with the provisions of guidelines and regulations of the GoM, the direct, indirect and residual effects of the project on the following factors:

- Physical and chemical characteristics of the earth (soil, landform, unique physical features), water (marine and underground), atmosphere (air quality and climate),

- biological conditions including flora (trees/shrubs and endangered species), fauna (birds, land animals, coral and endangered animals) habitats (environmentally sensitive areas protected area etc);

- cultural factors including aesthetic and human interest (scenic views and vistas, wilderness qualities, landscape design, historical and archaeological sites and objects), and cultural status (employment); and

- ecological relationships including eutrophication, disease and insect vectors, and introduction of alien species social impacts etc..

This EIA report has been prepared by Dr. Mahmood Riyaz a registered EIA consultants (Registration no 03/07) at EPA was contracted by the proponent. EIA preparation process is as follow:

1- The consultant prepares EIA application form with necessary relevant documentations for the proponent for submission to EPA, and the proponent submits the application along with project brief and a draft TOR.
2- EPA calls for a scoping meeting with proponent, consultant and relevant stakeholders from government agencies to finalise the draft TOR of the EIA study
3- The consultant undertakes literature review and gathers relevant data and information on the project.
4- Consultant undertakes the field assessment work
5- The consultant analysis data and information gathered and identify environmental impacts, determine mitigation measures, rationally evaluate and suggest alternatives and limitations and propose a monitoring plan.
6- The consultant discusses major findings with the proponent and suggests possible changes to the project/project component.
7- Based on the discussion with the proponent the consultant reviews the EIA and makes necessary changes to the document.
8- The proponent should provide written commitment to undertake mitigation measures and post-development environmental monitoring as per the EIA report.
9- The consultant submits the final EIA to the proponent who subsequently will submit to EPA for review and to issue decision note.

Once the decision note is issued from EPA the proponent is obligated to implement the EIA and matters highlighted in the decision note. Also the proponent shall implement the periodic monitoring programme during construction and operational phase of the project and submit monitoring report as indicated in the EIA report.

3.4 SCOPE OF THE EIA

The scope of this EIA is based on the consultations held during the scoping meeting at the Environmental Protection Agency on 14th August 2016. The approved ToR highlighted 8 major tasks to be covered including;

1. Description of the proposed project;
2. Legislative and regulatory considerations;

3. Description of the existing environment
4. Stakeholder consultation
5. Potential impacts of the proposed project;
6. Alternatives to the proposed project;
7. Mitigation and management of negative impacts;
8. Development of monitoring plan; and

.

A copy of the ToR is attached in Annex 1. The EIA report closely followed the approved ToR for the assessment.

3.5 PROJECT SETTING

Villingili is located on the north east of Huvadhu Atoll at the periphery in an elongated, N-S oriented reef platform measuring a length of 20 km is shared by multiple islands. Reef perimeter is 43km and the area is approximately 25sqkm. The reef is shared by three more islands including Villingili Island. Villingili is an elongated-oval shape, N-S oriented island large part of the island has been reclaimed. Average depth of the reef flat is on the eastern side of the island is between less than -0.5 to -1.5m m from MSL.

This EIA focuses on the selected location for the proposed development of public recreation area for swimming and picnics on the north eastern end of Villingili (Lovers point). Where an artificial beach will be created by extending NE beach nourishment and a swimming area will be created deepening the shallow lagoon (Figure 1).

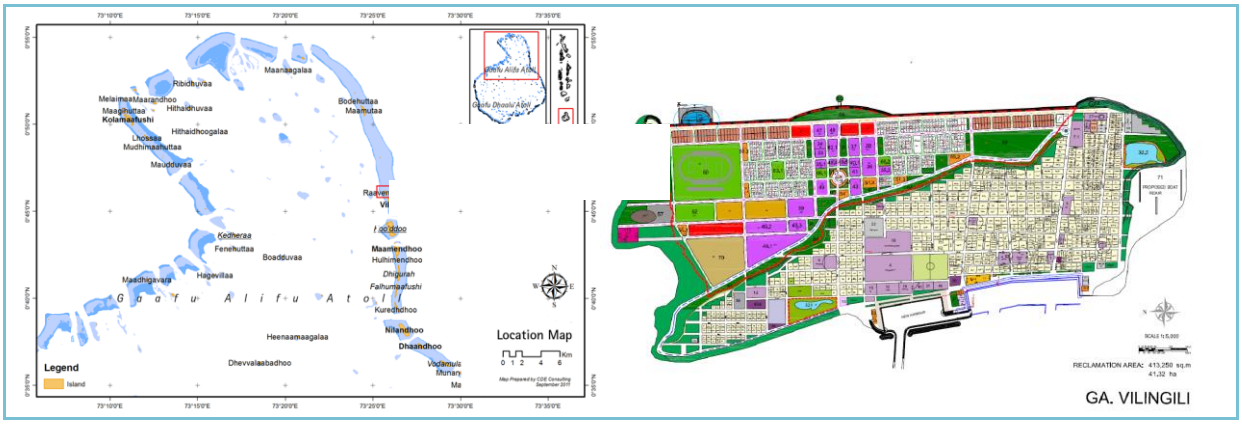

Figure 1: Location of GA Villingili in North Huvadhu Atoll and land use plan of the island and the location of the project: (Atoll Map; CDE)

3.6 PROJECT JUSTIFICATION

Allocation of GA Raaverehaa for fisheries development resulted in loss of picnic and entertainment opportunities for the people of Villingili island. GA Villingili is the capital of GA atoll and most with a population of over 10,000 people. To accommodate the growing population of the island fairly large area of the island has been reclaimed in the past. Raiverehaa was used as an island for local picnic but the recent decision by the government to develop fisheries related activities and lease of the island to Ensis Fisheries Pvt. Ltd would not be conducive to accommodate local picnics in the island. The

proponent of Raiverehaa recognized the need and importance of having a local picnic facility for the people of Villingili and agreed to develop a picnic area in Villingili in any location selected by the people.

Villingili is becoming congested with the urbanization and availability of facilit~~ies~~ for recreation and entertainment for the community living in the island can be considered as important as a basic human needs. Also the development will contribute to overall social cohesion of the island community and create a solid social bonding between the island communities and families through organization of, picnics BBQs and other social gatherings. Therefore, the proposed development project in GA Villingili is important to create a healthy community, physically and mentally fit population for nation building, establish and maintain social cohesiveness of the island community.

3.7 PROJECT SCOPE SUMMARY

The project mainly involves deepening the swimming area and utilize ~~use~~ the dredged material for beach replenishment and construction of coastal protection structures, public toilets and changing rooms on the north eastern corner of GA Villingili. The proposed project covers the following activities;

- Mobilisation
- Dredging area 3859m^2 to a depth of 1-2 m at low tide;
- Extract dredged material volume, 5788.5-7718m^3
- Size of replenishment area: area 1708m^2
- 182m long rock boulder breakwater construction
- Public toilets and changing room construction
- Demobilization

3.8 REVIEW OF RELEVANT STUDIES

As part of relevant literature review and preparation of the report, the following EIA studies on dredging, reclamation and coastal protection related work in various parts of the Maldives have been reviewed and used as reference;

Environmental Impact Assessment Development of Tuna Purchasing and storage Facility, GA. Raaverrehaa, North Huvadhu Atoll by Riyaz M. and Shiham M.S. (2015)

EIA for playground reclamation project for Ga Dhaandhoo by Energy Consultancy Pvt. Ltd, February (2013)

Environmental Impact Assessment For Proposed Levelling And Earthworks Of Football Arena In Nadella, South Huvadhu Atoll by Riyaz M. (2016)

3.9 EIA IMPLEMENTATION METHODOLOGIES

This study was based mainly on data collected during a field investigation mission from 24-26th September 2016, by the consultant. Field studies have been undertaken using methods generally employed for EIA studies in the Maldives. Environmental impacts are predicted by using descriptive

checklists and its significances are evaluated by the use of Leopold matrices. Expert judgment and professional opinion as well as review of relevant EIA studies have also been widely used throughout the impact assessment and evaluation process. These methods are described in detail at the relevant section of this EIA Report.

4 DESCRIPTION OF THE PROJECT

4.1 THE PROPONENT

The proponent of the project is GA Villingili Council. The island council is the responsible body for the development and coordination of infrastructure development project that is developed for the general public. Also the council has the mandate to look after and maintain the public facilities. The proposed project will be funded by Ensis Fisheries Pvt. Ltd as part of their Cooperate Social Responsibility (CSR) to create a recreation area for swimming and picnics. The developmental activities will be carried out by a contractor. The process of selection of the contractor will start after. The main responsibility of the island council would be the overall coordination of the project activities during the construction period and maintain the facility after development.

4.2 PROJECT LOCATION AND BOUNDARY

Villingili is situated on the north eastern of Huvadhu Atoll located at the periphery in an elongated, N-S oriented reef platform measuring a length of 20 km is shared by multiple islands. Reef perimeter is 43km and the area is approximately 25sqkm. The reef is shared by three more islands including Villingili Island. Villingili is an elongated-oval shape, N-S oriented island large part of the island has been reclaimed. Average depth of the reef flat is on the eastern side of the island is between less than -0.5 to -1.5m m from MSL.

This EIA focuses on the selected location for the proposed development of public recreation area for swimming and picnics on the north eastern end of Villingili (Lovers point). Where an artificial beach will be created by extending nu beach nourishment and a swimming area will be created deepening the shallow lagoon (Figure 2).

Figure 2: Project Boundary. The project boundary is confined to GA Villingili Island Project boundary (left) and project impact foot print (right)

4.3 MAIN DEVELOPMENT FEATURES OF THE PROJECT

The proposed artificial beach development in GA Villingili involves dredging an area of 3859m^2 and using the extracted sand to nourishment of 1708m^2 area to extend the existing beach. Construction of a breakwater to protect the excavated swim area and the nourished beach created on the north eastern end. Facilities including toilets and changing rooms will be constructed in the existing beach area. A conceptual drawing of the artificial beach is shown in Figure 3.

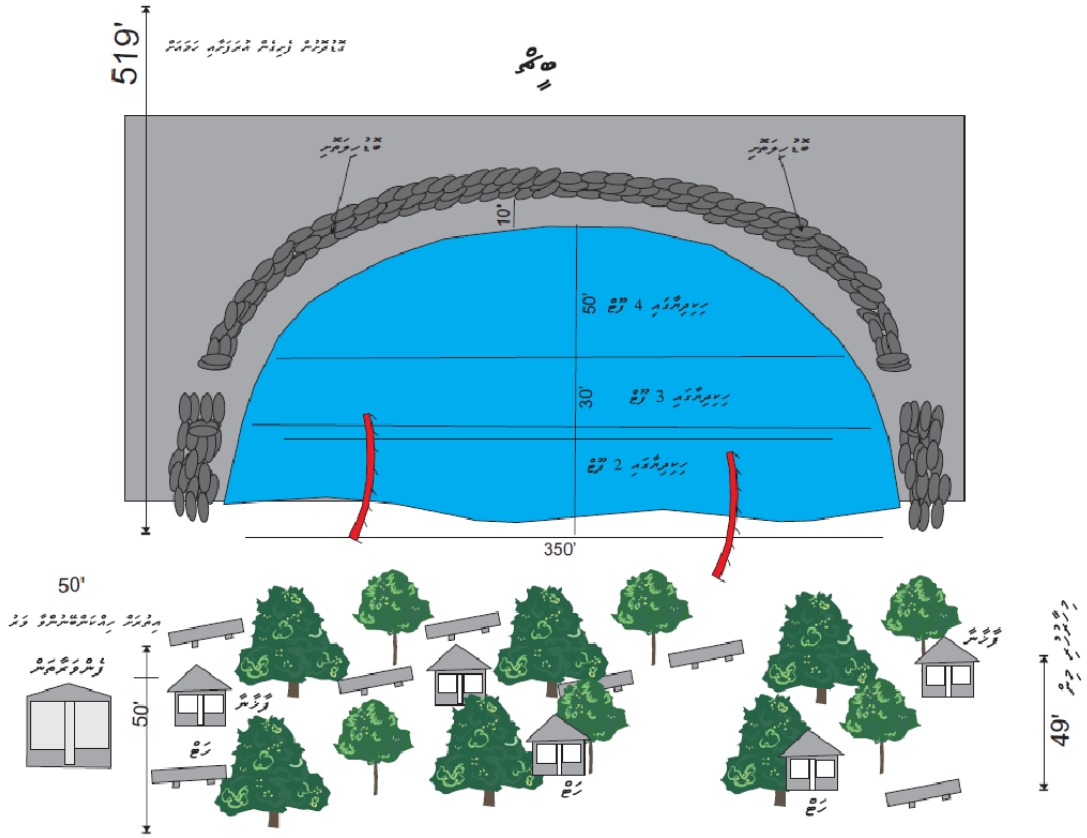

Figure 3: Conceptual drawings of the proposed artificial beach in Ga. Villingili island.

4.3.1 Dredging

- Location of dredging: north eastern shoreline of the island
- Size of dredge area: area 3859m^2
- Volume of dredged material: 5788.5-7718
- Equipment use: Excavator 1.5m bucket size, loader and two lorries

- First the excavator will build excavator path (1m wide 30m long) from sand, which will also be used for loading the excavated material to the lorries (Figure 3)

4.3.2 Beach nourishment

- Location of dredging: north eastern shoreline of the island
- Size of replenishment area: area 1708m^2
- Volume of sand material: 5788.5-7718m^3
- Equipment use: Excavator 1.5m bucket size, loader and two lorries

4.3.3 Coastal protection

- Type: breakwater
- Length: 182m
- Break water Crest: 1.5m
- Construction material: Imported Rock boulders
- Rock boulders will be transported in a barge to Villingili unloaded and transported to the site. At the site boulders will be placed by using an excavator

4.4 MAJOR CIVIL WORKS

4.4.1 Initial mobilisation and site preparation

Site mobilisation of the construction equipment, can be easily brought into the island through the existing harbour. The proposed construction work requires use of heavy machinery and special equipment. Some of these include excavators, lorries, trucks, loaders etc. Since this is a very small project the workforce involved with the project would be very small within the range of 10-15. The workforce can be accommodated on the island in the existing houses.

4.4.2 Dredging

The proposed dredging to deepen the swim area and to obtain material for beach nourishment involves dredging 3859m^2 area from north eastern shoreline. Total volume of the dredged material is in the range of 5788.5-7718m^3. Dredging and beach nourishment application is submitted along with the EIA report.

The dredging will be undertaken by using an excavator. The excavator will work from an excavator bed that will be eventually moved to the beach nourishment area. The dredged material will be directly transported using lorries through the routs shown in Figure 3. This helps in the retention of the dredged material due to the high level of compaction that would be achieved. It is planned to complete all activities within the scope of this project within 60 days.

4.4.3 Beach nourishment

Dredged material from the area will be used to nourish and extend the existing beach. Total nourishment area is 1708m^2. Height of the nourished beach will be at 1.6m above MSL. Appropriate fill slope will be created in the beach.

4.4.4 Coastal protection

The proposed breakwater will be installed using an excavator. Prior to installation the rock boulders would be moved to the location of the breakwater in truck. The rock boulders will be then placed carefully according to the design to create the proposed breakwater. Seaward side face of the break water (slope) will be made as smooth as possible. Rock boulders would be placed in such a way that it has adequate space between the boulders to allow maximum wave absorption by the structure and minimizes the reflection of the wave energy so as to minimize erosion on either side of the artificial beach.

4.5 VOLUMES AND TYPES OF SEDIMENT TO BE DREDGED

From existing depth information for the proposed dredging area 5788.5-7718m^3 of dredged material will be generated. The dredged material will be mostly composed of hard coral material which will be the cap rock of reef flat and fine to medium sized coral sand with minor mount of coral rubble lying underneath the cap-rock.

The disadvantages of dredging are potential short-term impacts to water quality. During dredging operation, some sediment becomes suspended into the water column. This sediment can then be carried by the current until it settles out of the water column. However, it is not possible to control sediments entirely because the work is done underwater and every dredge leaves some residual material on the bottom.

4.6 WASTE MANAGEMENT

The project does not involve any vegetation clearance. Construction wastes that will be generated are largely dredged material which will be used for beach nourishment. Coral boulders that may be taken during dredging can be used as core material during breakwater construction.

Almost negligible quantities of waste oil may be generated from the operation and maintenance of vehicles. Such waste oil would be kept in sealed containers and taken to Thilafushi upon project completion for appropriate disposal, as required by the Waste Management Regulation.

4.7 TIMINING

Timing of the dredging is proposed to be coincided during the NE monsoon period to allow the sediment plume to move towards the island and dissipate by the predominant wind and surface current. The proposed dredging schedule is given below in Table 1.

4.8 PROJECT SCHEDULE

An indicative project schedule is given below. The project is schedule to be completed in 7 months. The schedule will be subject to change depending on the contractor and delivery of machine and its installations.

Table 1: indicative project schedule for Villingili artificial beach development

Project - GA Villingili artifcial beach development project

Today's Date: 10/30/16 0

Start Date: 10/30/16

Ser.	Tasks	Start	End	Duration days
1	EIA preperation and approval	10/30/16	11/19/16	20
2	Contract award preliminary survey	11/25/16	12/25/16	30
3	Mobilisation	12/25/16	01/09/17	15
4	Start dredging work	01/10/17	02/24/17	45
5	Beach nourishment	02/15/17	04/01/17	45
6	Coastal protection work	04/01/17	05/01/17	30
7	Beach levelling work	05/01/17	05/21/17	20
8	Toilets and changing rooms	05/20/17	06/04/17	15
15	Beach open for the public	06/05/17		

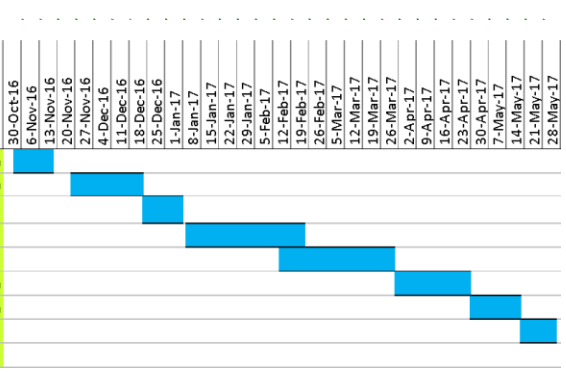

Table 2: Matrix of major inputs to the project

Input resource(s)	Source/type	How to obtain resources
Workers	Skilled and semi-skilled labour, Manager (1) Supervisor (1) Excavator Operator (2), Loader operator (1), , Driver (2), Labourer (4) total of 11 people, skilled and semi-skilled 7 and unskilled labourers 4.	Trained and licensed staff of the contactor
Machinery (excavator, , operational tools)	01 excavator 01 loader 02 lorries 02 diesel tank 1000 litre 01 small dingy	To be obtained and operated by the contractor. Contractor will be required to bring to the site machines in good working conditions to avoid loss of time due to breakdown of machines, vehicles and equipment.
Output	Anticipated quantities	Comments
Dredged material	5,788.5-7,718m^3 sand	To be used for playground levelling
Wastes	Minor amount	No wastes during the excavation will be allowed to be dumped into the sea. Solid wastes and human wastes will be managed through the existing wastewater and solid waste management system on the island
Waste oil and lubricants	Minor amount	Gathered in a barrel and sent to Thilafushi through existing waste management system
Noise and light	Localized	Excavator and truck operation will generate some noise during the project execution. If work is carried out in the night lights will be necessary in the working area. Work will not be carried out late into the night to avoid disturbance to local

		population.
Plastics and packaging waste	Minor amount	Managed through existing waste management system of the island

5 REGULATORY CONSIDERATIONS

This is section highlights relevant government stakeholders, their roles and reviews relevant legal framework applicable to the proposed project.

5.1 MINISTRY OF ENVIRONMENT, ENERGY & WATER

The Ministry of Environment and Energy (MEE) is key Ministry in the government mandated with the protection of the environment. Environmental responsibilities assigned to MEE includes formulating environmental policies, coordinating, preservation and management of the environment throughout the country, and enforcing Environmental Protection and Preservation Act (EPPA) (04/93). Under Article 5(a) of EPPA, Environmental Impact Assessment (EIA) is mandatory for projects that may cause potential harm to the environment. The EIA report has to be submitted to the EPA for approval before commencement of a project. As per this legislation, any project that has any undesirable impact on the environment can be terminated without compensation by MEE.

5.2 ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA is the key regulatory body on environment, which is an autonomous body formed under the umbrella of MEE. It is mandated with implementing the EIA process in the Maldives, implementing the Environment Act and subsequent regulations on behalf of MHE, regulating water and sanitation, biodiversity conservation, waste management and coastal zone management. Also, it is responsible for developing environmental standards and guidelines in the country.

5.3 LEGAL FRAMEWORK

Four regulations pertaining to the proposed project have been reviewed and the project's conformity to these has been assessed.

a) EIA Regulations 2012 and amended regulations in 2016
b) Regulations on cutting down of Trees
c) Regulation on Dredging and Reclamation
d) Regulation and Waste Management

5.3.1 EIA Regulations 2012

The most important governing law as far as the environmental impact assessment is concerned is Environment Protection and Preservation Act (Law No. 4/93) (EPPA).

EPPA mandates all development projects in the Maldives to undertake an Environmental Impact Assessment prior to undertaking any such project.

Further the EPPA states an impact assessment study shall be submitted to the relevant Government authority before implementing any development project that may have a potential impact on the environment.

It goes on to say that the relevant Authority of Government shall formulate the guidelines for environmental impact assessment and shall determine the projects that need such assessment as mentioned in above.

The law also gives power to the relevant Government authority to terminate any project that has any undesirable impact on the environment. A project so terminated shall not receive any compensation.

According to the EPPA waste disposal, oil and poisonous substances any type of waste, oil, poisonous gases or any substance that may have a harmful effect on the environment shall not be disposed within the territory of the Maldives.

Government of Maldives reserves right to claim compensation for all the damages that area caused by the activities that are detrimental to the environment.

5.3.2 Environment Impact Regulations, 2012 & other relevant regulations

Under the provisions of EPPA the Government of Maldives has formulated and gazetted Environmental Impact Assessment Regulations (2012) detailing the EIA process and the EIA preparation.

In addition to EIA regulations, other relevant regulation will be followed in development and implementation of the proposed project. These regulations include ban on coral mining. Coral mining from house reef and atoll rim reef has been banned since 1990. Sand mining from any island has also been banned since March 2000.

The EPPA, EIA Regulations and other relevant regulations will be duly taken into consideration in preparing the EIA report and in the implementation of the project.

5.3.3 Regulation on Cutting down Trees

Cutting down and relocating of mature trees is regulated in Maldives under the by-law on cutting down, uprooting, digging out and export of trees and palms from one island to another. In the preamble of the law, made in pursuant to Law No. 4/93, it states the purpose of the law is to educate citizens and developers about the importance of trees including sound management to maintain trees and provide standards for the preservation of trees in the Maldives.

Under the law certain tree are prohibited to remove from island. They include:

- The coastal vegetation growing around the islands extending to about 15m into the island
- All trees and palms growing in mangroves and wetlands spreading to 15m of land area
- All trees in Government protected areas
- Trees that are being protected by the Government in order to protect species of animal / organisms that inhabit on such trees
- Trees / palms those are unusual in nature.

The law states that prior permission must be obtained for removal and/or relocation of 10 or more trees or palms. For indiscriminate removal and land clearances and EIA Decision Note is required. The size of the trees and palms that are allowed to be relocated should have more than 15feet from lowest point to the crown spread for palms and 8 feet from the lowest point to the trunk to tip of the highest branch for trees other than palms.

The law also states that cutting down and uprooting of the trees shall be made under supervision of the island / atoll offices (in the current context Atoll / Island Councils).

The project does not involve removal of any tree from the island hence the regulation will be fully complied to.

5.3.4 Regulation on Dredging and Reclamation

Regulation on Reclamation and Dredging of Islands Lagoons (Regulation 2013/R-15) came into effect in April 2013. The regulation requires having permission of EPA on projects requiring alternation of the island, either by reclamation of dredging. Specifically the regulation requires producing scaled-maps of the island before and after the proposed intervention. Special provisions have been made on protected and sensitive area restricting changes to the environment of the islands.

Since any EIA submission shall be made only after successful clearance of the dredging and reclamation permit, the proponent has submitted for the dredging and coastal modification permit from EPA with the EIA report. A copy of the application form is given in Annex 8.

5.3.5 Regulation and Waste Management

Waste management Regulation (No. 2013/R-58) is more recent coming into effect on 6 February 2014. The regulation was gazetted on 05 August 2013. The regulation provides set of comprehensive guidelines on collecting, storing, transporting and managing waste. In the preamble its states the objective of the regulation is in line with the Article 22 of the Constitution which requires that development activities designed for achieving socioeconomic targets should ensure that environment and its constituent living component is not compromised and that resources are utilized effectively.

The regulation describes the responsibilities of collection, transport, treating and storage of waste. It also gives emphasis on management centres and landfill sites and managing hazardous waste. Various sectors and entities (including tourist resorts) encouraged having their own waste management plans consistent with the regulation.

EPA is the implementing agency of environmental law and the implementing agency of the EIA regulation.

Wastes produced from the project will be disposed in compliance to this regulation

6 METHODOLOGIES

6.1 METHODOLOGY

The section covers methodologies used to collect data on the existing environment. The key environmental and socio-economic components of the project that were considered are physical environment, social and environmental aspects of fish loading/unloading storage and transportation operations. In order to study the existing environment of the island, the following data collection methodologies were used during the field visits undertaken in September 2016 to GA. Villingili Island.

6.1.1 Sea water sampling

Sea water samples from the lagoon area proposed for development of the artificial beach was obtained in 1.5 L PET bottles after washing them with fresh water. Parameters tested for sea water quality assessments were physical appearance, temperature, pH, electrical conductivity, total suspended solids, salinity, Phosphate and Nitrate. Necessary parameters to assess the overall quality of the sea water were analyzed at the Maldives Water and Sewerage Company (MWSC) laboratory.

6.1.2 Mapping and location identification

The area proposed for the development was mapped and various location and areas of interest are marked by using a handheld GPS. These data collection points include low water mark, high water mark, and vegetation line and sea water sampling locations. Figure 4 shows the water sampling locations, vegetation transact, and beach profile lines.

Figure 4: Map showing sampling and beach profile locations

6.1.3 Vegetation assessment

Since the development does not involve removal of any existing plant, the vegetation line was mapped using a handheld GPS and the vegetation composition at the proposed beach development site in Villingili island was visually assessed.

6.1.4 Geology and geomorphology

Aerial photographs and Digital globe, Google earth and island surveys are comparatively evaluated using GIS technology to assess the developments of the island. Three beach profiles were taken during the field visit to evaluate differences in beach morphology of the island and evaluate the island.

6.1.5 Bathymetry

Since the area proposed for development of artificial beach and swim area has a very uniform shallow depth and inaccessible due to wave actions, the overall depth was measured using measuring staff. Lagoon depth eastern side of Villingili proposed for beach and swim area development shows a fairly uniform depth ranging from -0.2—0.7 at low tide.

6.1.6 Marine survey

The reef flat on the eastern side is extremely shallow hence not suitable for snorkeling or swimming due to the shallow depth of the area. Visual observation assessment and photographic documentation was carried out by walking on the reef flat covered with sea grass and coral rubble.

6.1.7 Climate and Oceanographic Regime

Climate oceanographic regime requires long-term data on climate and oceanographic conditions. Climate data collection at the Kooddoo Airport began recently and therefore the data from the airport is not considered for this study. Hence published literature on climate and oceanography was used to predict climatic oceanographic conditions at the project site.

6.2 DATA GAPS

In the Maldives it is common to expect a detailed environmental analysis for an EIA to be undertaken in a relatively short period of time. Therefore, limitation of the time spent on site has been the key limiting factor to get a more detailed assessment on all environmental aspects surrounding the island. Given the seasonal climatic variations in Maldives and the differences in island dynamics and climate settings in individual islands such a short time frame is too little to assess selected aspects of the environment. This problem is compounded by the absence or extreme difficulty in obtaining grey literature (held in technical reports in some government officers) and of long-term studies in other parts of Maldives. Hence, most EIA's end up being based on an environmental snapshot of specific point in time. However, experienced EIA specialists can deliver a close match to reality based on a number of similar assessments and expert judgments of the team. In this regard, the following gaps could be identified in information.

- Absence of long-term site specific or even regional data (at least1- 2 years). Most critical data include current, wave and coastal dynamics.
- Absence of historical and long-term records on reef and lagoon environment.

These gaps are seriously considered in the assessment and care has been taken to address the issue in designing mitigation measures and the monitoring programme. Nonetheless, most of the assessments, including vegetation, ground and sea water quality, island dynamics, reef health, bathymetry were done in accordance with the TOR and other relevant information are collected through literature review to reflect closest match to existing environment of the island at the time of these assessments

6.3 DREDGING REQUIREMENTS AND WORK METHODOLOGY

6.3.1 Dredging Method

Dredging works under this project involves the following three steps; excavation, transport and disposal.

6.3.2 Excavation

It involves dislodgement of and removal of sediments and/or rocks from sea bottom of the dredge areas. An excavator will be used to dredge the material by mechanical actions. The dredging will be performed utilizing a CAT 330 hydraulic excavator equipped with 1.5-yd^3 hydraulic bucket. The excavator will work from an excavator bed in areas at a distance from the shoreline, while in areas close to the shoreline excavated material will be directly disposed to the beach fill area. Dredging will be conducted from the excavator bed and the dredged material will be loaded into dump truck to transport to the fill area.

6.3.3 Transport of Excavated Material

Transporting materials from the dredging area to the fill area will be achieved as follows. Sediments will be dumped into dump trucks in the excavator bed; when the truck is full, the truck will transport the sediment to the beach fill area. Excavator with appropriate bucket size has been recommended due to the relatively small size of the area requiring dredging and due to relative simplicity of the methodology for not having to do much pre-work preparation and to shorten the job schedule.

6.3.4 Disposal Site

Dredged material transported by dump trucks will be disposed off at the fill area followed by ground levelling and spreading of the load carried out manually and using various equipment.

6.4 IMPACT ASSESSMENT METHODOLOGY

The environmental impacts that may be associated with the proposed artificial beach development project in GA Villingili Island are predicted by using a simple matrix. Dredging for various reasons such as harbour development, extract sand and reclamation, beach nourishment etc., is very common in the Maldives. People are very familiar with the environmental impacts associated with the development. Due to its necessity for socio economic benefits of the proposed activity, development always overweight environmental concerns. Impacts from various activities of the proposed project both in the construction and operational phases have been identified through consultation with the project management team, public consultation, field surveys, observations and assessment, as well as based on field experience and expert opinion on similar development projects in the country.

Other sources of information have been used wherever possible. Data collected during field surveys can be used to predict outcomes of various operational and construction activities on the various related environmental components. Data presented in this report can also be used as a baseline for environmental monitoring of the project activities.

7 EXISTING ENVIRONMENTAL CONDITIONS

7.1 GEOLOGY AND GEOGRAPHY

GA Villingili Island is an inhabited island situated on the north eastern side of Gaafu Alifu (GA Atoll, at approximately 73°26'7.64"Eand 0°45'9.34"N. The island lies inside the Huvadhoo Atoll, which is believed to the second biggest atoll of the world.

Villingili island is situtated on the north east of Huvadhu Atoll located at the periphery in an elongated, N-S oriented reef platform measuring a length of 20 km is shared by multiple islands. The reef is shared by four islands. Over 40 hectares of the islands has been reclaimed in the past and the island; Falhuverreha that used be on the northern tip of Villingili has already been connected with the reclaimed part. The eastern part of the reef extends in the form of a shallow lagoon into eastern rim of the Atoll. The elongated-oval-shaped island of Raaverrehaa is lying in the western half of the reef. The coral reef system of Villingili is 20km long and the width is 0.8-1.8km. Reef perimeter is 43km and the area is approximately 25sqkm. The distance from the edge of the reclaimed beach to the reef edge in both eastern and western sides is fairly consistent measured approximately 160-200m on the east and 200m on the western side. Average depth of the reef flat on the eastern side is less than -1 to -0.5m m from MSL.

Distance between Villingili and Raaverrehaa is approximately 300m while the nearest airport situated on Kooddoo Island is at a distance of 2.5 km from Villingili. Kooddoo Island is also the main fish processing center in the southern region of Maldives. Other inhabited islands in close proximity to Villingili include, Maamendhoo (6.18 km) and Nilandhoo (14.6km).

7.2 OBJECTIVES

The purpose of this EIA was to assess the existing environmental conditions of the island, including marine and land environment. These assessments would not only enable avoiding impacts to the environment as a result of the project but also would contribute to better planning recommendations for the proposed project. This is critical in assessing potential impacts and to determine the actual extent of damage should an unforeseen impact occur during the implementation phase.

The main aim of the surveys and assessments was to establish the existing baseline environmental conditions of GA Villingili Island. Environmental monitoring during construction and operation phase of the islands is essential to ensure that the changes in environment are captured and remedial actions for the observed negatives impacts are addressed in a timely manner. The objectives of the present assessment were to:

- determine the general abiotic and biotic conditions of the terrestrial environment of the project area;
- determine the general abiotic and biotic conditions of the marine environment of the project area;
- determine the geological and geomorphological characteristics of the project area;
- assess the changes that will be associated with the proposed project;
- propose mitigation measures to avoid, minimise potential effects from the proposed project; and

- Propose monitoring arrangements to measure effectiveness of the proposed mitigation measures

7.3 METEOROLOGY AND CLIMATE

7.3.1 Temperature

The daily average temperatures rarely drop below 25°C and rarely go above 32°C. The warm period of the year is from March to May with an average daily high temperature above 31°C. The hottest day of the year is during April, with an average high of 32°C and low of 28°C.

The cool periods lasts from October/November to January with an average daily high temperature below 30ºC. The coldest day of the year is around mid-December, with an average low of 26°C and high of 30ºC. The sea surface temperature in the Indian Ocean in July 2014 is recorded to be around 29-30°C.

7.3.2 Rainfall

GA Raaverrehaa is located in a high rainfall zone of the country. Rainfall data from the three main meteorological stations, HDh Hanimaadhoo, K. Hulhule and S. Gan shows an increasing average rainfall from the northern regions to the southern regions of the country. The southern atolls receive, on average, 2,277 mm of rainfall annually, while the relatively drier northern atolls receive 1,786 mm. The nearest meteorological station to GA Raaverrehaa is at Kaadedhoo airport which became operational relatively recently in 1993. Rainfall data for the period 1994 – 2012 from Kaadedhoo has been used to determine rainfall pattern for GA Villingili Island.

The mean annual rainfall for GDh Kaadedhoo is 2186.6 mm with a Standard Deviation of 398.1 mm and the mean monthly rainfall is 182 mm. In 2015 the highest rainfall was in November and the lowest was in February and March (See Figure 5).

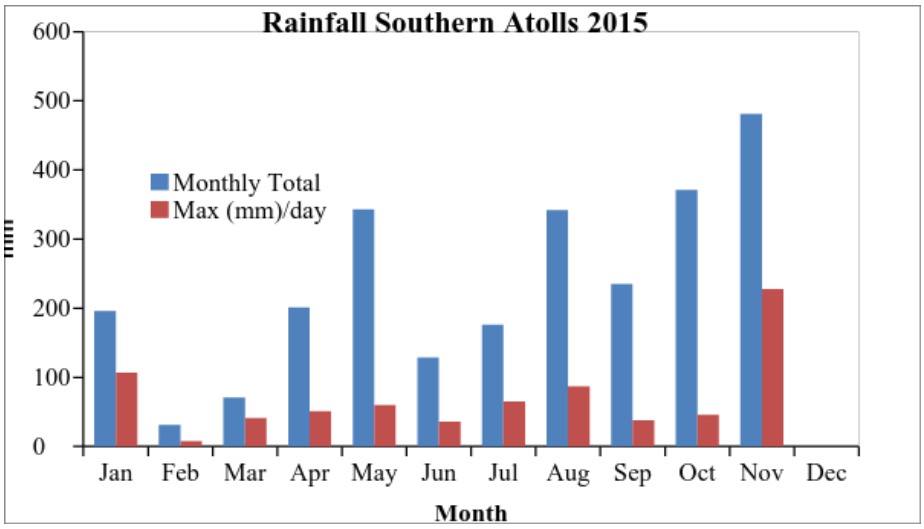

Figure 5: variation in average total monthly rainfall and maximum rainfall/day in southern atolls in 2015

Available severe weather event records shows that GDh Kaadedhoo received a maximum precipitation of 219.8 mm for a 24 hour period on 10th July 2002, the highest recorded anywhere in Maldives since recording began. This event caused widespread damage or disruption to personal property, road infrastructure, sewerage infrastructure, backyard crops, harbour quay wall, school operation and businesses in GA Villingili Island ~~located.~~ Flood depths in the southern part of GA Villingili were reported at 0.3-0.4 m. During the flooding events of November 2003, the recoded rainfall in GDh Kaadedhoo for the 24 hour period was 64.4 mm. A month later, rainfall up to 60.3 mm was observed. Two similar events ~~were~~ occurred in 2016 in which part of the island was flooded from torrential rain and associated *Udha* (storm serges). *Udha* was initiated from southern end of the island and extensively flooded large part of the island. *Figure 6* shows the tranches made to release the floodwater into the sea. Extreme weather related events cause disruption to businesses, school and minor damage to household goods in GA Villingili Island. Flooding events experienced in GA Villingili Island are believed to be due to combination of high intensity ~~of~~ rainfall in the region in combination with substantial changes brought to the physical environment of the island and poor drainage.

Figure 6: tranches made to drain flood water

7.3.3 Monsoons

The climate of Maldives is characterised by the monsoons of Indian Ocean. Monsoon wind reversal significantly affects weather patterns. Two monsoon seasons are observed in Maldives: the Northeast (*Iruvai*) and the Southwest (*Hulhangu*) monsoon. The parameters that best distinguish the two monsoons are wind and rainfall patterns. The southwest monsoon is the rainy season while the northeast monsoon is the dry season. The southwest monsoon occurs from May to September and the northeast monsoon is from December to February. The transition period of southwest monsoon occurs between March and April while that of northeast monsoon occurs from October to November.

7.3.4 Winds

The climate of the Maldives can be divided into two monsoon periods marked by strong seasonal reversals in wind direction that are confined to a narrow range of wind angles. Wind data records

since 1964 indicate that the Maldives experience west to northwest winds (225^0–315^0) from April to November during the *Hulhangu* monsoon with a mean wind speed of 5.1 m s^{-1}. In contrast the *Iruvai* monsoon, from December to March, is characterized by winds from the east-northeast (45^0–90^0) with a mean wind speed of 4.9 m s^{-1}. Wind strength is most variable during the crossover between northeast and westerly monsoons with mean wind speed falling to 3.5 m s^{-1} in March (Department of Meteorology, 1995). Table 3 shows the monthly maximum wind speed and direction recorded in southern atolls in 2015.

Table 3: Monthly maximum wind speed and direction southern atolls in 2015

Month	Max wind speed (mph)	Direction
Jan	37	SW
Feb	25	NW
Mar	25	NE
Apr	49	W
May	47	SW
Jun	53	W
Jul	31	WNW
Aug	63	W
Sep	40	W
Oct	40	SW
Nov	41	WSW

7.4 HYDROLOGY

7.4.1 Waves

Two major types of waves are observed along the coast of Maldives. The first type is wave generated by local monsoon wind with a period of 3-8 seconds and the second type is swells generated by distance storms with a period of 14-20 seconds (DHI, 1999). The local monsoon predominantly generates wind waves which are typically strongest during April-July in the south-west monsoon period.

Maldives experiences occasional flooding caused by long distance swell waves that are generated by South Indian Ocean storms (Goda 1988). The swell waves of height 3 metres that flooded Malé and Hulhumalé in 1987 are said to have originated from a low pressure system off west coast of Australia. More recently in May 2007, swell waves that originated from the southwestern side of the Indian Ocean caused flooding in 35 inhabited islands across 13 atolls, including Addu atoll.

The proposed location for the development of artificial beach is behind the reef flat that is exposed to swell waves throughout the year. Since the area has a fairly shallow depth the breaking wave height at high tide would be in the range 0.5 to 0.9m and the significant wave height is estimated to be approximately 0.6m with significant wave period of 5-7 seconds. Based on the anticipated wave condition rock boulders are suggested for the swim area protection breakwater in GA Villingili Island.

7.4.2 Tides

Tides experienced in Maldives are mixed and semi-diurnal/diurnal. Typical spring and neap tidal ranges are approximately 1.0m and 0.3m, respectively. Maximum spring tidal range in the central and southern atolls is approximately 1.1m. There is also a 0.2m seasonal fluctuation in regional mean sea level, with an increase of about 0.1m during February to April and a decrease of 0.1m during September to November. Like in most other atolls, semidiurnal tides are experienced in Huvadhoo Atoll - that is two high tides and two low tides a day. The tide varies from place to place, depending on the location and on the shape and depth of the basin, channels and reefs and also time of the year. Tidal variations in Maldives are presented in Table 4

Table 4: Tidal variations at Malé International Airport

Tide Level	Referred to MSL
Highest Astronomical Tide (HAT)	+0.64
Mean Higher High Water (MHHW)	+0.34
Mean Lower High Water (MLHW)	+0.14
Mean Sea Level (MSL)	0.00
Mean Higher Low Water (MHLW)	-0.16
Mean Lower Low Water (MHLW)	-0.36
Lowest Astronomical Tide (LAT)	-0.56

Astronomical tides are related to the motion of the earth-moon-sun system, and have a range of periodicities. The highest astronomical tide was recorded as 0.64 m above the mean sea level and the lowest astronomical tide was recorded as 0.56 m below the mean sea level. Tidal variation of 1.2m from lowest to the highest tide levels were recorded in the country.

7.4.3 Currents

Currents which affect the sea area around the Maldives are caused by one or more of the following systems:

a) Oceanic currents
b) Tidal currents
c) Wind-induced currents
d) Wave-induced currents

The oceanic currents flowing across the Maldives are notorious for their strength. The exposure of the Maldives to the vast Indian Ocean ensures that an immense body of water is constantly flowing across the plateau on which the atolls are built. In the Arabian Sea, as one gets closer to the equator, the prevailing winds become more and more indicative of the oceanic surface current. Thus, wind (especially during monsoons) can be a major factor affecting current velocity and direction, and currents can be of great strength (wind-induced currents). For example: currents in the channels near Malé have been recorded at 4 knots or more. Inside an atoll, current speeds are more settled. Oceanographic currents are driven by two monsoonal winds, namely the westerly and north easterly wind. The westerly flowing current tend to dominate from January to March while the easterly currents dominate from May to November. The changes in

current flow patterns occur in April and December. The current velocities are about 0.5 m/s, only in May values may increase to 0.8 m/s.

The vertical water movements associated with the rise and fall of the tide are accompanied by horizontal water motion termed 'tidal currents'. These tidal currents have the same periodicities as the vertical oscillations, but tend to follow an elliptical path and do not normally involve simple to- and-from motion. Generally the tidal currents are eastward in flood and westward in ebb. Tidal currents, which flow according to the height of the tide, are generally not strong. There is a strong diurnal influence, which governs the tides in the Maldives, but in general the tidal range is less than 1m.

The area proposed for the development of artificial beach is exposed to rip current in swash zone. The intensity of the rip current will vary depending on the sea bottom morphology, wave height, wind speed and tidal influence.

7.5 COASTAL ENVIRONMENT

The coastal environment of GA Villingili has been extensively modified, particularly the eastern and western sides of the island. Over 40 hectares of land has been reclaimed from the eastern side under the land reclamation project (Figure 7). Comparison of 1969 and 2009 with the recent images of the island shows complete transformation of the island. The 1969 image also shows fairly large enclosed water bodies' marshy lands (*Kulhi*) on the northern and southern ends of the islands. With extensive reclamation and expansion of the urbanisation the two marshy lands has significantly decreased in size and the natural environment has been altered ~~has altered~~.

Figure 7: Ariel photgrpahs of GA Villingili, 1969 (left) and 1994 (right showing changes in landuse and land cover

The eastern shoreline has been protected by a rock boulder revetment. Two harbours are developed on the western side of the island. The harbours are protected with a rock boulder breakwater and a quay

wall has been constructed at the inner edge of the harbour. Three entrance channels have been cut through the reef flat into the inner atoll lagoon on the western side.

The proposed development is take place on the north eastern end of the island. The area is reclaimed and a rock boulder revetment has been constructed along the eastern coastline (Figure 8). Pocket beaches (white sandy beaches) are developed along the eastern shoreline. The north western corner has a fairly wide; 3-5m ~~wide~~ sandy beach developed by accretion of sand. The northern end of the beach has large number of fairly wide beach rock series. Beach composition on the eastern side consists of medium grained coral sand and coral rubble 1-4 inch long dead branching coral and pebbles. Coral rubble is extensively used in the island to cover the black sand in the houses. Manually coral rubble is mined from the area. Evidence of mining was observed during the field visit Figure 9.

Figure 8: existing beach and rock boulder revetment on the eastern side of Villingili

Figure 9: Evidence of manual sand mining from the beach scarp of the mined area

Part of the existing revetment is covered with coastal vegetation and extends few meters seaward. Coastal vegetation cover in the area consists of a mix of shrubs dominated by *Scavola taccada* (Magoo) and *Tournefortia argentia* (Boashi). The tropical coastline creeper *Ipomoea pre-caprae* (Bodu veli veyo) covers the sandy seashores (Figure 10).

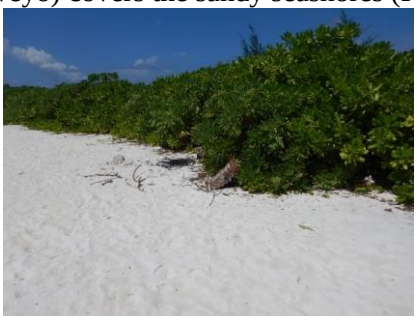

Figure 10: Coastal vegetation on the north eastern corner of the island

The beach is currently used by local picnic~~kers~~ goers particularly the youth for romantic beach settings and parties. Left over material from beach parties and picnics were found on the beach (Figure 11)

Figure 11: Leftover material from picnic NE, end of GA Villingili

Three beach profiles are taken across the north eastern section of the eastern beach. The beach profiles start from the landward side and run across the existing revetment, vegetation, sandy beach and into the shallow lagoon perpendicular to the beach. Location of beach profiles are shown in Figure 12 Profile #1 taken from the north eastern tip of the beach shows fairly stable but meandering beach slope with relatively high rises and steep dips. Fourteen meter wide beach rock is observed on the profile, the beach consist of two or three series of horizontal beach layers (Figure 12). The beach rock exposer extends further on the northern side of the island. Beach material on this profile is comparatively finer than the material observed on other profiles. Profile #2 and #3 has a fairly steep

slope from the high water mark. This indicates that these beaches are unstable and subject to ~~for~~ shifting seasonally. The widest beach in the area was observed in Profile #2, where the beach width is over 30m. The narrowest beach in the area is in profile #3 where the measured beach width is approximately 15m (Figure 12) Overall the beach profile shows that large part of the existing beach on the north eastern end of GA Villingili is very dynamic to seasonal hydrodynamic conditions.

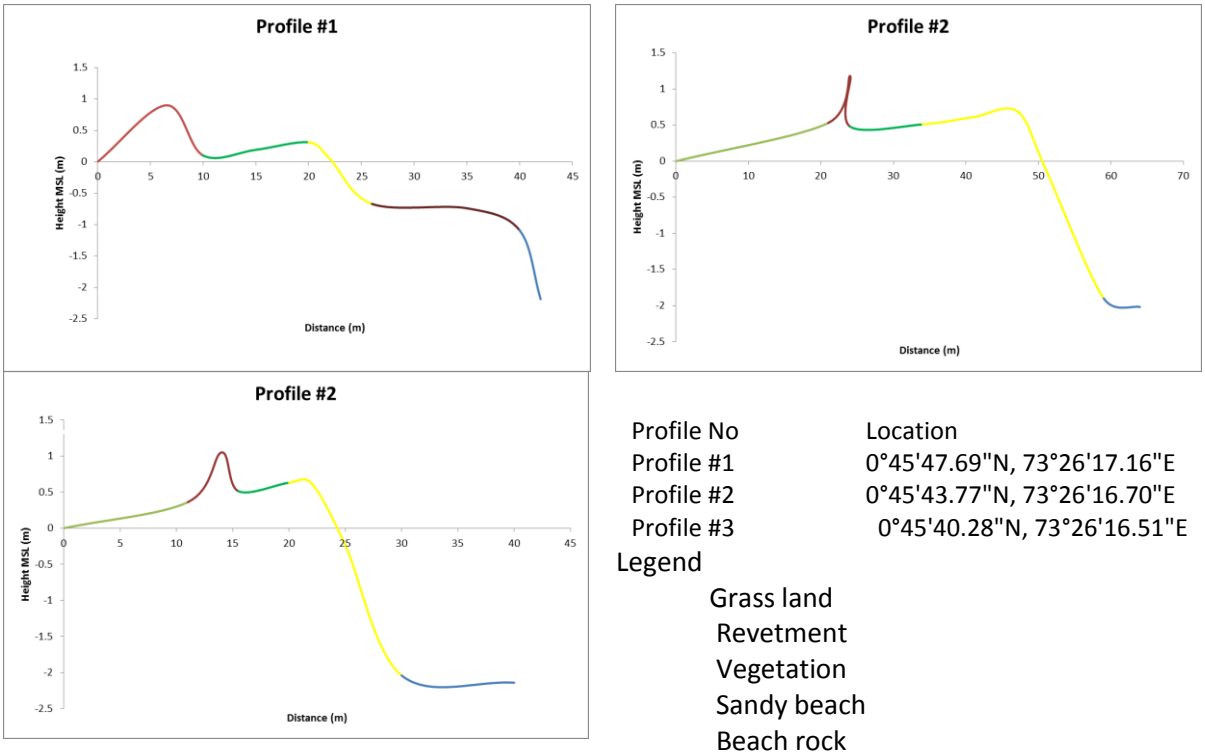

Figure 12: Beach profiles taken from area proposed for the development of artificial beach at GA Villingili.

7.6 WATER QUALITY

Lagoon seawater sample was taken and water quality was assessed at the Male' Water and Sewerage Company's laboratory using standard methodologies. Sampling locations are shown in Figure 4. The results are given in Table 5 and the original tests results are given in Annex 5. It is recommended to use the monitoring data during the project implementation against the baseline information in assessing the environmental impacts

Table 5: Water quality laboratory analysis results

	Sea water
Physical appearance	Clear with particles
pH	8.19
Temperature (oC)	19.8

Total suspended Solids	17
Hardness Calcium(mg/l)	1470
Total Dissolved solids (mg/l)	26700
Salinity (mg/l)	35.14
Turbidity	0894

7.7 MARINE ENVIRONMENT

GA Villingili is an inhabited island and the capital of GA Atoll. The island is found on the north eastern part of Huvadhu Atoll located at the periphery in an elongated, N-S oriented reef. At present the reef is shared by three more islands including Villingili Island. Over 40 hectares of the islands has been reclaimed in the past and the island Falhuverreha that used be on the northern tip of Villigili has already been included within the reclaimed part. The eastern part of the reef extends in the form shallow lagoon into eastern rim of the Atoll. The elongated-oval-shaped island of GA Raaverrehaa lies in the northern end of Villingili Island. The coral reef system of GA Villingili is 20km long and the width is 0.8-1.8km. Reef perimeter is 43km and the area is approximately 25sqkm. The distance from the edge of the reclaimed beach to the reef edge in both eastern and western sides is fairly consistent measured approximately 160-200m on the east and 200m on the western side. The vast lagoon space on the eastern and western side mainly consisted of sandy bottom with extensive patches of seagrass (*Thalassia sp*). These patches were not obvious in the aerial photo of the island taken in 1969. Therefore, seagrass formation in the lagoon appears to be relatively recent. Most of the western side of the island has been dredged to create island harbour and reclaim land to enlarge the GA Villingili reclamation. Dredged lagoon depth is within the range 6-8m.

7.8 LAGOON AND SUBSTRATE COVER

The lagoon on the eastern side of GA Villingili has an average depth of 0.5 – 1.5m during high tide periods. The original lagoon covered with sandy substrate has already been reclaimed. The existing area between the reclaimed shoreline and the reef is a 200m wide shallow reef flat. The reef flat is covered with seagrass with occasional coral colonies. Seagrass grows on nutrient rich eutrophic and slow-moving water bodies particularly in fishing islands where large amount of organic waste is dumped into the lagoon (Figure 13). The lagoon water on the eastern side was generally clear and visibility is excellent. The ocean ward eastern side reef flat of GA Villingili has a fairly ~~divers~~ rich fish diversity. Rays and juvenile sharks were encountered during the survey. Also fairly large (approximately 1m long) school of black tipped reef sharks were encountered during the survey (Figure 14).

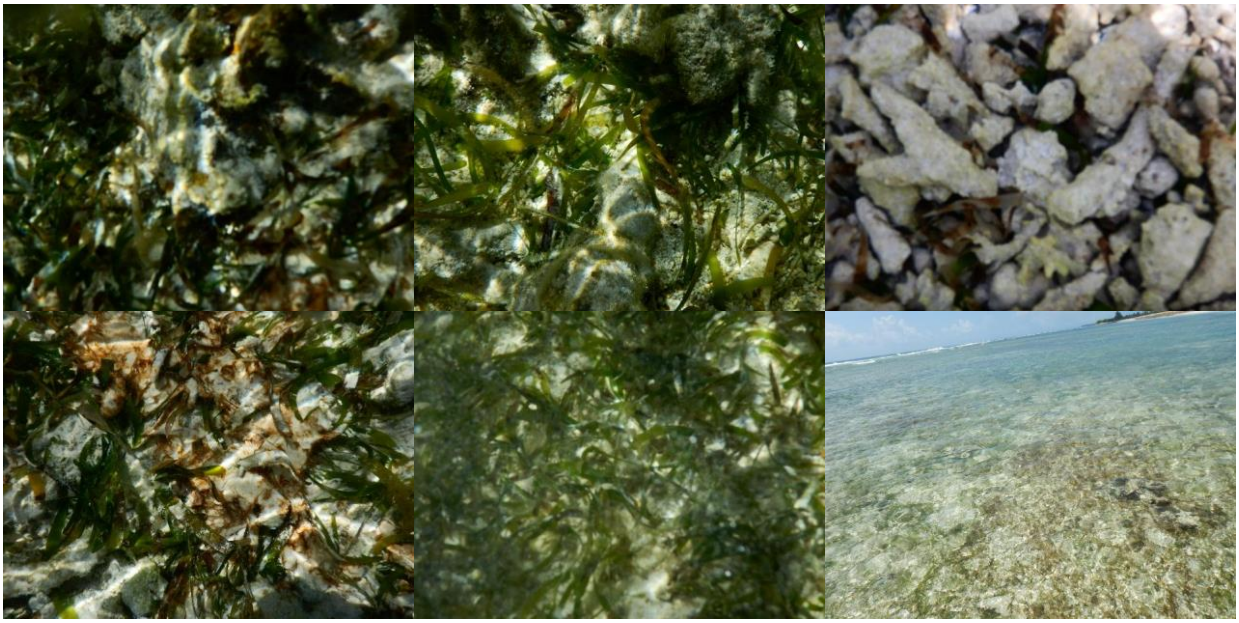

Figure 13: Substrate compositions on the NE end of the island, area proposed for artificial beach development.

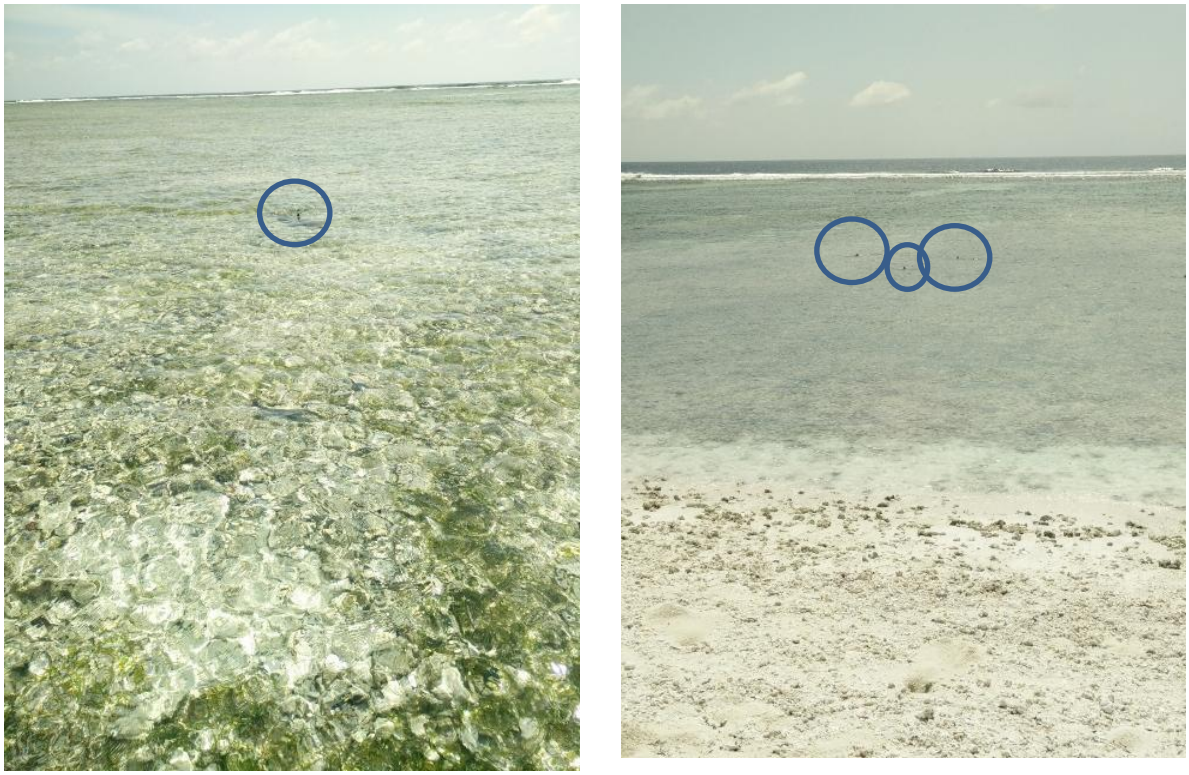

Figure 14: School of black tipped sharks encountered at the site, NE corner of Villingili

7.9 SOCIO-ECONOMIC ENVIRONMENT

7.9.1 Introduction

As part of outlining general socio-economic environmental condition for the proposed project of developing fish purchase and storage facility in GA Raaverrehaa, socio-economic conditions of the Atoll in general has been looked into since the project impact is expected to be highest on this island considering its close proximity to the project site as well as it being the Atoll hub for all commercial and administrative activities.

7.9.2 Population

The total registered population of North Huvadhoo Atoll in December 2008 is 3077. The total enumerated population of the Atoll, from Maldives population and housing census of 2006 is reported as 8262 (Ministry of Planning and National Development, 2008). There were 4185 males and 4077 females (MPND, 2008). In 2006, the atoll represented 2.76 % of the national population. According to the recent census in 2014 the population of GA atoll is 10,942 which includes 6727 males and 4215 females, 2074 foreigners and 8427 Maldivian. Almost 26% of the Atoll population was residing in the capital; Villingili Island. The atoll had 118 males for every 100 females in 2014. Population migration to Male' for various purposes was considered high for the Atoll. Population growth rate in the atoll is 0.83 and the highest growth rate is in Villingili approximately 2.98.

Expatriate population is on a growing trend throughout the islands of the Maldives and the islands of GA atoll are no exception. Many foreigners are employed by the government in education and health sector in Villingili Island. Foreigners working in the private sector were reported to be small. however, field surveys revealed that their numbers were considerably higher. It is impossible to get an exact figure of foreign population in the private sector as there is no monitoring mechanism in the island office or employment ministry. The total number of foreigners on GA Villingili is estimated to be close to 2074, consisting of 1926 males and 148 females.

7.9.3 Poverty

In general, the population of GA Villingili appears relatively well-off compared to other islands within the Atoll. The Maldives Vulnerability and Poverty Assessment of 2004 (VPA II) reported that 7% of the island population have an income less that MVR 15 per day and 1% have an income less than MVR 10 per day. The figure 7% population below Rf 15 per day is much lower than the national average of 21% and outer atoll average of 28%. There was no observed abject poverty on the island. (UNDP, 2009).

7.9.4 Local Economy and Trade

GA Villingili is one of the major fishing islands in the Maldives. One of the largest fish collection and processing center in the Maldives is based in the neignboring Kooddoo Island. Employment in Kooddoo manufacturing factory was identified as key income source in the manufacturing sector. Additionally, the airport facility developed on Kooddoo Island provides employment benefits to people of GA Villingili. In addition to Atoll level administrative facilities developed on Villingili makes it the wholesale and retail trade service hub for the region. The island enjoys critical economic infrastructures such as harbour, port, power house, and communication infrastructures. The presence of the Atoll hospital and Atoll school seems to provide opportunities to expand trade activities targeting temporary visitors from nearby islands (UNDP, 2009).

In terms of the employment structure for GA Villingili, much of the employment is in public administration (36%), fishing (22%) and manufacturing (18%). Together, these three sectors account for 76% of the employed population. The wholesale sector comprises 9% of the working population. Other non-basic service sectors comprise 15% of the working population.

The main economic activity of GA Villingili in terms of estimated income is fishing. It is followed by employment in civil service, and wholesale and retail trade. The mainstay of GA Villingili economy are the basic sectors involved in the export of goods and services – fishing, manufacturing and wholesale trade. The rest of the non-basic sectors such as transport, retail trade, hotels and other small business activities are dependent on the economic functioning of the basic sectors. Hence, a lowering of income from fisheries will reverberate through the economy. For example, a decline in fishery may lead to a reduction in demand for new housing construction and transport activities (UNDP, 2009).

7.9.5 Socioeconomic Benefits

The proposed development of an artificial beach, picnic and swimming area can be considered as an important social infrastructure that will contribute to overall wellbeing and gross happiness of the people of Villingili. The island is becoming congested with the urbanization and availability of facilities for recreation and entertainment for the people living in the island is equally important as food and other basic human needs. Such a facility will contribute to create a healthy population physically fit to serve the nation and the community. Also the development will contribute to overall social cohesion of the island community and create a solid social bonding between the island communities near and far and social gatherings. Therefore, the proposed artificial beach development project in GA Villingili is a platform and a vehicle for youth development and empowerment. It will also ensure creation of a healthy community, physically and mentally fit population for nation building, establish and maintain social cohesiveness and it also will serve as a solid foundation that will unite the island community.

The facility is also expected to bring economic benefits for the island community through creation of jobs and SME business opportunities to provide various services in the facility.

Some of the indirect benefits of the development includes; increase in revenues to private entrepreneurs, and contributions to the development of service oriented facilities related to entertainment and recreation. Therefore, the proposed project will create employment and open new market avenues and opportunities particularly for the people living in Villingili Island.

8 STAKEHOLDER CONSULTATION

The scoping meeting to determine the scope of the EIA report was held on 14th August 2016 at EPA. During the meeting the stakeholders were identified and the scope of the EIA report was determined. Methods used for stakeholder consultation include direct communication and interviews with locals in GA Villingili, formal meeting such as the scoping meeting, Atoll and island council and the people of GA Villingili.

8.1 KEY STAKEHOLDER

As per the TOR the key stakeholders identified are

1- GA atoll council and Villingili islands council
2- People of Villingili island
3- Health Protection Agency (HPA)
4- Engineers, project financier

8.2 EIA SCOPING MEETING

EIA scoping meeting was held on the 14th of August 2016. Most of the stakeholders were present in the meeting (meeting attendance is in Annex 7). The meeting was chaired by Mr. Yazeed Ahmed, Director EPA. The consultant gave a briefing on the proposed development of an artificial beach and creation of swim area on the north eastern end of GA Villingili and explained the design details and answered the technical questions. The council president who was attending the meeting questioned about the need to create an artificial swim area at the far end of urban area of the island. He stated that the decision to select the proposed location was made by the council in a meeting he did not attend. He also pointed out some of the disadvantage of the proposed location and from his interventions it was very clear that he wanted to create the artificial beach/swim area in the southern end of the island. Beside council president's concerns about the proposed location for the development of artificial beach the following issues and concerns were raised by the EPA:

1- EPA noted that the proposed location for the development of artificial beach is the sand accumulation area at the north eastern end of the island. They also pointed out that once the beach is developed in the area, erosion on either side will trigger causing sand accumulation on one side and erosion on other side.
2- The proposed area is exposed to ocean swells throughout the year and the area might have strong rip current.
3- The area needs to be well protected with a fairly strong breakwater. Council president also emphasized that strong rock boulder break water is required to protect the swim area.
4- EPA questioned the representative of HPA if they have any guidelines on water quality of public swimming area, in response HPA said that they are in the process of developing such a guideline and they will share the draft with EPA once it is ready.
5- EPA also questioned about toilet and bathing facilities in the beach area. In response to that the concept included those facilities and restaurants and the waste water from the facility to be connected to the main sewer network of GA Villingili. EPA also questioned about the outfall pipe of the sewerage network and the island council president responded that the outfall is on the southern end of the island.
6- In the light of the discussions held in the scoping meeting, EPA requested to provide options for alternative location in the EIA report.

8.3 CONSULTATION WITH ISLAND COUNCIL

Stakeholder consultation with Villingili Island Council was held on the 25th of September 2016 at the Council Office during the field visit (Figure 15). The meeting was held after the field visit and survey of the proposed location for the development of the beach and also exploration of the potential options for development of the beach. The meeting was chaired by the president of the Island Council. He briefed about the discussions in the scoping meeting and what was requested by EPA during the meeting. The consultant explained the process and shared some of the observations from the field assessment. It was obvious from various interventions in the meeting the council is fairly polarised on the selected location for artificial beach development on the north eastern corner of the islands. Some members are in favour of the north eastern end and others on the southern end of the island. The consultant questioned the council if they have discussed the matter with public. In response they said that some degree of discussion was held with the public and the location was decided based on the outcome of the discussions with various community groups particularly the youth, who will be the most frequent potential users after the facility development. The consultant requested to provide a copy of the minutes of the meeting held to decide on the location of the proposed beach, also requested to organise a meeting with the public for further discussions.

Figure 15: Meeting with the Island Council

8.4 PUBLIC CONSULTATION

Formal consultation with the public was held in the Island Council Office at around 21:00 hours. Representatives of the general public, a selected group of youth, senior citizens, former chiefs, present council members, women's committee etc., are invited for the meeting (Figure 16). A list of attendees to the meeting is given in Annex 7. Council president gave a brief introduction about the meeting and also what has been discussed at the scoping meeting and consultants meeting with the council members in the morning. Then the consultant gave a briefing about the EIA process and the role of stakeholder consultation in environment related decision making. Then the floor was open for discussions.


Figure 16: meeting with the representatives of the public

Most of the interventions focused on the potential advantages and disadvantages of locating the proposed beach on north eastern end or the southern end. The following Table 6 discussion points for and against the option highlighted in the meeting with the people of GA Villingili.

Table 6: Advantages and disadvantages of the potential location for beach development

Beach development options	Advantages	Disadvantages
North eastern end (proposed location)	✓ Considering the long term development of the island this location is less congested , has potential for growth of related businesses and services ✓ Isolation from the inhabited area gives privacy for picnickersd, family gatherings ✓ Far from urbanization ✓ Coastal erosion can be managed ✓ Potential for development of related facilities, restaurants, shops etc., ✓ Coastal protection cost is relatively lower	✓ Far from the inhabited area (access is difficult) ✓ Extremely isolated, long distance to walk particularly for elderly, woman and kids ✓ Development may trigger coastal erosion and subsequently beach maintenance would be difficult ✓ At present no one using the area for bathing or swimming ✓ Due to isolation may promote socially unacceptable behavior ✓ Exposed to ocean swells
Southern end	✓ Already used by many for swimming, and recreation activities ✓ Existence of a natural beach no need to create a beach ✓ No need to deepen the area ✓ Within the urbanized area of the island ✓ Easy access to the public	✓ Far end of the island not very easily accessible for the people living on the northern part ✓ Flood prone area ✓ Close to Kooddoo (aircraft noise, polluted water from Kooddoo fish processing plant) ✓ Coastal protection cost is relatively higher

	✓ Potentially most valuable land in the island	✓ Urbanized area, less privacy, less potential for picnics and family gatherings ✓ Potential area for industrial development in the island ✓ Erosion prevalent ✓ Strong wave action during SW monsoon ✓ Close to the proposed boat repair area

The consultant suggested potential alternative location other than the two discussed above and their pros and cons from environment and socioeconomic perspective. At the end of the discussions everyone in the meeting requested from the consultant to properly evaluate the potential locations for the development of the artificial beach in GA Villingili and they agreed that they will accept the recommendations of the consultant in this matter.

8.5 MAIN CONCLUSIONS FROM THE STAKEHOLDER DISCUSSIONS

Most of the concerns raised during the scoping meeting was addressed and discussed with the islands council land the public and the following are the outcomes of the discussions;

Everyone agrees that there is a need to have a designated public beach area to undertake beach related recreational activities such as picnics, swimming, water sports etc. in GA Villingili islands

The people of the island is well aware of the project, the plan and the proposed location has been shared with in social media within Villingili community and the progress is well updated in the following facebook page. https://web.facebook.com/Secretariat-of-the-Villingili-Council-1192297754167285/posts/

The general public and the council are divided on the potential location to create an artificial beach in the island.

Meeting with the representatives of the general public also agreed that the selection criteria to create artificial beach should include public swimming area, picnic area and facilities, proper protection and easy access, relatively reasonable privacy for families and social gatherings etc., in the beach.

The EIA consultants are requested to provide a comprehensive potential alternative location analysis and their selection with justifications.

Table 7: list of people met in stakeholder discussion

Name	Designation	Contact No
Mr. Niyaz Nizar	President Villingili Council	
Thamheen Hassan	VP Villingili Council	
Fathuhee Mousa	Council member	
Mohamed Farooq	Council member	

Husain Sabry	Council member	
Nadeem Mohamed	Council member	
Aiminath Sheelaa Ali	Council member	
Fathimath Reema	Director EPA	Fathimath.reema@epa.gov.mv
Yazeed Ahmed	EPA /Director	Yazeed.ahmed@epa.gov.mv
Dr. Mahmood Riyaz	Consultant	7890307
Fathimath Shabana	(HPA)	3014494

9 POTENTIAL IMPACTS AND MITIGATION MEASURES

This section of the report identifies the potential environmental impacts and possible issues that could arise from implementation of the dredging works using an excavator. Their identification of potential impacts does not mean that they would necessarily occur or that they could not be successfully mitigated. The proposed other activities include beach replenishment, dredging and coastal protection of the swimming area.

Possible impacts arising from the construction and operation works are categorized into reversible and irreversible impacts. Reversible and irreversible impacts are further categorized by intensity of impacts (negligible, minor, moderate and major) for identifying best possible remedial (mitigation measures) action to be taken. Below are the impact categories

- Negligible: the impact is too small to be of any significance (Reversible)
- Minor: the impact is undesirable but accepted (Reversible)
- Moderate: the impact give rise to some concern but is likely to be tolerable in short-term, or will require value judgment as to its acceptability (May or may not be Reversible)
- Major: the impact is large scale giving rise to great concern; it should be considered unacceptable and requires significant change or halting of the project (Irreversible)

Severity of impact is assessed by reviewing the engineering design, detailed site plan as well as comparison of development with the existing environment and construction methodologies employed. Mitigation measures are derived based on the site specific assessment as well as similar project elsewhere in the Maldives. Impact identification matrix is provided in Table 8. Potential impacts and their mitigation measures and detail discussion is the following sections. Table 6 gives a summary of impacts their magnitude reversibility and duration.

9.1 IMPACT IDENTIFICATION

The following section describes in detail and discusses the main potential environmental impacts that have been identified and predicted for the proposed artificial beach development project on the north eastern corner of GA Villingili island. Identified potential impacts are divided into construction phase and operation phase environmental impacts.

9.2 LIMITATION/UNCERTAINTY OF IMPACT PREDICTION

The methods used to predict and evaluate the environmental impacts that may be associated with the proposed artificial beach development project on the north eastern corner of GA Villingili island may not be the most comprehensive. The main shortcoming of these methods is that impacts are predicted by reviewing the survey data collected during the field visits and information revealed by the designers and engineers, therefore the assumptions have been made to predict the impacts which may or may not be accurate. Also, the data collected during the field visit is limited, which subsequently limits the overall understanding of even the short term environmental conditions (wave condition, currents, and littoral movement). Nonetheless, within the time limitation of EIA field data collection and report preparation the methods used are concise and provide a general overview as well as the range of impacts that can affect the environment.

Table 8: Impact identification matrix

Impact	Construction phase Activities						Operational phase Activities	
	Site setup and mobilization	Work force	Dredging	Beach nourishment and coastal protection work	Equipment and vehicle maintenance	Demobilization	Solid waste management	Dredged area use
Noise	-	-	-	-	X	-	-	X
Dusting -Air Quality	-	X	-	-	-	-	-	X
Coastal process	X	X	-	X	X	-	X	-
Terrestrial flora	X	X	X	X	X	X	-	X
Ground water	X	X	-	-	-	X	-	X
Soil	X	X	X	-	-	-	-	X
Marine water quality	-	X	-	-	-	-	-	-
Hydrodynamics	-	X	-	X	X	X	-	-
Marine habitat and Fauna	-	X	-	X	X	-	-	-
Socio-economic	+	+	+	+	+	-	+	+

Key: (-) Negative impact (+) Positive impact (X) no impact

9.3 IMPACTS AND MITIGATION MEASURES

Construction phase can be considered as the period in any developmental project that causes major direct and indirect long and short-term impacts on the environment. Anticipated potential direct and indirect environmental impacts from the proposed artificial beach development project on the north eastern corner of GA Villingili island include the following:

- Mobilization of equipment and labour
- Dredging, and subsequent sedimentation
- Hydrodynamic regime
- Marine habitat and coastal environment
- Noise, vibrations and air pollution
- Earthwork and levelling
- Equipment & vehicle maintenance

The following paragraphs will provide detailed impacts and mitigation measures during the construction phase of the project.

9.4 IMPACTS FROM MOBILIZATION OF EQUIPMENT AND LABOUR

Mobilization of dredging set excavator and other heavy equipment and machinery needed for the project will have minor impact on the marine and coastal environment. The major impact of the mobilization would be aesthetic unattractiveness of the vehicles and equipment camp site. Disposal of minor amounts of hazardous waste and sewage may be a concern but use of the existing systems in the island, e.g., sewerage system, water and waste disposal mechanism will make the impact negligible

9.4.1 Lagoon Dredging, and subsequent sedimentation

Deepening of the lagoon and use of dredge material to replenish the beach on the north eastern corner of GA Villingili will have a direct irreversible negative impact to the ecological habitat in the area. Direct impact of this activity is limited to GA Villingili lagoon and may extend to the reef depending on the weather conditions and work methodology.

Given below are relevant impacts that should be considered:

1. Physical damage on lagoon benthic fauna and loss of habitat: The effect of this would be in the immediate to medium term with the loss of substrate and its fauna.
2. Disturbance to the area during dredging activity: Release of sediments and potential loss of the faunal composition underneath sediment material will undoubtedly occur.
3. Dredging will change in the flow patterns. The unexpected outcome may be erosion or accretion of the island or coastal areas particularly on the north western side of the island.

In order to minimize the impact from sediment, dredging should be completed in shortest time possible. Dredging ought to take place during low tides or slack tides to minimize the release of sediment to the area.

9.4.2 IMPACTS TO CORAL REEF AND SEAGRASS

The coral reef flat and the adjacent seagrass bed to the project area will be exposed to direct removal and sedimentation impact from the dredging activity. Dredging will result in the short-term irreversible loss of the existing coral patches live colonies on the affected area. The potentially negative impacts on the associated fish species are thought to be less severe given that that there are adequate reef ecosystems on the island house reef to which they may retreat. Thus, the immediate negative impact of dredging would be reversed over the long-term period.

Without turbidity barriers the currents and the wave action mostly generated by wind particularly during the North East monsoon would promote rapid sediment transport of turbid waters away from the immediate area and into the shore and spread in the shallow lagoon.

Use of dredged material for beach replenishment will also increase the impact of sedimentation and mortality of creatures attached to the sea bottom at the immediate beach nourishment area as a direct result of filling with dredged material. Mobile creatures live on the seagrass bed and reef flat will move away from the disturbed area and retreat into elsewhere.

9.4.3 Hydrodynamic regime

Development of the proposed artificial beach development project on the north eastern corner of GA Villingili Island is likely to change the overall hydrodynamic regime within of the nearshore due to creation of shore perpendicular structure and increase in water depth of the area. Further the structure will block sediment movement in the nearshore area and therefore the beach on either side of the structure may undergo severe erosion conditions may take a number of years to stabilize against the prevailing conditions. Figure 17 shows the existing beach and anticipated change and shoreline after the development.

Figure 17: Existing shoreline and anticipated change in shoreline after the development

Depending on the severity of sand accumulation and erosion ~~considered~~ may affect the beaches and stability of protection structures. However, it is proposed to have in place a beach monitoring program against the baseline set up for this study should an unforeseen changes occur to the beach especially during unusual weather conditions.

9.4.4 IMPACTS TO COASTAL MORPHOLOGY AND AESTHETIC VALUE

The turbidity associated with the excavation will probably be restricted largely to the bottom, and the immediate vicinity of the dredging area. A plume will still be visible around the dredging operation. It is possible that the visual impact will be moderately severe and localised. The overall significance of this impact will vary from person to person, but on a precautionary basis is regarded as being moderate. Modifications to the lagoon will result in the lowering of the aesthetics of the island compared to the baseline conditions.

9.4.5 NOISE, VIBRATIONS AND AIR POLLUTION

During the mobilisation of equipment and operation of heavy machinery for dredging and playground levelling work, it is anticipated that significant noise will be generated. Minor ground vibration is anticipated during movement of excavators and heavy vehicles. Furthermore, noise vibrations may alter species behaviour. In addition, dust and emissions from vehicle and machinery exhausts will degrade the air quality. However, these impacts will be short term and can be mitigated to avoid nuisance to the locals in the island. With proper mitigation measures, it is unlikely that noise, vibration and air pollution impacts will cause long term effects such as human health risks leading to increased public and private health costs.

9.4.6 Equipment & vehicle maintenance

Impacts: All sorts of motorized equipment, requiring fuel, lubrication and maintenance will be used on the site. Many will be fitted with lead batteries. Therefore, the potential accidental spillage and contamination of the soil and the sea by hydrocarbons as well as the careless disposal of batteries exists during the construction period.

9.4.7 Solid waste management & disposal

Impacts associated with solid waste are the most important environmental impacts with greatest concern during the operations phase of the artificial beach. Inadequate methods of solid waste disposal during the operation phase of the artificial beach will generate a number of impacts on the area. For instance, waste such as garbage, plastic bags, glass and plastic bottles, aluminum cans and others discarded by the picnickers generate marine pollution in the surrounding area, which in turn will have detrimental impacts on coral reefs as well as on reef fish populations. Also, such pollution can be seen on various parts of the island as well as washed onto the beaches of the island if not properly taken care of, thus, the beach will become aesthetically unattractive and unpleasant, which can tremendously affect the prime use of the beach as a recreational area. However, proper garbage management practices will be implemented at the site and permanent staff to look after the beach will be kept in the area. Adequate number of dustbins will be placed in various parts therefore, issues related to improper solid waste disposal will be avoided. It is anticipated that dedicated staff will be engaged to collect and dispose of waste from the beach on daily basis to the waste management dumpster in GA Villingili.

Mitigation Measures:

- Dedicated staff will be engaged to collect and dispose off waste from the beach to the waste management dumpster in Villingili on a daily basis
- Awareness raising activities for the public and picnickers will be conducted on ways to reduce and avoid solid waste
- Dustbins for collection of different types of waste will be placed on the beach.
- Metals, glassware, plastics, paper and organic waste like leaves and twigs will be separated from other materials.

9.5 POTENTIAL POSTIVE IMPACTS

Potential positive impact of the project would be creation of short term employment opportunities for the locals. The proposed development of an artificial beach, picnic and swimming area can be considered as an important social infrastructure that will contribute to overall wellbeing and gross happiness of GA Villingili population. Creation of the facilities and infrastructures will attribute to create a healthy population physically fit to build the nation and the community. Villingili is becoming congested with the urbanization and availability of facility for recreation and entertainment facilities for the community living in the island can be considered as important as food and other basic human needs. Also the development will contribute to overall social cohesion of the island community and create a solid social bonding between the island communities and families through organization of picnics, BBQs and other social gatherings. Therefore, the proposed development project in GA Villingili is important to create healthy community, physically and mentally fit population for nation building, establish and maintain social cohesiveness of the island community.

The facility is also expected to bring economic benefits for the island community through creation of jobs and SME business opportunities to provide various services in the facility.

Some of the indirect benefits of the development are increase in revenues to private entrepreneurs, and contributions to the development of service oriented facilities related to entertainment and recreation. Therefore, the proposed project will create employment and open new market avenues and opportunities particularly for the people living in GA Villingili Island and in general to the people.

9.6 NEGATIVE IMPACTS

1- Loss of benthic biota at the dredging area on the reef flat.
2- Short- medium term sedimentation and turbidity over seagrass and corals due to suspension and dispersal of fine sediments.
3- Alteration of alongshore sediment movement pattern erosion/accretion of sand on either side of the beach
4- Possible impacts on pelagic environment due to suspended sediments.
5- Impaired visual/seascape impacts from the presence of the dredging equipment.
6- Increased noise levels due to dredging and earthwork operations.

9.7 CUMMULATIVE IMPACTS

The area proposed for the development of artificial beach in GA Villingili has already gone under heavy reclamation impact during the land reclamation period. Also coastal revetment construction work along the eastern shoreline has already been carried out in the past. Historical shoreline of the island has been extended over 500m off shore through lagoon filling and subsequent reclamation work. The coral reef and lagoon environment on the eastern side of the islands does not seems to have fully recovered or became equilibrium with the surroundings therefore the proposed development would be an additional environmental impact for a smaller part of the reef flat that will further delay the on-going recovery process of the marine and coastal environment. Therefore, impact of project activities on the marine environment will be compounded and it may go beyond what has been described in this report in this area on a collective basis.

9.8 IMPACT MITIGATION MEASURES

Table 9 below lists the potential impacts identified above in Section 9 and describes the corresponding mitigation measures that should be put in place during implementation of the proposed development of an artificial beach, picnic and swimming area project at GA Villingili. In summary the impact mitigation measures proposed should entail:

1) Good dredging practice to minimise sediment suspension and dispersal at the dredging sites.
2) In order to minimize the impact from sediment, dredging should be completed in shortest time possible. Dredging ought to take place during low tides or slack tides to minimize the release of sediment to the area.
3) Coinciding the dredging activity for NE monsoon period to force the plume to move away from the house reef by allowing the sedimentation to island shore.

4) Environmental monitoring of the project to ensure use of turbidity barriers and turbidity level do not exceed the standard levels.
5) The contractor shall be mandated that appropriate turbidity barriers be deployed at all times during dredging. The type of barriers selected should take into consideration the shallowness of the area and the prevailing wave and current conditions.
6) During the project activities and operational phases, all efforts should be made to prevent the intentional or accidental spill of oil, waste oil and hazardous materials release into the environment which could lead to further damage to the marine environment.
7) Contractor should take steps to ensure that there is no dumping of oily waste from dredging vehicles or land-based activities related to the project. Careful consideration should be given to the requirements for storage and appropriate disposal of waste oil.

9.8.1 Mitigation Cost Elements

The mitigation measures associated with significant costs, beyond those of dredge equipment rental and deployment, and good dredging practice, is identified below in Table 9 along with the major cost elements. Costs are based on the estimation of magnitude of the activity

Table 9: Significant impacts, mitigation measures and associated costs

Phase	ACTIVITY	IMPACTS	IMPACT PREDICTION			MITIGATION MESURES	Mitigation				
		1.	Magnitude	Reversibility	Duration		cost (MVR)	Benefit	Expertise	Responsibility / Manpower	Equipment /technology timing
Construction phase	2. Dredging and beach nourishment	Sedimentation on lagoon, reef and seagrass	M	R	M-L	Dredging during low tides or slack tides to minimize the release of sediment to the area Dredging during NE Avoid operation of heavy machinery out of construction area or boundary Use a silt screen	Silt curtain 10,000 USD	Reduce sedimentation	Environmental protection	Contractor	Silt curtain installation NE monsoon

	Coastal protection work	Hydrodynamic regime Sediment movement pattern Coastal morphology and aesthetics	M	I	M-L	Long term monitoring during construction an operation phase	Monitoring cost provided in relevant section	Take mitigation action in a timely manner	Environmental protection Financial savings	Environmentalist	Monitoring equipment
		Noise vibration and air pollution	L	R	S	Heavy machinery operated only during mid to low tide		Avoid public nuisance	Environmental protection	Contractor	Timing
						Avoid use of heavy machinery during night hours					
Operational Phase	Solid waste management	Beach and swim area pollution	H	R	S	Dedicated staff will be engaged to collect and dispose of waste from the beach Adequate number of dustbins will be placed	Plug into existing waste collection system	Keep the area clean	Environmental protection	Island Council	Recruitment 3-4 staff

	User impacts	Aesthetically offensive and unpleasant odour	L	R	S	Sign boards and awareness raising activities for the public and picnic goers	Staff salary 144,000 MVR/year				

Key

Magnitude	Reversibility	Duration
H=High	I=Reversible	L= Long Term (Over 10 years)
M=Medium	R=Reversible	M=Medium term (Over 5 years)
L=Low		S=Short term (Below 5 years)

10 ALTERNATIVES

10.1 NO DEVELOPMENT OPTION

It is believed that a number of environmental impacts will be generated from the proposed development of artificial beach in GA Villingili. Although no impacts on the environment will be associated if the proposed development does not go ahead, the development will bring overall wellbeing and gross happiness to Villingili population as availability of a recreational and entertainment facilities for the community living in the island can be considered as important. Also the development will contribute to overall social cohesion of the island community and create a solid social bonding between the island communities and families through organization of picnics, BBQs and other social gatherings. The project will increase the value of the land/project site, improve the living environment and provide economic opportunities and contribute directly and indirectly to health and wellbeing of the community. The facility is also expected to bring economic benefits for the island community through creation of jobs and SME business opportunities to provide various services in the facility

Given the range of benefits that the proposed development will bring the project has been considered important and "No-Development" Option has been considered not favourable for the proposed development and decided to go ahead with the proposed development.

Development can take place only within the limits of the environment and the society. Hence, the aim is to ensure that all project activities are undertaken without any adverse long term irreversible environmental damages that cannot be mitigated. Preferred alternatives discussed below has been selected based on the above broad development concept.

10.2 ALTERNATIVE LOCATION

As mentioned in the report there has been debatable arguments within island population about the locations of the proposed development. The people of the island are juggling with two main potential locations:

a) The proposed location north eastern corner of GA Villingili island (Lovers point)
b) The southern end of the island currently used area for swimming and bathing

During the public consultation the consultant suggested a third location which also has a potential for development of an artificial beach in GA Villingili. These locations are shown Figure 17. Main arguments for and against the preference of locations during the stakeholder consultation is shown in Table 10.

Figure 18: Options for alternative locations

As requested by the public the consultant evaluated an alternative analysis for three potential locations for the project based on environmental and socioeconomic criteria including:

- Accessibility to the facility
- Economic viability
- Environmental justifiability
- Future expansion
- Social acceptability

Based on the above five criteria, alternative location to develop an artificial beach in GA Villingili was weighed with scores given for each location from 1 to 5. The purpose of developing a scoring system is weight the options to obtain a favourable alternatives location based on the criteria proposed by considering alternatives in terms of accessibility, economic viability (cost of protection and development), environmental justifiability, social acceptability and potential for future expansion and development. The total for all factors gives an overall weight of the location. The highest total score provides the most desirable and preferred alternatives and vice versa.

Table 10: Alternative location analysis

Criteria	NE corner (L1)	Southern end (L2)	Extended beach (L3)
Accessibility	Far from the inhabited area (access is difficult) long distance to walk particularly for elderly, woman and kids Isolation from the inhabited area gives privacy for picnickers,	Far end of the island not very easily accessible for the people living on the northern part Within the urbanized area of the island Easy access to the public	Far from the existing urbanised area Almost mid-way in the planned development Not very difficult to access, reachable distance for the elderly woman and kids Isolation from the

	family gatherings		urbanised area gives privacy for picnickers, family gatherings
Economic viability	Coastal protection cost is relatively lower. Potential for development of related facilities, restaurants, shops etc.,	Coastal protection cost is relatively higher Potentially most valuable land in the island Potential area for industrial development in the island	Coastal protection relatively low Potential for development of supporting facilities, restaurants shops etc
Environmental feasibility	Development may trigger coastal erosion and subsequently beach maintenance would be difficult Exposed to ocean swells Potential feeding ground for juvenile sharks and rays	Flood prone area No need to deepen the area Natural beach no need to create a beach Erosion prevalent Close to Kooddoo (aircraft noise, polluted water from Kooddoo fish processing plant) Strong wave action during SW monsoon	Development may trigger beach erosion on either side Exposed to ocean swells Short distance between the beach end surf breaking area Potential feeding ground for juvenile sharks and rays
Social acceptability	At present no one using the area for bathing or swimming Used by the younger generation for picnic and parties Due to isolation may promote socially unacceptable behaviour	Already used by many for swimming, and recreation activities Urbanized area, less privacy, less potential for picnics and family gatherings Within the urbanized area of the island	Not used by anyone for swimming Used by the younger generation for picnic and parties Not very isolated therefore less potential to promote socially unacceptable behaviour
Future expansion	Considering the long term development of the island this location is less congested , has potential for growth of related businesses and services	No potential for growth without land reclamation	Potential for growth and expansion Land available for development of related businesses and services

Description of the environment of the two potential sites L2 and L3 are given below:

10.2.1 Existing environment location 2 (southern end)

The southern end of GA Villingili is within the urbanised area of the island. Erosion is prevalent in this area at the time of survey fairly wide 3-10m sandy beach was observed. This wide beach is extremely dynamic evidence of coastal erosion was observed and fairly deep erosion scarps were noted. The area is also exposed to fairly strong current from the channel between Kooddoo and Villingili (Figure 19- Figure 22).

As per the locals storm surges (*Udha*) mostly attacks from the south western side of the island from this area.

There is a fairly wide (200m) and deep lagoon in this area. Average depth of the lagoon at low tide is about 1-1.5m. Therefore fairly strong and breakwater is needed to create safe swimming area. The protection should also be designed to address *Udha* and coastal erosion problem prevalent in this area.

Benthic cover of the lagoon consists of patchy seagrass beds alternated by sandy areas. This area is currently used by the locals for swimming.

Figure 19: Beach on the southern end of the island used by the public for swimming and recreation

Figure 20: Severe erosion on southern end

Figure 21: Lagoon and substrate cover on the southern end (L2)

Figure 22: Southern end only available area for public recreation and swimming

10.2.2 Existing environment Location L3 (Extended beach eastern side)

This area is located on the east coast 500m south of the locations one. The revetment, beach and vegetation in the area is very similar to location one. However, the distance between the reef and beach is shorter (Approximately 90m) than the reef-beach distance in location one. The seagrass bed on the reef flat is patchier in this area and alternated by sandy areas.

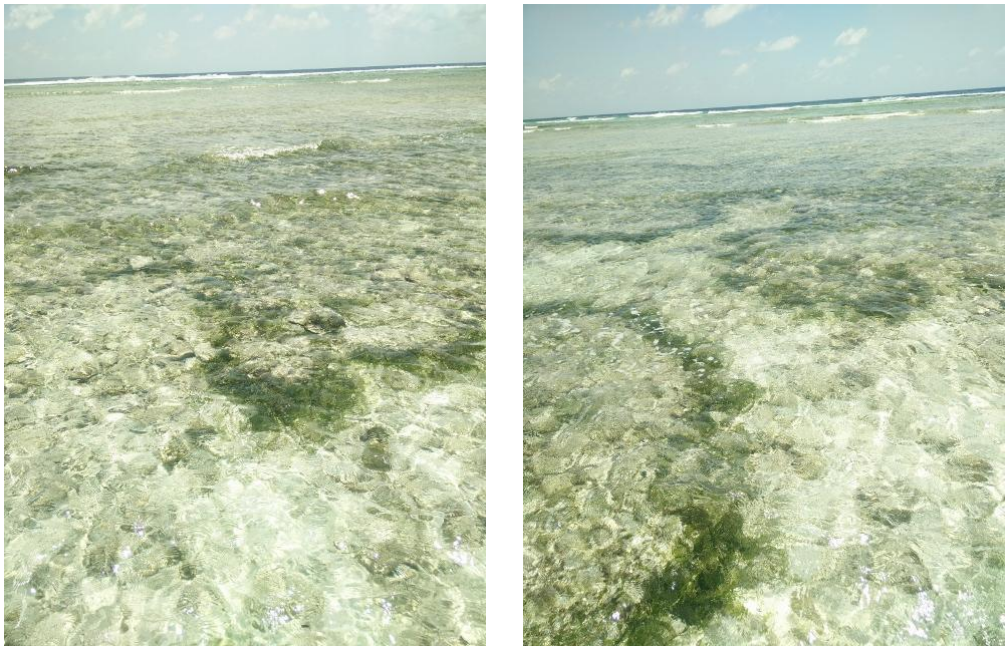

Figure 23: Reef flat and beach on the extended beach area location 3.

Figure 24: Substrate composition location (L3)

10.2.3 Assessment of the weights of options for alternative locations

The following Table 11 shows the weighted scores of the alternative location analysis exercised for the proposed artificial beach development project in GA Villingili island.

Table 11: Weighted scores of alternative location analysis

Criteria	L1 (NE corner)	L2 (southern end)	L3 (extended beach)
Accessibility to the facility	3	2	4
Economic viability	4	1	4
Environmental justifiability	4	2	4
Future expansion	5	4	5
Social acceptability	4	3	5
Total	**20**	**12**	**22**

Based on the option analysis the location (L3) at the extended beach area scored the highest followed by location (L2) north eastern corner of the island. The alternatives location is preferred because the location is not too far from the present existing urban area and also centrally located within the planned development of the island. Also the area is not very isolated hence the negative social impact of isolation can be minimised.

10.2.4 Preferred Alternative

The preferred alternative location for development of artificial beach in GA Villingili is location 3, which is 500 hundred meters south of the NE corner, on the eastern side of the islands.

10.2.5 Mitigation measures for the preferred alternative

The mitigation measure for this location would be same as the mitigation measure for the NE corner of the island. However, the breakwater should be stronger and should not be perpendicular to the coast as in the proposed design. Suggested design is shown in Figure 25.

Figure 25: Potential alternative concept design for location (L3)

11 MONITORING

Environmental monitoring is essential to ensure that post-construction and operational impacts are known and eliminated in a timely manner. Dealing with impacts earlier would save money and also help planning and operationalize the process.

The parameters that are most relevant for monitoring the impacts that may arise from the proposed project are included in the monitoring plan. These include sea water (turbidity, sulphate, phosphates, nitrates, faecal coliform and BOD), sediment deposition. Monitoring the shoreline changes that may occur due to the medium to long-term impacts from the changes in coastal processes.

Table 12: Shoreline, Beach Profiles and Coastal Process monitoring schedule

Parameter	Indicators	Baseline / Reference Values	Method / Technique	Frequency	Estimated cost in USD
Shorelines (high / low tides)	Beach morphology	Baseline to be re-established immediately after construction is complete	Differential GPS	Bi-annually in the first two year and yearly thereafter	100/ trip
Beach profiles	Coastal changes	Requires to re-establish the baseline following the construction	Beach profile surveys	Bi-annually in the first two year and yearly thereafter	100 / trip
Currents	Nearshore currents	Baseline to be collected immediately constructions are over, especially on western side	Drogue survey	Bi-annually in the first two year and yearly thereafter	100/trip

Table 13: Coral reef monitoring schedule

Parameter / Method	Frequency of Monitoring	Purpose	Estimated cost (USD)
Benthic cover by major life forms (live, dead, rock rubble, seagrass and sand)	Annually	Indicative of the changes in the live coral cover	150/trip
Fish population / visual census	Annually	To assess broad scale change in the ecological status of the coral reefs (increase / decrease of herbivores, etc)	

Table 14: Sea water quality monitoring schedule

Type	Parameters	Locations	Frequency	Estimated cost (USD)
In situ monitoring / sampling and testing from a laboratory	Dissolved oxygen Turbidity (NTU) Nitrates Sulphates COD TDS	All locations marked	Bi-annually	400/ set of tests

11.1 MONITORING COSTS

It is understood that costs of monitoring be borne by the proponent. It is also understood the mitigation measures would be accommodated in the contract costs. A commitment letter confirming compliance on mitigation measures is given in Annex 4.

11.2 MONITORING REPORT

A detailed environmental monitoring report is required to be compiled and submitted to the Environment Protection Agency annually, based on the data collected for monitoring the parameters included in the monitoring programme given in this report.

The report will include details of the site, strategy of data collection and analysis, quality control measures, sampling frequency and monitoring analysis and details of methodologies and protocols followed.

12 CONCLUSIONS

The environmental impact assessment study for proposed development of artificial beach in GA Villingili shows there are two main activities that would cause significant negative environmental impacts. Those, in order of significance, are:

1. Lagoon dredging, beach nourishment and coastal structures.
2. Impacts of solid waste during the operational phase

Of these a long term impact would be from lagoon dredging and beach nourishment activity to create a beach and deepen the swimming area. Potential erosion/accretion and adjustment of the existing beach to create a new equilibrium with the surrounding environmental conditions are likely to extend to medium to long term. These impacts would be cumulative occurring over long period of time and so can be managed through proper monitoring and addressing them in a timely manner. Based on the scale of dredging and beach nourishment work projects that is taking place in Maldives, impacts associated with the proposed dredging activity is insignificant.

Inadequate methods of solid waste disposal during the operation phase of the artificial beach will generate marine pollution in the surrounding area, which in turn will have detrimental impacts on coral reefs as well as on reef fish populations. Thus, the beach will become aesthetically unattractive and unpleasant, which can tremendously affect the prime use of the beach as a recreational area. These impacts could be managed through adoption of proper garbage management practices such as a permanent staff to look after the beach and placement of adequate number of dustbins and other relevant management measures. However, the positive socio economic impacts from the proposed development outweigh the temporary negative impacts of lagoon dredging.

The study has evaluated alternative locations for the project and found that the extended beach, five hundred meters south of the proposed area would be a more preferable option for the proposed artificial beach development in GA Villingili Island. Based on the similar project activities elsewhere in the Maldives the report found, that the lagoon will recover from the impacts of dredging, reclamation and coastal modifications and will re-establish a new ecological balance soon. Even though there is no very significant impact from this project after the report has come-up with an extensive monitoring programme that will keep on monitoring coastal and marine environmental changes associated with dredging and make necessary adjustment based on the findings of various measured environmental parameters suggested in the monitoring plan.

Therefore, on the basis of this environmental impact assessment study and the impact mitigation measures proposed in the report will be duly implemented and recommendations are given due consideration, it is concluded that the benefits of development of artificial beach and swimming area in the selected location in this study in GA Villingili will substantially outweigh its imposition on the environment.

13 REFERENCES

Bureau of Statistics, Maldives (2014) Preliminary Results, Maldives Census 2014

DHI 1999, Physical modelling on wave disturbance and breakwater stability. Fuvahmulah Port Project, Port Consult, Denmark

DNP (2012) Household income and expenditure report findings 2009/2010

Energy Consultancy Pvt. Ltd (2013) EIA for playground reclamation project for Ga Dhaandhoo by Energy Consultancy Pvt. Ltd, February 2013

EPA (2013) Dredging and Reclamation Regulation, 2013,

Environmental Impact Assessment Development of Tuna Purchasing and storage Facility, GA. Raaverrehaa, North Huvadhu Atoll by Riyaz M. and Shiham M.S. (2015)

EIA for playground reclamation project for Ga Dhaandhoo by Energy Consultancy Pvt. Ltd, February (2013)

Environmental Impact Assessment For Proposed Levelling And Earthworks Of Football Arena In Nadella, South Huvadhu Atoll by Riyaz M. (2016)

Fourth Tourism Master Plan (2013-2017), Ministry of Tourism, Arts and Culture.

Leopold, L. B., F. E. Clarke, B. B. Hanshaw, and J. E. Balsley. 1971. A procedure for evaluating environmental impact. U.S. Geological Survey Circular 645, Washington, D.C

1 ANNEXES

Annex 1: EIA Terms of Reference (ToR) Approved by EPA
Annex 2: Concept Approval from the Ministry of Housing and Infra structure
Annex 3: Minutes of Villingili Council meeting to select the location of the artificial beach
Annex 4: Commitment letter from the proponent
Annex 5: Water test laboratory results
Annex 6: Letter from GA. Atoll Council indicating that they have received the EIA report
Annex 7: Public consultation attendees list
Annex 8: Dredging application

بسم الله الرحمن الرحيم

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Environmental Protection Agency

203-EIARES/407/2016/6

Terms of Reference for Environmental Impact Assessment for Development of an artificial beach at, Ga Villingili North Huvadhu Atoll

The following is the Terms of Reference (ToR) following the scoping meeting held on 14th August 2016, for undertaking the EIA of the proposed artificial beach developmentat *Ga Villingili, North Huvadhu Atoll.* The proponent of this project is Gaafu Alifu Vilingili Council.

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 to the project-Describe the purposed artificial beach development project and, if applicable, the background of the project and the tasks already completed. Clearly identify the rationale and objectives to enable the formulation of alternatives. Define the arrangements required for the environmental assessment and how coordination between other consultants, project engineers, contractors and government institutions will be carried out.

2. Study area - Submit a minimumA3 size scaled plan with indications of the proposed infrastructure. Specify the agreed boundaries of the study area for the environmental impact assessment highlighting the proposed development location, size and important elements of the proposed water supply system. The study area should include adjacent or remote areas, such as relevant developments and nearby environmentally sensitive sites (e.g. coral reef, sea grass, 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 site preparation, construction and decommissioning phases. The following tasks shall be completed:

Task 1. Description of the proposed project – Provide a full description and justification of the relevant parts of the project, using maps at appropriate scales where necessary. The following should be provided (all inputs and outputs related to the proposed activities shall be justified):

The main activities of the proposed development are:

- Dredging of 3895sqm swimming area
- Creation of (1708 sqm) beach area by using dredged material ;
- Coastal protection: construction of 180m long 1-1.5m wide seawall using sand and cement bags to protect the area;
- Development of changing rooms, bathrooms, toilets, and restaurants etc
- Measures to protect environmental values during construction and operation phase;
- Project management (include scheduling and duration of the project and life span of facilities; communication of construction details, progress, target dates, construction/operation/closure of labour

camps, access to site, safety, equipment and material storage, fuel management and emergency plan in case of spills)

Jetties, and lagoon area:

- Justification for the selection of these locations;
- Labour requirements and (local) labour availability;
- Housing of temporary labour, and
- Emergency plan in case of spills (diesel, grease, oil)

The EIA report should investigate possibilities for alternatives:

- Operation and positioning options;
- Alternative locations: have these been considered and if so, give arguments why these alternatives have not been selected, and

Power water, and sewerage :

- Sources of power and water for the facility ;
- Detail solid waste disposal mechanisms, equipment used and periodicity (how often?).

Waste management:

- Materials to be collected and management, waste reduction and recycling;
- Transportation mechanisms and costs;
- Recycling ventures and awareness activities within the community.

Coastal protection works and beach nourishment activities:

- Protection structure size, location, number and type, including oceanographic justification and map;
- Construction materials and function;
- Beach nourishment
- Longevity of protection structures;

Task 2.Description of the environment – Assemble, evaluate and present the environmental baseline study/data regarding the study area and timing of the project(e.g. monsoon season). Identify baseline data gaps and identify studies and the level of detail to be carried out by consultant. Consideration of likely monitoring requirements should be borne in mind during survey planning, so that data collected is suitable for use as a baseline. As such all baseline data must be presented in such a way that they will be usefully applied to future monitoring. The report should outline detailed methodology of data collection utilized.

The baseline data will be collected before construction and from at least two benchmarks. All survey locations shall be referenced with Geographic Positioning System (GPS) including water sampling points, reef transects for posterior data comparison. Information should be divided into the categories shown below:

Climate

- Temperature, rainfall, wind, waves, evaporation rates (including extreme conditions)
- Risk of hurricanes and storm surges;

Geology and geomorphology

- Offshore/coastal geology and geomorphology (use maps);
- Bathymetry (bottom morphology) (use maps);
- (Seasonal) patterns of coastal erosion and accretion (see appendix for monitoring details), and
- Characteristics of seabed sediments to assess direct habitat destruction and turbidity impacts during construction;

Hydrography/hydrodynamics (use maps)

- Tidal ranges and tidal currents;
- Wave climate and wave induced currents;
- Wind induced (seasonal) currents;
- Sea water quality measuring these parameters: temperature, pH, salinity, turbidity, phosphate, nitrate, ammonia, sulphate, total coliforms and faecal coliforms and BOD.

Ecology

- Identify marine protected areas (MPAs) and sensitive sites such as breeding or nursery grounds for protected or endangered species (e.g. coral reefs, spawning fish sites, nurseries for crustaceans or specific sites for marine mammals, sharks and turtles). Include description of commercial species, species with potential to become nuisances or vector.
- Benthic and fish community monitoring around the island (see appendix for monitoring guidelines);
- Landscape integrity, and
- Include ground water monitoring (See appendix for parameter healthy ranges);

Socio-economic environment

- Demography: total population, sex ratio, density, growth and pressure on land and marine resources;
- Income situation and distribution
- Economic activities of both men and women (e.g. fisheries, home gardening, fish processing, employment in industry, government);
- Seasonal changes in activities;
- Land use planning, natural resource use and zoning of activities at sea;
- Accessibility and (public) transport to other island;
- Services quality and accessibility (water supply, waste/water disposal, energy supply, social services like health and education);
- Community needs;
- Sites with historical or cultural interest or sacred places (mosques, graveyard).

Task 3. Legislative and regulatory considerations – Identify the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project, and identify the appropriate authority jurisdictions that will specifically apply to the project. Include permits and approvals in the EIA document.:

Task 4. Potential impacts (environmental and socio-cultural) of proposed project, incl. all stages – The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

Impacts on the natural environment

- Impacts on marine habitats including damages to coral reefs and sea grass communities, fish stocks, protected areas and protected species;
- Changes in erosion/sedimentation patterns, which may impact shore zone configuration/coastal morphology;
- Temporary sediment dispersal in water column (turbidity at the dredging site, beach nourishment areas and related to shore protection activities), possibly resulting in changes in visibility, smothering of coral reefs and benthic communities and affecting fish and shellfish etc.;
- Impacts on landscape integrity/scenery.

Impacts on the socio-economic environment

- Impacts on employment and income, potential for local people to have (temporary or long term) job opportunities (and what kind) in the execution of the works;
- Disturbance to local natural resource users such as fishing areas, other tourism ventures;
- Impacts to nearby industrial establishments;
- Impact equity (economic activities, employment, income);

Construction related hazards and risks

- Pollution of the natural environment (e.g. oil spills, discharge of untreated waste water and solid waste, including construction waste);
- Risk of accidents and pollution on workers and local population.

The methods used to identify the significance of the impacts shall be outlined. One or more of the following methods must be utilized in determining impacts; checklists, matrices, overlays, networks, expert systems and professional judgment. Justification must be provided to the selected methodologies. The report should outline the uncertainties in impact prediction and also outline all positive and negative/short and long-term impacts. Identify impacts that are cumulative and unavoidable.

Task 5. Alternatives to proposed project – Describe alternatives including the *"no action option"*should be presented. Determine the best practical environmental options. Alternatives examined for the proposed project that would achieve the same objective including the "no action alternative". The report should highlight alternative locations and how the proposed location was determined. All alternatives must be compared according to international standards and commonly accepted standards as much as possible. The comparison should yield the preferred alternative for implementation. Mitigation options should be specified for each component of the proposed project.

Task 6.Mitigation and management of negative impacts – Identify possible measures to prevent or reduce significant negative impacts to acceptable levels. These will include both environmental and socio-economic mitigation measures. Mitigation measures to avoid or compensate habitat destruction, e.g. temporal sediment control structures, coastal protection structures to reduce erosion. Measures for both construction and operation phase shall be identified. Cost the mitigation measures, equipment and resources required to implement those measures. The confirmation of commitment of the developer to implement the proposed mitigation measures shall also be included. In cases where impacts are unavoidable arrangements to compensate for the environmental effect shall be given.

Task 7. Development of monitoring plan– Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan for coastal modification, beach morphology, sediment movement around the island. Ecological monitoring will be submitted to the EPA to evaluate the damages during construction, after project completion and every three months thereafter, up to one year and then on a yearly basis for five years after. The baseline study described in task 2 of section 2 of this document is required for data comparison. Detail of the monitoring program including the physical and biological parameters for monitoring, cost commitment from responsible person to conduct monitoring in the form of a commitment letter, detailed reporting scheduling, costs and methods of undertaking the monitoring program must be provided.

- Water quality, especially turbidity;
- Erosion and accretion changes;
- Temporal sedimentation rates on nearby coral reefs, benthic system and seagrass beds;
- Condition of the sensitive ecosystems and marine resources;
- Environmentally sound removal of dredging and other equipment including construction materials, and
- Employment of available local labour force.

Task 8. Stakeholder consultation, Inter-Agency coordination and public/NGO participation) – Identify appropriate mechanisms for providing information on the development proposal and its progress to all stakeholders, government authorities such as Ministry Environment and Energy, ministry of Housing and Infrastructure, government agencies, engineers/designers, development managers and members of the general public. **The EIA report should include a list of people/groups consulted, their contact details and summary of the major outcomes**.

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, 2012 and subsequent amendments.

Timeframe for submitting the EIA report – The developer must submit the completed EIA report within 8 months from the date of this Term of Reference.

16th August 2016

Environmental Protection Agency
Green Building, 3rd Floor, HandhuvareeHingun
Male', Rep. of Maldives, 20392
Tel: [+960] 333 5949 [+960] 333 5951 : ގުޅުއްވުން
Fax: [+960] 333 5953 : ފެކްސް
Email: secretariat@epa.gov.mv : ޕޯޓަލް
Website: www.epa.gov.mv : ވެބްސައިޓް

ތަރުގަބުދާއި ވާތావරණ ކަންކަން ބަލާ ތަނ
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ދަގު، ދިވެހިރާއްޖެ، 20392

Annex-2 Annex 2: Concept Approval from the Ministry of Housing and Infra structure

[illegible] - [illegible]

VISIT MALDIVES YEAR

Ministry of Housing and Infrastructure
Male', Republic of Maldives.

މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ
މާލެ، ދިވެހިރާއްޖެ.

ނަންބަރު: 138-PS1/407/2016/13

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ތިސިޓީގައި ހަވާލާދީފައިވާ ސިޓީއިން އެދިވަޑައިގެންފައިވާ [illegible] ގއ. ވިލިނގިލީ [illegible] [illegible] ސަރަހައްދުގެ [illegible] [illegible] [illegible] [illegible] [illegible] ސަރަހައްދު [illegible]، [illegible] [illegible] [illegible] މި ސިޓީއާއެކު ފޮނުވީމެވެ. އަދި ދަންނަވަމެވެ. މިސަރަހައްދުގެ [illegible] އެއްވެސް ބަދަލެއް ގެންނަވާނަމަ، ގެންނަވަންވާނީ މި މިނިސްޓްރީގެ ހުއްދައާއެކުގައި ދަންނަވަމެވެ.

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23 ޖޫން 2016 މ.

ޚާދިމުކުމް

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މިނިސްޓަރ އޮފް ސްޓޭޓް

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ގއ. ވިލިނގިލި
ދިވެހިރާއްޖެ

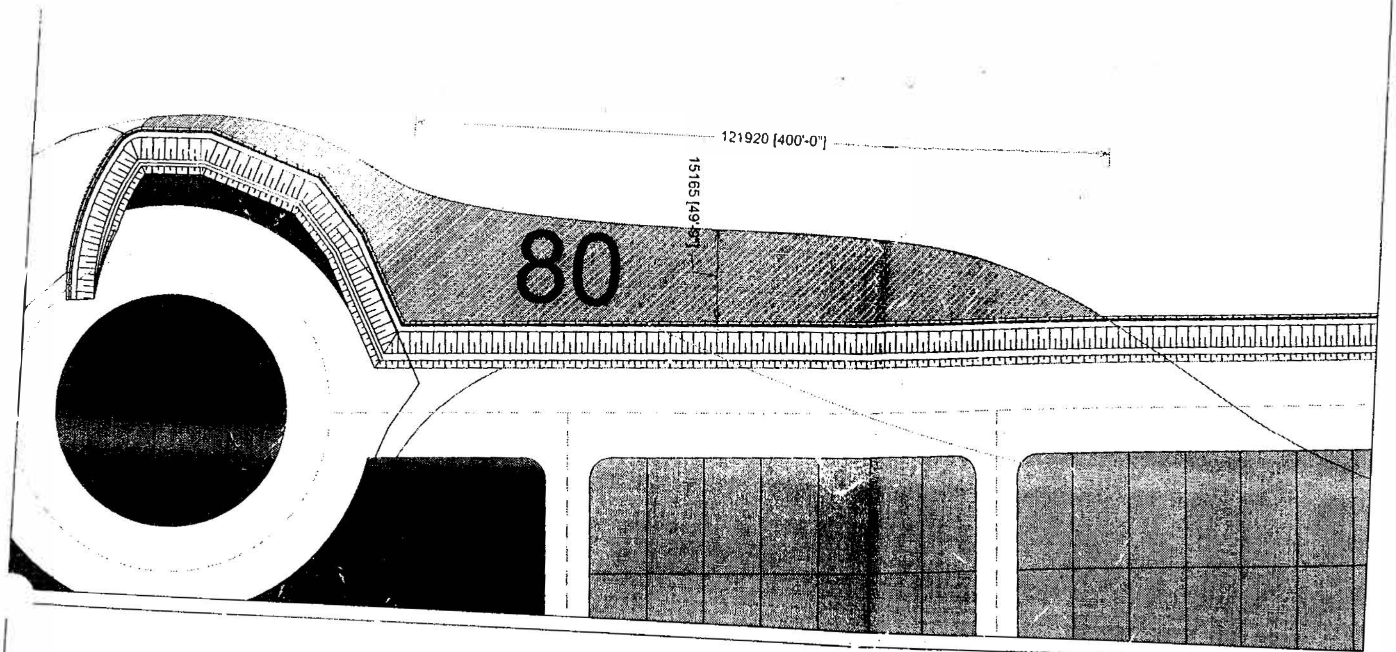
ކޮޕީ: ހުވަދުއަތޮޅު އުތުރުބުރީ އަތޮޅު ކައުންސިލްގެ ރައީސާ

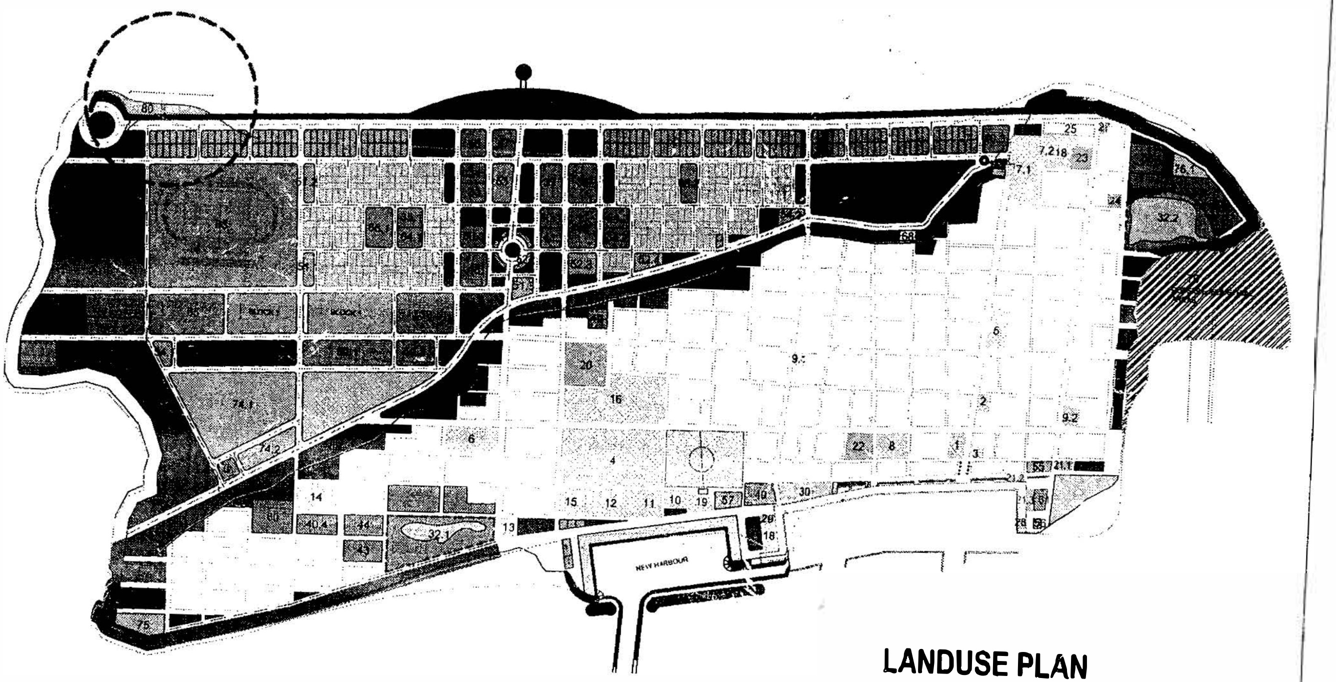
789 0307

RECLAMATION AREA: 413,250 sq.m
41.32 ha

GA. VILINGILI

138_PS1/407/2016/13





LANDUSE PLAN

GA. VILINGILI

LEGEND

EXISTING LAND USE

- EXISTING RESIDENTIAL AREA
- INSTITUTIONAL & COMMUNITY FACILITIES
  - 5 Airolnuge
  - 6 Town Hall
  - 7.1-7.2 Atoll Hospital
  - 8 Friday Mosque
  - 9.1-9.2 Neighborhood Mosque
  - 10 Bank of Maldives
  - 11 Media Centre
  - 12 Customs
  - 13 Family & Children Service Centre
  - 14 Police Station
  - 15 Women's Centre
  - 16 Youth & Sports Centre
  - 17 Ferry Terminal
  - 18 Shelters for IDP
  - 19 Office of the Stadium
- UTILITY AND MUNICIPAL SERVICES
  - 20 Power House
  - 21.1-21.3 Oil Storage
  - 22 Cemetery
  - 23 Dhiraagu Site
  - 24 Wataniya Site
  - 25 Desalination Plant
  - 26 Existing Waste Management Unit (to be relocated to 62)
  - 27 Pump Station
- COMMERCIAL USES
  - 28 Fish Market
  - 29 Cafe'
  - 30 STO Trade Centre
- CONSERVED MARSHY AREAS
  - 32.1 Kaaraan ... (Kulhi)
  - 32.2 Hal Dhandu
- EXISTING SPORTS & RECREATION
- EXISTING HARBOUR BASIN

PROPOSED LAND USE

- HIGH-END APARTMENTS FOR SALE
- PROPOSED SITES FOR HOUSING UNITS
- PROPOSED RESIDENTIAL ZONE
- PROPOSED INSTITUTIONAL & COMMUNITY FACILITIES
  - 33 Island Court
  - 34 High Level Courts
  - 35.1 - 35.2 Pre-School
  - 36 Primary School
  - 37 Secondary School
  - 38 Collage Campus
  - 39 Grand Mosque
  - 40.1-40.4 Neighborhood Mosque
  - 41 Post office
  - 42 Cultural/ Heritage Centre
  - 43 Cost Guard/MNDF
  - 44 Fire Station
  - 45 Atoll Committee
  - 46 Disaster Management Centre
  - 47 Fishermen's Memorial Centre
  - 48 Office Complex
  - 49 Guest House
  - 50.1 - 50.3 Reserved for future institutional uses
- PROPOSED COMMERCIAL ZONE
  - 51.1 - 51.3 Neighborhood shops cafe' / restaurant / bakery
  - 51.4 Pharmacy and other Commercial use
  - 51.5 Cafe-Restaurant
  - 52.1 - 52.6 Mixed commercial area
  - 53 Shopping Centre
  - 54.1-54.2 Petrol Shed
  - 54.3 Oil Storage (fenaka)
  - 54.4 Oil Storage (others)
  - 55 Local Market
  - 56 Ice Plant
  - 57 Kulee Bin
- PROPOSED UTILITY & MUNICIPAL ZONE
  - 58 Power house
  - 59 Desalination plant
  - 60 Cemetery
  - 61 Utility Fuel Storage
  - 62 Waste Management Center
  - 78 PSM Digital TV transmitting station
  - 79 MRDC plot
- SPORTS & RECREATION ZONE
  - 63 Football stadium
  - 64.1 - 64.2 ...
  - 65 Indoor Sports Stadiums
  - 66.1-66.2 Sports Facilities/Games
- OPEN/GREEN BUFFER AREAS
  - Parking Areas
  - Marshy areas
  - 68 ...
  - 69 Tsunami Monument
  - 70 Vilingili Gate
  - 71 Vilingili Tower
  - 72 Vilingili Lighthouse
  - 73 Urban Green Space (Park & Jogging Tracks)
- 80 ARTIFICIAL BEACH
- AGRICULTURAL LAND
  - 76 Agricultural lease land
- ENVIRONMENTAL PROTECTION ZONE (EPZ)
- LIGHT INDUSTRIAL ZONE
  - 74.1-74.2 Light Industries
  - 75 Boat repair & Slipway
- TOURISM RELATED
  - 76.1 Tourism Development
- MIXED USE ZONE
  - 67 Mixed use / Community centre
- RESERVED FOR FUTURE USE

SCALE 1: 5,000

LINE TYPE ROAD HIERARCHY

- 15m ROAD
- 12m ROAD
- 10m ROAD
- ... ROAD
- PEDESTRIAN ACCESS

MINISTRY OF HOUSING AND INFRASTRUCTURE	TITLE: PROPOSED ARTIFICIAL BEACH	PROJECT: GA.VILLINGILI LAND USE PLAN	DRAWN BY: FRAGNAA / CHECKED BY: ZSHIN	DRAWING NO: 1 OF 1 / SCALE: / DATE: 20 JUNE 2010

Annex 3: Minutes of Villingili Council Meeting to select the location of the artificial beach

بسم الله الرحمن الرحيم

Secretariat of the Villingili Council
North Huvadhu Atoll
GA. Vilingili , Republic of Maldives

ހުވަދުއަތޮޅު އުތުރުބުރީ ވިލިނގިލި
ކައުންސިލްގެ އިދާރާ
ވިލިނގިލި، ދިވެހިރާއްޖެ

ހުވަދުއަތޮޅު އުތުރުބުރީ ވިލިނގިލި ކައުންސިލްގެ 2016 ވަނަ އަހަރުގެ 07 ވަނަ ޢާންމު

ޖަލްސާ އިން ނިންމުނު ކަންތައްތައް

16 ޖެނުއަރީ 2016 / 12.15 – 10:10

1. ކައުންސިލް އިދާރާގެ ސެކްޝަންތަކުން ހުށަހަޅާ ހުށަހެޅުންތަކާއި ގުޅޭ މަޝްވަރާކުރުން.

1.1 މި އިދާރާގެ އިންޖިނިއަރިންގ ޑިވެލޮޕްމަންޓް ސެކްޝަނުން ހުށަހަޅުއްވާފައިވާ ގެސްޓްހައުސް ވިއްލާރި އުސްކުރުން ޕްރޮޖެކްޓާއި ބެހޭ ގޮތުން މަޝްވަރާކުރުމަށްފަހު ގޮތެއް ނިންމުން.

އެޖެންޑާ އައިޓަމް 1.1 ގައި އޮތް ހުށަހެޅުމާއި ބެހޭގޮތުން މެމްބަރުންގެ ތެރޭގައި މަޝްވަރާކުރުމަށްފަހު ވިލިނގިލި ބީޗް ފަޅު އެރިޔާގައި މި ކަން ކުރުމަށް ހުށަހެޅުއްވުމުން ތާއީދު ކުރެއްވުމުން ރައީސް ކުރެއްވުމުން އަމަލުކުރަންޖެހޭ ކަންތައްތައް ރާވައި ހުށަހަޅަން އިދާރާއަށް ހަވާލުކުރުމަށް ބައިވެރިވި މެމްބަރުންގެ އިއްތިފާޤުން ވަނީ ފާސްވެފައެވެ.

1.2 : މި އިދާރާގެ އިންޖިނިއަރިންގ ސެކްޝަނުން ހުށަހަޅުއްވާފައިވާ ވިލިނގިލި އިކޮނޮމިކް ޒޯނުގެ ހިމާޔަތްކުރުމުގެ އުސޫލު ހަދާ ފައިދާ ދެވޭނެ ގޮތަކަށް ބެލުމުގެ ހުށަހެޅުމާއި ބެހޭ ގޮތުން މަޝްވަރާކުރުމަށްފަހު ގޮތެއް ނިންމުން.

އެޖެންޑާ އައިޓަމް 1.2 ގައި އޮތް ހުށަހެޅުމާއި ބެހޭގޮތުން މެމްބަރުންގެ ތެރޭގައި މަޝްވަރާކުރުމަށްފަހު ހިމާޔަތް ކުރުމުގެ އުސޫލު ފަރާތްތަކުގެ ދާއިރާގެ ބެލުން ހިމަނައިގެން ތައްޔާރުކުރުމަށް ހުށަހަޅާ ރައީސް ކުރެއްވުމުން ތާއީދު ކުރެއްވުމުން ހުށަހަޅާ ކަމަށް އެންމެ ރަނގަޅުކަމުގެ ގޮތުން ބައިވެރިވި މެމްބަރުންގެ އިއްތިފާޤުން ވަނީ ފާސްވެފައެވެ.

2 . ސެކްރެޓަރީގެ އިދާރާ ތަރަފުން ހުށަހަޅާ ހުށަހެޅުންތަކާއި ގުޅޭ މަޝްވަރާކުރުން.

ފުރަތަމަ ކޮޕީ ރައިޓަރު ނަންބަރު: FNK/GAV/MISC/16/01 ސިޓީއިން ހުށަހަޅާފައިވާ ނަރުދަމާ ނިޒާމުގެ މަސައްކަތާއި ބެހޭގޮތުން މަޝްވަރާކުރުމަށްފަހު ގޮތެއް ނިންމުން.

އެޖެންޑާ އައިޓަމް 2.1 ގައި އޮތް ހުށަހެޅުމާއި ބެހޭގޮތުން މެމްބަރުންގެ ތެރޭގައި މަޝްވަރާކުރުމަށްފަހު ވިސްނާ ބަލައި ރިޕޯޓެއް ތައްޔާރުކުރުމަށް މެމްބަރުންގެ އިއްތިފާޤުން ވަނީ ފާސްކޮށްފައެވެ.

އެޖެންޑާ އައިޓަމް 3: އަމިއްލަ ފަރާތްތަކުން ހުށަހަޅާ ހުށަހެޅުންތަކާއި ގުޅޭ މަޝްވަރާކުރުން.

އެޖެންޑާ އައިޓަމް 3 އާއި ގުޅިގެން އެއްވެސް ހުށަހެޅުމެއް ލިބިފައިނުވާތީ ރިޔާސަތުން ވަނީ މި އައިޓަމް ދޫކޮށްލައްވާފައެވެ.

އެޖެންޑާ އައިޓަމް 4. ކައުންސިލަރުން ހުށަހަޅާ ދެންނެވުންތަކާއިމެދު މަޝްވަރާކުރުމަށްފަހު ފާސްކުރުން.

އެޖެންޑާ އައިޓަމް 4 އާއި ގުޅިގެން އެއްވެސް ހުށަހެޅުމެއް ލިބިފައިނުވާތީ ރިޔާސަތުން ވަނީ މި އައިޓަމް ދޫކޮށްލައްވާފައެވެ.

އެޖެންޑާ އައިޓަމް 5: ކައުންސިލްގެ 2016 ވަނަ އަހަރުގެ ޖަލްސާގެ ތަޤުވީމު ފާސްކުރުން.

އެޖެންޑާ އައިޓަމް 5 އާއި ގުޅިގެން އެއްވެސް ހުށަހެޅުމެއް ލިބިފައިނުވާތީ ރިޔާސަތުން ވަނީ މި އައިޓަމް ދޫކޮށްލައްވާފައެވެ.

Annex 4: Commitment letter from the proponent

بسم الله الرحمن الرحيم

Secretariat of the Viligili Council
North Huvadhu Atoll
GA. Vilingili,
Republic of Maldives.

ދުވަފަހެއްގެ ތަފާތުކަމުގެ ފުވާލުގެ ކައުންސިލް
ސެކްރެޓަރިއެޓް
ވިލިނގިލީ،

ވިޒިޓް ދިވެހިރާއްޖެ - ސަރުކާރުގެ ތަރައްގީ ތަންތަނުގެ ލިސްޓް

Number: 407/438/2016/17

Mr. Thoriq Ibrahim
The Minister
Ministry of Environment and Energy
Ameenee Magu, Maafannu,
Malé-20392 , Republic of Maldives
06 November 2016

Dear Mr. Ibrahim,

Re: EIA – <u>ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED ARTIFICIAL BEACH IN GA VILLINGILI, NORTH HUVADHU ATOLL</u>

As the proponent responsible for environmental compliance for the above project, I hereby give our financial commitment to implement the monitoring plan, undertake the mitigation measures recommended and to comply with the issues identified in the Environmental Impact Assessment Report submitted to your agency.

Yours sincerely,

Secretariat of Villingili Council GA.Vilingili, Republic of Maldives

Fathuhee mōosa
Villingili council member

ގެ.އަ. ވިލިނގިލީ،
ދިވެހިރާއްޖެ

ވެލްކަމ് ކުރަންވީ ކަން ދަންނަވަމެވ.

ވ.އަ.ވ.ން ދިގުވާ ދިމާކޮށްދިނުމުގެ ތަކެއް

- ދިގުވާގެ ނަން: Environmental Impact Assessment for Proposed Artificial Beach In GA·Villingili North Huvadhu Atoll
- ލަފާދީ ފަރާތް: ގެ.އަ. ވިލިނގިލީ ތާރާ
- ދަށްދުން: ގެ.އަ. ވިލިނގިލީ ތާރާ
- ލިބިގެންދާ ފަރާތް: ގެ.އަ.ވ.ގެ ވިލިނގިލީ ތާރާ
- ތާރީޚް: 02 ފެब്രുവަރി 2016 ގަޑި: 09·30

- ސޮއި:
- ސީލް:

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
FEN Building 5th Floor, Machangoalhi, Ameeneemagu, Male', Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

Annex 5: Water test laboratory results

WATER QUALITY TEST REPORT

Test Report No: 301226/2016/06

Customer Informations : *Mr. Mahmood Riyaz*
H. Hithifaiy,
Hithah Finivaa magu,
Male'
Rep.of Maldives

Date: 17/10/20

Sample Description / Location~	GA. Villingili NE end	TEST METHOD	UNI
Sample Type~	Sea water		
Sampled Date~	10/10/2016		
Sample Received Date	13/10/2016		
Test Requisition Form No.	900166732		
Sample No.	827611		
Date of Analysis	13/10/2016 -16/10/2016		
PARAMETER	**ANALYSIS RESULT**		
Physical Appearance	Clear with particles	Visual	
pH	8.19	Method 4500-H+ B. (adapted from Standard methods for the examintation of water and waste water, 22nd edition)	
Hardness, Calcium	1470	HACH Method 8204	mg
Salinity	35.14	Method 2520 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	‰
Temperature	19.8	Electrometry	°
Total Dissolved Solids	26700	Electrometry	mg
Total Suspended Solids	17	Method 8006 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg
Turbidity	0.894	HACH Nephelometric Method (adapted from HACH 2100N Turbidimeter User Manual)	N

Keys:
‰: Parts Per Thousand, °C: Degree Celcius, mg/L: Milligram Per Liter, NTU: Nephelometric Turbidity Unit
LoQ: Limit of Quantification

Checked by:	Approved by:
Afnan Farooq Laboratory Executive	Mohamed Eyman Senior Technical Officer

Notes:
Sampling Authority: Sampling was not done by MWSC Laboratory
This report shall not be reproduced except in full, without written approval of MWSC
This test report is ONLY FOR THE SAMPLES TESTED.
~ Information Supplied by the customer

**********END OF THE REPORT**********

WQA/I

Annex 7: Public consultation attendees list

[illegible]

9.00

25/9/2016

#	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	
3	[illegible]	[illegible]	
4	[illegible]	[illegible]	25/9/16
5	[illegible]	[illegible]	25/9/16
6	[illegible]	[illegible]	25/9/16
7	[illegible]	[illegible]	25/09
8	[illegible]	[illegible]	25/9/16
9	[illegible]	[illegible]	25/9/16
10	[illegible]	[illegible]	25/9/16
11	[illegible]	[illegible]	25/9/16
12	[illegible]	[illegible]	〃
13	[illegible]	[illegible]	25/9/2016
14	[illegible]	[illegible]	25/9/16
15	[illegible]	[illegible]	
16	[illegible]	[illegible]	25/9/16
17	[illegible]	[illegible]	
18	[illegible]	[illegible]	
19	[illegible]	[illegible]	25/9/2016
20	[illegible]	[illegible]	
21	[illegible]	[illegible]	
22	[illegible]	[illegible]	25/9/16

بسم الله الرحمن الرحيم

Ministry of Environment and Energy
ފަރުވާތަކެއް ދިނުމުގެ ކުރިން ތަކެތި ބަލައި ބަލައި ބަލައި ބަލައި

Environmental Protection Agency
ބަލައި ބަލައި ބަލައި ބަލައި ބަލައި

ތަކެތި ބަލައި ބަލައި ބަލައި ބަލައި ބަލައި ބަލައި ބަލައި ބަލައި

* ސ.ފ.ބ.ބ. "ބ.ބ.ބ." ބ.ބ.ބ. ބ.ބ.ބ. ..... ބ.ބ.ބ.:
* ބ.ބ.ބ. 3 ބ.ބ.ބ. 2 ބ.ބ. ..... (ބ.ބ.ބ.)
* ....

1 ބ.ބ.ބ. | ....

ބ.ބ.ބ.: ....
(..... ....) ....

ބ.ބ.ބ.: .....

ބ.ބ.ބ.: ....: ....

ބ.ބ.ބ.: info·villingilicouncil@gmail·com ....): -----

ބ.ބ.ބ.: 6820027 ..... 6824680 .....:

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..... 3859 .... 1708 .... 182 ....

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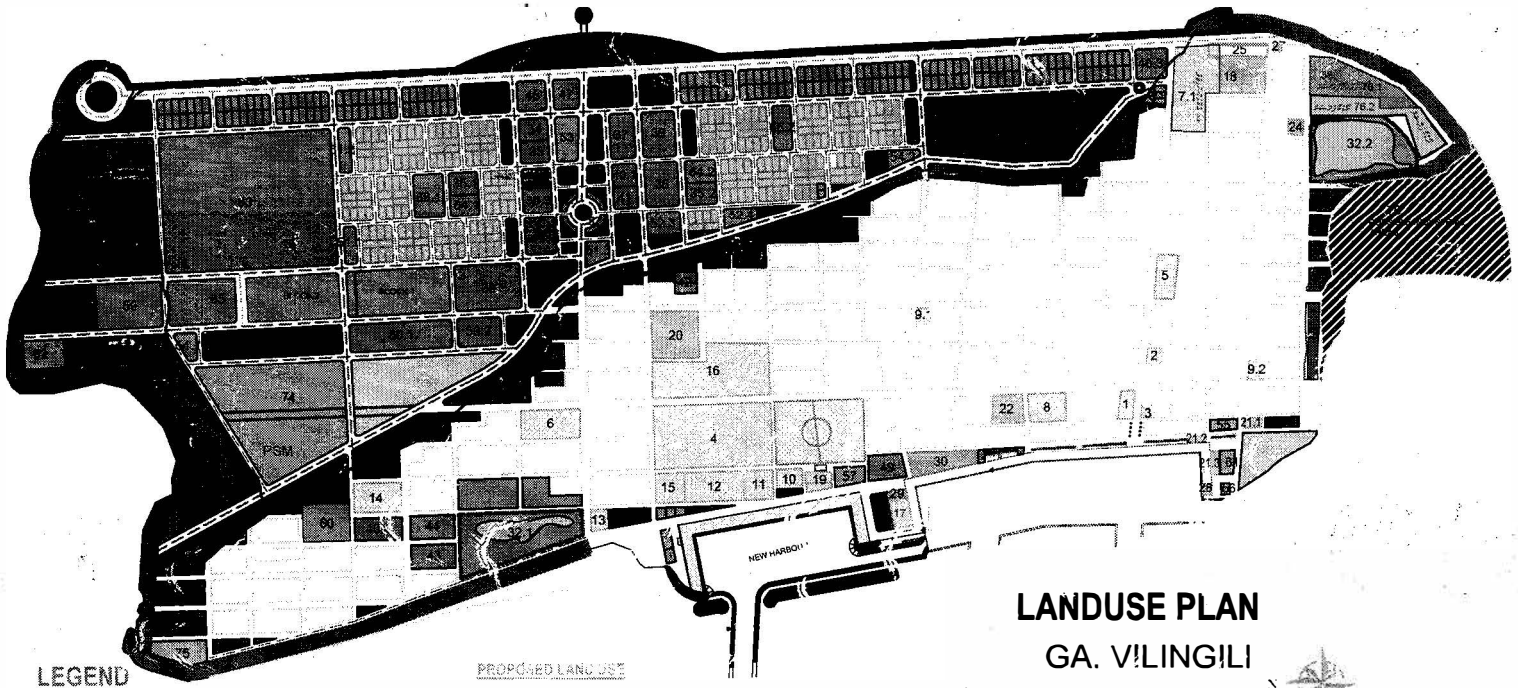
FINALISED

LANDUSE PLAN

GA. VILINGILI



LEGEND

EXISTING LAND USE

- EXISTING RESIDENTIAL AREA
- INSTITUTIONAL & COMMUNITY FACILITIES
  - 1 Atoll Office
  - 2 Island Office
  - 3 Island Court
  - 4 Atoll Education Centre
  - 5 Atholhuge
  - 6 Town Hall
  - 7.1-7.2 Atoll Hospital
  - 8 Friday Mosque
  - 9.1-9.2 Neighborhood Mosque
  - 10 Bank of Maldives
  - 11 Media Centre
  - 12 Customs
  - 13 Family & Children Service Centre
  - 14 Police Station
  - 15 Women's Centre
  - 16 Youth & Sports Centre
  - 17 Ferry Terminal
  - 18 Shelters for IDP
  - 19 Office of the Stadium
- UTILITY AND MUNICIPAL SERVICES
  - 20 Power House
  - 21.1-21.3 Oil Storage
  - 22 Cemetery
  - 23 Dhiraagu Site
  - 24 Watamiya Site
  - 25 Desalination Plant
  - 26 Existing Waste management Units (to be relocated to 62)
  - 27 Pump Station
- COMMERCIAL USES
  - 28 Fish Market
  - 29 Cafe'
  - 30 STO Trade Centre
- CONSERVED MARSHY AREAS
  - 32.1 Koaraadaa (Kulhi)
  - 32.2 Hai Dhandu
- EXISTING SPORTS & RECREATION
- EXISTING HARBOUR BASIN

PROPOSED LAND USE

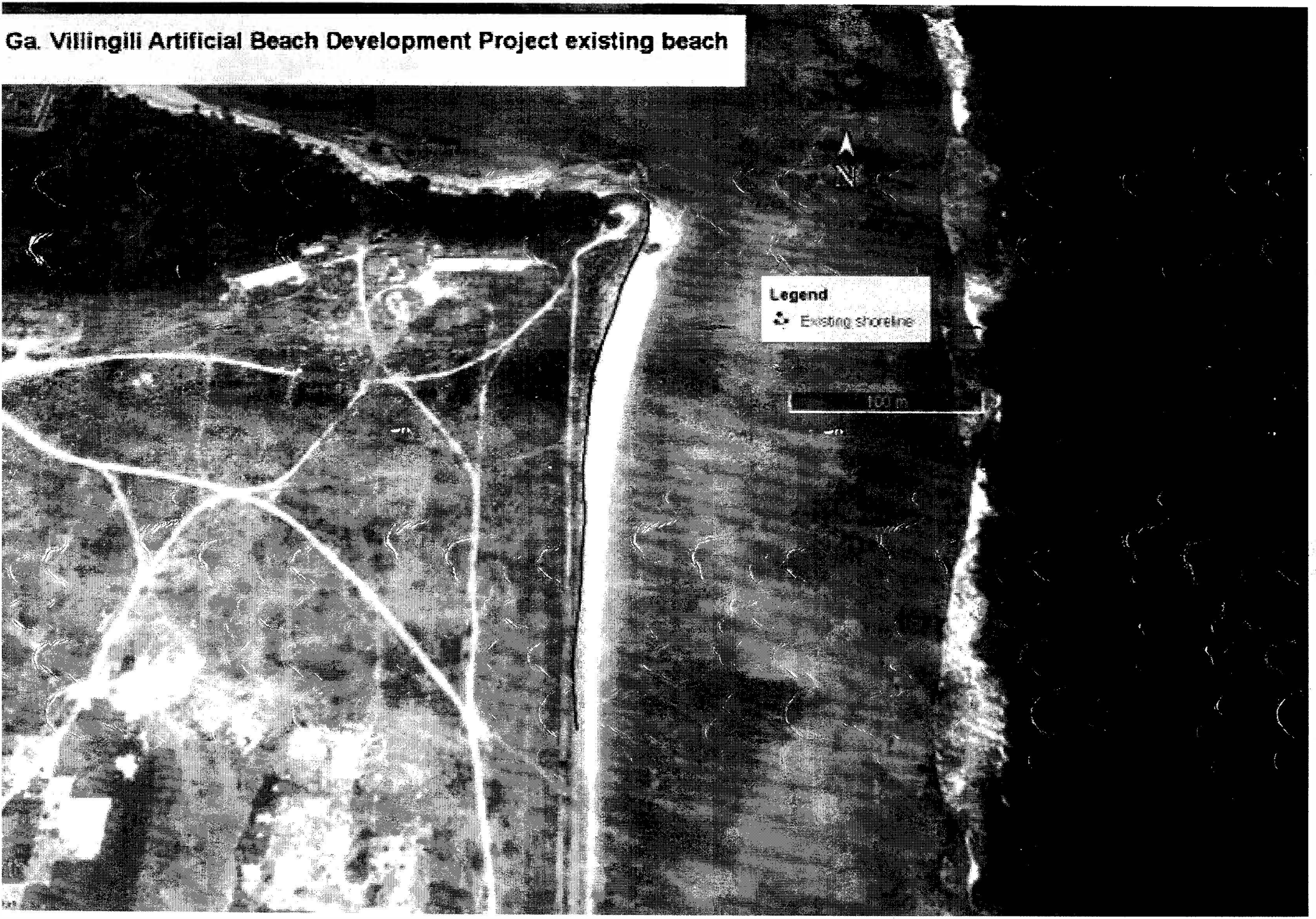
- HIGH END APARTMENTS FOR SALE
- PROPOSED SITES FOR HOUSING UNITS
- PROPOSED RESIDENTIAL ZONE
- PROPOSED INSTITUTIONAL & COMMUNITY FACILITIES
  - 33 Island Court
  - 34 High Level Courts
  - 35.1 - 35.2 Pre-School
  - 36 Primary School
  - 37 Secondary School
  - 38 Collage Campus
  - 39 Grand Mosque
  - 40.1-40.4 Neighborhood Mosque
  - 41 Fostoffice
  - 42 Cultural/ Heritage Centre
  - 43 Coast Guard/MNDF
  - 44 Fire Station
  - 45 Atoll Committee
  - 46 Disaster Management Centre
  - 47 Fishermen's Memorial Centre
  - 48 Office Complex
  - 49 Guest House
  - 50.1 - 50.3 Reserved for future Institutional uses
- PROPOSED COMMERCIAL ZONE
  - 51.1 - 51.3 Neighborhood shops / cafe' / restaurant/ bakery
  - 51.4 Pharmacy and other Commercial use
  - 51.5 Cafe/Restaurant
  - 52.1 - 52.6 Mixed commercial area
  - 53 Shopping Centre
  - 54.1-54.2 Petrol Shed
  - 54.3 Oil Storage (fenaka)
  - 54.4 Oil Storage (others)
  - 55 Local Market
  - 56 Ice Plant
  - 57 Kutee Bin
- PROPOSED UTILITY & MUNICIPAL ZONE
  - 58 Powerhouse
  - 59 Desalination plant
  - 60 Cemetery
  - 61 Utility Fuel Storage
  - 62 Waste Management Centre
- SPORTS & RECREATION ZONE
  - 63 Footballstadium
  - 64.1 - 64.2 Safe play areas
  - 65 Indoor Sports Stadiums
  - 66.1-66.2 Sports Facilities/Games
- OPEN/GREEN BUFFER AREAS
  - Parking Areas
  - Marshy areas
  - 68 Flood Control area
  - 69 Tsunami Monument
  - 70 Villingili Gate
  - 71 Villingili Tower
  - 72 Villingili Lighthouse
  - 73 Urban Green Space (Park & Jogging Tracks)
- AGRICULTURAL LAND
  - 76 Agriculturalleasehold
- ENVIRONMENTAL PROTECTION ZONE (EPZ)
- LIGHT INDUSTRIAL ZONE
  - 74 Light Industries
  - 75 Boat repair & Slipway
- TOURISM RELATED
  - 76.1-76.2 Tourism Development
- MIXED USE ZONE
  - 67 Mixed use / Community centre
- RESERVED FOR FUTURE USE

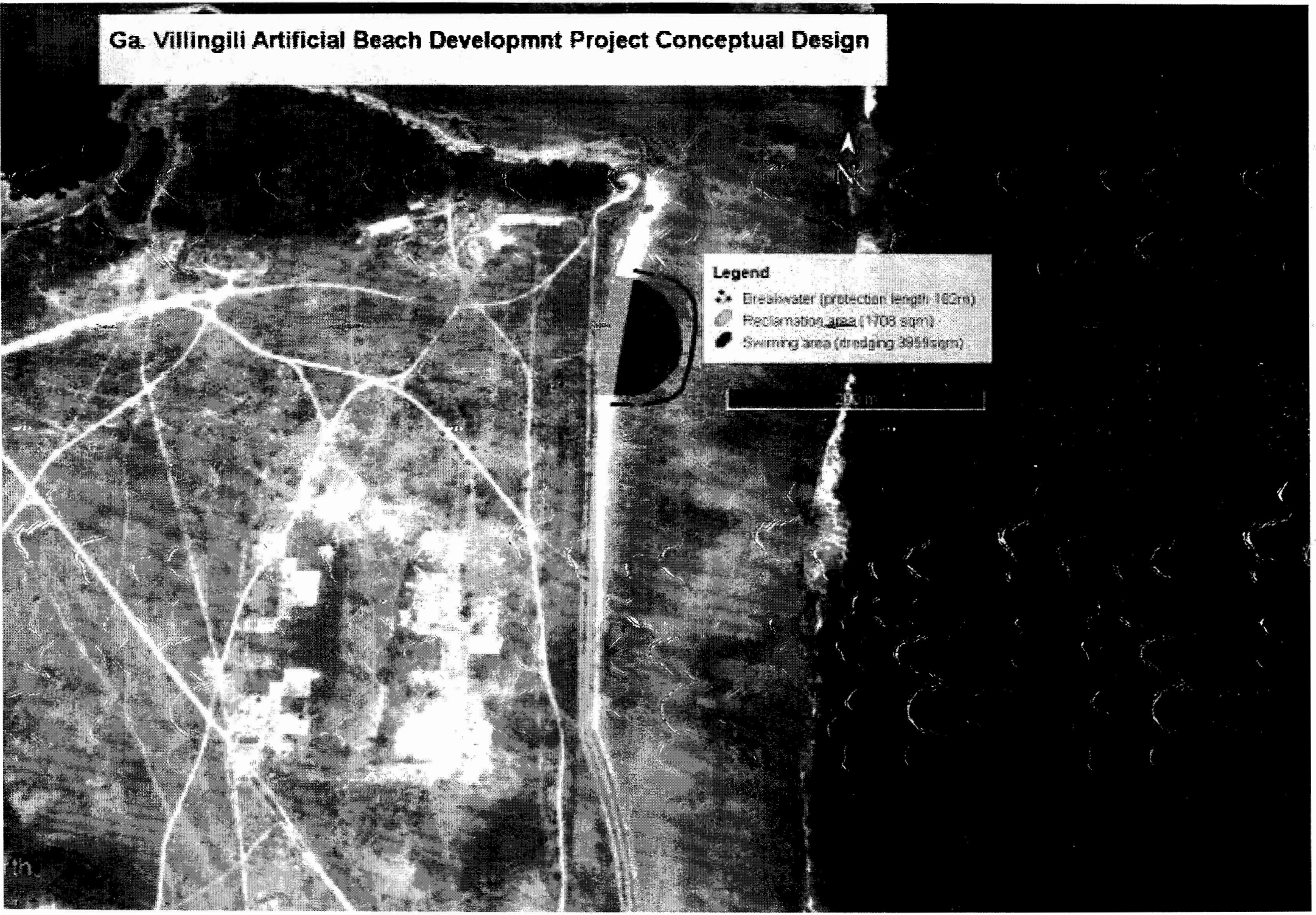
LINE TYPE ROAD HIERARCHY

- 15m ROAD
- 12m ROAD
- 10m ROAD
- 7.5m ROAD
- PEDESTRIAN ACCESS

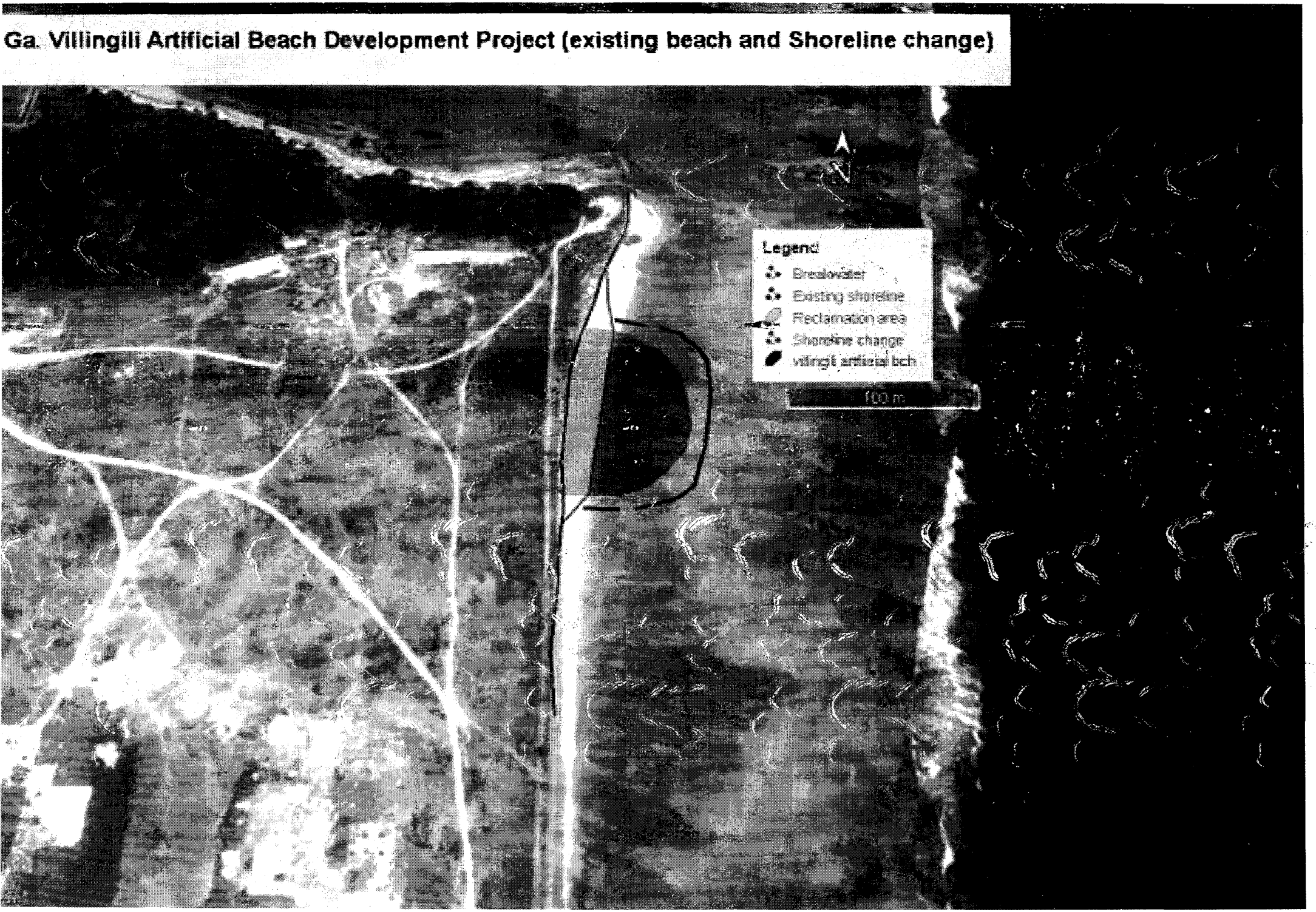
MINISTRY OF HOUSING AND ENVIRONMENT AMEENEE MAGU, MALE' 20392, REPUBLIC OF MALDIVES. TELEPHONE: 3004300 FAX: 3004301 E-MAIL: planning@housing.gov.mv	TITLE: PROPOSED LAND USE PLAN	PROJECT GA. VILLINGILI LAND USE PLAN	DRAWN BY: NAA CHECKED BY: ZS DRAWING NO: 1 OF 1 SCALE: DATE: 24 Mar 2014

Ga. Villingili Artificial Beach Development Project existing beach




Ga. Villingili Artificial Beach Developmnt Project Conceptual Design
Legend
Breakwater (protection length 162m)
Reclamation area (1705 sqm)
Swimming area (dredging 3951sqm)

Ga. Villingili Artificial Beach Development Project (existing beach and Shoreline change)



بسم الله الرحمن الرحيم

Ministry of Housing and Infrastructure

Male', Republic of Maldives.

މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ

މާލެ، ދިވެހިރާއްޖެ.

ނަންބަރު: 138-PS1/407/2016/13

ހުވަދުއަތޮޅު އުތުރުބުރީ ވިލިނގިލީ ކައުންސިލްގެ ރައީސް އަލްފާޟިލް ނިޔާޒް ނިޒާރު

ފުރަތަމަ ސަލާމަށްފަހު ހުށަހަޅަމެވެ.

ތިޔަ ކައުންސިލްގެ ނަންބަރު 407/138/2016/19 (12 މެއި 2016) ސިޓީއާ ހަވާލާދީ ދަންނަވަމެވެ.

މިގޮތުން ހަވާލާދީފައިވާ ސިޓީއިން އެދިވަޑައިގެންފައިވާ ފަދައިން ގއ. ވިލިނގިލި ދިގުހެރާ ފަޅުތެރޭގެ ހިއްކި ސަރަހައްދުގެ ޒޯނިންގ ޕްލޭނާއި، އާބާދީ ސެކްޓަރ ތަރައްޤީކުރުން ސަރަހައްދު ކުރިއަށްގެންދިއުމަށް، ބަޔާންކުރާ ތަފްސީލު ދިރާސާކުރުމަށް މި ސިޓީއާއި ހަމައަށް ފޮނުއްވުން އެދި ދަންނަވަމެވެ. އަދި ދަންނަވަމެވެ. މިސަރަހައްދުގެ ... ގެންނަވަމުންނެވި، މި މިނިސްޓްރީގެ ހައުސިންގ ޑިޕާޓްމަންޓާއި ދަންނަވަމެވެ.

އިޚްލާޞްތެރި ޚިދުމަތުގައި ހުރީމެވެ.

18 ޝަޢުބާން 1437 ހ.

23 މެއި 2016 މ.

ޚާދިމުކުމް

[illegible]

މިނިސްޓަރ އޮފް ސްޓޭޓް

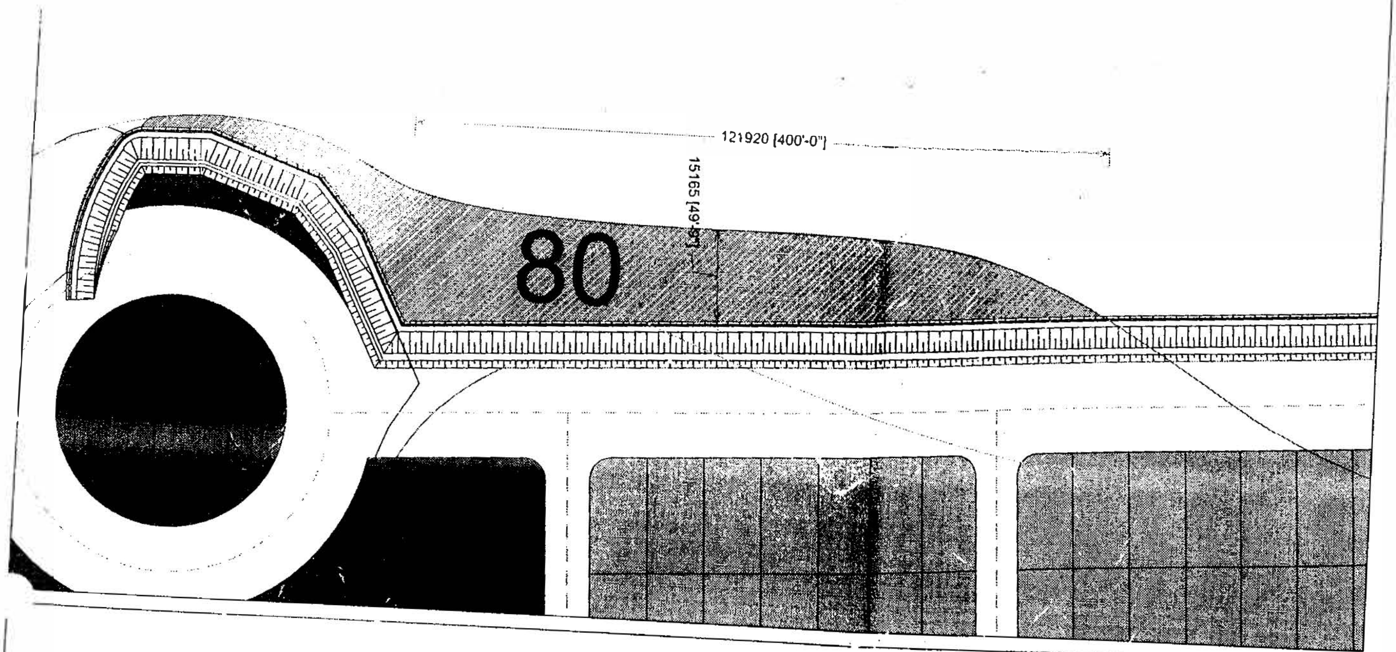
ހުވަދުއަތޮޅު އުތުރުބުރީ ވިލިނގިލީ ކައުންސިލްގެ އިދާރާ

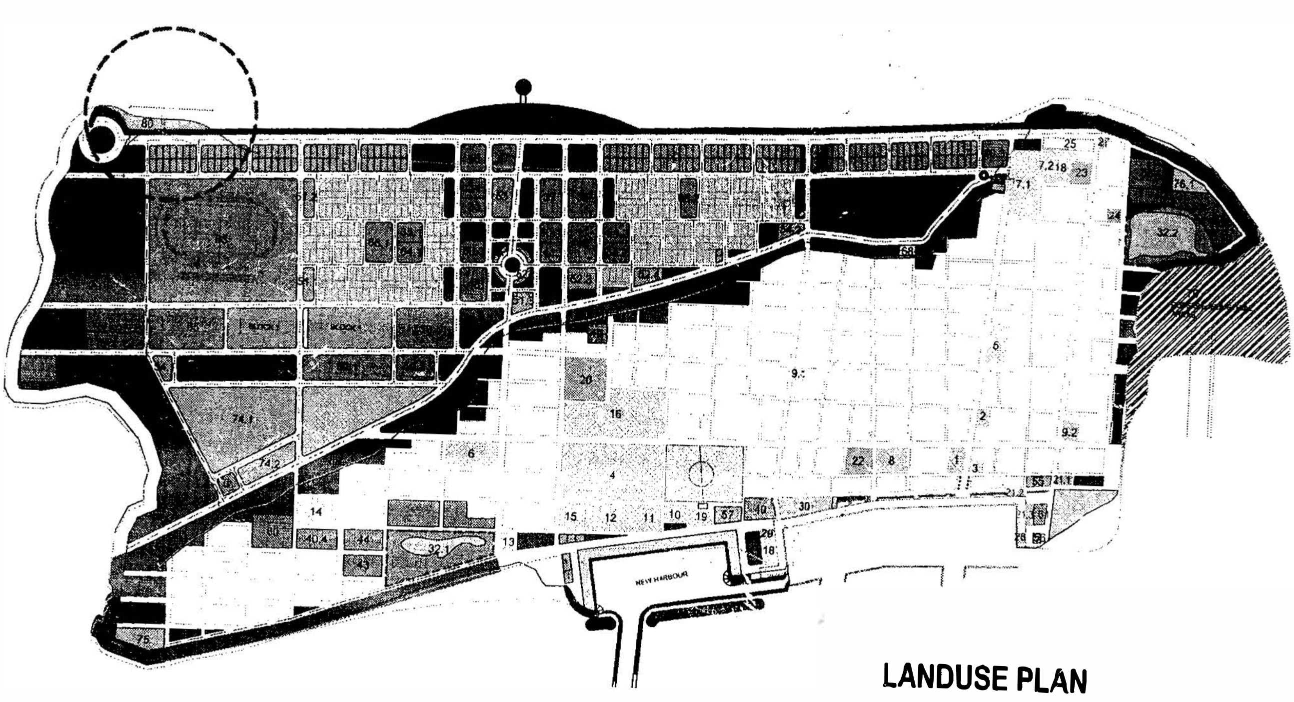
ގއ. ވިލިނގިލި

ދިވެހިރާއްޖެ

ކޮޕީ: ހުވަދުއަތޮޅު އުތުރުބުރީ ކައުންސިލްގެ އިދާރާ

138 PS1/407/2016/13





LANDUSE PLAN

GA. VILINGILI

LEGEND

EXISTING LAND USE

- EXISTING RESIDENTIAL AREA
- INSTITUTIONAL & COMMUNITY FACILITIES
  - 5 Ambulage
  - 6 Town Hall
  - 7.1-7.2 Atoll Hospital
  - 8 Friday Mosque
  - 9.1-9.2 Neighborhood Mosque
  - 10 Bank of Maldives
  - 11 Media Centre
  - 12 Customs
  - 13 Family & Children Service Centre
  - 14 Police Station
  - 15 Women's Centre
  - 16 Youth & Sports Centre
  - 17 Ferry Terminal
  - 18 Shelters for IDP
  - 19 Office of the Stadium
- UTILITY AND MUNICIPAL SERVICES
  - 20 Power House
  - 21.1-21.3 Oil Storage
  - 22 Cemetery
  - 23 Dhiraagu Site
  - 24 Wataniya Site
  - 25 Desalination Plant
  - 26 Existing Waste Management Units (to be relocated to 62)
  - 27 Pump Station
- COMMERCIAL USES
  - 28 Fish Market
  - 29 Cafe'
  - 30 STO Trade Centre
- CONSERVED MARSHY AREAS
  - 32.1 Kaaraa...
  - 32.2 Hal Dhandu
- EXISTING SPORTS & RECREATION
- EXISTING HARBOUR BASIN

PROPOSED LAND USE

- HIGH-END APARTMENTS FOR SALE
- PROPOSED SITES FOR HOUSING UNITS
- PROPOSED RESIDENTIAL ZONE
- PROPOSED INSTITUTIONAL & COMMUNITY FACILITIES
  - 33 Island Court
  - 34 High Level Courts
  - 35.1 - 35.2 Pre-School
  - 36 Primary School
  - 37 Secondary School
  - 38 Collage Campus
  - 39 Grand Mosque
  - 40.1-40.4 Neighborhood Mosque
  - 41 Post office
  - 42 Cultural/ Heritage Centre
  - 43 Cost Guard/MNDF
  - 44 Fire Station
  - 45 Atoll Committee
  - 46 Disaster Management Centre
  - 47 Fishermen's Memorial Centre
  - 48 Office Complex
  - 49 Guest House
  - 50.1 - 50.3 Reserved for future institutional uses
- PROPOSED COMMERCIAL ZONE
  - 51.1 - 51.3 Neighborhood shops cafe' / restaurant / bakery
  - 51.4 Pharmacy and other Commercial use
  - 51.5 Cafe-Restaurant
  - 52.1 - 52.6 Mixed commercial area
  - 53 Shopping Centre
  - 54.1-54.2 Petrol Shed
  - 54.3 Oil Storage (fenaka)
  - 54.4 Oil Storage (others)
  - 55 Local Market
  - 56 Ice Plant
  - 57 Kulee Bin
- PROPOSED UTILITY & MUNICIPAL ZONE
  - 58 Power house
  - 59 Desalination plant
  - 60 Cemetery
  - 61 Utility Fuel Storage
  - 62 Waste Management Center
  - 78 PSM Digital TV transmitting station
  - 79 MRDC plot
- SPORTS & RECREATION ZONE
  - 63 Football stadium
  - 64.1 - 64.2 Futsal ...
  - 65 Indoor Sports Stadiums
  - 66.1-66.2 Sports Facilities/Games
- OPEN/GREEN BUFFER AREAS
  - Parking Areas
  - Marshy areas
  - 68 Tsunami Monument
  - 70 Vilingili Gate
  - 71 Vilingili Tower
  - 72 Vilingili Lighthouse
  - 73 Urban Green Space (Park & Jogging Tracks)
- 80 ARTIFICIAL BEACH
- AGRICULTURAL LAND
  - 16 Agricultural lease land
- ENVIRONMENTAL PROTECTION ZONE (EPZ)
- LIGHT INDUSTRIAL ZONE
  - 74.1-74.2 Light industries
  - 75 Boat repair & Slipway
- TOURISM RELATED
  - 76.1 Tourism Development
- MIXED USE ZONE
  - 67 Mixed use / Community centre
- RESERVED FOR FUTURE USE

SCALE 1: 5,000

LINE TYPE ROAD HIERARCHY
- 15m ROAD
- 12m ROAD
- 10m ROAD
- PEDESTRIAN ACCESS

MINISTRY OF HOUSING AND INFRASTRUCTURE	TITLE: PROPOSED ARTIFICIAL BEACH	PROJECT: GA.VILLINGILI LAND USE PLAN	DRAWN BY: IRIAGNAA / CHECKED BY: ZSHA	DRAWING NO: 1 OF 1 / SCALE: / DATE: 20 JUNE 2010