ENVIRONMENTAL IMPACT ASSESSMENT FISH PURCHASE, PACK AND EXPORT FACILITY OF ADDU FRESH ADDU CITY, HITHADHOO

Prepared for
Addu Fresh Pvt. Ltd

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January 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.

Dr. Mahmood Riyaz (EIA03/07)
January 2016

17th January , 2016

Object: Declaration of the Proponent

As the proponent of Addu Fresh fish purchase, pack and export Facility, 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.

Yours sincerely,

Juri Pogliani

General Manager

Addu Fresh Pvt Ltd

Acronyms used in the text

CAM	Complementary and Alternative Medicine
DNP	Department of National Planning
EPA	Environmental Protection Agency
MBR	Membrane Bioreactor
MHTE	Ministry of Housing, Transport and Environment
MoFA	Ministry of Fisheries and Agriculture
MoEE	Ministry of Environment& Energy
MoTAC	Ministry of Tourism, Arts and Culture
MPL	Maldives Ports Limited (a state-owned enterprise)
MRC	Marine Research Centre
MSL	Mean Sea Level
NPC	National Planning Council
HACCP	Hazard, Analysis Critical Control Points.
GMP	Good Manufacturing Practice

1- މިއީ އައްޑޫ ފްރެޝް ޕްރައިވެޓް ލިމިޓެޑުއިން އައްޑޫސިޓީ ހިތަދޫގެ ބަނދަރުމަގުގައި ތަރައްގީ ކުރަން ބޭނުންކުރައްވާ އެކުއަކަލްޗަރުގެ ރިސަރޗްސެންޓަރ ފީލާ ކޮން އެކްސްޕޯޓް ކުރުމުގެ މަސައްކަތް ހިންގުމަށް ގެނެސްދޭ ކާރުހާނާއެއް ދޫކޮށްފައިވާ ކުރުމަށް އައު ކަރަންޓު ހަރަކާތްތަކުން އަރުވާނީ އައު ކަރަންޓުގެ ހަރަކާތްތަކުގެ ސަރަހައްދު ތިމާވެށަށް އަސަރު ފޯރުވާނެ ދުރާގަމާ ރިޕޯޓް ތައްޔާރުކުރުމަށް ވެށީގެ ހާލަތު ބަލައި ތަނުގެ ޝަކުވާތަކާއި އެކުލެވިގެން ނިންމާފައިވާ ޕްރޮޖެކްޓުގެ 'ނަން މިގޮތުގައި' ޤާނޫނުގެ ދަށުން ތަރުޖަމާކޮށް އަމަލުކުރާ ވަނީ ތަނުގައި ވަސީލަތްތައް ފޯރުކޮށްދިނުމަށް މިއީ ތިމާވެށީގެ އަސަރު ދެނެގަތުމުގެ ދިރާސާ ރިޕޯޓެވެ. މިހާރުގެ ގޮތުގައި ބިނާކުރެވިފައިވާ އިމާރާތް ފްރެޝް ޕްރެސް ހިސާބު. މިހަރަކާތްތަކުގެ ހަރަކާތްތައް ގެނެސް ބިނާކުރަން ގަސްތުކުރާ ފެކްޓަރީގެ މަސައްކަތްކުރާ މީހުން އަކީ ތިމާވެއްޓާއި ބެހޭ ގޮތުން ދިވެހިރާއްޖޭގެ ޤާނޫނު ނަންބަރު (93/4) ތިމާވެށި ރައްކާތެރިކުރުމާއި ދެމެހެއްޓުމުގެ ޤާނޫނުގެ ދަށުން ރިޕޯޓެވެ. އެއީ އިމާރާތް ރިޕޯޓް ތަކުގެ ހަމަތައް ދަނެގަތުމަށް ކުރެވޭ ދިރާސާ ހަރަކާތްތަކުގެ އަސަރު ކަނޑައެޅުމަށް ކުރެވޭ މަސައްކަތްތަކެވެ. އަދި އެތަނުގެ ތަރައްގީ ކުރުމުގެ މަސައްކަތް ޓެކްނިކަލް އާއި ތިމާވެށީގެ ކަންކަމާ ގުޅިގެން ދިރާސާކޮށް މިރިޕޯޓުގައި ބަޔާންކޮށްފައިވާނެއެވެ. އަދި ތިމާވެށީގެ ހަރަކާތްތަކުގެ އަސަރު ދެނެގަތުމުގެ ފަރާތުން ރިޕޯޓެއް ތައްޔާރުކުރުމަށް ކުރެވޭ ހުރިހާ މަސައްކަތެއް ހިމެނެއެވެ.

2- މިރިޕޯޓް ތައްޔާރުކުރުމަށް 2012 ވަނަ އަހަރު މިނިސްޓްރީ އޮފް އެންވަޔަރަންމަންޓް އެންޑް އެނަރޖީއިން ދޫކުރެއްވި ރިޕޯޓުގެ ޝަރުތުތަކުގެ އަށް ބަލާފައެވެ. އައްޑޫ ފްރެޝް އިން ރިޕޯޓް ކުރާ ތިމާވެށީގެ ދިރާސާކުރުމުގެ ގޮތުން ގެނެސް ދޭ ތިމާވެށީގެ ހަރަކާތްތަކަށް ފޯރުވާނެ އަސަރުތަކަށް ބަލައި ވަޒީފާގެ ފުރުސަތު އާއި އިޤްތިސާދީ-އިޖްތިމާޢީ ފައިދާއަށް ބަލާފައިވާނެއެވެ. މިރިޕޯޓްގައި ހިމެނޭ މައުލޫމާތު ތިމާވެށީގެ ދިރާސާ ނަތީޖާ، ވަގުތު، ކުރަހަ، ތަރުތީބު އަދި ހިންގުމުގެ ތަރައްގީ ކުރެވޭނެ ގޮތް ތަކުގެ ބަޔާން ތިމާވެށީގެ ރިޕޯޓް ގައި އަދި ތިމާވެށީގެ ދިރާސާތަކުގައި ވެސް ބަޔާންކޮށްފައިވާ ކަންކަމާއި ތިމާވެށީގެ ރައްކާތެރިކަމަށް ހިތްވަރު ލިބިދޭނެ ކަންތައްތައް ތިމާވެށީގެ މައްސަލަތައް ހައްލު ކުރުމަށް ބޭނުންވާ ފިޔަވަޅުތައް ރިޕޯޓުގައި ހިމަނާފައިވާނެއެވެ.

3- މަސްގަނެ ޕެކްކޮށް އެކްސްޕޯޓް ކުރުމުގެ ހުރިހާ މަސައްކަތެއް ހިނގާނީ އައްޑޫ ފްރެޝް ކާރުޚާނާގައެވެ. މިކާރު ޚާނާއަކީ އައްޑޫ ސިޓީ ހިތަދޫ ބަނދަރު ކުރިމަތިން އޮންނަ ބަނދަރުމަތީގައި އައްޑޫ ފްރެޝް އަށް ދޫކޮށްފައި އޮތް 4800 އަކަމީޓަރު ބޮޑު ގޯތިގައި ގާއިމް ކޮށްފައިވާ 1500 އަކަމީޓަރު ބޮޑު ކާރުޚާނާގައެވެ.

4- އައްޑޫ ފްރެޝް އިން މައިގަނޑު ގޮތެއްގައި ކުރުމަށް ހަމަޖެހިފައިވާ މަސައްކަތަކީ މަސްގަނެ ބޯޓާއި ޑޮކު/ކަކުރުގަނޑުގައި ޑޮކު ނަގައި ފްލޯޓިން ފިނިކުރެވޭނެގޮތަށް ގަނޑުކުރެވޭ މަސްކުރުމަށްޓަކައި ހުރިހާ އެއްޗެހި ތައްޔާރުކޮށް އެކްސްޕޯޓްކުރުމެވެ. މިމަސައްކަތުގައި ކާރުޚާނާގެ އަދި މަސައްކަތްތެރިން ބޭނުންކުރާނީ ހަބަރުބި އިން އުފެއްދޭ ފެންކުރިން ތަކެތީގައި ފްލޯޓިން ދަމަހައްޓައިގެން ގެންގޮސް ކާރުޚާނާ ބަލަހައްޓާނީ ބަލަހައްޓާ ސިސްޓަމެއް މެދުވެރިކޮށް ޕެކްކޮށް ސީލްކުރެވޭނެ ކަމަށް ހަމަޖެހިފައިވެއެވެ. އިމަރޖެންސީ ޖެނެރޭޓަރެއް ބޭނުންކުރާނީ ކާރުޚާނާގެ ގާއިމް ކުރެވޭ ހަދަޖެހިފައިވެއެވެ. އިމަރޖެންސީ ޖެނެރޭޓަރު 2 ޖަނަރޭޓަރު އާއި އިންޖީނުގެ ތަފާތު ކާރުޚާނާގެ ބަނދަރުގައި ހުންނާނެ ބިންގެ އިންޖީނެއް ބަދަލުވާ ބޭނުންވާ ވިސްނުމުގެ ފުރާޅުގައި ކާރުޚާނާގައި ބޭނުންކުރާ އިންޖީނުގެ އޮޑިޔޯގެ ކާރުޚާނާ ބޭނުންވާ އެޖެންސީގެ ބޭނުންކުރާ ބޭރުގެ ޕާކިން ހަރުކުރުމަށް ހުޅުވާލެވިފައިވެއެވެ. މިހެންކަމުން މީހުންނަށް މަސްޕަކުރުމުގެ ފެނުގެ ފަހުގެ ސްޓޯރޭޖް އެކަމަށް ކޮމްޕްރެސް ބޭނުންކުރެވިފައިވާ ގޮތުގައި ސްޓޯރޭޖް ފަސިލިޓީ ރެފްރިޖެރޭޓަރު ކުރާނެއެވެ.

5- އައްޑޫ ފްރެޝް އަށް ބޭނުންވާ މަސްގަންނަނީ ބޮއެޖެހޭ މަސްވެރިންގެ އަތުންނެވެ. އައްޑޫ ފްރެޝް އަކީ މީގެ ކުރިންވެސް މަސް ފްރޮސެސްކޮށް އަދި ބޭރުކުރުމުގެ މަސައްކަތްތަކުގައި ފުރިހަމަ ތަޖުރިބާ ހުރި ކުންފުންޏެކެވެ. އައްޑޫ ފްރެޝްގެ މަސައްކަތްތަކުގައި އަމިއްލަ ދޯނި މަސްގަނެ ބޯޓާއި ޑޮކު/ކަކުރުގަނޑުގައި ޑޮކު ނަގައި ފްލޯޓިން ފިނިކުރެވޭނެގޮތަށް ގަނޑުކުރެވޭ މަސްކުރުމަށްޓަކައި ހުރިހާ އެއްޗެހި ތައްޔާރުކޮށް ކާރުޚާނާގެ މަސައްކަތްތަކުގެ ސަރަޙައްދު ބަލަހައްޓާ ތަނުގެ ކަމުގެ ބޭނުންކުރާ މަސްވެރިކަން ކުރާ ފަރާތްތަކާއި ކަނޑުގެ މަސައްކަތް ކުރާ ފަރާތްތަކުން އުފެއްދުން ބޭނުން ދަށްކުރުމަށް އެޅޭއިރު ގަނޑު ވިއްކުމުގެ އިތުރުފަހަރުމަތީގެ ފަހަރުގެ ދަށުން ދެކެވޭ. މިގޮތުން އިތުރުންނާ ކާރުޚާނާއިން އިކުލާބު ގަޑިގެ އެބޭގެ ތަކުގެ (ބޯޓާއި ބަނދަރު ޑޮކު) އެކަތަން ޝައުގުވެރިވާ ފަރާތްތަކުން ލިބޭނެ ގޮތުގެ ހަމަޖެހުން ރާއްޖެއާއި އަދި ވިޔަފާރީގެ އާއި ބޮޑުވާ ދަށުގެ އުފެއްދުންތަކުން ފައިދާ ލިބުނު ވިޔަފާރީގެ ފުރުސަތު އައްޑޫސިޓީގެ ރައްޔިތުންނަށް ފަހިވެގެންދާނެއެވެ.

6- އައްޑޫ ފްރެޝް އިން މަސްގަނެ ބޯޓާއި ޑޮކު އަދި ކަކުރުގަނޑުގައި ޑޮކު ނަގައި ފްލޯޓިން ފިނިކުރެވޭނެގޮތަށް ގަނޑުކުރެވޭ މަސްކުރުމަށްޓަކައި ހުރިހާ އެއްޗެހި ތައްޔާރުކޮށް އެކްސްޕޯޓް ކުރުމުގެ މަސައްކަތުގެ ސަރަޙައްދު ވިޔަފާރީގެ އަސަރުތަކާ ދިމާވާ ބަދަލުތަކާއި އިޖްތިމާޢީ ގޮތުން ފަހަރެއް އެއްވަރަކަށް ކުރެވެނެވެ. މިގޮތަ އިޖްތިމާޢީ ގޮތުން ފަހަރެއް އަދި ޢާއްމުކޮށްވެސް ތިމާވެށްޓަށް އަސަރުކުރާ ދަށުގެ ފަސްޓަރ ފަހަރުގެ ބަދަލުތަކާއި ބޭނުންކުރާ ބަލަހައްޓާކަމެވެ. މިފަދަ ބަދަލުތަކެއް އިޖްތިމާޢީ (ފަހަރުގެ) އުނގެނި މަސްގަނެ ބޯޓާއި ޑޮކު/ކަކުރުގަނޑުގައި ޑޮކު ނަގައި

ދުވަސްތައް ފިނިކުނިވުމާއި ގޮސްފަތުރުގައި ހިންގަމުންދާ ގަދަ ވައިރަސް ފެތުރުން ހުއްޓާލުމަށް ގެންނަ ފަރާތްތަކުގެ ތެރެއިން ކަނޑައަޅާ ފަރާތްތަކުގެ (ހިންގަނީ) ތަކެއްޗާ ގުޅިގެން ކަނޑައަޅާ ފަރާތްތަކުން ކުރަންޖެހޭ ކަންތައްތަކ

9- ތިމާވެށްޓަށް އަންނަމުންދާ ބަދަލުތައް ބަލާ މޯނިޓަރުކުރާނެ ޕްރޮގްރާމެއް މިރިޕޯޓުގައި ހިމަނާފައިވާނެއެވެ. މިފަދަ މޯނިޓަރިންގ ޕްރޮގްރާމްގެ ބޭނުމަކީ ތިމާވެށްޓަށް ކުރާއަސަރުތައް ދުރާލާ ދެނެގަނެ [illegible] [illegible] [illegible] ރަނގަޅުކުރުމުގެ ފިޔަވަޅު އެޅުމެވެ.

10- އައްޑޫ ފްރެޝް ޕްރައިވެޓް ލިމިޓެޑް އިން [illegible] [illegible] [illegible] އަދި [illegible] 65 މިލިއަން [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 50% [illegible] [illegible] [illegible].

11- [illegible] އަސަރު [illegible] އައްޑޫ ފްރެޝް ޕްރައިވެޓް ލިމިޓެޑް އިން [illegible].

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2 NON TECHNICAL SUMMARY

1- This is the Environmental Impact Assessment (EIA) report carried out for proponent−Addu Fresh Pvt. Ltd.−to operate fish purchase, pack and export facility in Addu City Hithadhoo. Addu Fresh Pvt. Ltd. (or Addu Fresh) is one that does not undertaken an EIA study prior to their establishment on Addu City Hithadhoo five years ago in 2010. The EIA Regulation requires the EIA study be undertaken before the project start. However, in this case the EIA is done only for completing formalities and obtaining the license from the MoFA. While the ToR may not entirely reflect this, the readers and evaluators of this report keep this in mind. The EIA was prepared as partial fulfilment of the requirement by the Ministry Fisheries and Agriculture (MoFA) for acquiring permission to renew the fish purchase pack and export licence from the relevant government authorities. 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 , amended in 2015 and covers both negative and positive environmental and socio-economic impact arising from the operation of fish purchase, pack and export facility. Major findings of this report are based on information gathered during the site visit of both the existing environment and possible effects of the project activities, and ongoing similar projects elsewhere in the Maldives and through extensive literature review and experiences gained from similar projects elsewhere.

3- The proposed activity will take place on Addu Fresh fish purchase, pack and export facility located at Addu City, Hithadhoo harbour area on Bandherimagu. Addu Fresh Pvt Ltd is located on North eastern side of Addu City Hithadhoo harbour. Addu Fresh fish purchase pack and export facility occupies 4800m^2 area and the factory and processing facilities are constructed in 1500m^2 area of land on the main road at the Hithadhoo harbour Bandherimagu.

4- Major operation that will be undertaken in Addu Fresh is fish purchase, pack (G&G/HG) and export to EU and Asian markets. Water and energy needed for the facility will be purchased, on commercial rates, from the local utility providers. An emergency powerhouse will be established at the back of the facility. The proponent will ensure that the powerhouse implies with the relevant regulations and will be registered at MEA. The exhaust chimneys, lightening conductors, sound attenuators, and CO_2-based fire fighting equipment will be installed. Ear mufflers will be provided for staff working at louder areas of the facility.

5- The raw material, mainly skipjack and yellowfin tuna caught by pole-and-line and handline by Maldivian on local fishing vessels will be purchased entirely from the Maldivian fishermen. Addu Fresh has been operating fish purchase, pack and export activities in Hithadhoo for over two years therefore, the company is well known among the fishermen in the southern region.

6- During the preparation of the EIA report an impact matrix, which is a standard tool for identifying the possible impacts of operational phase, has been arrayed against a selection of environmental factors that may be affected directly or indirectly as a result of project activities. The impact outcomes from this analysis are considered and appropriate mitigation measures in the operational phase has been provided.

7- The report has identified the main environmental impacts associated with the proposed activities and found that high water and energy consumption and the discharge of effluent with a high organic content are the major issues. Noise, odour, solid wastes occupational health and safety issues may also be concerns of the operational phase. The study has found that most significant

negative environmental impact identified during the operational phase of this project is release of untreated effluent into the Hithadhoo harbour area. Liquid, solid and other forms of wastes and particularly hazardous waste generated during the operational phase has also been identified as moderate impact associated with the project and appropriate mitigation measures are suggested for each and every impact identified in relation to the project.

8- The study has evaluated alternative options for some of the activities of the operational phase of the project and has suggested alternatives for wastewater discharge, emergency powerhouse and fish waste. It is suggested to under-take an extensive monitoring programme that will keep on monitoring the environmental changes associated with the commencement of operations to make necessary adjustment to the activities and its operations based on the findings of various measured environmental parameters suggested in the monitoring plan.

9- The overall positive environmental impact from the operation of Addu Fresh is to integrate the existing product lines and the value-addition of fishery products. Job creation and stimulation of local economy, and exports is the most significant positive environmental impact of this activity. The long-term sustainability of the activity however, will depend on the sustainability of the fish stock. Skipjack and yellowfin tuna are highly migratory and their stocks straddle across the countries' exclusive economic zones into the high seas spreading out into the entire Indian Ocean. The stocks are being managed by the Indian Ocean Tuna Commission which among its 32 coastal and distant water fishing nations. Maldives is a full member and now heavily engaged, partly due to its existing Marine Stewardship Council (MSC) Certification of its pole and line skipjack and yellowfin tuna fishery. The current assessed status of the skipjack and yellowfin tuna stock is considered 'not overfishing'. The total average Indian Ocean catches are below the assessed maximum sustainable levels and the spawning biomass is healthy well above the point of recruitment impairment. The Maldives fishery component takes 17% of Indian Ocean skipjack and some 15% of the yellowfin. The most recent MSY is around at 680,000 Mt per year for skipjack and 350,000 Mt for yellowfin tuna.

10- 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 the operation of Addu Fresh fish purchase, pack and export facility will substantially outweigh its imposition on the environment.

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3 INTRODUCTION

3.1 BACKGROUND AND CONTEXT

Addu Fresh Pvt.Ltd has been operating a chilled and frozen yellowfin Tuna H&G, G&G and frozen whole round yellowfin Tuna storage and export business for over two year. The facility was exporting processed and packed fresh fish to European countries; hence the facility was strictly following European standard operational procedures. Fish processing compliance certificate issued by the Maldives Food and Drug Authority (Competent Authority to inspect and certify fish and fishery products exported to EU) to Addu Fresh Pvt.Ltd. expired on April 2015 and when applied for renewal they were asked to conduct an EIA and get environmental clearance decision note from EPA.

Prior to 2010 MoFA does not issue 'operating licenses' to fish processing facilities. Once the clearance from the Ministry (including line Ministries were sought) a permit was granted through a letter. Subsequent monitoring takes place only if or when required. However, following the new fishery regulation that came into effect in January 2010, fish processing and packing facilities requires obtaining an annual license for the processing and packing fish and fisheries products. Following Addu Fresh Pvt. Ltd requested for renewal of their compliance certificate MFDA and MoFA informed the facilities to obtain the environmental clearance and submit the environmental Decision Note prior to granting compliance certificate from MFDA.

Addu Fresh Pvt. Ltd. (or Addu Fresh) is one that does not undertaken an EIA study prior to their establishment on Addu City in five years ago in 2010. The facility is a medium sized fish processing and packing facilities in the country. The EIA Regulation requires the EIA study be undertaken before the project start. However, in this case the EIA are done only for completing formalities and obtaining the license from the MoFA. While the ToR may not entirely reflect this, the readers and evaluators of this report keep this in mind.

3.2 PROJECT SETTING AND STUDY AREA

The main focus of this report is to assess the status of the existing Addu Fresh fish purchase, pack and export facility in Addu City, Hithadhoo Bandherimagu and the surrounding environment with regards to identifying environmental impacts of operational phase of the facility. The following Figure 1 shows location of study area and Addu Fresh fish purchase pack and export facility within Hithadhoo island.

Figure 1: Location of Hithadhoo island in Addu Atoll (left, map source MEE, 2012) magnified view of Hithadhoo harbour area and location of Addu Fresh (right).

3.3 EIA REPORT

In general the objective of an EIA report is to address the environmental issues of the development project and help achieve efficient planning, aid in identifying impacts and their mitigation measures if required during development and it in the operational phase.

This EIA does not follow the normal procedure as this study takes place post-development and so the normal procedures may not apply. The facility is operational and so project alternatives may be applicable.

3.4 PURPOSE OF THE EIA

Given the potential environmental impacts associated with the Addu Fresh fish purchase pack and export facility, the proponent seek the assistance of an EIA 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 amended in July 2015 and to obtain necessary permits to restart the operations of the facility.

The objective of the EIA study is:

a) To provide an assessment of the potential environmental effects of the operation of fish purchase pack and export facility 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 project; and

c) To assess how the operations of the project have been developed to achieve a satisfactory level of environmental performance in line with the local EIA Regulations and other potential financing agencies.

3.5 METHODOLODY

The EIA process followed in the Maldives has evolved to an internationally recognized standard. Started around 1995/1996 the EIA Regulations underwent a major revision in 2007. The EIA Regulation[1] provides complete process including EIA screening, scoping, review, public comment, and issuing decision notes. In order to maintain the standards, EIA reports are peer-reviewed and only registered consultants may undertake the EIA studies.

The EIA process is shown in Figure 2. What has been lacking in the Maldives is strategic environment assessment, which gives directions for environmental management, including spatial planning and development strategy.

As shown in the flow chart, the actual process of the methodology in preparing the EIA follows the screening where a decision is made whether the project requires an EIA or not. Under the EIA Regulation, fisheries development projects require EIA and so a scoping meeting held at EPA. Key

[1]Environment Impact Assessment Regulations, 2007.Ministry of Environment, Energy and Water, Malé, Maldives, 74 pages.

stakeholders attended the meeting, among them were representative from the Addu City Council, MFDA and MoEE and EPA.

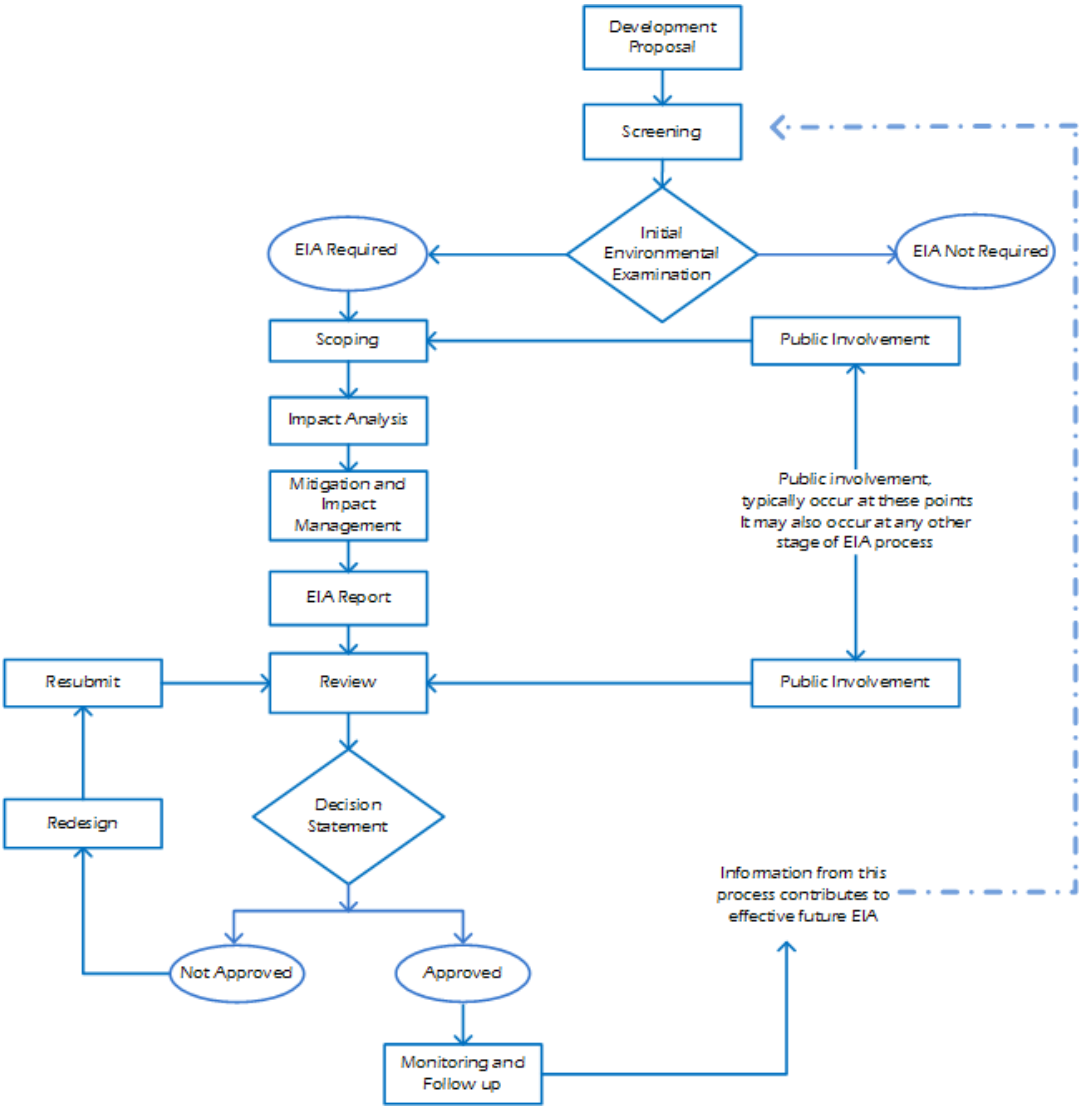

Figure 2: A general flow-chart of the EIA process that is followed in the Maldives.

3.6 REVIEW OF RELEVANT STUDIES

As part of relevant literature review and preparation of the report, the following EIA studies prepared by the consultant have been used as reference;

> *EIA for Development of tuna purchasing and storage facility, Ga. Raaverrehaa, North Huvadhu Atoll, by Dr. Mahmood Riyaz & Dr. Mohamed Shiham Adam January 2015*
>
> *EIA for Development of tuna purchasing and storage facility, Ga. Kedheraa, North Huvadhu Atoll, by Dr. Mahmood Riyaz, November 2015*

EIA Construction and Operation of Cold Storage facility, Hulhumeedhoo, Addu City, by: LaMer Pvt.Ltd.

EIA for establishment of a Katsuobushi processing facility in Hithadho, Addu City by: M.S Adam, October 2015

EIA for Tuna Canning factory of Ensis Fisheries, Hulhumalé , by Dr. Mahmood Riyaz, August 2015

EIA for Ensis Fisheries Pvt.Ltd Fresh Fish Packing Facility at Hulhumalé Industrial Zone, by Dr. M. Shiham Adam, March 2013

These projects are fisheries related projects, hence could be a good reference material to understand the types, degrees and magnitudes of environmental impacts and potential mitigation measures for the operational phase of Addu Fresh fish purchase, pack and export facility in Addu City Hithadhoo.

4 DESCRIPTION OF THE PROJECT

4.1 THE PROJECT

The project entails purchase of fish mainly yellowfin tuna from the fishermen, and export semi processed chilled (H&G and G&G) yellowfin una to European markets. This is a shore-based activity that takes place at Addu Fresh Pvt Ltd. located on North eastern side of Addu City Hithadhoo harbour. Addu Fresh Pvt Ltd pack and export facility occupies 4800m^2 and factory and processing facilities are constructed in 1500m^2 area of land on the main road at the Hithadhoo harbour Bandherimagu (Figure 3).

Figure 3: Google earth image of Hithadhoo harbour area showing Addu Fresh Pvt. Ltd and surroundings

4.2 THE PROPONENT

The proponent of this project is Addu Fresh Pvt. Ltd., a 100% foreign investment registered in the Maldives (Reg. No C0030/2013). Addu Fresh Pvt. Ltd. perhaps the only Company in Maldives approved as 100% share foreign investment in the fisheries sector. Addu Fresh has a vast knowledge on Yellowfin Tuna and their products are supplied to the best Japanese Restaurants. The company works everyday with fishermen to improve fishing in Maldives and especially on the conservation of wild-caught product. They are also developing their own fishing fleet geared to conduct long line fisheries between 100-200 nautical miles within the EEZ (exclusive Economic Zone) of Maldives.

4.3 JUSTIFICATION AND OBJECTIVES

Addu Fresh was a reputed during its operations and well known among its buyers in Europe for its eco-friendly tuna. The company was able to export fresh with the best quality as required by the highest international standards such as the EU and Japanese markets.

The objective of this project proposal is twofold; first to purchase fresh Yellowfin tuna from the southernmost Atolls in the Maldives and maintain and export quality and fresh whole fish by freezing and taking appropriate care to deliver as a high grade premium quality raw fresh and frozen fish to markets in EU and Japan Figure 4. These objectives are in line with government's key policy to diversification fisheries sector locally by establishing more buyers interested in diverse types of fish. Since pole and line skipjack and yellowfin tuna are now MSC Certified Yellowfin Tuna from the Maldives can now fetch a fairly high price in EU and Japanese markets.

Figure 4: High quality fresh and frozen tuna exports from Addu Fresh

Addu Fresh facility has been operating since 2013 and purchases around 5-15 MT fish from local different fishing vessels daily basis within the market price range between MVR 50-100 per kg

The primary objectives of the Project include (i) Ensuring greater involvement of the private sector in economic diversification; and (ii) Provision of a sustainable mechanism for pack and export of value added fresh fishery (mainly Big eye yellowfin Tuna,) product to high-end markets in Europe and Asia

The following facilities and fish processing supporting infrastructures are included within the premises of Addu Fresh Pvt. Ltd land plot Addu City Hithadhoo.

4.4 EXISTING FISH PROCESSING AND SUPPORTING INFRASTRUCTURES

The facility has a 40MT capacity cold storage to store the finished product capable of maintaining temperature at -4 ^{o}C and 5MT per day blast freezing capacity to to maintain at -45^{o}C. The facility also has the capacity to produce gel ice which is required to maintain the appropriate temperature while transportation. Flake ice and cube ice is produced from fresh water. The total ice capacity is about 15-20. Extra 40 feet container cold storage has been brought to facility for the start-up of operation. Packing cardboard cartons boxes are delivered to the facility to the exact sizes, very little waste, (Figure 5and Figure 6 inside the facility). The facility will export two types of products:

1-Fresh tuna in cardboard carton box with gel ice

2- Frozen GG Tuna (gilled and guttered) at –20 0^{o}C in cold containers.

1. **Unloading area, Receiving room, Entry Workers and Hands disinfection area**
2. **Cool Boxes area, Processing area**
3. **Wastle area**
4. **Packaging area**
5. **Cool room and Blast freezer**
6. **Stores packaging material**
7. **Maintenance store and Cleaning material store**
8. **Changing room and Toilets**
9. **Laboratory**
10. **Corridors and internal roads**
11. **Ice plant**
12. **Office**
13. **Generator room**
14. **Close area**

Figure 5: General layout of Addu Fresh fish purchase, pack and export facility

Figure 6: pictorial presentation of the Addu Fresh fish processing facility

4.5 ENERGY AND WATER USAGE

All the energy and water needed for the daily operation of the factory will be provided local utilities. As per the Addu City Council the existing capacities of the utilities can cater for the needs of the Addu Fresh fish processing and packing facility at Hithadhoo. For emergency purposes the backup generator will be installed in the premises of the facility.

At present the 2 emergency generator sets are at run-down state kept at the back of the factory Figure 7 . Sign of oil leakage into the cement floor is evident. This matter has been brought to the attention of the proponent and has been advised to construct a proper emergency powerhouse prior to the commencement of the operations.

The generator sets and emergency powerhouse needs to be registered in MEA after completion. Two sets of 40kVA and 80kVA generator will be installed. This capacity is believed to be sufficient to run clod storages, ice-making machines and blast freezers in an emergency power failure from Addu City main power station. The powerhouse will be located at the back of the facility. Noise insulation baffles will be constructed to minimize the impact of noise emission from the generator sets.50 litre day tanks will be utilized to provide fuel to the generator sets. Day tanks will also be bunded with 110% capacity of the storage tanks to contain accidental spills and leakages. Day tanks will be located at the premises of the power house.

Figure 7: Existing generator sets top, powerhouse (bottom left) Penal board (bottom right)

Rainwater is harvested from the roofs of the main building and the facility has 25,000 litre water storage capacities. Mixed water from the utility and rainwater harvested are used for fish cleaning. Utility water and rainwater mixing and chlorinating process is an MDFA approved and acceptable process to clean fish. Details of this process are given in Appendix 3.

4.5.1 Ice production / Refrigeration

Production of ice is one of the key aspects of the fresh fish purchase pack and export facility At Addu Fresh has a cold storage with a capacity of 40 MT/day and blast freezing capacity of 5 MT/day extra 40 foot-container will be installed in the facility. All the installed cooling and refrigeration capacity is using HCFs because most of them are imported from Europe where HCFCs were phased out in early 2000. Therefore the facility will have no issue in complying with the Ozone Act which came to effect on 6th December 2015.

The refrigerant used in all the plants is HFC 404A which has zero Ozone Depletion Potential (ODP). Under the HCFC phase-out management plan, Maldives targets to phase-out HCFCs, and other Ozone Depleting Substances (ODS) by 2020.

Figure 8: Existing rain water harvesting and storage tanks

4.6 FIRE SAFETY AND FUEL HANDLING

A small amount of fuel, approximately 50lt, is stored for use in the powerhouse. At present the fuel storage is not up to the standards and the necessary precautionary measures are not taken during handling and storage. The diesel fuel tanks is not completely bounded to protect against accidental spill or partial or even total collapse of the tank. National Fire Code (NFC) is not very strictly followed while storing fuel. Fuel handling in the facility needs to be brought to the national standards.

4.7 WASTE COLLECTION AND DISPOSAL

Solid waste generated in the facility is transported into the island dumpster on daily basis. Fish waste is transported in a Dhoni and dump into the open sea. Head and belly cuttings will also be available for locals who are interested in using them or making Rihaakuru. Appropriate solid waste collection and disposal plan for the facility will be developed and implemented with the commencement of operations.

Waste blood water outfall is in harbour area. This will create eutrophication foul smell, unhygienic and unhealthy conditions in the lagoon. This is an important area that needs to be improved and this report will suggest measures to abate these issues elsewhere in this report.

4.7.1 Chemicals and detergents used cleaning

Cleaning and pathogen disinfection chemical are selected based on the fact that they are not hazadours for users, production and the environment (Figure 9). All the chemicals and detergents used for cleaning and removal of pathogens are used in right proportions as per the instruction of supplier. To ensure the health and safety of the employees, product and the environment material safety, clear procedures and HACCP standard operations are followed and data sheet of all chemicals are filed properly at the quality control department of Addu Fresh Pvt. Ltd.

Mainly 5 types of chemicals and detergents are used facility for daily cleaning and washing all the areas. Their trade names and brief on each is given below:

1. Biochloro: Sanitizing tablets used for sanitize the floor, tables, toilet and Chlorination of water. When the tablet mixed with water it can produce hypochlorous acid with good oxidation potential. BIOCHLORO is used to kills pathogens.

2. Le Savon: Neutral soap for hand washing purposes for staff before entering to the production area.
3. Pharma soap: Disinfectant liquid soap for bathing and washing purposes.
4. Sanform: Sanitizer used for floor cleaning.
5. Sirio-WC: Sanitizer and disinfectant used for toilet cleaning. It can remove 99 % of pathogen.

Figure 9: Common chemicals and detergents used for cleaning and disinfection

4.8 SOURCING OF FISH

Sustainability of fish supply and processing depends on a healthy tuna stocks and its fishery. The Maldives' fishery is the traditional one which was developed and evolved over hundreds of years. Maldives fishermen generally use handline fishing to catch large yellowfin tuna targeted for export markets. Many boats have made informal arrangements with the local buyers and exporters on supply of ice. Often ice is provided free of charge on condition that catches is sold to the exporters.

Quality is of utmost importance for exporters. A considerable amount of the care is required to ensure fish are delivered in Grade A condition. Fish has to be taken in minimum time from hooking to on-board. Fish are killed by stunning or destroying the brain to avoid build-up of lactic acid. Gills and guts is removed and cleaned to avoid build of up lactic acid either bled or gutted. The standard operating procedure is to kill quickly, bleed quickly and chill quickly.

The fresh fish export sector effectively depends on the large yellowfin handline fishery. The fishery is targeted entirely for export market. All the production from the facility will be processed in the form of premium quality (Grade A) G&G and H&G whole fresh or frozen fish. The proposed purchasing and storage facility will target to purchase Grade A and B fish to fetch the highest market value through export of G&G and H&G whole fish to EU and Japanese markets.

Yellowfin tuna needed for the Addu Fresh processing and export facility will be purchased mainly from the local fishermen from Addu, Huvadhoo and Fuvahmulah who are interested in selling fish for a competitive price. The facility will also operate a fishing fleet consisting of 3 boats that will be used for longline fisheries away from 100 miles in the territorial waters within the Exclusive Economic Zone. Below is a general product flow diagram:

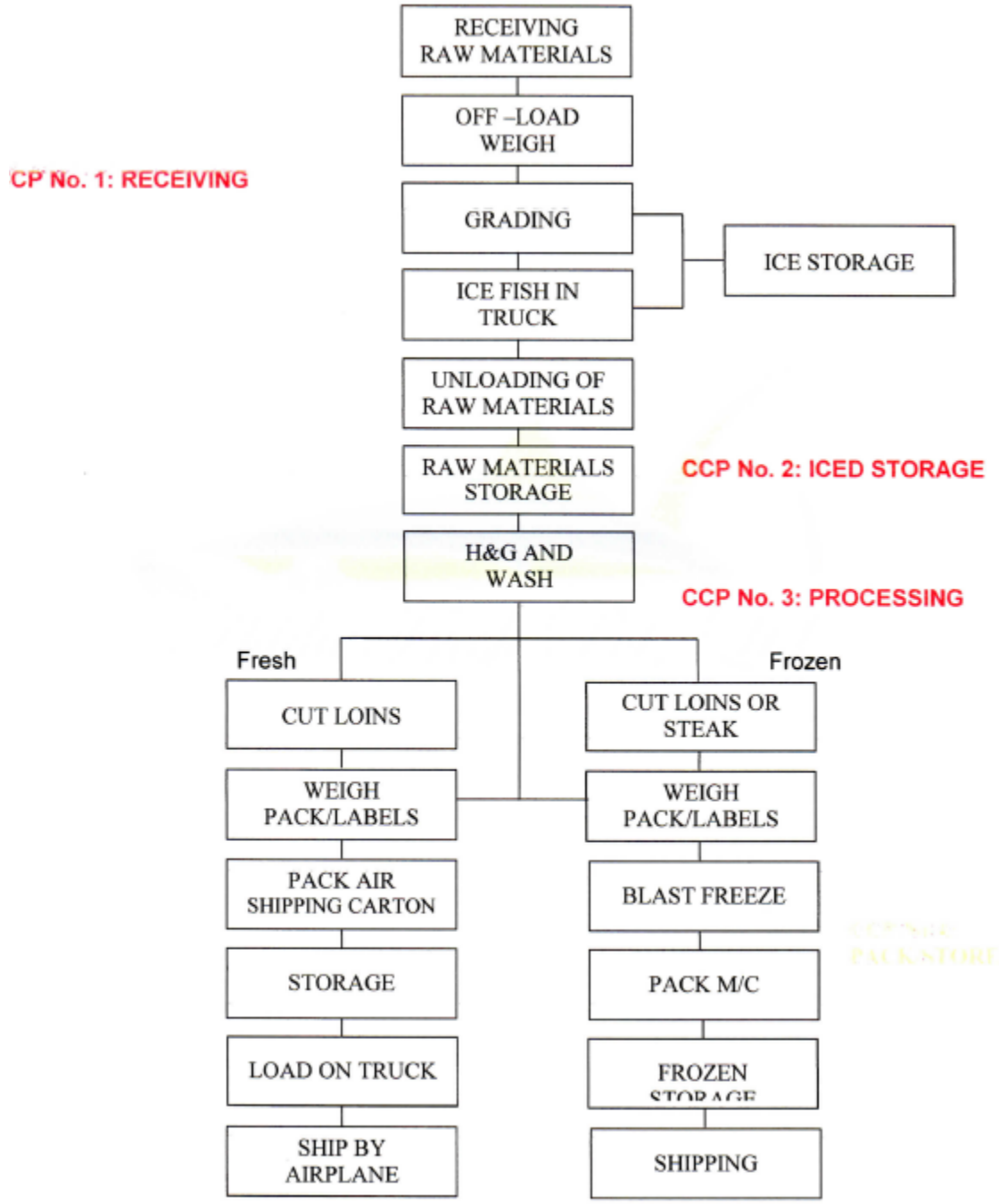

Figure 10: General product flow diagram.

4.9 HACCP

Hazard Analysis and Critical Control Points (HACCP) is a systematic preventive approach to food safety and allergenic, chemical, and biological hazards in production processes that can cause the finished product to be unsafe. It also deals with the design measurements to reduce these risks to a safe level. In this manner, HACCP is referred as the prevention of hazards rather than finished product inspection. The HACCP system can be used at all stages of a food chain, from food production and preparation processes including packaging, distribution, etc. HACCP is critical and key aspect of the fish process and packing facilities. HACCP begins with the layout of the production flow.

MFDA is the Competent Authority to inspect and certify fish and fishery products exported to EU from the Maldives. MFDA has a check list and see that all the requirements are met before exporting any products from any facility, which is intended for export. They will visit and see trial runs of processing and if it is satisfactory, they will send it to EU for the approval of the establishment. Every EU approved establishment would be inspected twice a year by MFDA, the Competent Authority to inspect and certify fish and fishery products exported to EU from the Maldives.

Ministry of Economic Development issues Export licensee, but for EU approval they will see if it is in compliance to their regulation, which is basically all the relevant EU Council Directives.

4.10 PROJECT SCHEDULE

As mentioned earlier unlike other EIA report in this case the EIA is done only for completing formalities and obtaining the license from the MoFA as the facility is already constructed and has been operating until April 2015. Facility operation is ready to commence after obtaining environmental clearance and renewal of the existing export license. Therefore the project is scheduled to start operations not more than a month after obtaining the environmental clearance.

4.11 PROJECT INPUTS AND OUTPUTS

Due to the nature of this project being already constructed the main focus of this section will be inputs and outputs of the operational phase only.

Table 1: Project inputs operational phase

Input resource(s)	Source/type	How to obtain resources
10-20 operational staff	80% locals and 20%expatriate,	Recruited through bidding and announcement in Addu City, and recruiting agencies etc.
5 labourer	3 locals and 2 expatriate	Recruited through bidding and announcement in local papers, and recruiting agencies etc.
Frozen Yellowfin Tuna	5-10 tonnes/day	Locally purchased from Fisherman
Drinking water	Bottled water	Locally purchased empty bottles will be sent back to the company for recycling
Electricity/ energy /thermal energy	Utilities	Emergency powerhouse 40 kVA and 80kVA gen sets
Maintenance material	Timber, electrical cables, electrical	Locally purchased

	appliances, paint, thinner etc.	
Telecommunications	PABX system, fax machines, email and internet	Local telecom companies
Transport	Trucks speed boats, by sea and land	Trucks and speed boats
Auxiliary process phase chemical for cleaning equipment and utensils	Alkaline Detergent, all-purpose cleaners, glass cleaners, bathroom cleaners, destainer, softener, alkali neutralizer, detergent, detergent plus, stain spots remover, etc. preference will be given to bio-degradable compounds, sodium hydro oxide sodium hypochlorite Chemicals (for water)	Imported and locally purchased
Paper products	tissue roll, tissue boxes, hand tissues, / brochures office use paper products	local supply if available if not import. Recycle products and fabric material tissues will be preferred
Firefighting equipment	Fire Pumps, Fire Protection System, Smoke Detectors, Carbon Dioxide and Foam Fire Extinguishers, etc.	Local suppliers
Tools and equipment	Spare components, Other tools (e.g. scissors, knives), Equipment oil	Locally purchased/imported
Fuel,	Diesel minor amount,	Local suppliers

Table 2: Project outputs operational phase

Outputs (s)	Anticipated quantities	Disposal method
Used refrigerants, Dirty plastic containers, Odors	Fish reception and storage minor quantities	Disposed at Addu City waste yard, odor released to air
Portable water	100-500 plastic bottles/ month and	Plastic Bottles – crushed and sent to the bottling company Glass Reused or Returned to manufacturer
Wastewater	Waste water effluent mixed with blood from different processes, moderate quantities	Discharged into the sea through sewer network/
General Domestic waste	Over 10 kg/day	Disposed at waste yard
Organic waste	Over 25kg/day	Disposed at open sea
Waste oil and grease	Over 1 liters/ month	Stored in closed cans Disposed at Addu City waste yard
Paper and Plastics, packaging waste	5-20 kg /month	Disposed at Addu City waste yard
Glass and glass bottles	5-10 bottles/ day	Disposed at Addu City waste yard
Hazardous waste	Minor quantities	Disposed at Addu City waste yard

5 LEGISLATIVE AND POLICY CONSIDERATION

5.1 INTRODUCTION

The Addu Fresh Pvt. Ltd fish processing and export facility in Addu City Hithadhoo Island will be subject to the laws, in particular Environmental Protection and Preservation Act (No. 4/93) of Maldives. The EPPA is the main legal instrument that provides statutory power for the Ministry of Environment and Energy on environmental regulation and enforcement. The EPPA states that natural environment and its resources are a national heritage, that needs to be protected and preserved for the benefit of future generation and that the protection and preservation of the country's land and water resources; flora and fauna as well the beaches, reefs, lagoons and all natural habitats are important for the sustainable development. Thus, it must satisfy the EIA process and get approval before the project starts implementation.

The main regulation stemming from EPAA for regulating environmental issues of development projects is the Environmental Impact Assessment Regulation of 2012. The Regulation provides a comprehensive outline of the EIA process including various processes from project screening, scoping, public comment, and appeal and issuing of the decision notes and implementing powers of its provisions. The line ministries require coordinating with MoEE on environmental issues in development projects and ensure regulations relating to development projects are consistent with Environmental Regulation.

With regards to projects relating to fisheries, the line ministry is the Ministry of Fisheries and Agriculture (MoFA). All matters relating to the fishery development, mariculture/ aquaculture, fishery regulation, and management and monitoring are executed and implemented by the MoFA. Development projects on fisheries and mariculture require EIA by law (as indicated in the Appendix II of the EIA Regulation) are expected to complete the EIA and provide the decision notes issuing permits for the development projects.

In the recent years, a number of developments in fishery regulatory framework have taken place with main objective of improving monitoring and enforcement. These developments are related, in part, to the requirement for Maldives to engage and play an active role in the regional fishery management organization – the Indian Ocean Tuna Commission (IOTC) and relating to requirements for export of fish into EU Territories. This section outlines and summarizes key policies, applicable laws and regulations relevant to the proposed project.

5.2 THE FISHERY LAW

The Fishery Law (Law No. 5/87) governs the fishery activities in the country. The Law contains 14 articles and there are few instances of specific reference to fisheries development and management. Articles 3a and 3b states that MoFA is 'hereby empowered to formulate and administer regulation on matters relating to fisheries" and in article 3b goes on saying that the MoFA 'shall oversee all fisheries activities in the country. It shall be the obligation of the MoFA to explore the possibilities of the development'.

Recognising the Fishery Law (5/87) is out-dated the Ministry has been working on the new fisheries bill since 2003. The bill was submitted 2007 and debated in Majlis. Due to widening differences of opinion on some of the provisions relating to development and enforcement, the Government decided to withdraw the bill for revision. Since then nation-wide consultations have been undertaken and revisions have been incorporated. It is hoped that revised fisheries bill will be submitted to Majlis for debate later in the year.

Lack of regulation and enforcement in fishery issues has been partly hampered by the delays in the new fishery bill. There appears to be a number of requirements of fishery management and monitoring that cannot be enforced with the existing Act (Law No. 5/87). Despite these shortcoming some regulation are being implemented of which most are very recent. Below is a non-exhaustive summary of the fishery and related regulations regarding export of fish and fishery products from the Maldives.

5.3 FISHERY REGULATIONS& GUIDELINES

The regulations relevant for fish processing and packing facilities are given below:

1. **Maldives Fishery Regulation:** This is a generic regulation that came into effect in late 1990s. The regulatory power for this regulation is stipulated in Article 3a of the Fishery Law (5/87) that empowers the MoFA to formulate and administer regulation on matters relating to fisheries. The Regulation covers but is not limited to the following:

    a. Fishing on reefs and lagoons
    b. Prohibited activities in fishing
    c. Banned species in the Maldivian EEZ
    d. Reporting of fishery activities
    e. Issuing of permits in relation of fish processing and export
    f. Conducting research in the EEZ

    Article 7 of the Regulation refers to issuing permits for projects relating to fish processing and export. It states that parties or individuals wishing to start projects on fish processing and export shall obtain written permit from MoFA. This is to ensure that the investor does not face difficulties down the line due changes in the rules or otherwise.

2. **Guideline for Preparation of Fisheries Project Proposals:** This guideline is a direct outcome of the major shift of fishery policy in early part of 2000 to encourage private sector investment and cessation of state control on export of fresh tuna. The guideline (for fishery and mariculture) is intended as an information package for start-ups for submitting their business proposal. The proposal is focused on the extent and nature of investment and its economic feasibility. As such information on investment planning, and financial feasibility is required. The last requirement in the guideline is the 'Environmental Aspects', which states development proposal should include an environmental statement that gives an account of the existing environmental conditions of the proposed project locations. An Evaluation Committee consisting of officials of MoFA and (previous) Department of National Planning evaluates the project. Finally, the Minister endorses the projects except in difficult cases is submitted for Fishery Advisory Board (FAB) for advice. Before any project is given the final approval, environmental impacts assessment study is required and its Decision Note should be presented to the Ministry.

3. **Regulation on Fishing for Large Yellowfin and Export of Large Yellowfin Tuna from the Maldives:** The regulation is intended essentially to license the fishery targeting large (>60-70cm total length) yellowfin for export specifically into EU markets. This includes the handline and longline fishery, which target yellowfin and the latter bigeye and yellowfin tuna. The move is also to comply with the EU – IUU (Illegal, Unregulated and Unreported) Regulation which requires to be complied should exports occur into EU Territories. The regulation states that an export license shall be issued from the Ministry of Economic Development. It also talks of the requirement of the health and safety certificate emphasising of quality of export. Finally it requires for longline vessel to have vessel monitoring systems

and observes on-board should Ministry wants[2]. There are also other requirements of issuing 'catch certificate'- a signed document by the captain of the vessel stating the fish comprising in the export shipments were caught by the vessel. MoFA has institutionalized a Catch Certificate to deal with the paper work of export shipments. The catch certificate is essentially an instrument for used of chain of custody or in traceability of shipments.

4. **DRAFT Regulation on export of fish and fishery products in to European Union:** This is a draft regulation available on the website of the Ministry of Economic Development[3]. Formulated in reference to Law No 31/79 (Maldives Export Import Law), in the preamble it states that the regulation is now required due to increased volume of fish export into EU market and the need for Maldivian producers and processor to ensure the EU-Directives are complied with. It talks of various directives of the Council of the European Community and the competent authority in the Maldives, i.e., Maldives Food and Drug Authority (MFDA). The regulation has not come into force although MoFA's regulations help to comply with most of the EU Directives.

5. **Regulation on fishing for sale to fish exporters and licensing of fish and fishery and aquaculture products:** The Regulation is also related facilitating to comply with the EU-IUU Regulation. The regulation is about licensing of the facilities (fish processing, aquaculture ornamental facilities). The license is given for one year on renewable basis. The Regulation talks of providing catch certificates for shipments exporting into Europe, which information such as vessel registration number, and the date of catch of the fish the shipment contains. Compared to the Regulation in #3 this is a general regulation aiming to regulate fishing for export or sale of fish exporters and processors intending to export or sale to exporters, parties who hold live-fish for export and aquaculture facilities.

There are other regulations that indirectly relevant for the development project under considerations. These are mainly for fishing activities, boat-building codes.

5.4 REGULATIONS ON HEALTH AND SAFETY

1. **Regulation of food advertising:** The regulation is important for fish processors as significant proportion of the produce (packed fresh fish) is marketed locally. The regulation is specifically on advertising. It talks of the obtaining prior permission from the Department of Public Health on any advertising and marketing campaigns on food products.

2. **Regulation on Food Hygiene Standards (health certificates)**: The regulation is intended to giving powers to government authority to inspect health and hygiene standards of outlets processing, producing and/or selling food products. Some of the packing facilities have subsidiary outlets or they regularly supply to retail shop on Malé and on islands, and for the resort market. This regulation will apply to them.

5.5 ENVIRONMENTAL REGULATION

5.5.1 Regulation on Waste

Waste management Regulation (No. 2013/R-58) is more recent come into effect on 6 February 2014. The regulation was gazetted on 05 August 2013. The regulation provides set of comprehensive

[2] The requirement of having a vessel-monitoring device on board fishing vessels in now being broadened – thanks to the current government's programme on 'Beyas Nubeyas' that requires having accurate and timely information on location and fish catch.

[3] www.trade.gov.mv/?lid=5, accessed January 2013.

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 covers the management of general, hazardous and special waste. Wastes arising from paints and chemical solvents are considered as special waste.

Clause 7 of the regulation requires the preparation of Waste Management Plans for specific sectors or areas. Clause 7(c) requires that City and Island Councils prepare their own Waste Management Plans for EPA approval. Clause 8 is for hazardous waste management and clause 9 for special waste management. The types of hazardous waste considered under clause 8 are given in Appendix J of the Regulation.

Clause 10 is about extended producer responsibility and Clause 11 requires that waste shall be disposed in approved locations only. Clause 11(b) states the areas where waste should not be disposed at all including roads, parks, beaches, lagoon, reef, and so on. Clause 11 (c) (d) states the situations that exempt the enforcement of the regulation including situations where human life is at risk and natural disasters or national security threats. Clause 11(e) states that waste management at household level would not require any permits under the regulation. Clause 12 states the provisions for managing waste in public places; that appropriate bins placed in appropriate locations with appropriate labels distinguishing different kinds of waste and that those bins shall be emptied periodically in an appropriate manner to avoid nuisances of any sort.

Clause 13 is for waste management on sea-going vessels. Clause 14 is for waste management at harbours or ports. Clause 15 is for recycling and recovery of waste.

Clause 16 to 23 deals with waste management permits including the standards to be adhered by licensed parties, renewing licenses, types of licenses, renewal and change of licensee, cancellation of licenses, fees and charges. Clause 24 requires that EPA maintains an inventory of the licensed parties and the details required in the inventory.

Clause 25 to 28 lists the provisions for waste transport. Clause 29 talks about the responsibilities of the licensed parties. Clause 30 requires that administrative records including fines shall be maintained by the EPA. Clause 31 gives the EPA the authority to check/monitor the activities of the licensed parties. Clause 32 and 33 are also about data collection and reporting.

Clause 34 discusses the actions to be taken in case of non-compliance. Clause 35 sets the conditions for cancellation of license. Appendix M of the regulation states the different fines that will be levied upon non-compliance.

This regulation was effective from 6 January 2014 and EPA would be responsible for the implementation this regulation.

5.5.2 Regulation on Environmental Damage and Liabilities

Under the Environmental Protection and Preservation Act (No. 4/93), the Ministry of Environment formulated the Environmental Damage Liabilities Regulation in February 2011, which encompasses the basis to avoid environmental deterioration, extinction of biological resources, environmental degradation and avoid wastage of natural resources. The main purpose of this regulation is to stop unlawful activities on environment and adequately implement a fining procedure for violations as well as implement a compensation mechanism on environmental damages. Its Schedules form the basis for

levying fines on various environmental components and activities. Hence, the proposed project will be subjected to this Regulation for any activity outside of the EIA scope and EIA Decision Statement.

5.5.3 Fuel Storage and Handling

The Ministry of Defence and National Security's regulation on Fuel Storage came into effect on 12 August 2015 (R160-250). In general the regulation in enforced from the day it was published on government gazette, although areas requiring re-investment and training has been given 6-12 months to begin comply and enforcement.

The objective of the regulation is to prevent and mitigate fire accidents in the country, create awareness on the safety issues fuel handling and storage and finally to facilitate exiting and new facilities to follow and maintain the standards prescribed in the regulation.

The proponent is expected to follow the regulation in constructing, signing and maintaining the fuel storage area on the island.

5.5.4 Desalination Regulation

Desalination Plant Regulation (2002) states that all sea water desalination plants installed and intended to supply water to 200 or more people or large scale agricultural needs or tourism related activity need to be registered prior to the operation of the plant. Therefore, it would be necessary to consider the impacts of desalination plant in this EIA so that registration can be done without further environmental scrutiny. Desalination plant registration is required to be renewed every five years. Therefore, regular monitoring shall be ensured in order to carry out and efficient renewal process.

5.5.5 Borehole guidelines

Borehole Drilling Technical Specifications and Guidelines were issued by EPA dated 25 September 2011. The Guidelines covers drilling of boreholes and installation of electric pumps for source water extraction for various water supply development projects. The Guidelines state that boreholes shall be drilled at the location(s) designated by the client in consultation with Environmental Consultant and Environmental Protection Agency (EPA). It is also stated that care must be taken in handling and storage of all drilling fluids, oils, greases and fuel on site, to avoid any environmental pollution, damage and degradation. Any toxic materials, drilling fluids and other additives, cuttings and discharged water shall be disposed in a manner that do not cause damage to the environment, public and private property.

According to the Guidelines, the in-land borehole depth shall be more than 30m even if the electrical conductivity of discharge water has reached 50-60mS/cm before reaching 30m depth. If electrical conductivity of discharge water at 30m depth is measured less than 50-60mS/cm, drilling shall continue until electrical conductivity reaches to 50-60mS/cm. This aspect of the Guidelines has raised concerns especially with reference to boreholes at the periphery of the island where, according to renowned hydro-geologists, the freshwater lens may not exist and therefore shallower depths may be considered. Further studies are proposed under the scope of the proposed project in order to determine the exact nature of this.

The Guidelines also provide guidelines for the different records that ought to be made during the drilling process. For monitoring purpose, boreholes drilled shall provide water sampling tubes at the interval of 5m from top to bottom. Water quality testing that may be necessary to be performed upon completion of the borehole has also been indicated in the Guidelines.

5.5.6 General guidelines for Domestic wastewater disposal

This guideline was the first public document demanding the application for a permit and subsequent approval before installation of a sewerage system in the Maldives. The guideline lack legal backing

however EPA tries to implement the guidelines. The guidelines require all wastewater management systems to meet prescribed criteria for the use of ground water, design for an easy access for maintenance and durability and undertake monitoring and provide facilities for sampling final effluent.
These guidelines are set for domestic wastewater and it clearly states that industrial effluents require special permits from the authorities. The guideline states "where a sea outfall is used it should be placed away from the areas such as commercial harbours, or areas designated for recreational purposes. The sea outfall must be placed in such a way that the effluent will be flushed out into the deep sea, where it can be diluted and dispersed so that the impact on the marine environment is reduced. Untreated wastewater shall not be disposed into the near shore lagoon."

EPA guidelines permit connection to local sewer network if the BOD and COD of the effluent are below 50mg/l and 200mg/l respectively.

5.5.7 Water production and power generation

Production of water and power generation is almost always an activity undertaken on site for fish processing and packing facilities. The regulation requires that if water production on site exceeds 10 MT/day the water plant has to be registered EPA.

Similarly all power generation units have to be registered with Energy Authority of the Maldives. This regulation came sometime in 2010 and many facilities have to require complying with this requirement.

For the proposed project Addu city Hithadhoo local water supply will be used for fish processing and cleaning process and will be charged on commercial rates. Similarly the electricity needed for daily operations of the facility will be from the Stelco local grid and charged on commercial rate basis for the company. Generator sets that will be installed for backup and emergencies have to be constructed and certified by MEA. The emergency powerhouse should meet the MEA standards and registered as stipulated in the regulations.

Addu Fresh Pvt. Ltd will strictly follow the MEA regulation and standards and will register the emergency powerhouse as soon it is constructed.

5.5.8 Ozone Act

Refrigeration and air-conditioning equipment usually use Ozone depletion substances as refrigerants. Maldives is a party to Montreal Protocol and Vienna Convention, which controls Ozone layer depleting substances. Under the Ozone act import ban is imposed on all the Ozone depleting substances listed in schedule one, CFCs and Halons. Import licence from MEE is required to import substances listed in schedule two of the act (HCFC's). Also import of equipment containing ODS listed in schedule 2 is banned from 31 May 2016.

All the refrigeration and air-conditioning equipment already installed in Addu Fresh is HFC based equipment and they have no plans to install HCFC based equipment in the future, therefore Addu Fresh facility is in compliance with the Ozone act.

6 EXISTING ENVIRONMENTAL CONDITIONS

Generally in the Maldives, commercial projects takes place on uninhabited islands. In such cases the island is exclusively used for development and operation of the project. In other words the Project will be the only development, which would cause direct impact on the environment. In such cases, complete descriptions of the environmental conditions of the uninhabited island (marine and terrestrial) are required to provide the baseline environmental conditions of the project site. Addu fresh fish purchase and export facility is developed in a land plot designated for industrial development in Hithadhoo local harbour area. Therefore the baseline data on the existing environment for the proposed development would include general geography, demographic status, ecologically protected areas, and other environmental aspects pertinent to the project. A detailed description of baseline data compiled through the surveys and monitoring is provided in this section.

6.1 DATA COLLECTION METHODOLOGY

This EIA draws information from existing resources on the project location as well as field investigations to collect some baseline data. Baseline data are important to fix a reference point from which future trends can be compared with. Various data collection methodologies were utilized to obtain information on the terrestrial and marine ecosystem. Field investigations were conducted to supplement the available data, where it was lacking. Both qualitative and quantitative methods were used to collect data including field surveys, visual observations using photos and videos and interviews with key project personals. International standards used for calculation of inputs and output of fish purchase and packing process is obtained from the review of relevant literature and standards followed by various international agencies such as World Bank, UNIDO, UNEP and FAO.This section briefly outlines the data collection strategies that were used and methods of data collection.

6.1.1 Water sampling

Ground water from the premises of the Addu Fresh facility land plot was obtained from an existing groundwater well. Water from this well is used for gardening and toilet flushing. Seawater sample from the area in front of the Addu Fresh facility was obtained and analysed at the MWSC laboratories. Results of the ground water tests can be used as a baseline for future water monitoring purposes.

6.1.2 Mapping and location identification

Location of the Addu fresh facilities was initially identified by using high resolution Google Earth® imagery. Location of data collection sites were marked using handheld GPS. These data collection points include ground water sampling locations, and the boundary of the facility.

6.1.3 Status of Tuna Fishery

The current status of the tuna fishery in the world and the Maldives was assessed by analyzing the relevant statistical data from various sources. The status of Maldives Tuna fishery was analyzed by using statistical data obtained from the Ministry of Fisheries and Agriculture and from online information available on the Indian Ocean Tuna Commission (IOTC) website.

6.2 ADDU ATOLL GEOGRAPHY

Addu atoll located at 0° 38'S', 73°10'E is a relatively small atoll (159 km^2) compared to most other atolls in the Maldives. Addu atoll has a triangular shape that is dissected by four deep channels Gan Kandu, Viligili Kandu, Maakanda, and Kodakanda and comprises 16 islands, all of which are formed

on the atoll peripheral reef. The atoll lagoon has depths between 30 and 80m. The peripheral reefs where Hithadhoo island (Gan- Hithadhoo reef) is located in on northwestern part of the atoll.

The island of Hithadhoo lies at the northwester side of Addu atoll on the Gan-hithadhoo reef complex. Between Hithadhoo and Gan lie Hankede Maradhoo, Maradhoo-Feydhoo, Feydhoo and Gan Island. These islands are connected by land though the Linkroad.

6.2.1 Hithadhoo Island

This island is elongated and aligned approximately NNW-SSE. It is about 11km long and joined by road to Maradhoo to the south. The southern 3km of the island is very narrow and the island covers an area of approximately 5.3km2, and is the second largest island area in the Maldives. The steep western beach forms a continuous and relatively high boundary, and to the north it curves around eastward to form a boundary between the sea and the northern Kilhi, the Eidhigali/Kottay Kilhi. The largest brackish freshwater pond (Kulhi) in the Maldives is found on Hithadhoo Island on the northwest side of the atoll. A number of other small brackish water systems are found throughout the other islands in the atoll. These freshwater systems have a high ecological value because they support resident and migratory bird populations and important species of plants. These ecosystems have contributed to sustainable human occupation of the islands over a long period.

The elevation of the beach on the east side is much less where much of the natural beach has been built upon, dredged away or incorporated in reclaimed land.

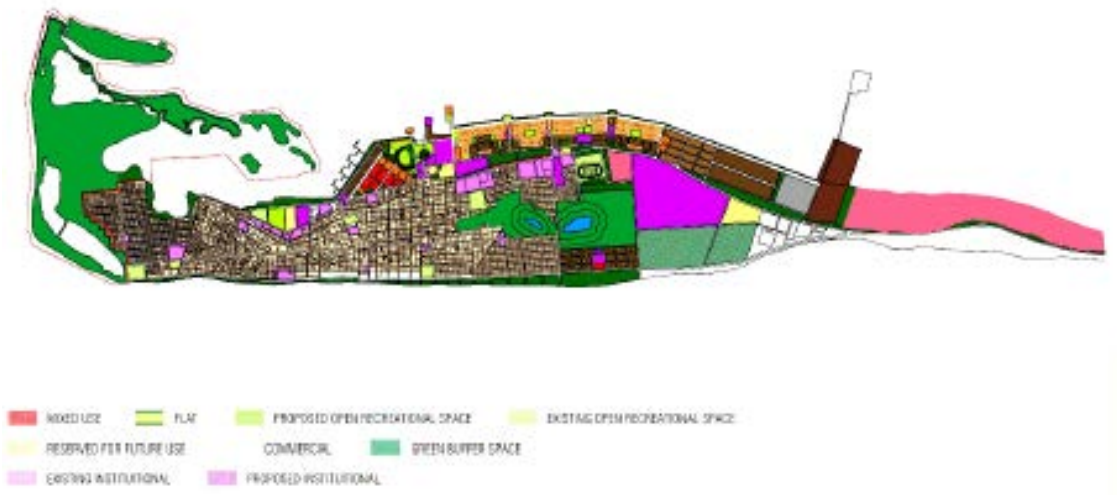

Figure 11: Hithadhoo landuse plan (Source: MEE 2011)

6.3 EIDHIGALI KULHI AND KOATTEY PROTECTED AREA

Under the Environmental Protection and Preservation Act (No. 4/93) the Ministry of Environment and Energy, has established protected areas in the Eidhigali Kulhi and Koattey area. The Hithadhoo Protected Area is located on the northern end of the island, which is locally known as Eidhigali Kulhi and Koattey. The area encompasses the top section of the island and extends 2km offshore to capture all the coral reefs found around the area including the Koattey area, the large freshwater pond, mangrove area, large area of islands vegetation and very shallow semi-enclosed lagoon area of fine silt on top of the sand.

The 'Kilhi' composed of large fresh/brackish water pond and associated mangroove forest, Unique vegetation and a resting and roosting place for most of the protected birds of Maldives. Extensive intertidal reef flats and seagrass beds, a fringing coral reef surround the protected area. According to EPA high diversity of corals and marine life including turtles are found in the area[4].

The proposed development is taking place 2km south east of the Eidhigali Kulhi and Koattey protected area and Maa Fehele Kilhi which can be considered as an ecologically significant inland water body and wetland area. Therefore given the distance between the Addu Fresh facility and the nature and scale of operation is very unlikely that these ecologically significant areas will be directly affected by the project activities.

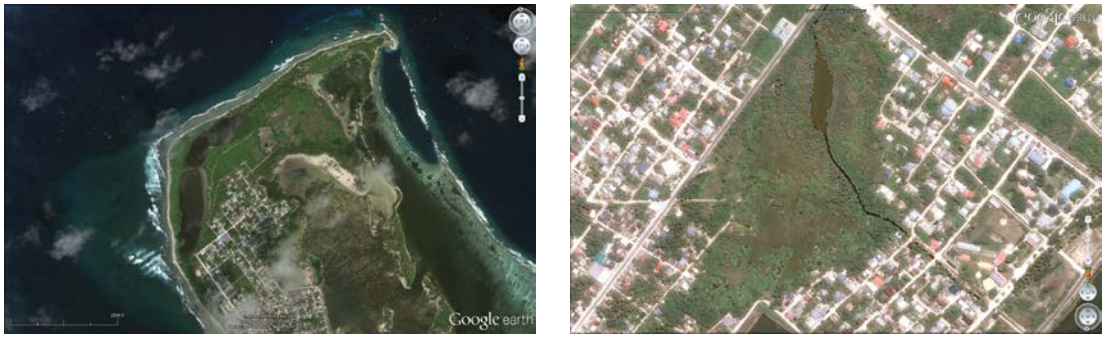

Figure 12: Eidhegali Kilhi and Koattey protected area (left)and MaaFelekilhi (right)

6.4 HITHADHOO HARBOUR INDUSTRIAL ZONE

The developments in Hithadhoo industrial zone takes place in front of Hithadhoo local harbour. Blocks in the industrial zone are allocated for different activities walled out. For example, Maldives Road Development Cooperation (MRDC) construction and site office, STO Cement storage facility, MIFCO colds storage are some of the industrial activities related facilities near the Addu Fresh Facility in Hithadhoo. Addu Fresh Pvt Ltd purchase, pack and export facility occupies 4800m^2 land area, factory and processing facilities are constructed in 1500m^2 area of land on the main road at the Hithadhoo harbour Bandherimagu.

6.5 GROUND WATER QUALITY

In order to establish the baseline quality of ground water, samples from the site was taken during the field visit for analysis at the MWSC Laboratory. A pit was dug at the almost the center of the proposed development site until ground water was reached. The sampling bottles were washed with the same ground water at the site and the sample was transferred to Malé' sent to the MWSC laboratory for water quality analysis. Laboratory tests results of ground water analysis is given in Table 3. Ground water from the site will not be used for any purpose during operational phase of the project. However ground water quality assessments can be used as a valuable indicator to monitor seepage or spill of contaminants into the ground during the lifetime of the project activities.

The results shows that the groundwater of the island is free from contamination and do not have potential health risks. Nitrate, sulphate and Phosphate levels as well as salinity level is very low; this

[4] http://epa.gov.mv/index.php?option=com_content&view=article&id=72:eidhigali-kilhi-and-koattey-area&catid=5:view-al-lareas&Itemid=25 accessed 1th January 2016

indicates that the overall ground water quality of Addu Fresh is very good. Groundwater will not be used for any purposes for the proposed development. The original water test result from MWSC is given in Appendix 4.

Table 3: Ground water sample laboratory results

Parameter	Ground water
Location (Geographic coordinates)	Latitude: 0°36'12.92"S Longitude: 73° 5'32.60"E
Physical appearance	Clear
Conductivity	21.6
pH	7.6
Nitrate (mg/l)	1.1
Salinity (‰)	0.02
sulphate(mg/l)	<10 (LoQ 10mg/l(
Phosphate	0.10
Total dissolved solids (mg/L)	10.78
turbidity (mg/L)	0.117

6.6 SEA WATER QUALITY

A sea water sample from the Hithadhoo was obtained and analysed at the MWSC laboratory. It was noted that the sulfer concentration in sea water is extremely high (3350 mg/l), exceptionally high sulfer concentration in Hithadhoo harbour needs to be further investigated. Results of this sample will be used as a baseline for comparison during seawater quality monitoring in the future.

Table 4: Sea water sample laboratory results

Parameter	Ground water
Location (Geographic coordinates)	Latitude: 0°36'11.02"S Longitude: 73° 5'34.87"E
Physical appearance	Clear
Conductivity	51300
pH	7.92
Nitrate (mg/l)	2.8
Salinity (‰)	33.66
sulphate(mg/l)	3350
Phosphate	0.11
Total dissolved solids (mg/L)	25600
turbidity (mg/L)	2.82

6.7 TUNA FISHERY

The packing facility plans to source raw material (tuna) from local fisheries. The two main key species that will be purchased to Addu Fresh are skipjack (*Katsuwonus pelamis*) and yellowfin tuna

(*Thunnus albacares*). These are also the two most important species in the Maldivian tuna fishery. They are fished from livebait pole-and-line and handline fisheries.

The main target species in the pole-and-line is skipjack but small quantities of juvenile yellowfin are also caught. Handline fishery targets surface dwelling large yellowfin tuna (> 80 cm) targeted essentially for fresh export which is the main source of raw material for the packing facility. Skipjack which is the primary species in the pole-and-line catch is used for canning which Horizon Fisheries (in L. Maandhoo) and the MIFCO, the state-owned enterprise, is engaged. Both species are straddling and highly migratory and its stock has ocean-wide distributions. Consequently they are managed by a regional fishery management organization. In the Indian Ocean stocks are managed Indian Ocean Tuna Commission (IOTC, www.iotc.org) where the Maldives is a full member among its 32 members. For management purposes IOTC considers single stock for both skipjack and yellowfin tuna. This means assessment of the stock is done at the stock level.

The combined catches of the skipjack and yellowfin tuna in the Maldives is currently around 120,000 MT of which around 70,000 MT is skipjack and rest is essentially yellowfin tuna. Catches of skipjack reached an all-time peak of nearly 140,000 MT in 2006 but have been declining since then although the last year's catch have shown a slight increase. These sharp declines are difficult to interpret but could be associated with number of factors including changes in oceanographic conditions or changes to gear vulnerability related to biological and physical oceanography of the area. Nevertheless an important reason for recent decline of skipjack in the Maldives is also due to reduced targeting of skipjack in favour yellowfin tuna (Figure 13 & Figure 14).

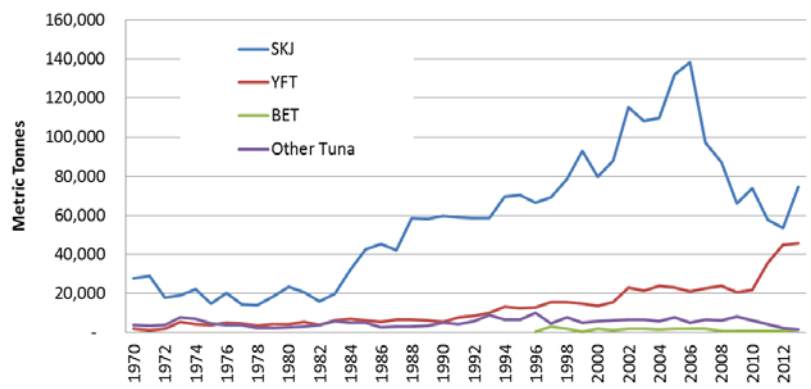

Figure 13: Catches of three main species of tuna in the Maldives tuna fishery. Source, Maldives National Report submitted to IOTC: www.iotc.org, accessed December 2015.

Elsewhere in the Indian Ocean both species are fished in the EEZ's of coastal states an on the high seas mainly by the distant water fishing nations essentially from purse seine, gillnet and longline (IOTC-SC18, 2015). The most important of this is the EU purse seine fishery which represent vessels from the Spain and France centered on the western central Indian Ocean. Together they both take more than 200,000 MT per year which is around 50% of the total Indian Ocean harvests (Figure 15).

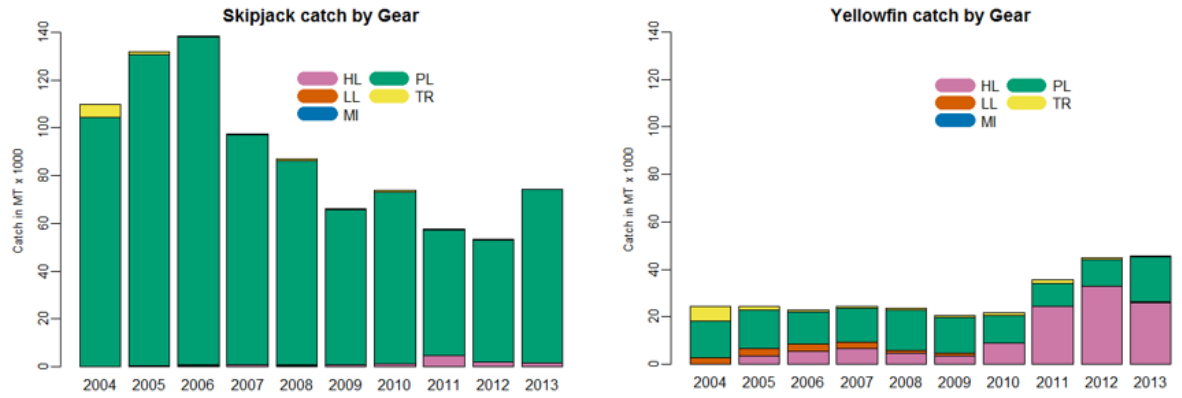

Figure 14: Catches of skipjack and yellowfin tuna by gear. Note skipjack are caught from pole and line (PL) and yellowfin tuna are caught on pole and line handline (HL) gear (source: www.iotc.org, SC report, accessed December 2015).

Maldives have always been a cooperating party of the IOTC but became a cooperating and contracting party in 2010. The Maldives has been fully engaged with the IOTC in the management of tuna. As a cooperating and contracting party Maldives submits its tuna catch and effort and data and contribute science by attending its annual meeting and stock assessment meetings.

Since November 2012 the pole-and-line fishery of skipjack and yellowfin tuna have MSC Certification[5] – an ecolabel of international best practice in fishery management.

Stock	Indicators	Prev	2010	2011	2012	2013	2014
Skipjack tuna *Katsuwonus pelamis*	Catch 2013: 424,580 t Average catch 2209 -2013: 401,132 t MSY (1000t) (80% CI): 648 (550 – 849) F_{MSY} (80% CI): 0.65 (0.51 – 0.79) SB_{MSY} (1000t) (80% CI): 875 (708 –1,075) C_{2013}/C_{MSY} (80% CI): 0.62(0.49 –0.75) SB_{2013}/SB_{MSY} (80% CI): 1.59(1.13 – 2.14) SB_{2013}/SB_0 (80% CI): 0.58(0.53 – 0.62)						
Yellowfin tuna *Thunnus albacares*	Catch 2013: 402,084 t Average catch 2209 -2013: 339,359 t MSY (1000t) (80% CI): 344 (290 – 453) F_{MSY} (80% CI): n.a (n.a – n.a) SB_{MSY} (1000t) (80% CI): 881 (784 –986) F_{curr}/F_{MSY} (80% CI): 0.69(0.59 –1.40) SB_{curr}/SB_{MSY} (80% CI): 1.24(0.91 – 1.40) SB_{curr}/SB_0 (80% CI): 0.38(0.28 – 0.38)	2008					

Colour key	Stock overfished ($SB_{year}/SB_{MSY} < 1$)	Stock not overfished ($SB_{year}/SB_{MSY} \geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY} > 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)		
Not assessed/Uncertain		

Figure 15: Indian Ocean stock status- Skipjack and Yellowfin tuna; Source: Data from IOTC, Scientific Report – 2014 (www.iotc.org, accessed August 2015)

The most recent Indian Ocean stock assessment of skipjack tuna shows that stocks are not overfished and not subjected to over-fishing (Figure 15). The maximum sustainable yield (MSY) of skipjack is

[5] https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/maldives_pole_line_tuna

estimated at 640,000 MT per year with average catches of around 400,000 MT. Yellowfin tuna stock status in 2014 was believed to be healthy[6].

During October 2015 a revised stock assessment for yellowfin tuna was conducted. The stock assessment determined that the Indian Ocean yellowfin stock was overfished and overfishing. The results were presented at the IOTC scientific Committee Meeting in November last year where the result was taken with caution.

Area[1]	Indicators		2015 stock status determination
Indian Ocean	Catch 2014: Average catch 2010–2014:	430,327 t 373,824 t	94%*
	MSY (1000 t) (80% CI): F_{MSY} (80% CI): SB_{MSY} (1,000 t) (80% CI): F_{2014}/F_{MSY} (80% CI): SB_{2014}/SB_{MSY} (80% CI): SB_{2014}/SB_0 (80% CI):	421 (404–439) 0.165 (0.162–0.168) 1,217 (1,165–1,268) 1.34 (1.02–1.67) 0.66 (0.58–0.74) 0.23 (0.21–0.36)	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
*Estimated probability that the stock is in the respective quadrant of the Kobe plot (shown below), derived from the confidence intervals associated with the current stock status (SS3 stock assessment model).

Colour key	Stock overfished ($SB_{year}/SB_{MSY} < 1$)	Stock not overfished ($SB_{year}/SB_{MSY} \geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY} > 1$)	94%	0%
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)	6%	0%
Not assessed/Uncertain		

Figure 16: Most recent (2015) stock assessment result for Indian Ocean Yellowfin tuna. The stock determined to be overfished and overfishing with probability of 94% (Source: IOTC-20145-SC18, www.iotc.org, accessed January 2016)

The maximum sustainable levels of yellowfin estimated during 2015 was about 421,000 Mt. Average catches during the last 3 years (2010-2014) stood at 373,000 Mt while the catch in 2014 was 430,327 Mt, above the MSY level estimated in 2015. This resulted in recommendation of a reduction in catch, by at least 20% of the 2014 levels.

The Maldives fishery component takes 17% of skipjack and some 15% of the yellowfin reported in the India Ocean.

6.8 TUNA FISHERY IN ADDU ATOLL

Traditionally most popular fishing atolls were in the north (e.g. Lh and Raa Atolls). This trend was completely reversed over the last 10-15 years making the southern atolls more popular. The most important atolls for tuna fishing in the south are Huvadhoo and Seenu Atolls where Addu Fresh expects to sough fish. The reason for this reversal are due to economic factors and the establishment of Kooddoo shore-based facility[7] and presence of mother vessels and collector vessel in the atoll which makes them easy for disposal of catch. This is also probably due to new collection facilities such as Addu fresh which buys larger yellowfin tuna.

[6] Stock assessment conducted in 2012 (Ref: IOTC-SC2015, Report)
[7] It should be important to note here fish fresh fish collection started in the north, from Lhaviyani – Felivaru Canning factory (around mid 1970s)

The development of the fishery took off in the south in the late 1980s and 1980s with the advent of the fiber reinforced plastic Fibre-glass (FRP-hull) vessel. Vessel in excess of the 110 feet (34 m) LoA with the engine horse power of 600-800 is common in the south.

A key fishing area in the south is *Satoraha*, a seamount between the L and Ga Atoll in the Huvadhoo Channel. An equally popular seamount exists south of Addu atoll popular among the Addu fishermen. Seamounts in the open ocean are considered as tuna aggregation sites due its associated upwelling and consequent build of productivity around the area. There also a number of fish aggregating devices (FADs) anchored around the Huvahdoo and Addu atolls which are important fishing spots in the area.

The main gear used for tuna fishing in the region is livebait pole-and-line method. Handline line catches of yellowfin tuna are increasing in Addu Atoll (Figure 17). Reported fishing effort however, is decreasing in Addu Atoll observed in the all the atolls. Assuming the reporting of correct this is likely due to increasing size of fishing vessels with concomitant reduction in number of active fishing vessels in the fleet.

Figure 17 provides summary for catches of skipjack and yellowfin tuna in the area. These are two most important species for tuna processing (canning and the fresh products). Catches of Addu atolls represent around 5-6% of the national landings. Close to 10% of skipjack and 4% of the yellowfin tuna are caught in the Maldives are form Addu Atoll.

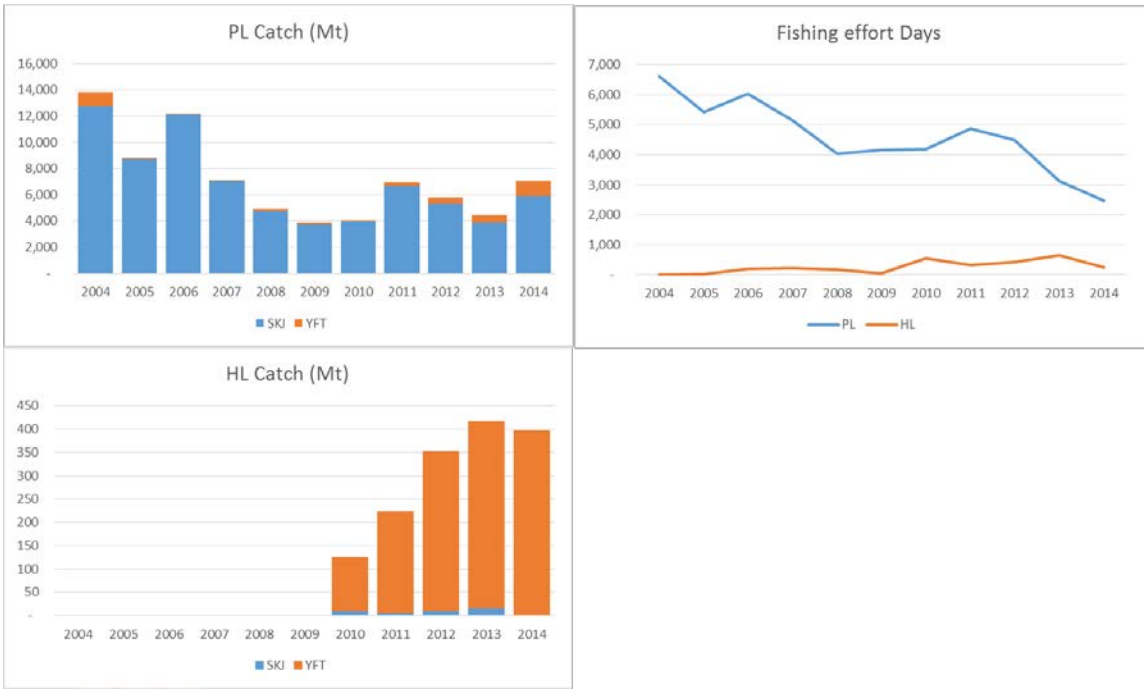

Figure 17: Catches of skipjack and Yellowfin tuna for Addu Atoll for the years 2004-2014; Source: MRC, via MoFA.

The trends in catches in Addu atolls follow that of national catches (Figure 17, panel a) with peak catches in 2004-2006 followed by rapid decline (Figure 14). Overall catches have been picking in the recent years. Handline catches represent on average about 0.5% of the skipjack catch in pole and line fishery and most catches of yellowfin are from handline gear. Handline catches appear to occur in national statistics from 2010 which presumably coincides the start of fresh packing for export in Addu. Catches from the fishery have been increasing since then.

6.9 SOCIO-ECONOMIC ENVIRONMENT

The total registered population of Addu Atoll exceeds thirty thousand. The total enumerated population of the Atoll, from Maldives population and housing census of 2014 is reported as 21396 (DNP, 2014). There were 10906 males and 10490 females (MPND, 2014). The atoll represented 5.78 % of the national population. Almost half of the Atoll population is residing in Hithadhoo Island approximately 10575. The atoll had 91 males for every 100 females in 2014. Population migration to Male' for various purposes was considered high for the Atoll.

Expatriate population is on a growing trend throughout the island of the Maldives and Addu City is no exception. Many foreigners are employed by the government in education and health sector. . 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 in Addu City is estimated during the 2014 Census is 2141.

Fishing population of Addu Atoll is 270, based on the statistics of Ministry of Fisheries and Agriculture (MoFA 2013). The atoll is reported to have 28 active fishing vessels in in 2013 (MoFA 2013). Pole-and-line catch is landed to collector vessels that operate in the region and landing ports in nearby atolls. Some of the catch is also landed to the islands of the atoll and sold to small scale fish processors.

Other economic activities on the island and the atoll in general include; employment in the civil and public service, small businesses such as shops and café/restaurants, agriculture, value addition (smoke/dried fish) of fishery resources. The atoll has outlets of major businesses in the country including telecommunication companies (Dhiraagu and Ooredoo), commercial banks (Maldives Islamic Bank, Bank of Maldives and State Bank of India). Private distribution businesses such as Happy Market, Euro Store and Checkmark are also present in the atoll. A number of local guesthouses catering for the European and foreign markets have sprouted due to the recent change in the Government's policy.

6.10 SOCIOECONOMIC BENIFITS

Commencement of operations in Addu Fresh facility will contribute to the national economy through direct contributions from land rent and taxes. Fish purchase and storage facility when operational will generate approximately 10-20 new job opportunities. The new job opportunities created will bring a number of socio-economic benefits to the local communities as well as contribute in the overall development of the Atoll. Generally not many people form Addu atoll is engaged in yellowfin tuna fishery but large number of fishing vessels from outer atoll come for yellowfin fishing in Addu Atoll. Most of these yellowfin tuna fishermen has to come back to Male region to sell their catch. Therefore one of the main advantages of Commencement of Add Fresh operations is the ability to sell yellowfin tuna close to their fishing grounds and get a competitive price for their catch. Most importantly the development would diversify the local economy and increase the dependency on fisheries through integration and value addition to various types of fishery related productions. Some of the indirect benefits are increase in revenues to private entrepreneurs, and contributions to the development of service oriented facilities related to fisheries and infrastructures. Therefore the project will create employment and open new market avenues and opportunities particularly for the people living in Addu City and generally to the people of Maldives.

7 IMPACT PREDICTION AND ANALYSIS

Operation of fish purchase, pack and export facility in Addu City Hithadhoo is believed to generate a series of environmental impacts, of which some can be felt immediately on the environment, while others can be reversible as well as others can be felt on a long-term basis. The primary purpose of this section is to predict the potential environmental impacts that may be associated with the commencement of facility operations and evaluate these impacts to identify their significance. The main focus of this EIA report will be environmental impacts and mitigation measures from the operational phase of fish purchase pack and export facility. Mitigation measures suggested in the report will focus on the existing environmental problems as well as impacts that may rise in the future based on consultations, expert opinion and observations. Fish purchase pack and export process and its environment and health and safety issues will be audited regularly by the various parties (EU-Competent authority, ISO Certification auditors and regular visits from EU-buyers themselves) and therefore will not be dealt here.

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

7.1 METHODS OF IMPACT PREDICTION, EVALUATION AND ANALYSIS

First of all, most of the environmental impacts that may be generated as a result of the project is identified in the operational phases of the project. Potential impacts have been identified by using simple matrix method. Impact identification process also to a great extent incorporate expert judgment and professional opinions of the EIA consultants involved in the preparation of the report.

Secondly, the magnitude, nature and geographic distribution of environmental impacts have been evaluated and then analyzed by using descriptive checklist method in order to identify their significance.

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:

- **Magnitude:** Refers to the quantum of change that will be experienced as a consequence of the impact.
- **Reversibility:** Refers to the degree of reversibility of an impact (i.e. ease of reversing the conditions).
- **Duration:** Refers to the temporal scale (i.e. duration, frequency) of the impact. It does not take into account the duration of the impact's effects.
- **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)

7.2 LIMITATION

The methods used to predict and evaluate the environmental impacts that may be associated with the fish purchase, pack and export facility may not be the most comprehensive methods as they are quite simple methods. The main shortcoming is lack of data or published material on impacts of effluent on marine environment of the Maldives. Naturally assumptions (based on international best practice) have been made to predict the impacts which may or may not be accurate. Also, the degrees at which these impacts are either accurate or inaccurate as well as uncertainties and natural variability are the key factors that affect the accuracy of these methods. Nonetheless, the methods used are concise and provide a general overview as well as the range of impacts that can affect the environment.

Possible impacts arising from operational activities of the facility are categorized into duration, reversibility, magnitude and significance. Impact magnitude and significance is further categorized by intensity of impacts (negligible, minor, moderate and major) for identifying best possible remedial (mitigation measures) action to be taken.

Process diagram and identification of environmental impacts of fish purchasing, packing and export operation is shown in Figure 13). Environmental impacts are predicted in the operational phase (Table 3) of Addu Fresh fish purchase, packing and export facility. A summery matrix of the potential impacts and mitigation measures for Addu Fresh fish purchase pack and export facility operations are given in Table 4.

Figure 18: Process diagram and identification of environmental impacts of fish purchasing, packing and export operation

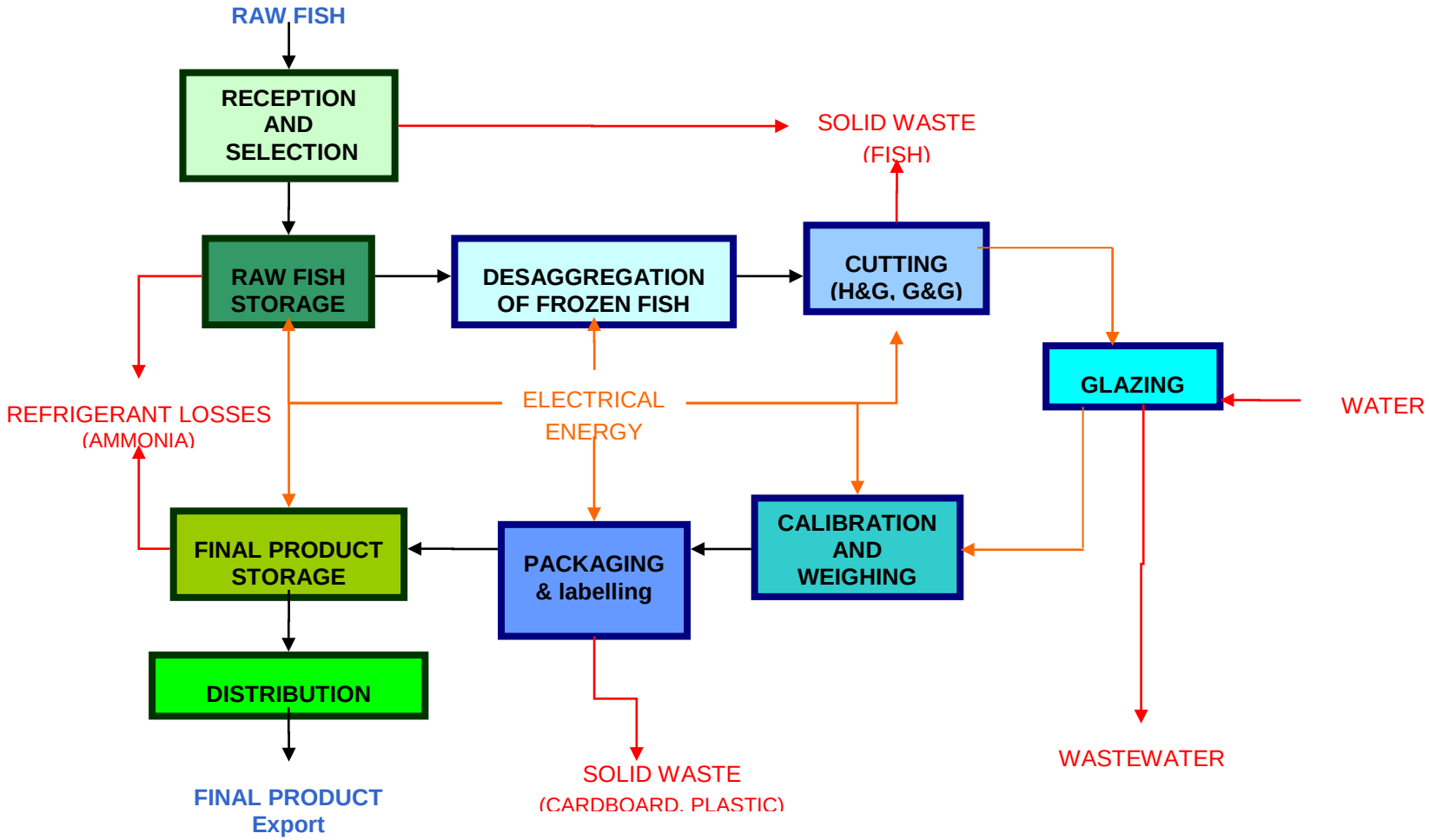

Table 5: Addu Fresh purchase, packing and export, environmental impacts of operational process

Environmental Impact	Reception and selection	Raw fish storage	Disaggregation of frozen fish	Cutting (H&G G&G)	Glazing	Cleaning & washing tools	Water chlorinating	Calibrating and Weighing	Packing and Labelling	Storage	Distribution	Final Product export
Water consumption	X			X	X	X						
Waste water	X		X	X	X	X						
Fish waste	X	X	X	X		X						
Packaging material									X	X	X	X
Liquid media spill			X	X		X	X					
Energy	X		X			X	X	X	X	X		
Air emission										X		X
Odour's	X	X	X	X	X	X	X	X	X			
Noise						X		X	X			
Refrigerant agent	X	X								X		
Other chemicals						X						
Detergent						X				X		X
Oil for equipment						X						

Table 6: Addu Fresh fish purchase, pack and export facility environmental impacts and mitigation operation phase

Impact Causing Activity	Type of Impact	Duration	Reversibility	Magnitude	Significance	Mitigation measures	Mitigation Cost
Release of effluent waste water (blood water) and discharge into the sea	Direct	Long term	Reversible	Moderate	Moderate	- removal of solid waste collect internal organs and other organic material prior to entry into the wastewater separately; -Conduct a dry pre-cleaning of tools and processing areas before wet cleaning (e.g. rubber scraping of work tables and plant floor before hosing); -Establish procedures for the dry removal of offal, using dry vacuum systems where feasible; -Equip the outlets of wastewater channels with screens and fat traps to recover and reduce the concentration of coarse material and fat in the combined wastewater stream; -Choose bio degradable cleaning agents.	Installing screen and fat traps Biodegradable cleaning agents 10,000USD/year
Ground water and soil contamination	Direct	Long term	Reversible	Minor	Minor	-construct proper fuel storage with bund around the fuel tanks to protect against accidental spills; -Standardise the fuel storage take to fit into local regulations ; -Regular monitoring of leaks; -Take necessary precautionary measures during fuel handling, transport and storage.	Construction of Emergency generator fuel tanks will be included in the cost of establishment of powerhouse construction
Water consumption	Direct	Long term	Reversible	Minor	Minor	-Use enough ice to secure product quality and match ice production to requirements; -Improve efficiency by concentrating activities if the facility or process is not operated at full capacity; -Improve the process lay out to facilitate cleaning and eliminate wet transport of wastes, to minimize water consumption; -Dry clean with a scraper or broom before cleaning with water; -Avoid recycling contact process water. Recycling of cooling water, rinse water, and	

						wastewater for some specific noncritical applications may be feasible as long as hygiene considerations are observed.	
Odour	Direct	Long term	Irreversible	Minor	Minor	-Install condensers on all appropriate process equipment, to treat air emissions for odour, including sulfides and mercaptans; -Install bio filters as the final method of air treatment and acid scrubbers for ammonia removal ahead of the biofilter; -Install cyclones and filtration (fabric filters normally are adequate) to remove particulates; -Reduce fugitive odor sources from open doors, open windows, and general room ventilation through the use of negative pressure-controlled ventilation systems.	Installation of condensers, biofilters, fabric filter etc 2000USD
Physical hazards	Direct	Long term	Reversible	Minor	Minor	-Provide workers with training in the proper use and maintenance of cutting equipment (including the use of machine safety devices, handling / storage and upkeep of knives,) and personal protective equipment (e.g. metallic gloves and leather aprons for cutting activities, and protective footwear with rubber soles); -Clearly demarcate transport corridors and working areas; - use non-slip floor surfacing;	Training workers, maintenance of cutting equipment and protective wear etc 1000 USD
Biological hazards	Direct	Long term	Reversible	Minor	Minor	-Consider work rotation strategies to reduce occupational exposure to allergens; -Provide food-approved shielding hand creams; -Avoid aerosol-generating activities (e.g. use of compressed air or high-pressure water for cleaning); -Provide proper ventilation of enclosed or semi-enclosed areas to reduce or eliminate exposure to aerosols; -Provide adequate distances between workers and aerosol-generating activities; -Ensure physical segregation of work and personal facilities to maintain worker	Food approved hand cream and use of compressed air or high pressure water for cleaning 1000 USD

						personal hygiene.	
Exposure to chemicals	Direct	Long Term	Reversible	Minor	Minor	-Avoid locating smoking kilns in the same rooms as processing workers; -Respiratory protection should be used when cleaning; -Ensure that employees handling concentrated lye, acid, and chlorine wear protective clothing and eyewear.	Respiratory protection and protective clothing and eyewear 2000USD
Exposure to heat and cold	Direct	Long term	Reversible	Minor	Moderate	-Set the temperature in air-conditioned processing facilities, where stationary manual work is conducted, at a level that is appropriate according to temperature stress management procedures. -Products awaiting the next processing step can be kept chilled without lowering the ambient temperature through proper use of ice, slush-ice, or water ice mixtures; -Equip cold stores and chill stores with strip curtains to avoid extensive drafts when doors are open. -Design air-conditioning systems for processing facilities in conjunction with strip curtain placement to minimize drafts; -Provide protective clothing in cold environments (e.g. refrigerated storage rooms). Process workers should always be equipped with proper working garments, including dry boots; -Reduce movement of processing workers between different temperature zones (e.g. when packing frozen products).	Installation of strip curtains, protective clothing already included in the project
Solid and hazardous waste	Direct	Long term	Reversible	Minor	Minor	-Small volumes of waste lube oil generated should be disposed of properly; -Encourage reuse of waste oil as lubricants; - Regular remove and deposal at Addu City dump site.	
Safety	Indirect	Long term	Irreversible	Moderate	Moderate	Install appropriate fire detection devices, fire alarms and fire extinguishers; -Install pressurized recycled/treated water supply system of network of fire hydrants and fire fighting house reels locations.	Already installed and maintained

Odour and aesthetics	Direct	Long term	Reversible	Moderate	Moderate	-Daily collection and disposal of fish waste; -Daily cleaning; -Appropriate housekeeping procedures	

7.3 WASTEWATER DISPOSAL

7.3.1 Impact on seawater

Results of sea water test from the harbour indicates relatively higher levels of Nitrate, Sulphate and turbidity level . With the commencement of operation, the potential for increased water pollution is likely to occur. Aspects of the project which affect the water quality are:

- Blood water discharge into the harbour
- Wastewater discharge from boats
- Wastewater discharges from the cleaning of seawall that contains fish, blood and organic matter.

Mitigation measures

-Connect effluent pipes either to Addu City sewerage system or directly to the atoll lagoon out of Hithadhoo reef. Other relevant mitigation measures are:

- ✓ Collect internal organs and other organic materials separately, for processing into by-products according to the recommendations for solid waste management above;
- ✓ Design the production line so that cooling water, storm water, and process effluents can be kept separate to permit appropriate treatment options;
- ✓ Conduct a dry pre-cleaning of equipment and production areas before wet cleaning (e.g. rubber scraping of work tables and plant floor before hosing);
- ✓ Establish procedures for the dry removal of offal, using dry vacuum systems where feasible;
- ✓ Fit and use floor drains and collection channels with grids and screens, and / or traps, to reduce the amount of solids entering the wastewater;
- ✓ Equip the outlets of wastewater channels with screens and fat traps to recover and reduce the concentration of coarse material and fat in the combined wastewater stream;
- ✓ Avoid submersion of open products (e.g. fillets) in water, as soluble protein may leak out and enter the wastewater effluent stream;
- ✓ Choose cleaning agents that do not have adverse impacts on the environment in general, or on wastewater treatment processes and sludge quality for agricultural application. Optimize their use through correct dosage and application. Avoid cleaners that contain active chlorine or prohibited, banned, or restricted chemicals.

7.4 IMPACT OF FISH P PROCESSING AND PACKING OPERATIONS

Fish processing and packing operations typically consumes large quantities of water and energy and discharges significant quantities of organic material, both as effluent and as solid waste. However, there is very little use of hazardous substances. This report identifies major environmental impacts ways of reducing the consumption of resources, increasing yields and reducing the volume and organic load of effluent discharges:

Significant environmental improvement can be derived from simple modification to housekeeping procedures maintenance programs, which will lead at the cost savings and financial benefits. Most of the environmental enhancement suggestions given in the report are relate to good housekeeping practices, work procedures, maintenance regimes and resource handling. Environmental Impacts associated different stages of the fish processing and packing operations are outlined below:

7.4.1 De-icing, and Washing

Water is supplied for de-icing process. The rate of water consumption is normally about 1 m^3 per tonne of fish. The wastewater discharged from these processes contains minor amounts of organic matter, the quantity of which depends on fish quality.

7.4.2 De-heading

Typical water consumption rate for de-heading processes is approximately 1 m3 per tonne of fish. The organic loading of wastewater generated from the de-heading process is relatively high, due to contamination with blood and flesh pieces.

7.4.3 Packaging, Freezing and Storage

Freezing and refrigeration consume large quantities of energy, and inefficient equipment can result in emission of refrigerant gases, such as ammonia. The consumption of electricity and of water can be quite high. If refrigerants are used there is a risk that refrigerant gases will be emitted to the atmosphere, contributing to the depletion of the ozone layer. There is also a risk of ammonia and glycol leaks, which can be an occupational, health and safety problem for workers, but can also result in environmental problems.

7.4.4 Collection and Transport of Offal

Fluming of offal is responsible for a considerable proportion of the effluent generated from fish processing. During transportation of the offal in the water flume, organic matter is dissolved in the water stream, contributing to high levels of COD and nutrients.

7.4.5 Unloading of Fish

'Bloodwater' is generated during unloading and initial washing before transporting to the cold storage the bloodwater can represent as much as 20–25% of the total organic load generated from the process..

7.4.6 Cleaning the Fish Processing Area

The water consumption for cleaning will be very high. The organic load contained in cleaning wastewater is high, containing fish wastes which have been washed to the drain. Cleaning wastewaters also contain detergents and disinfectants. In addition, hazardous substances such as sodium hydroxide and sodium hypochlorite are sometimes used in conjunction with cleaning.

7.5 ENERGY CONSUMPTION

Energy is used for operating machinery, producing ice, pumping, and cooling. Consumption of energy depletes fossil fuel resources, also produces air pollution and greenhouse gas emissions, which have been linked to global warming.

Energy from the utility will be used for in the facility diesel generators will be used for emergency purposes only. At present there is no proper powerhouse in the facility the generators are kept at the

back of the facility and the overall condition is not up to the standards of the Maldives Energy Authority.

Mitigation measure:

- Construct a proper powerhouse that meets local standards
- Registration of Power Generation with MEA:
- Carry out regular maintenance to optimize energy efficiency of equipment

7.6 GROUND WATER AND SOIL CONTAMINATION

Signs of soil contamination through continuous oil leakage into the ground from the day tank, near the emergency generator sets, were physically observed particularly at and around the fuel storage tank.

Mitigation measures:

1- Bounding of fuel storage tank to protect against accidental spill or partial or even total collapse of the tank
2- Standardise the fuel storage tank and take necessary precautionary measures during handling and storage.
3- Ensure that fuel handling and storage meets with the standards of national fire code
4- Regular monitoring of leaks

7.7 SOLID AND HAZARDOUS WASTE

Fish processing produces between 55% and 75% of the fish's raw weight as waste. Solid waste generated on the facility which mainly consists of general domestic waste. Such waste and the packaging waste generated onsite will be taken to Addu City local dumpster and waste management area. Fish waste generated by facility will be transported off reef and dumped into the open ocean. Disposal of large quantity of fish waste into the open ocean will result in feeding behavioural change of fish living in the dumping area. Mitigation measures to reduce fish packing waste are listed below:

- Cutting fish at above -4°C
- Use of sharpened cutting gear
- Installing special slicing/cutting machines for cutting frozen fish
- Improve the control of inventories to avoid product deterioration or expiring of shelf life.
- Adequate training for each worker on their work
- Avoiding purchase of raw materials with excessive packaging
- Avoiding over-stocking by undertaking supply audits
- Elimination of unnecessary packages and packaging in the product
- Maintenance of appropriate storage conditions in the warehouses (including humidity, temp., eliminating rodents)
- Use of folding boxes and plastic recyclable boxes instead of wooden boxes
- Small volumes of waste lube oil generated should be disposed of properly
- Encourage reuse of waste oil as lubricants

7.8 SOCIO-ECONOMIC BENEFITS

In addition to opening up of a new avenue for employment, entrepreneurship operations of the facility contribute to the food security and self sufficiency of the country. Other beneficial impacts are:

Activities of the facility contribute to GDP growth by providing a range of direct and indirect economic and social benefits at the national and local levels.

Direct economic effects include increased government revenue and increased employment opportunities. Indirect economic effects will include increased earnings high revenue from export of fresh fish and employment by the island's support infrastructure development including the construction, supply, transport service and agriculture industries.

7.8.1 Impacts on Livelihood and Enterprise Development

Local benefits for the people of Addu City from the operation of Addu Fresh Pvt. Ltd fish Purchase, pack and export facility includes; continuous supply of fresh fish for the island at affordable prices. Revenue generated by the local businesses through providing services to the facility.

The facility will give away head and other fish waste free of charge to Hithadhoo people who are interested in making Rihaakuru or making use of it. As a result it is expected that some people from the island will take interest in producing Rihaakuru on a commercial scale to sell locally in Addu City or elsewhere in the Maldives.

8 ALTERNATIVES

8.1 NO DEVELOPMENT OPTION

With and without Project scenario in the case of Addu Fresh Pvt. Ltd is not an option as the facility is already in place and have been operating until April 2015. Operation of the facility is an important economic activity that generates revenue to the country through related business and increased employment. Therefore this section of the report will focus on alternatives options that would improve on-going operations and processes that will have least environment impact. Following have been considered for the alternatives:

8.2 WASTEWATER DISCHARGE

As mentioned earlier the facility discharges blood water effluent into the Hithadhoo harbour area. Wastewater discharges causes eutrophication and significant pollution of the lagoon. Therefore it is advised either to connect wastewater (blood water) to the Addu City wastewater network, or extend the pipeline out of the reef into the deep lagoon.

From these two options connection to island waste water or sewerage network will be cost effective and affordable for the proponent. In this case the facility should bring the BOD and COD levels of the effluent to the standards acceptable for the FENAKA who is providing the utility services in the City.

8.3 EMERGENCY POWERHOUSE

At present emergency generators are kept at the back of the facility and operated. The present condition of the area condition is not up to the standards of the Maldives Energy Authority. Therefore it is advised highly recommended to construct a proper powerhouse that meets the MEA standards and the fuel day tank is properly bund to meet the fire safety stanrds and and fits in to Maldives National Fire code.

8.4 FISH WASTE

A large quantity of fish waste generated from the fish processing (Deheading, removal of gill and gut etc) will be disposed-off at the deep sea. Therefore as an alternative it is suggested that if the facility could make the useful parts of the fish waste available for the interested local people to produce Rihakuru and make other uses of the fish instead of throwing away into the deep sea. Similar arrangements by other companies in some islands (e.i Huraa) have brought reasonable income to local people and immensely benefitted economically.

9 ENVIRONMENTAL MONITORING

Environmental monitoring is essential to ensure that operational impacts identified in this report can be eliminated in a timely manner. Monitoring will help to continuously evaluate the result of mitigation measures suggested and to adjust the measures to reflect and react to the changes in environmental condition of the area.

9.1 OBJECTIVE OF MONITORING

The main objectives of the monitoring plan are:

- To verify effectiveness and the accuracy of the mitigation measures and adjust the response accordingly
- To identify observe and response to unforeseen impacts in a timely and appropriate manner at the earliest
- To eliminate or reduce environmental costs

9.2 MONITORING PARAMETERS

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 ground water (pH, dissolved oxygen, electrical conductivity, total oil (Hydrocarbon) and faecal coliforms), seawater quality (turbidity, dissolved oxygen, phosphates, nitrates COD and BOD), of the Hithadhoo harbour area.

Table 7: Environmental Monitoring Program for Addu Fresh Pvt Ltd facility at Addu City Hithadhoo

Indicators	Measuring parameter	Survey Technique	Frequency	Baseline/References	Cost (USD)
Ground water Quality	Salinity, pH, Nitrate (ug/l), Ammonia, Chloride, Phosphate, COD, colliform and faecal colliforms	Sampling and Laboratory Analysis	Once a month	Baseline data available.	300.00
Sea water Quality Kulhi and Lagoon	turbidity, dissolved oxygen, phosphates, nitrates COD and BOD	Sampling and laboratory analysis	Once every three months 10-samples	Baseline data available	300.00

9.3 MONITORING REPORT

Based on the data collected, a detailed monitoring report will be compiled annually and submitted to the relevant government authorities for compliance. The report will include methodologies and protocols followed for data collection and analysis, quality control measures and indicate the uncertainties.

Table 8: A tentative schedule for submission of EIA monitoring report to EPA

	2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Monitoring report, Operational Phase												

9.4 MONITORING COSTS

It is understood that costs of monitoring be borne by the developer. It is also understood the mitigation measures would be accommodated in the contract costs. A commitment from the proponent is given Appendix 6.

10 STAKEHOLDER CONSULTATIONS

Stakeholder consultation relating to the project took place at the Scoping Meeting held at EPA on 20th December 2015. Present at the meeting were officials representing Addu City Council, Ministry of Environment and Energy and Maldives Food and Drug Authority, and Mr. Juri Pogiliani Director as the representative of the proponent – Addu Fresh Pvt. Ltd. Ministry of Fisheries representatives did not attend the meeting. A list of meeting attendees is given in Table 15.

The proponent presented an over-view of the project and the on-going operations as well as the existing capacities of Addu Fresh purchase pack and export facility. He also explained how the existing facility has been operating until April 2015 and the history of facility operation. HE also indicated that MFDA is visiting the facility at the time of this meeting to assess HACCP of the facility and subsequent approval.

MFDA is the responsible authority for the health and safety issues of the products. MFDA's primary role is to ensure the process of production follows internationally accepted norms of HACCP (Hazard Analysis and Critical Control Points). MFDA guidelines and approval ensures that process flow design meet those standards. As such the MFDA role would be to approve HACCP.

Since the Ministry of Fisheries and Agriculture and Maldives Energy Authority did not attend the meeting EPA requested the EIA consultant and the proponent to separately consult with these two stakeholders and most importantly requested to meet with the Addu City Council separately to discuss overall issues and address their concerns in the EIA report. In this respect a consultative meeting was arranged with the Addu City Council at the City council office meeting room on 5th January 2016.
Apart from the scoping meeting consultation with the following stakeholder groups were separately held.

1- Addu City Council
2- Ministry of Fisheries and Agriculture (Telephone Communication)
3- Maldives Energy Authority (Telephone communication)
4- Proponent of the Project

In all consultation representative from Addu Fresh and the consultant was present. Standard approach was used. First the introductions of everyone were made. It was followed by the introduction of the consultants and brief explanation of what the EIA is all about. Following the project was explained including the key development features. After the briefing the floor was opened for general remarks and issues they may have on any aspect of the project.

Notes were kept for the each meeting and photographic evidence was also taken. Points of concerns from the various discussions are presented below:

10.1 CONSULTATION WITH ADDU CITY COUNCIL

As part of the consultation process the consultant has discussed the development with the Addu City Council during the field visit on 5th January 2016 . The meeting was attended by Abdullaa Sodiq (President Addu City Council), Hussen Hilmy (Addu City Council Member) Ali Fahmee (Addu City Mayor) Council director Mohamed Luthfee and Administrative Officer Fathimath Zahira and Mujthabaa Musthafaa (Representing Addu Fresh).

The consultant initiated the meeting and gave a brief introduction of the project and the status of the ongoing procedures to renew the operational and export license of Addu Fresh Pvt. Ltd. He also briefed about the discussions held during the scoping meeting and the issues rose from the meeting. Therefore he explained that the issues need to discuss in this meeting are:

- Use of water and energy from the Addu City utilities for operation of Addu Fresh fish purchase pack and export facility.
- Solid waste management
- Effluent discharge from Addu Fresh Facility to Hithadhoo Harbour

At the onset of the meeting he welcomed the development and said the people of Addu are looking forward to see restarting of Addu Fresh fish purchase, pack and export facility operation. He also highlighted some of the economic and social benefits that are anticipated to bring with the commencement of operation of the facility. On issues raised Addu City Mayor responded by saying that there is no issue with the use water provided by FENAKA and he believe that the facility will be billed on commercial rates. With regard to the energy consumption he said that at present there are some issues but it will still be enough to provide electricity needed for the facility. He also revealed some of the future extension plans for powerhouse and potential additional electricity generation capacity.

With regard to waste generated from the facility he inquired about the potential quantities and types of waste that will be generated from the facility. With regard to fish waste he said that Yellowfin head is a delicacy in Addu City and he suggested that if the facility could make available the off cuttings for the interested local people to produce Rihakuru and make other uses of the fish. The representative from the proponent said that at present the plan is to dump the solid waste including off cuttings from the fish to the open sea out of the reef. They said they also have plans to make use of them in a later stage but if the people are interested in making use of the head and other fish waste it will be available free of charge to Hithadhoo people who are interested in making Rihaakuru or making use of it. The mayor also said that the waste management section of Addu City is going to start composting very soon, probably early this year, so the fish waste from the facility can be used for composting.

With regard to other types of solid waste which is envisaged to be minor amounts of cardboard, packing material and other municipal waste, he said those waste can be accommodated at the Addu City waste yard.

Addu City mayor was concerned about the nature of effluent discharge into the Hithadhoo harbour, particularly he questioned about the type of chemicals that will be used for cleaning and discharged into the water through the effluent. The consultant explained that at present the effluent is discharged into the harbour area and most of the cleaning chemical used in the facility is biodegradable EU accepted slandered chemicals which will have very minor impact on the environment. He suggested that the facility may consider either connecting the effluent to the local sewerage network or extending a separate pipeline to the atoll lagoon through the reef in the future. The proponent agreed to look into the options and consider the most feasible option for effluent discharge line.

In conclusion Addu City Council is very much in favour and look forward for the commencement of operation of Addu Fresh fish purchase pack and export facility as it will bring socio-economic benefits for the people particularly fishermen of the Addu City. They also in the opinion that use of Addu City utility services (water and energy) have the capacity to accommodate water and energy needs of the facility. The Council suggested that if the facility could make the useful parts of the fish waste available for the interested local people to produce Rihakuru and make other uses of the fish instead of throwing away into the deep sea. It was suggested for the proponent to consider either connecting the effluent to the local sewerage network or extending a separate pipeline to the atoll lagoon through the reef.

10.2 CONSULTATION WITH MEA

Stakeholder consultation with Maldives Energy Authority (MEA) was held via telephone conversation with Engineer Ms. Fizna Yousuf. The consultant gave a briefing on the project and discussed the issue of providing electricity needed for Addu Fresh fish purchase pack and export facility from the generators in Hithadhoo. She said that FENAKA is providing the service in Hithadhoo and as a matter of principle and as per he MEA guidelines there is no problem in that if they have additional capacity required for the Addu Fresh Facility in Hithadhoo.

Construction and installation of emergency generator sets and electrical wiring should meet the MEA standards and once the power house is complete it should be registered in MEA as stipulated in the MEA regulations.

10.3 CONSULTATION WITH MOFA

Stakeholder consultation with Maldives Energy Authority (MEA) was held via telephone conversation with Assistant Project Officer Mr. Hussain Zameel. The consultant gave a briefing on the project and discussed the issue of renewal of Addu Fresh export licence and other issues that the fisheries ministry might have about the project. He said that there is no issue with Addu Fresh they once they complete the procedures and permission needed from other line ministries and Government authorities they will follow the standard procedure to issues the fish purchase, pack and export license.

10.4 CONCLUSIONS OF STAKEHOLDER CONSULTATIONS

Following conclusion can be drawn from the various consultations held with stakeholder:

The council strongly supports the proposed development and they are hoping to restart operations of the facility they believe that project will have the following socio-economic benefits.

1- Encourage local fishermen to go for yellowfin tuna fishing, (usually people of Addu Atoll don't go for yellowfin)
2- Large number of fishermen from other atolls, particularly from northern atolls uses Addu - Huvadhoo Atoll as a yellowfin fishing ground. However, once they catch the fish they have to return back to Male area to sell it in a competitive price because there are no yellowfin buyers in this region. Therefore they believe that commencement of operation in Addu Fresh will open-up the market opportunity for those fishermen to sell their catch, fresh and frozen, to Addu Fresh and fetch a similar/higher prices as in the Male region
3- Addu City Utilities have enough capacity to provide water and energy for the Addu Fresh fish purchase, pack and Export Facility in Hithadhoo. Also the utility will earn extra revenue as the facility will be billed on commercial rates for the services.

4- Addu Fresh fish purchase, pack and export facility will make the useful parts of the fish waste available for the interested local people to produce Rihakuru and make other uses of the fish instead of throwing away into the deep sea.

5- The proponent will consider either connecting the effluent discharge pipe to the local sewerage network or extending a separate pipeline to the atoll lagoon through the reef in the future.

It could be concluded from the stakeholder consultation that none of the stakeholders have significant concern with the commencement of operations in Addu Fresh fish purchase, pack and export facility. All the stakeholders welcomed and encouraged the development and showed willingness to cooperate and assist in their relevant field to make the facility operations as smooth as possible.

Photographic evidence of the meetings shown in Figure 18 and a list of people consulted are given in Table 9.

Figure 19: meeting with the Addu City Council members (left) Foreign technical team working in the project (Right)

Table 9: List of people consulted

Name	Designation	Office	Email /contact
Abdulla Sodiq	Mayor	ACC	7924030
Hussain Hilmy	Member	ACC	7772969
Ali Fahmy Ahmed	Member	ACC	9996602
Mohamed Luthufee	Asst. Dirct	ACC	9775768
Fathiath Zahira	Admin Ofcr	ACC	7902547
Mohamed Hamdhaan	Asst. Director	EPA	
Hashim Nabeel	Asst. ocn. obsvr.	EPA	
Hussain Zameel	Asst. Project Officer	MoFA	
Alfonso Beitia	Owner	Addu Fresh	
Juri Pogliani	Director	Addu Fresh	7869953
Mujthabaa Musthafaa	Director	Addu Fresh	mujey@mac.com
Mahmood Riyaz	Consultant	Private	Mahmood.riyaz@gmail.com
Aishath Shabeenaa	Lab technologist	MFDA	7988078
Ms. Fizna Yousuf	Engineer	MEA	9674646
Shahul Hameed Kunnampally	Lab Quality Department	Addu Fresh	Lab@addufreshmv.com

11 CONCLUSIONS

The EIA report focuses primarily on the environmental impact and mitigation measure of the operational phase of the existing Addu Fresh fish purchase pack and export facility, in Addu City Hithadhoo island and health and safety issues related to the process. The study has identified five main activities that would cause negative environmental impacts from the proposed development. Those, in order of significance, are:

- ✓ Effluent, wastewater discharge.
- ✓ Water consumption
- ✓ Energy consumption

Of these a long term impact would be from effluent discharge into the Hithadhoo harbour area and water consumption. 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 the development impacts associated with blood water discharge and water consumption are minor- moderate issues.

The facility is already constructed and has been operating until April 2015 therefore "no project development" option is not an option in this case. The study has evaluated alternative effluent discharge, emergency powerhouse construction and solid fish waste options for the project and found that the effluent discharged into Hithadhoo harbour area needs to reconsidered, a proper emergency power house has to be constructed and registered at the MEA and the facility could make the useful parts of the fish waste available for the interested local people to produce Rihakuru and make other uses of the fish instead of throwing away into the deep sea. The report has come-up with an extensive monitoring programme that will keep on monitoring the environmental changes associated with the operational phase of the project and make necessary adjustment to the activities of the project based on the findings of various measured environmental parameters suggested in the monitoring plan.

The assessment also showed there is strong positive environmental impact – the most important being the socio-economic aspect - the employment and livelihood for the fishermen and diversification of fisheries in the region. The development would also create healthy competition between various companies engaged in fishery related activities and Addu Fresh Pvt. Ltd. and therefore the likely to facilitate the regulation of purchase price. Harvest rates of the skipjack and yellowfin tuna from the Maldivian fishery are considered to be minimal relative to the total removal from the Indian Ocean stock.

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 the operation of Addu Fresh fish purchase, pack and export facility will substantially outweigh its imposition on the environment.

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13 ANNEXURE

Appendix 1. Approved ToR of the report
Appendix 2. FDA certificate and export licence
Appendix 3. Utility water and rainwater mixing chemical procedure
Appendix 4. Water test reports
Appendix 5. Letter from Addu City Council indicating that they have received the EIA report
Appendix 6. Commitment letter from the Proponent

Appendix 1. Approved ToR of the report

"Dhivehin" – Always Maldivian, Forever Independent

Environmental Protection Agency EPA

203-EIARES/PRIV/2015/662

Terms of Reference for Environmental Impact Assessment for Addu Fresh cold processing and export facility in S. Hithadhoo

The following is the Terms of Reference (ToR) following the scoping meeting held on the 20 December 2015 for undertaking the EIA of the Addu Fresh Pvt.Ltd's Fish Processing and exportFacilityatHithadhoo harbour area, Addu City. 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 purpose of the project and, if applicable, the background information of the project/activity and the tasks already completed.Objectives of the development activities should be specific and if possible quantified. Define the arrangements required for the environmental assessment and if relevant, including how work carried out under this contract is linked and sequenced with other projects executed by other consultants, and how coordination between other consultants, contractors and government institutions will be carried out. Identify the donors and the institutional arrangements relevant to this project.

2. **Study area** – Submit a minimumA3 size scaled plan with indications of all the existing (and proposed in any) infrastructures. Specify the agreed boundaries of the study area for the environmental impact assessment highlighting the proposed development location and size of the proposed facility. The study area should include adjacent such as relevant developments and nearby environmentally sensitive sites (e.g. coral reef,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.

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

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. In accordance with best international practice, the description should include all operations including use of port facilities by the boats, collection and transport of fish to the facility, onshore processing of the catches, arrangements for export of the product and quality control measures.

Type of species processed

- Identify species to be processed:;
- Transportation, packaging and handling description;

- Weekly waste generation per unit weight of fish and how the offal is disposed, including blood water.

Facility design

- Description and justification of the location, size and design of the facility;
- Refrigeration design: capacity;
- Emergency plan during a power cut: waste generation will be intense due to refrigeration failure;
- Water supply needed including source, volume, pipeline structure and construction details and detailed water usages;
- Water pumping system;
- Waste water containing high nutrients (oils, proteins and suspended solids) treatment plan: sanitation process, treatment capacity, solid waste disposal mechanisms;
- Power supply plan: define total power required from local power station (if possible); if power requirements are too high for power station, define power station facility design, construction details and operational features;
- Facility sanitation procedures: equipment and resources (water, products, power) required, periodicity;
- Access to facility activities including land clearance, and road access Odour and noise control;
- Operational procedures for dispatching goods including type of transportation vessels;
- Infrastructure for staff including sewerage treatment plan; staff lodging and accommodation etc.

Waste water (effluent) discharge pipeline

- Justify outfall site selection including the distance from the reef and depth of the pipe using oceanographic and ecological information. Currents and waves ought to quickly disperse the discharged water with minimum impacts on marine ecosystems and economic activities. Illustrate the extent of the sediment plume. The public and stakeholders should support the location of the outfall site;

Power station fuel storage plan

- Location and size of generators and facility;
- Fuel transportation technique and volume required;
- Low energy consumption ventures and awareness.

Packaging system

- Export and import plan: size of vessels entering port, volume of fish received per day, kilos of fish dispatched per day, destinations;
- Equipment required for packaging: card board boxes, plastic, wood, etc.;
- Number of employees;
- Packaging waste disposal mechanisms, e.g. faulty boxes;

Project management: Include communication of construction details, progress, target dates and duration of works, construction/operation/closure of labor camps, access to site, safety, equipment and material storage, water supply, waste management from construction operations, power and fuel supply;

Task 2. Description of the environment – Assemble, evaluate and present the environmental baseline study/data regarding the study area. 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, vegetation transects and manta tows sites for posterior data comparison. Information should be divided into the categories shown below:

**There is a description of the specific data collection requirements attached in the appendix of this TOR template.*

Physical parameters required for effluent (waste) water outfall pipelines (use maps where appropriate)

- Ground water quality assessment to assess possible contamination. Parameters to test should include the following: temperature, pH, salinity, turbidity, Electrical Conductivity, Total dissolved Solids, phosphate, nitrate, ammonia, sulphate, Feacal Coliform, Total Coliform, hydrocarbons, BOD and COD.

- Sea water quality measuring these parameters: temperature, pH, salinity, turbidity, Total Suspended Solids, phosphate, nitrate, ammonia, sulphate, BOD and COD. Sea water quality should be tested from all outfall sites.

- Current flow at the outfall site.

  Sea water and groundwater quality should be tested from at least one control site.

Biological parameters: Land-water run-off could affect the marine environment:

- Identify marine protected areas (MPAs) and sensitive sites such as breeding or nursery grounds for protected or endangered species (e.g. coral reefs,); and

- Benthic and fish community monitoring around the island.

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;
- Accessibility for commuting workers from neighbouring islands;
- Land use planning, natural resource use and zoning of activities at sea;
- Accessibility and (public) transport to other island;
- Services quality and accessibility if in inhabited island (water supply, waste/water disposal, energy supply, social services like health and education);

- Community needs, if in inhabited island;
- Sites with historical or cultural interest or sacred places (mosques, graveyard), if in inhabited island.

Absence of facilities in the country to carry out the water quality tests will not exempt the proponent from the obligation to provide necessary data. The report should outline the detailed methodology of data collection utilized to describe the existing environment.

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. Show that the proponent has applied for all necessary permits.

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 the operational phase, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

<u>Impacts on the natural environment</u>

- Terrestrial impacts: including ground water quality and vegetation and fauna biodiversity structure and abundance from land clearance activities;
- At effluent (waste) water outfall site, assess impacts from increased nutrients (eutrophication) in the surrounding waters, assess seawater quality;
- Impacts on nearby MPAs or sensitive areas (natural breeding grounds and feeding grounds);
- Impacts on landscape integrity/scenery.

<u>Impacts on the socio-economic environment, mostly if project is for inhabited islands</u>

- Impacts of odours;
- Impacts on food prices and food availability;
- Impacts of intense organic materials on other resource users e.g. fisheries and tourism industry (nearby resorts and dive sites);
- Impacts on island employment, income and economy diversification;
- Impact on recreational aspects
- Impacts of increased demands on natural resources and services especially water supply, land availability, waste management, energy supply, harbour capacity;
- Impact equity (economic activities, employment, income);
- Social destabilization of the island community.

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". This should include alternative water pumping technology, effluent (waste) water outfall pipelines and water intake pipeline locations taking into account environmental, social and economic factors. The report should highlight how the 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 to avoid or compensate habitat destruction. 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. An Environmental management plan for the proposed project, identifying responsible persons, their duties and commitments shall also be given. 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 ground water and sea water quality as well as for marine ecosystem due to increased nutrients in surrounding waters.Ecological monitoring will be submitted to the EPA to evaluate the damages during construction and after project completion, as per the EIA regulations 2012. 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. Monitoring of the following is required:

- Sea water quality especially at effluent outfall site, Select a control site in another location around the island;
- Marine ecosystem monitoring especially at effluent outfall site, water intake pipeline and surrounding areas. Select a control site in another location around the island;
- Ground water assessment to monitor possible contamination.

* This TOR contains an outline of the parameters that have to be tested. All projects are different, therefore additional or less data will be collected for recovery and impact assessments.

Task 8. Stakeholder consultation –Identify appropriate mechanisms for providing information of the project to relevant stakeholders, government authorities. In this respect consultation shall be undertaken with the following parties:

1. Addu City Council
2. Utility service providers
3. Ministry of Fisheries and Agriculture

4. Maldives Food and Drug Authority
5. Maldives Energy Authority

Details of the consultative meetings including summary outcomes, participants, date, time and location should be described. Photographic evidence of consultation needs to be included in the EIA report. The EIA report should include a list of people/groups consulted, their contact details and summary of the major outcomes. The EIA report should be submitted to the atoll council and evidence of which included in the EIA report.

Presentation- The environmental impact assessment report, to be presented in digital format, will be concise and focus on significant environmental issues. It will contain the findings, conclusions and recommended actions supported by summaries of the data collected and citations f or any references used in interpreting those data. The environmental assessment report will be organized according to, but not necessarily limited by, the outline given in the Environmental Impact Assessment Regulations, 2012 and relevant amendments.

Timeframe for submitting the EIA report – The developer must submit the completed EIA report within6months from the date of this Term of Reference.

.....

20th December 2015

Appendix 2. FDA certificate and export licence

بسم الله الرحمن الرحيم

SECRETARIAT OF ADDU CITY COUNCIL
S. HITHADHOO
REPUBLIC OF MALDIVES

No: EL-0108/2015

Export License

License Issued to: ADDU FRESH PVT LTD (C-0030/2013)
BA'NDHARIMAGU,S. Hithadhoo,Maldives.

Category of Export: Export of Royalty Charged Goods

Value of Exports (MRf): 1,000,000.00
(Stamp Value: RF 1000.00)

Items being exported: Big Eye Tuna (fresh or chilled), Big Eye Tuna (frozen), Big Eye Tuna Loins (fresh or chilled), Big Eye Tuna Loins (frozen), Yellow Fin Tuna (fresh or chilled), Yellow Fin Tuna (frozen), Yellow Fin Tuna Fillets (fresh or chilled), Yellow Fin Tuna Loins (fresh or chilled), Yellow Fin Tuna Loins (frozen)

LICENSE HOLDER HAS BEEN GRANTED EXPORT LICENSE IN ACCORDANCE WITH THE LAWS AND REGULATIONS GOVERNING IMPORT AND EXPORT BUSINESS OF THE REPUBLIC OF MALDIVES

Expiry Date: 03 March 2016

4th March 2015

IBRAHIM LABEEB
ASSISTANT DIRECTOR

Appendix 2. FDA certificate and export license

MALDIVES FOOD AND DRUG AUTHORITY
Male', Republic of Maldives

Certificate No: MFDA/FCD/2014/166

CERTIFICATE OF COMPLIANCE

Date of Issue: 10th OCTOBER 2014

NAME OF THE ESTABLISHMENT:	ADDU FRESH PVT LTD
LOCATION:	S.HITHADHOO, REP OF MALDIVES
REGISTRATIO NO:	MFDA/2014/OC/E-0013
VALIDITY:	09th APRIL 2015
TYPE OF PRODUCT:	CHILLED AND FROZEN YELLOWFIN TUNA H&G, G&G AND FROZEN WHOLE ROUND YELLOWFIN TUNA.

This is to certify that the **ADDU FRESH FISH FACTORY** was audited against the Regulations and other relevant legislations and found that the structure and operations of the factory comply with the respective Requirements.

For and on behalf of the Competent Authority

SHAREEFA ADAM MANIK
DIRECTOR GENERAL

Sathish Moosa
Microbiologist

Appendix 3. Utility water and rainwater mixing chemical procedure

MAINTENANCE OF WATER QUALITY PARAMETERS IN THE FACTORY

Addufresh Pvt. Ltd. has been maintaining the water quality which is using for cleaning the fish at receiving, cleaning the factory utensils, in the production at inside the factory, toilet purposes etc. to comply with Quality Management System of factory.

SOURCES OF WATER

There are two sources of water have in the factory,

1. Rain water
2. Local Island supply (FENEKA)

The two kinds of water can be mixed and used for factory use after met the quality parameters. The Microbiological parameters in the perfect parametric value can be reached by applying Chlorine in the water. Microbiological parameters checked once in three month at MFDA. Chemical parameters and indicator parameters will be checked annually by external accredited laboratory.

QUALITY PARAMETERS OF THE WATER

To keep the water safe for use in the factory has follow make sure the 63 parameters test has done and it passed. The Quality parameters of water means “63 parameters” and it can have divided into three parts,

1. Microbiological parameters.
2. Chemical parameters.
3. Indicator parameters.

Out of Total “63 parameters” of water, Microbiological parameters checked by MFDA laboratory as once in 3 months. The Microbiological parameters and parametric value are as follows,

PARAMETERS	PARAMETRIC VALUE LIMIT	TEST METHOD
Total coliform count / 100 ml	**0 / 100 ml**	**HPA std method, 2007, W2 issue 4.1**
Fecal coliform count (E. coli) / 100 ml	**0 / 100 ml**	**HPA std method, 2007, W2 issue 4.1**
Total viable count at 36°C (Cfu / ml)	**< 20 / ml**	**ISO 6222:1999**
Total viable count at 22°C (Cfu / ml)	**< 100 / ml**	**ISO 6222:1999**

Chlorination in the water has been done to comply the parametric limit of Microbiological parameters. Chlorination in water collecting tanks has been done two times per day internally. If it is not sufficient added more until to reach 0.2 to 0.5 ppm. Chlorine(Cl2) in the water added in

the form of Sodium hypochlorite (Na ClO) or Calcium hypochlorite (Ca (ClO)2). When mixing of any of these chemical compound with water can produce Hypochlorous acid ions with highly oxidation potential and disinfectant in acidic condition. The disinfectant capacity of Hypochlorous ions kills the pathogen in the water to keep it safe.

All other chemical and indicator parameters of 63 parameters has been doing at external accredited laboratory as annually. Hence the company can make sure the water is using in the firm is safe forever.

Appendix 4: Ground and sea Water test results

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

بسم الله الرحمن الرحيم

MWSC

WATER QUALITY TEST REPORT

Test Report No: 301226/2015/05

Customer Informations : ***Mr. Mahmood Riyaz***
H.Hithifaiy,
Boduthakurufaanu Magu,
Male'
Rep.of Maldives

Date: 14/12/2015

Sample Description / Location~	Addu Fresh SW	Addu Fresh GW	Raiveveha SW	Raivevehan GW	TEST METHOD	UNIT
Sample Type~	Sea Water	Ground Water	Sea Water	Ground Water		
Sampled Date~	6/12/2015					
Sample Received Date	9/12/2015					
Test Requisition Form No.	900162659					
Sample No.	820965	820966	820967	820968		
Date of Analysis	9/12/2015 -10/12/2015					
PARAMETER	ANALYSIS RESULT					
Physical Appearance	Clear with particles	Cloudy with particles	Clear with particles	Cloudy with particles	Visual	-
Conductivity	51300	21.6	51800	474	Electrometry	µS/cm
Nitrate	2.8	1.1	2.4	0.2	Method 8171 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
pH	7.92	7.60	8.21	7.71	Method 4500-H+ B. (adapted from Standard methods for the examintation of water and waste water, 22nd edition)	-
Sulphate	3350	<10 (LoQ 10 mg/L)	2900	32	Method 8051 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Salinity	33.66	0.02	34.07	0.23	Method 2520 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	‰
Phosphate	0.11	0.10	0.06	0.05	Method 8048 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Total Dissolved Solids (TDS)	25600	10.78	25900	237	Electrometry	mg/L
Turbidity	2.84	0.117	0.294	142	HACH Nephelometric Method (adapted from HACH 2100N Turbidimeter User Manual)	NTU

Keys:
mg/L: Milligram Per Liter, **‰**: Parts per thousand, **NTU**: Nephelometric Turbidity Unit
LoQ; Limit of Quantification

Checked by:	Approved by:
Nihaz Ali Zahir Laboratory Executive	Abdulla Rasheed Quality 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**********

Appendix 5. Letter from Addu City Council indicating that they have received the EIA report

بسم الله الرحمن الرحيم

"ދިވެހިންގެ ދިވެހިބަސް ދުވަހަކީ - ދިވެހަށްޓަކައި ދަތުރަކީ"

ތަކެއް ތަރައްގީކުރާ ތަންފަނު

ތަކެއް، ފިލުވާ ދާއިރާ

ނަންބަރ: (OTHR)426-AB/203/2016/1

ތަކެއް ތަރައްގީކުރާ ކުންފުނި ތަކެއް ދިނުމާ ގުޅޭ ގޮތުން ދަންނަވާ ލިޔުން

ފާހަގަ ކުރަންވާ ކަންކަން ކުރިން ހުށަހެޅުމަށް ދަންނަވަމެވެ.

ކ.ތަކެ.ތ. ތިމާގެ ލިޔުންތަކުގެ ތެރެއިން

ތިމާގެ ނަން:	Environmental Impact Assessment for proposed expansion and upgrading of the sheltered berth at Hithadhoo International Port, Addu City, Maldives
ބަލައްޓުވާ ފަރާތުގެ ނަން:	ތަކެއް ތަރައްގީ
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ލިޔެފައި:	14 ފެބްރުވަރީ 2016
ގަޑި:	10:50
ސޮއި:	ސްޓާމް:

ތިމާގެ ލިޔުން ލިބުނު ގޮތް

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ފޯނު: 6885003 Telephone: ފެކްސް: +960 6885002 Fax: ޕީ.ކ.ލ:email:secretariat@adducity.gov.mv

Appendix 6. Commitment letter from the Proponent

Our Ref: 17th January , 2016

Mr. Thoriq Ibrahim

The Minister

Ministry of Environment and Energy

Ameenee Magu, Maafannu,

Malé-20392 , Republic of Maldives

Dear Mr. Ibrahim,

Re: EIA – Addu Fresh fish purchase, pack and export facility, Addu City Hithadhoo

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,

Juri Pogliani

General Manager

Addu Fresh Pvt Ltd

 Ba'ndharimagu, Hithadhoo, Addu Atoll - Rep Of Maldives , Cell: +960 7869953 , E-mail: director@addufreshmv.com
www.addufreshmv.com