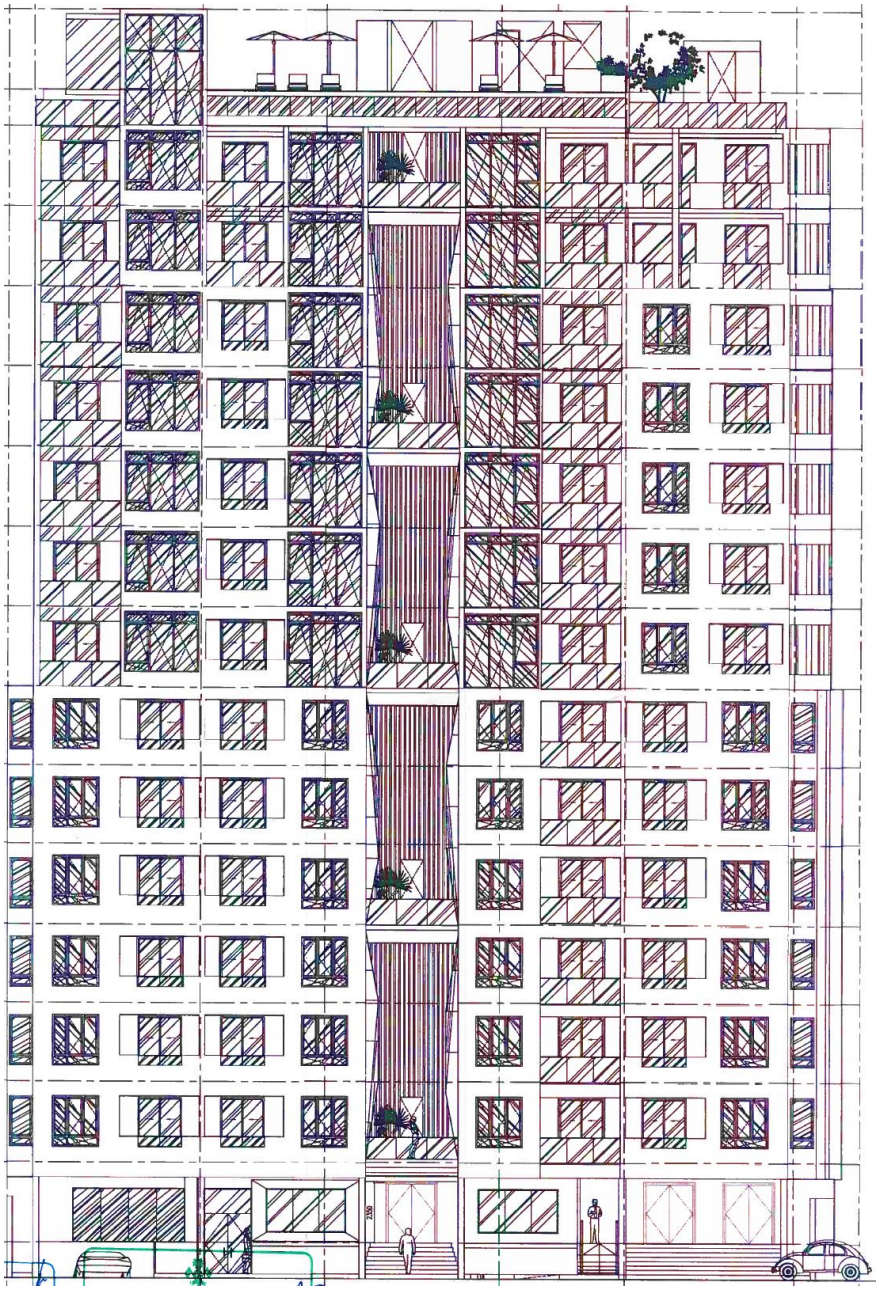
ENVIRONMENTAL IMPACT ASSESSMENT

Proposed 14-Storey Building with Basement
at Ma. Alidhooge, Male'



August 2017

Prepared for: Apollo Holdings Pvt. Ltd.
Prepared by: Mohamed Zuhair (EIA01/15) & Ibrahim Shakir (BP03106)

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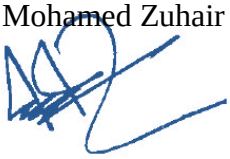
CONSULTANT'S DECLARATION

I, Mohamed Zuhair, Registered EIA Consultant at the Ministry of Environment and Energy of Maldives with the Registration Number EIA 01/15, hereby declare that the statements in this Environment Impact Assessment (EIA) Report for Proposed 14-Storey Building with Basement at Ma. Alidhooge, Male' are true, complete and correct to the best of my knowledge and abilities.

The EIA Report has been prepared in accordance with EIA Regulation 2012, implemented by Environmental Protection Agency (EPA).

Name: Mohamed Zuhair (EIA01/15)

Signature: 

Date: 7 August 2017

بسم الله الرحمن الرحيم

APOLLO
HOLDINGS PVT. LTD.

M.Marine Villa (2nd Flr), Varudhee Hingun, Malé 20282, Rep. of Maldives
+960 3320865 +960 3335786 info@apolloholdings.com.mv www.apolloholdings.com.mv

PROPONENT'S DECLARATION

Apollo Holdings Pvt. Ltd. hereby declare that the contents of this Environmental Impact Assessment (EIA) Report for the Proposed 14 Storey Building with Basement at Ma. Alidhooge, Male' have been read and understood by us.

Also, we are aware that this EIA Report has been prepared to fulfill the requirements of EIA Regulation 2012 with regards to obtaining environmental clearance for the project from Environment Protection Agency (EPA).

Mohamed Waheed
COO

August 8, 2017

APOLLO HOLDINGS PVT LTD
APOLLO
HOLDINGS PVT. LTD.
C-129/98

ސާދާ ހުލާސާ

މި މަޝްރޫޢުއަކީ އެޗްޑީސީ ހިންގާ ބުރޯޓް ޗާޓު އިން ތިމާވެށީގެ ހާލަތަށް ހުރަހަށްފައިވާ ފަރާތްތަކާއި ހާލަތު ކުރިއަށް ދިޔުމަށް ތިމާވެށީ ރިޕޯޓް ހިނގުމުގައި ހުރިހާ ކުރުން ޒަމާ. އަޕާޓްމަންޓް ޔުނިޓް ގޮތުގައި 14 ބުރީގެ އިމާރާތްތަކާއި ބޭސްމަންޓްތައް ހެދުމާއި ގުޅޭގޮތުން ތައްޔާރުކުރެވިފައިވާ ތިމާވެއްޓަށް އަސަރުކުރާނެ ކަންތައްތަކާ ބެހޭ ރިޕޯޓެވެ. މި ގޯތީގެ ބޮޑުމިނަކީ 6531.9 އަކަފޫޓެވެ. އަދި އިމާރާތް ތަޅުމުގެ ބޮޑުމިނަކީ 5274.42 އަކަފޫޓްގެ ބިމެވެ. ބާކީ 525.49 އަކަފޫޓު ހުސްކޮށް ހުންނާނެ ގޮތުގައެވެ. މި އިމާރާތް ތަޅުމުގެ ނިކުންނަ ދިމާލުން ފެންނަ ތަންތަނާއި ކަނޑައެޅިފައިވާ ބޮޑުމިނުގެ ބޮޑުކަމެވެ. މިބުރީގެ ބޮޑުމިން ނިސްބަތުން 1.8 އަކަފޫޓެވެ.

މި އިމާރާތުގެ ފައުންޑޭޝަން ބޭސްމަންޓް ހަދުމަށް 3 މީޓަރު އަޑިއަށް ކޮންކްރީޓުކުރެވޭ. ކޮންމެ ސަރަހައްދު ވަކިވަކިން އިމާރާތުގެ ހިމާޔަތްކުރާ ގޮތުން ބިންގަލުގެ ފެން 3.5 - 4 މީޓަރު އަޑިން ދަމައި ފެން ދިއްލާ އަދި ދަމައިގެން ކަނޑައިލުމަށް ފެންހިފަހައްޓާ ހަދަފައިވާނެ. މި ބިލްޑިން ވަރަކަށް ބުރިތަކުގެ ޒުވާނުން ފައުންޑޭޝަނުގެ މައްޗަށް.

މި އީ.އައި.އޭ ރިޕޯޓަށް ދިރާސާކުރިއިރު ތިމާވެށި ރައްކާތެރިކުރުމުގެ ޤާނޫނު (ޤާނޫނު ނަންބަރު 93/4) އަދި މި ޤާނޫނުގެ ދަށުން ހެދިފައިވާ އީ.އައި.އޭ ގެ ކަނޑައެޅިފައިވާ ގަވާއިދު ގޮތުގައިވާ އީ.އައި.އޭ ގަވާއިދު 2012 އަށް ތަބާވާގޮތުން ހެދިފައިވާ ރިޕޯޓެކެވެ. މި އިމާރާތަކީ 31 މީޓަރަށް ވުރެ އުސް، ބޭސްމަންޓާއި ހިލައި އަދި އަދި 10 ބުރީގެ ވުރެ ގިނަ އަދި ފައުންޑޭޝަން 5 ފްލޯރުވުރެ ފުން އިމާރާތްތަކުން އީ.އައި.އޭ ރިޕޯޓް ހެދުމަށް ގަވާއިދުގައި ލާޒިމް ކުރެއެވެ.

މި މަޝްރޫޢު ނިމުމުން އިމާރާތުގައި ޖުމްލަ ދިރިއުޅެން ހުޅަނގު 13 ފްލޯރ ހުންނާނެއެވެ. މި ފްލޯރތަކުގައި 2 ކޮޓަރީގެ 36 އެޕާޓްމަންޓާއި، 3 ކޮޓަރީގެ 24 އެޕާޓްމަންޓާއި އަދި 4 ކޮޓަރީގެ 2 އެޕާޓްމަންޓް ހުންނާނެއެވެ. އެހެން މުޅިފްލޯރގައި ކާރުޕާކިން ކޮމްޕްލެކްސްއާއި ޖިމް އަދި ގޭމް އޭރިއާއެއް ހުންނާނެއެވެ. މި އިމާރާތުގެ ދިރިއުޅުމަށް ހަދާ ފްލޯރ އަދި ޑްރައިވްވޭގައި 300 އަށްވުރެ ގިނަ މީހުންނަށް ދިރި އުޅެވޭނެއެވެ.

މި މަޝްރޫޢުގެ ސަބަބުން ތިމާވެއްޓަށް ކޮށްފާނެ ނޭދެވޭ އަސަރުތައް ދިރާސާ ކުރެވުނުއިރު މަސައްކަތާ އެކުލެވޭ ފިޔަވަޅުތައް ދެނެގަނެވިފައިވާ މަސައްކަތުގެ ވަގުތު ބޭނުމަށް ސާރވޭކުރެވިފައިވާނެއެވެ. އަޑުގަދަކަން މަސައްކަތުގައި އަޑުގެ މިންވަރު ހުރިގޮތާއި، ދުންވާގެ މިންވަރާއި، ފެނާއި، އަދި ކުނިބޮނި ހަލާކުވާ އިމާރާތްތަކާއި މަގުތަކުގެ ކޮންޑިޝަން ބަލާފައިވާނެއެވެ.

މި ސަރަހައްދުގައި އޮތް ހުންނަ މިންވަރު ހަރުމުގެ ގޮތުން 5 ސަރަހައްދުގައި ހުންނަ އޮޑީގެ މިންވަރު ހަމަޖެހިފައިވާ ތަން ވިދާޅު އަދި ބިމުގެ މަތީ ގެ ތެޔޮ ބަލައިލެވިފައިވާނެއެވެ. މިސަރަހައްދުގައި އޮޑީ އެންމެ ގަދައީ ކާބޮނުގެ މަގުތަކެވެ. އަދި މަޑު ސަރަހައްދު ނުހުރި ގޮތްގޮތުން ބަލައިލާނެ ބޭނުމަށް ކުރިއަށް ގެންދެވުނު ކަނޑުގެ ކުރަހާ ބަލައިލެވިފައިވާ، އެއީ އެބަގެ ތަކުގައި ދުއްވާ އެއްކޮޅު ގިނަގުނަ ބަލައިލެވިފައިވާ ފެހިކަމުގެ ބަލައިލެވޭ=ފައިވާއެވެ. ބައިގަނޑު ވަގުތުގައި ވަސް ސަރަހައްދުގައި އޮތް ހުރިހާ މިންވަރު

ދިވެހިރާއްޖެ ފުރަތަމަ ކޮންސްޓިޓިއުޝަން ހަދާ ކޮންވެންޝަން ފަށާފައި ހުންނަ ދުވަސްތަކުގައި ދިވެހި ރައްޔިތުން ދިވެހި ރައްޔިތުންގެ ދަށުން ދިވެހި ރައްޔިތުންނަށް ދެވޭ ހައްގުތަކާ ބެހޭ ކަންކަން ދެނެގަނެ ދެނެގަތުމަށް ކަނޑައަޅާ ގާނޫނެއް ނެތުމުން ދިވެހި ރައްޔިތުންގެ ހައްގުތަކާ ބެހޭ ކަންކަން ދެނެގަނެ ދެނެގަތުމަށް ކަނޑައަޅާ ގާނޫނެއް ކަމަށްވާ ދިވެހި ރައްޔިތުންގެ ހައްގުތަކާ ބެހޭ ގާނޫނު ތަންފީޒުކުރ

ތިމާގެއަށް ތަންކޮޅެއް ދިނުމުގެ ކުރިން ތިމާގެ ދަށުގައި ހުންނަ ބިންތަކުގެ ގުދަނ ބަލައި ބަލައި ބަލައި

1. EXECUTIVE SUMMARY

i. Apollo Holdings Pvt. Ltd., proposes to develop a 14-Storey Building with Basement at Ma. Alidhooge found on Shaheed Kudanevi Thuthu Manik Hingun, Male' for mixed use and residential purpose. The total area of the plot is 6,531.9 sqft. The development footprint will be 5,274.42sq.ft. An open space of 525.49sq.ft will be left within the plot. The project is expected to be completed in 1.8 years.

ii. The site will be excavated to a depth of 3m to lay the foundations and develop the basement area which will have a floor height of 2.3m. The entire boundary will be sheet piled to depths of 3.5 - 4m with corrugated sheets supported by iron beams as a safety and protection measure while preparing the site ready for construction. A raft foundation has been proposed for the building.

iii. Once completed, the building will have 13 residential floors with 2 bedroom, 3+1 bedroom and 4+1 bedroom apartments, ground floor for commercial use including shops and a mini mart and basement with car and motorcycle parking, storage, M&E room, chamber, admin, security room. A total of 36 x 2 bedroom, 24 x 3+1 bedroom and 2 x 4+1 bedroom unit will be developed for residential use. The rooftop on the 14th floor will have a play area, swimming pool, gym and a private garden area. It is estimated that around 300 persons can be accommodated in the residential units of the building.

iv. The EIA has been prepared as per the EIA Regulations 2012 developed directly under the Environmental Protection and Preservation Act and identifies that development of such buildings exceeding 31m in height and with basements or over 10 storeys with greater than 5ft foundation require an EIA to be undertaken and approved by EPA before commencement of construction.

v. In addition to Environmental Protection and Preservation Act, EIA Regulations, the project has to comply with Dewatering Regulation, Waste Management Regulation, Male' Planning Regulation, Land Act as well as comply with Maldives National Building Code recommendations.

vi. In order to understand existing environmental conditions of the proposed project area, assessments have been undertaken including ambient noise levels, traffic volume and movement, groundwater quality, soil and vegetation, physical condition of the surrounding buildings and roads as well as social assessments in the neighbourhood.

vii. The proposed development will take place in the central part of Male' City, Machchangoalhi District. The plot is within Block Number 194. The land plot is located at 4°10'33.51"N and 73°30'31.73"E. The proposed development area will be 5,274.42sq.ft of the 6,531.90sq.ft total plot area. The main connectivity to Alidhooge will be from Shaheed Kudanevi Thuthu Manik Hingun, which is a one-way road from east to west connected to Chandhanee Magu.

viii. Noise levels recorded from the sites were Site 1 51dB (10:00hrs), 65dB (18:00hrs) and 60dB (21:00hrs), Site 2 56dB (10:00hrs), 69dB (18:00hrs) and 64dB (21:00hrs), Site 3 50dB (10:00hrs), 67dB (18:00hrs) and 61dB (21:00hrs), Site 4 49dB (10:00hrs), 59dB (18:00hrs) and 62dB (21:00hrs) and Site 5 48dB (10:00hrs), 63dB (18:00hrs) and 57dB (21:00hrs). Based on noise level records, 18:00hrs, which coincided with schools afternoon session finish period was recorded to have the highest noise levels on all sites except for Site 4 where highest noise level occurred at 21:00hrs. The highest noise levels were recorded from Chandhanee Magu, which is a main road in Male' City where there is greater traffic movement most of the time.

ix. The traffic volume was assessed to be generally high especially on Chandhanee Magu which is a main road in Male' City. The highest traffic on both roads were recorded at 18:00hrs time period. This is mainly because the three school on Chandhanee Magu, Iskandhar School, Aminiya School and Arabiyya School finish their afternoon sessions at this time slot. The highest traffic volume at this period was from motorcycles having 1,942 on Chandhanee Magu and 773 on Shaheed Kudanevi Thuthu Hingun. All other traffic types including cars, pickups and lorries were recorded to be very low as such vehicles are not allowed during school rush hours. Pedestrian movement at this time was also observed to be extremely high.

x. The results of the groundwater analysis show that the groundwater of the area is good and free from contamination and pollution. The faecal colifirm levels were at 0 and salinity levels were at 0.650/00.

xi. There is no vegetation present in the proposed plot hence, vegetation assessment was not undertaken.

xii. The neighbourhood of block 194 as well as nearby blocks (195 and 196) has a number of multistorey buildings, most of which are believed to be used for residential purpose except for the ground floor of these buildings where it is used for commercial purpose such as shops. However, on the adjancent of Alidhooge plot, only one multistorey is found, which is located on the eastern side at Shimaagu. The buildings is currently under construction and 6 sheets have been completed out of 10 sheets. Other plots on the adjacent of Alidhooge at Gurumful on the northern side has 2 storey building and Anbaraa on the western side has a single storey building. The structure of Shimaagu is 2 - 3 years old. The buildings at Gurumful is less than 5 years old.

xiii. The condition of these roads are observed to be good. No cracks or physical damages were found.

xiv. There are some concerning environmental impacts from the proposed project, such as excavation, dewatering, construction activities, operation of construction machinery, construction waste generating environmental impacts such as noise, dust and pollution are believed to occur. Social impacts such as traffic congestion, disturbance to nearby residents have been predicted as well as health problems as a result of dust have been identified. During operation period of the project, domestic waste and traffic are believed to increase.

xv. As part of the proposed project, a number of mitigation measures have been proposed in the EIA Report including using corrugated sheets supported by iron beams as a safety measure for protecting the excavated area for foundation, dewatering will be undertaken upon approval from EPA, while preparing the site ready for construction, measures such as installation of safety and dust protection nets, appropriate signage will be placed to make aware people on the development.

Important considerations with regards to mitigating environmental impacts include closing the boundary of the project area, placing dust nets around the building, regularly transporting construction waste and avoiding material transport during peak traffic hours as well as designating proper time periods for construction works have been identified.

xvi. Although the project has short-term environmental impacts from the proposed development, the project has more social and economic benefits, which is believed to tremendously contribute to the need for residential and commercial space in Male', create some employment opportunities and contribute to the local economy in Male' in the long-term.

xvii. Although during construction of the project, negative environmental impacts from construction activities have been envisaged, with appropriate environmental management and mitigation measures, these impacts will be reduced to a considerable level. Also, with positive socio-economic outlook of the project and considering the need for additional space in Male', it is concluded that the project is an important development.

2. INTRODUCTION

2.1 PROJECT BACKGROUND

Apollo Holdings Pvt. Ltd., proposes to develop a 14-Storey Building with Basement at Ma. Alidhooge found on Shaheed Kudanevi Thuthu Manik Hingun, Male' for mixed use and residential purpose. The total area of the plot is 6,531.9 sqft. The development footprint will be 5,274.42sq.ft. An open space of 525.49sq.ft will be left within the plot.

The site will be excavated to a depth of 3m to lay the foundations and develop the basement area which will have a floor height of 2.3m. A raft foundation has been proposed for the building. The entire boundary will be sheet piled to depths of 3.5 - 4m with corrugated sheets supported by iron beams as a safety and protection measure while preparing the site ready for construction. Furthermore, the adjacent building walls within the boundary will be plastered while preparing the site ready for construction.

Once completed, the building will have 13 residential floors with 2 bedroom, 3+1 bedroom and 4+1 bedroom apartments, ground floor for commercial use including shops and a mini mart and basement with car and motorcycle parking, storage, M&E room, chamber, admin, security room. A total of 36 x 2 bedroom, 24 x 3+1 bedroom and 2 x 4+1 bedroom unit will be developed for residential use. The rooftop on the 14th floor will have a play area, swimming pool, gym and a private garden area.

The provision of main utility services of freshwater, electricity and sewerage will be from the main service providers including MWSC and STELCO. Additionally, waste collection will be undertaken by Waste Management Corporation (WAMCO) from the building.

2.2 AIMS AND OBJECTIVES OF THE PROJECT

The key aims and objectives of the project are;

- To develop a mixed use building for commercial and residential purpose
- To contribute to social housing needs in Male'

- To contribute to commercial space needs in Male'
- To develop a multi-purpose building in a prime location in Male' with state-of-the-art facilities including security and services

2.3 LEGAL REQUIREMENT

This is the Environmental Impact Assessment (EIA) Report for the proposed 14-Storey Building at Ma. Alidhooge, prepared in order to get environmental clearance from Environment Protection Agency (EPA) for the development.

The EIA has been undertaken as per the requirement of the EIA Regulation 2012 and its Amendments where the Schedule D of the Regulation, which enlists that EIAs shall be undertaken for development projects involving buildings exceeding 10 sheets without the raft foundation, buildings exceeding 31m in height, buildings exceeding 10 storeys with a foundation, buildings that have a basement and buildings that have a foundation deeper than 5ft.

The proposed project meeting with all of the above requirements, hence, requires an EIA to be undertaken and approved by EPA outlining the existing environmental conditions of the project site, key environmental concerns including likely environmental and social impacts that will be generated from the proposed project and measures to mitigate these environmental impacts and a monitoring programme to be undertaken during pre-construction and post-construction periods.

2.4 STATEMENT OF NEED AND RATIONALE

Land is scarce in Male'. As a result, government, private and commercial purposes, land for residential, commercial and public uses are created through development of multi-storey buildings. Due to drastic increase in population as well as commercial activities and need for residential, commercial and economic use of land, there is tremendous pressure on land in Male', which has been on the rising demand for several years. Most evidently, Male' has been experiencing stress on housing and demand for housing has increased manifold over the last couple of years. Therefore, development of residential or mixed-use for residential and commercial purposes has become quite prominent.

Because of the scarcity of land, Male' has a history of development of high rise buildings in order to meet the land requirement for housing and commercial uses. There is a great influx of people to Male' from the Atolls for commercial, educational, medical and employment purposes, which creates a very high demand for both residential and commercial space.

The government has recently introduced policies regarding involvement of private sector in social and commercial housing development in order to reduce the housing stress especially in greater Male' region. Furthermore, government recently allowed for development of buildings up to 25 storey to assist with increasing demand for space needs in Male and Greater Male' Region.

The proposed building is centrally located in Male' in a residential / commercial / public area, considered a prime location in Male' for multitude of uses due to close proximity to commercial areas as well as a number of large schools in Male'

The proposed project is designed as a commercial and residential development with a basement area designated primarily for parking. The proposed development is believed to contribute to addressing the housing and commercial space stress that currently exists in Male' in addition to creating indoor private parking space, which are becoming scarce in Male'. The project area is within a prime location in Male' for residential and commercial purpose.

Figure 1: Increased development of buildings in Male' as a result of population pressure

2.5 EIA APPROACH, SCOPE AND OBJECTIVE

This EIA Report has been prepared based on information collected from the project site and the surrounding environment by use of established methodologies, desk research for obtaining relevant secondary data, information obtained from the project proponent, use of guidelines collected from relevant laws and regulations as well as information obtained from EIA studies carried out in the country for similar projects and experience of the EIA team engaged in preparing the report.

The primary objective of the EIA study is to safeguard the surrounding environment during planning, design, construction and operation of the proposed project activities by mitigating environmental and social impacts envisaged during various phases of the project and implementing an environmental monitoring programme to quantify the changes in the environmental components as a result of the development.

The specific objectives of the EIA study are;

- Determine the baseline environmental conditions of the project and surrounding area.
- Identify, predict and assess environmental impacts that might arise during pre-construction, construction and operation phases of the project.
- Suggest environmental impact mitigation measures to suit local conditions in order to eliminate or reduce the negative impact on the environment
- Enable the project proponent to comply with environmental laws and regulations.

The scope of the EIA study includes;

- Assessment of the present status of physical, biological and socio-economic components of the environment relevant for the proposed development.
- Identify environmental and social impacts due to the proposed project on environmental components (during the pre-construction, construction and operation phases).
- Evaluate these impacts to understand their magnitude.
- Propose environmental management and mitigation measures for the impacts identified.
- Propose an environmental monitoring programme to be pursued by the project proponent.

2.6 EIA METHODOLOGY

The methodology adopted for the environmental impact study consists of the following stages:

- Identification of significant environmental components and assessment of their baseline (pre-project or existing) status within the study area. This is carried out by both qualitative and quantitative assessments.
- Prediction of impacts on various identified environmental and social parameters due to the proposed project. Data relating to the proposed construction activities, demolition (if any), construction and operation stage waste, as well as other activities causing environmental and social impacts through use of a descriptive impact matrices.
- Review of relevant EIAs carried out in similar environmental settings.
- Evaluation of significance of environmental impacts by use of significance analysis method
- Expert judgment and professional opinion have also been used throughout the impact assessment and evaluation process. These methods are described in detail at the relevant section of this EIA Report.

2.7 REVIEW OF RELEVANT STUDIES

As part of relevant literature review and preparation of the report, the following EIA studies have been reviewed to understand the effects of such development projects on the environment and social conditions in addition to personal experiences of the environmental consultant who have prepared this EIA Report. These are;

- EIA For the Development of a 14 Storey Building at H. Filigasdhoshuge, Malé, prepared by Water Solution Pvt. Ltd. in 2010.
- EIA For Proposed 14-Storey Mixed-Use Residential Complexes in Hulhumale' prepared by Mohamed Zuhair and Ibrahim Shakir in 2015.
- EIA For Proposed Multi-Storey Building at H. Blue Heaven, Male' prepared by Sandcays Pvt. Ltd. in 2016.

- EIA For Proposed Construction of 25 Storey Building at Indhira Gandhi Memorial Hospital, Male' prepared by CDE Consulting in 2016.
- EIA For Proposed 20-Storey Rehendhi Building in Male' prepared by Mohamed Zuhair and Ibrahim Shakir in 2016.
- EIA For Proposed 15-Storey Building with Basement at H. Dhoovehi, Male' prepared by Mohamed Zuhair and Ibrahim Shakir in 2017.

All these EIAs focus development projects involving multi-storey buildings as an important part of the project some of which are with basements, hence, have been used as reference material in order to understand the types, degrees and magnitudes of environmental and social impacts mostly from excavation, foundation development as well as construction activities. They also address how these impacts will be dealt with regards to reducing environmental and social impacts. Construction related impacts such as use of machinery, noise, dust, traffic congestion and short-term aesthetic issues have been identified as having both environmental and social implications.

Furthermore, potential inundation impacts on Male' City from projected sea level rise presented in the First National Communication to the Framework Convention on Climate Change has been highlighted in the report to address potential site risks.

2.8 EIA TEAM

Mr. Mohamed Zuhair, EIA Consultant (EIA01/15) is the team leader, who is a freelance Environment Consultant who has many years of experience in the field of environmental management, assessment and monitoring, implementation of environmental laws and regulations and has involved as lead consultant and a team member in preparing several EIAs in the Maldives including EIAs for tourist resort development, mariculture and agriculture development, residential and commercial development, harbor development, coastal protection, land reclamation, etc.

Mr. Ibrahim Shakir, Registered Land and Hydrographic Surveyor (BP03106), who is an experienced Land Survey Consultant who has undertaken a number of land surveys for the purpose of land registration and development, setting out surveys for buildings in tourist resorts and real estate projects, undertaken many hydrographic surveys for development of important

facilities such as jetties, harbours, water villas, as well as other water-associated facilities in many islands in the Maldives.

Curriculum Vitae of the Consultants have been annexed to this report.

2.9 EIA TERMS OF REFERENCE (TOR)

The Terms of Reference (TOR) outlining the scope of this EIA has been approved on 3 August 2017 based on the discussions undertaken in the EIA Scoping Meeting held at EPA on 3 August 2017.

The approved Terms of Reference is attached in **Appendix 1.**

3. STUDY AREA

The information for the EIA was collected from the proposed project area and the surrounding environment.

The following figures show the location of the project region, project location where the development will be undertaken as well as the study area boundary.

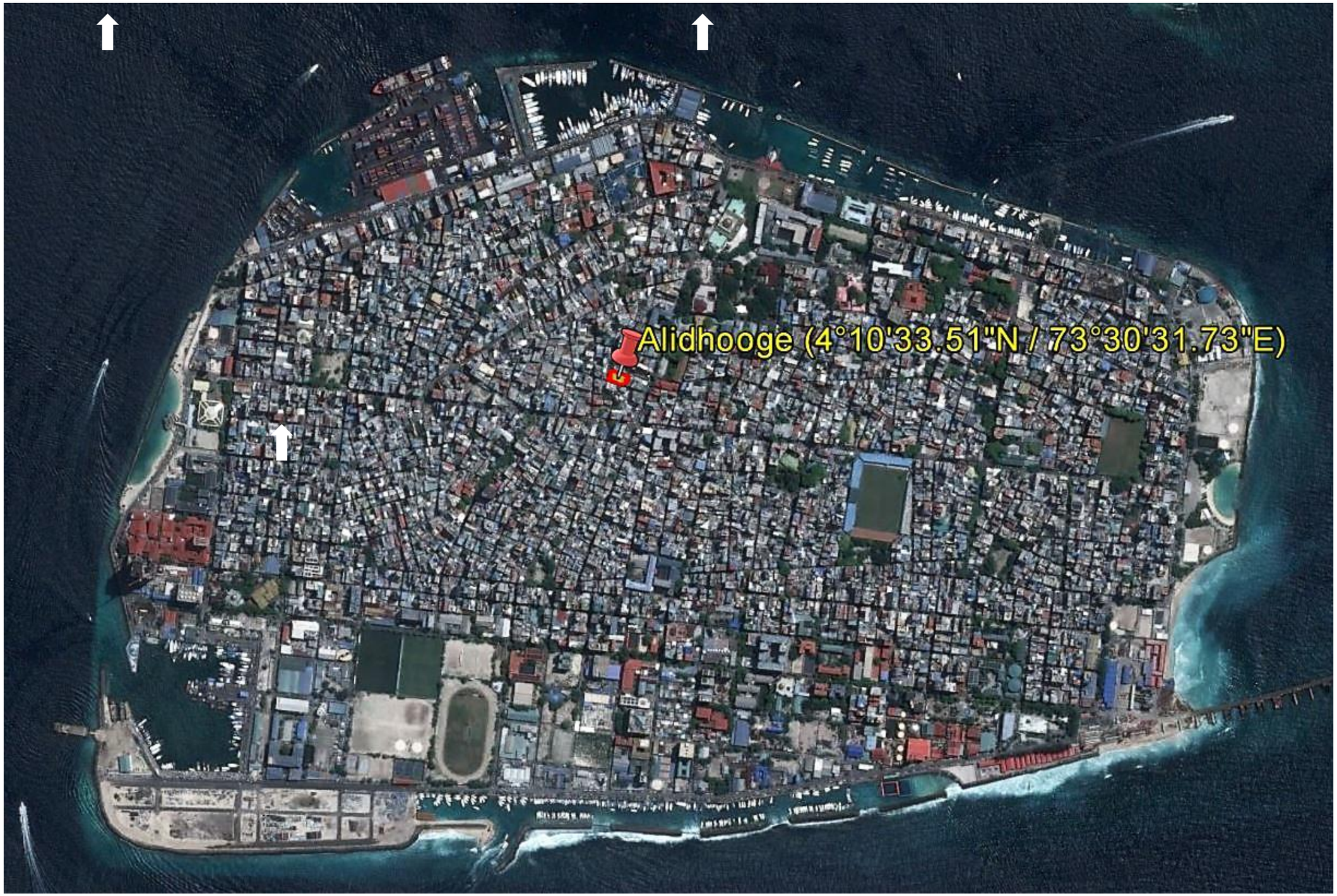


Figure 2: Location of the proposed development plot in Male' City

Figure 3: Aerial view and location of the proposed development plot

Figure 4: Study area

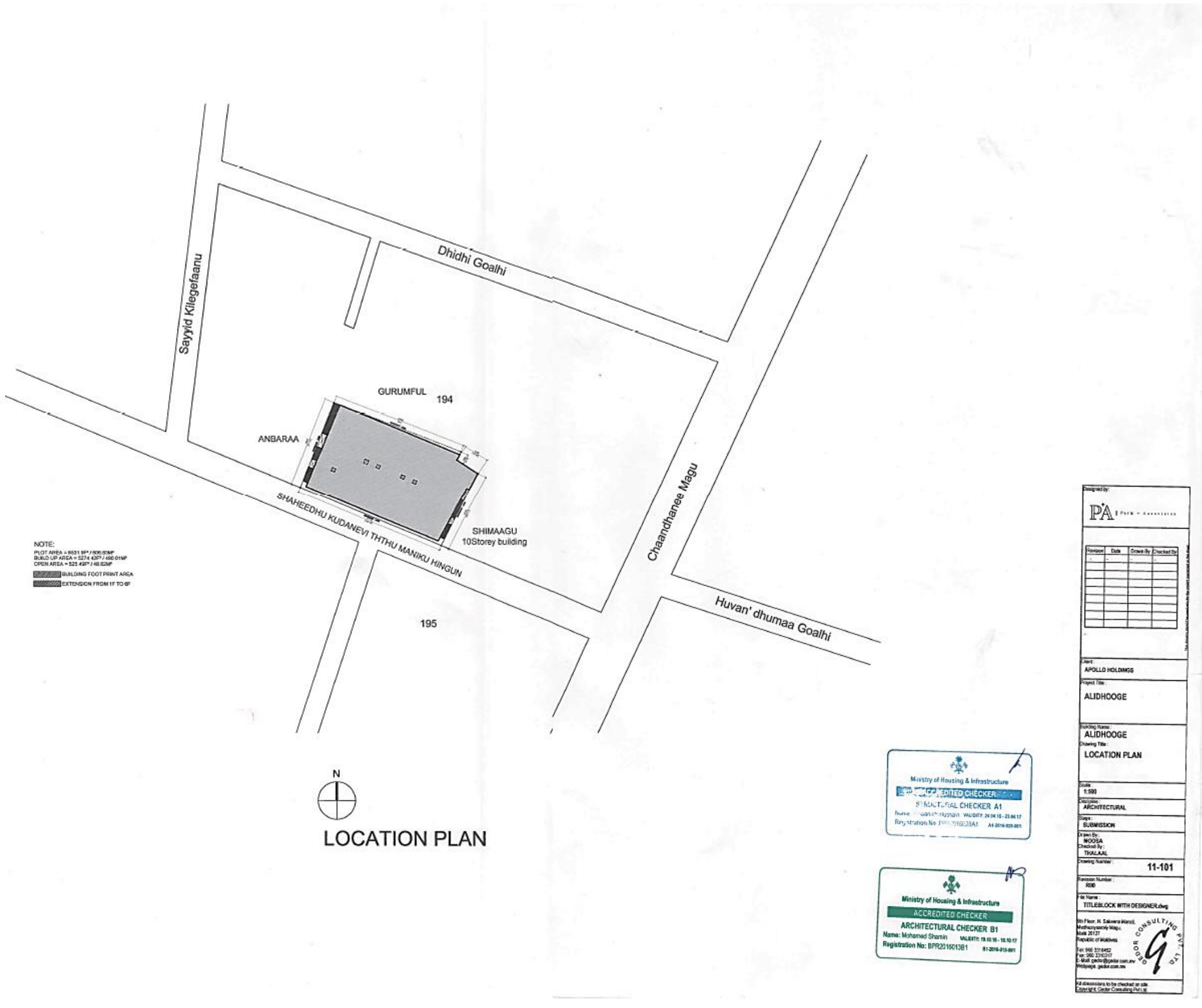


Figure 5: Plot location

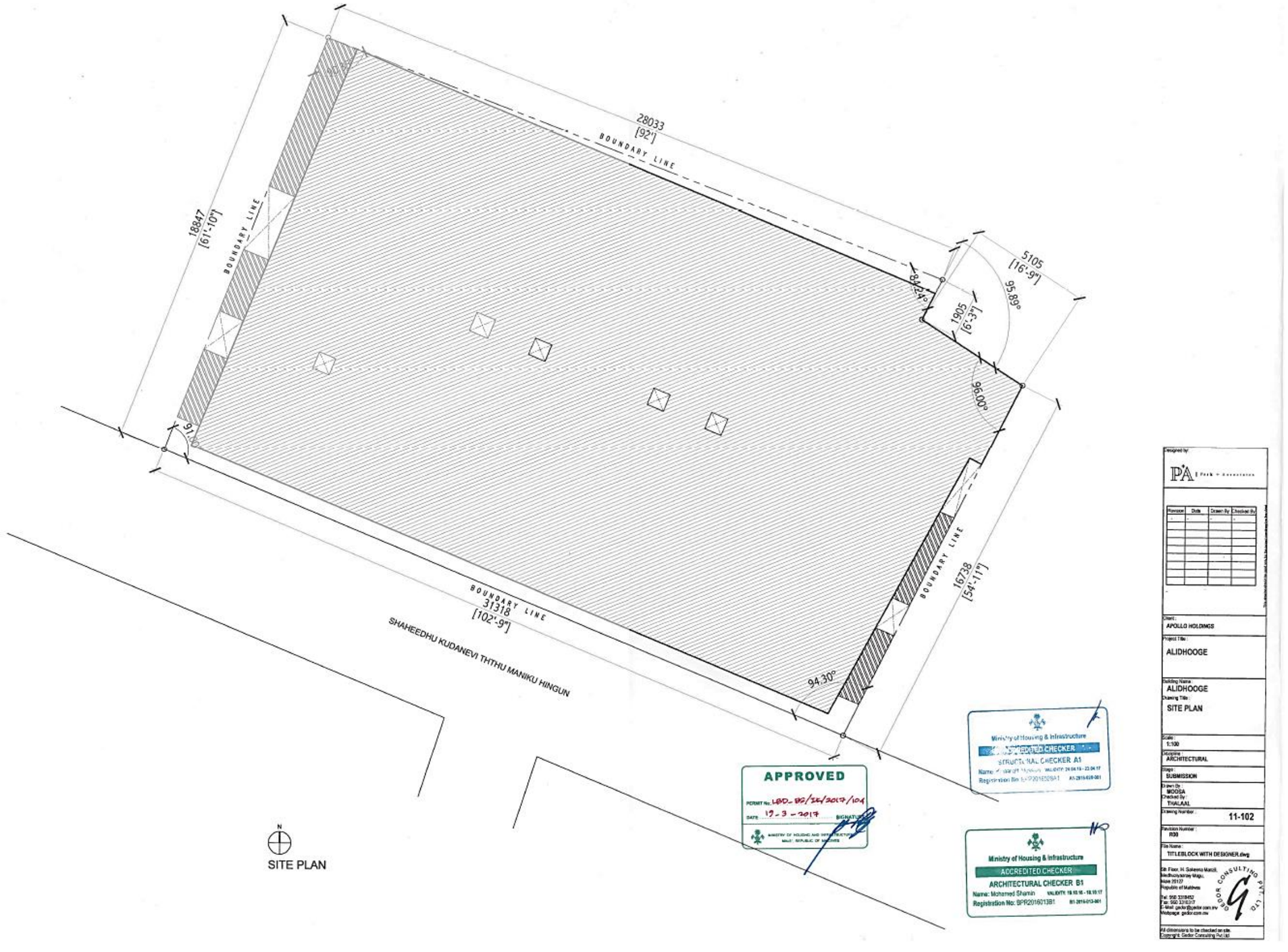


Figure 6: Plot boundary details

4. PROJECT DESCRIPTION

4.1 PROJECT LOCATION, SIZE AND TYPE OF DEVELOPMENT

The proposed development will take place in the central part of Male' City, Machchangoalhi District. The plot is located within Block Number 194. The main connectivity to Alidhooge will be from Shaheed Kudanevi Thuthu Manik Hingun, which is a one-way road from east to west connected to Chandhanee Magu. The block is located within a residential area as well as close to commercial shops and Iskandhar School, Aminiya School, Aribiyya School and Center for Higher Education.

The land plot is located at 4°10'33.51"N and 73°30'31.73"E. The proposed development area will be 5,274.42sq.ft of the 6,531.90sq.ft total plot area. It is a mixed-use real estate development project. A total of 14 storeys will be developed with a basement for parking, ground floor for commercial use as well as units for residential and private use.

4.2 PROJECT PROPONENT AND CONTRACTOR

Apollo Holdings Pvt Ltd was established in the year 1998 as a private limited company. The company commenced trading in the same year with import and distribution of hardware materials in the Maldives as its main line of business.

Apollo holdings' past financial investments in real estate business include the development of three real estate projects in Male' for long term lease basis, including Alidhooge The proposed project is set to commence in August 2017 and has been estimated to be completed by April 2019.

Contact details of the Proponent are;

Apollo Holdings Pvt. Ltd.
M. Marine Villa, 2nd Floor
Varudhee Hingun

Male' 20282

Tel: (960) 332 0065; (960) 779 7489

Fax: (960) 333 5706

E-mail: mohamed.adam@apolloholdings.com.mv

The Main Contractor of the project is;

Batch Construction Pvt. Ltd.

Boduthakurufaanu Magu

Maafannu

Male' 20276

Tel: (960) 334 5544

Fax (960) 333 7024

Email: asd.project@batch.com.mv / ms@batch.com.mv

4.3 JUSTIFICATION

Male' City is the Capital, commercial and business hub of Maldives, which only has a size of 5.8 km^2 and a population of 133,412 (Census 2014) making it the most densely populated island in the Maldives that exceeds 23,000 persons per km^2. This population density is higher than Macau (20,000 person per km^2) and Monaco (15,000 person per km^2).

Development of buildings for both residential and commercial use in Male' is rapidly growing in order to cater for the increasing population. As the island is relatively small, the only option available in order to meet with the rapid population growth and demand for space is by developing multi-storey buildings.

One good example is development of 14-storey government office complex at Velaanaage, which is housing a number of government offices including some ministries and offices at the building. The building was opened in 2010.

Figure 7: The 14 Storey Velaanaage Office Complex (left) and ongoing 25 Storey IGMH Building

Construction of high rise buildings in Male' for both residential and commercial use has increased manifold over the last years to address the increasing demand for spaces for various uses, especially residential. Construction and real estate businesses are now quite well established.

Also, in order to address the land issues in Male', Hulhumale' Villimale' and Gulhifalhu are targeted for social and commercial development, which although has brought some leverage to the issue, however, the demand continues to grow rapidly. This is primarily because adequate spaces for commercial and residential needs are not created in accordance with the increasing population in greater Male' region.

Recently, the Government of Maldives has announced provision for allowing development of larger plots of land having 25 storeys as maximum, which are 10 floors more than that is usually allowed in the country. Currently IGMH Building is being constructed for 25 storeys. This is also to increase space supply in order to meet with the growing demand for space for residential, social and commercial needs.

As part of the proposed project, the building will be used for commercial, residential purpose as well as private use with 14 floors and a basement.

4.4 PROJECT OUTLINE

4.4.1 Project Scope

The following aspects form the general scope of the proposed project,

- Design – designing of concept, architectural, engineering, structural and services schemes of the project
- Approval of the design from Ministry of Housing and Infrastructure
- Preparation of EIA and approval from Environment Protection Agency (EPA)
- Project Mobilization and management
- Site clearance and setting up
- Construction and development of the project
- Completion of the project
- Provision of operational, management and maintenance services

4.4.2 Project Master Plan

4.4.2.1 Development Concept

The proposed 14-storey building and the basement will be developed as a commercial and residential building with all facilities and services provisions.

The conceptual design of the project has been approved by Ministry of Housing and Infrastructure by the letter number LBD-BS/KF/2017/111 dated 19 March 2017.

A copy of the approval letter from Ministry of Housing and Infrastructure is attached in **Appendix 2.**

The design concept of the project is attached in **Appendix 3.**

The residential units developed from 1st floor above will be comfortable and modern in design with state-of-the-art facilities and services. The basement will have a large area for car and motorcycle parking and storage area. Ground floor is dedicated for commercial use including a mini market, shops, admin area and M & E Room. Effective use of space of the land plot has been greatly integrated with the development.

The building design has integrated cross-ventilation and natural lighting as an important aspect for energy saving. The southern side of the building, which is the main building façade will open to the road, hence ventilation and lighting will be greatly enhanced. Three lifts and staircases will be installed as per the requirements.

4.4.2.2 Parking Capacity and Access

The basement will have 9 car parking spaces, which will be developed for private use. A small area is also dedicated for motorcycle parking. Access to these car parking areas will be by a ramp from the main entrance on the southern side of the building through an open portico at Shaheed Kudanevi Thuthu Manik Hingun. This road is 15ft wide.

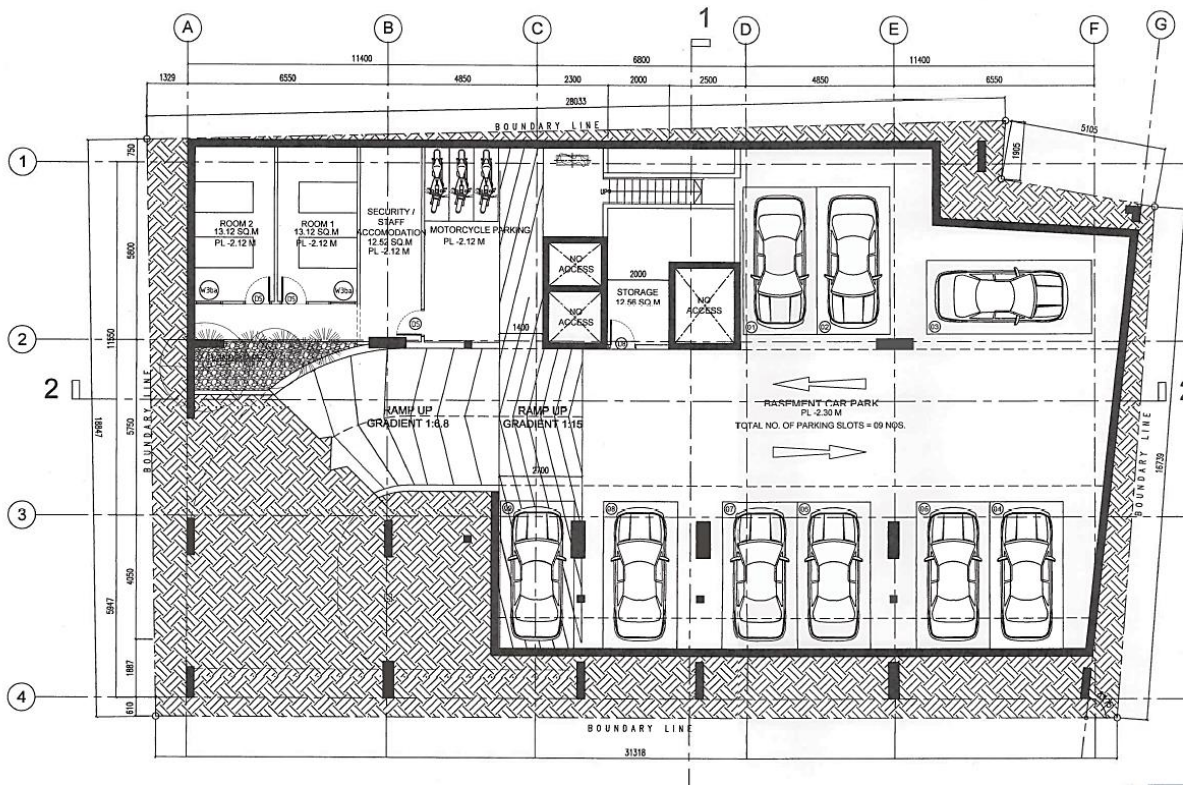


Figure 8: Parking plots and access point from Shaheed Kudanevi Thuthu Manik Hingun

4.5 PROJECT DEVELOPMENT

4.5.1 Project Schedule

The proposed project is expected to be completed in 1.8 years (667 days). A detailed project schedule is attached in **Appendix 4.**

4.5.2 Key Activities to Date

During the initial design of the project, approvals for architectural and structural designs were obtained from registered checkers, which was obtained in December 2016.

The approvals of the checkers are attached in **Appendix 5.**

The building concept was then designed and developed and approved by Ministry of Housing and Infrastructure in March 2017.

The existing single storey buildings in the plot have been demolished and the site has been appropriately fenced to commence the development activities.

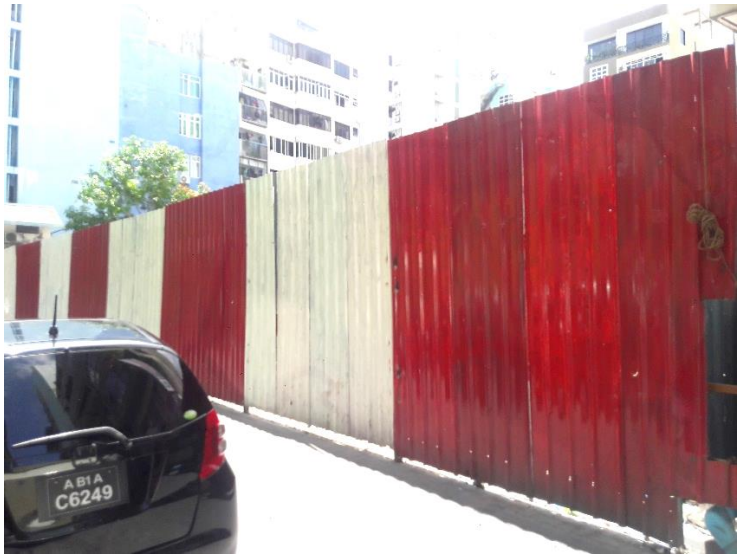


Figure 9: Fence of the proposed project area

Baseline assessments for collecting environmental and social data from the site and surrounding environment has been completed after approval of the EIA Terms of Reference on 3 August 2017.

4.5.3 Key Uncertainty Factors on Project Schedule

The key uncertainty factor that may affect the project schedule or the work plan of the project is extreme weather conditions and flooding in the area due to heavy rain where work such as excavations, foundation and lead time for sheets cannot be completed.

Also, certain delays in preconstruction activities such as obtaining permit for dewatering and construction may affect the overall project schedule.

4.5.4 Project Mobilization

Mobilization of the project will be undertaken once EIA is approved from EPA. A temporary security hut is currently developed within the plot. As the project has very tight deadlines, an early mobilization and getting ready for construction in order to meet with the key project milestones are an important aspect of the overall project implementation.

4.5.5 Temporary Setup

In order to make site ready, the road area of the plot has been appropriately fenced as some of the initial construction materials and machinery will be kept at the site.

Figure 10: Temporary setting works within the plot

Other important activity during the initial phase will be development of temporary storages for materials within the plot. Plastering works for the adjacent buildings will be undertaken once the temporary storages are completed.

In addition to setting up of temporary storages, temporary arrangements for electricity and water supply for construction works will be arranged from STELCO and MWSC. The requirements for the arrangements have already been communicated to the service providers and approved by them.

4.5.6 Site Clearance and Preparation

As there are no existing buildings at the plot, there will be no requirement for any demolition work. Ground leveling and preparation works will be undertaken immediately upon approval of the EIA. Excavation areas for basement and foundation will temporarily marked in order to make the site ready to initiate the activities.

4.5.7 Excavation Works

A total area of 607m^2 from the plot will require to be excavated to a depth of 3.5m, which will be done by using excavators. It is estimated that around 2,125m^3 of sand from the entire plot will be excavated for laying the foundation as well as basement of the building.

The excavated material will be immediately transported to approved locations in Male' by Ministry of Housing and Infrastructure. At present a site or a location for disposing the material has not yet been confirmed. The excavated sand will not be used for construction purpose.

4.5.8 Site Protection

As there are existing buildings on the eastern, northern and western sides of the plot as well as roadside on the southern side, the entire boundary will be shored with corrugated 6mm sheets supported by 1.1/2" angle iron beams at 1.2m – 1.5m distance for bracing as a safety measure while preparing the site ready for laying the foundation and construction works. The sheets will be laid to a depth of 4m.

Before excavation works begin, sheet piling and plastering of the walls of the adjacent buildings will be undertaken to ensure further protection of the buildings.

Figure 11: A sample sheet pile done to test protection of adjacent buildings

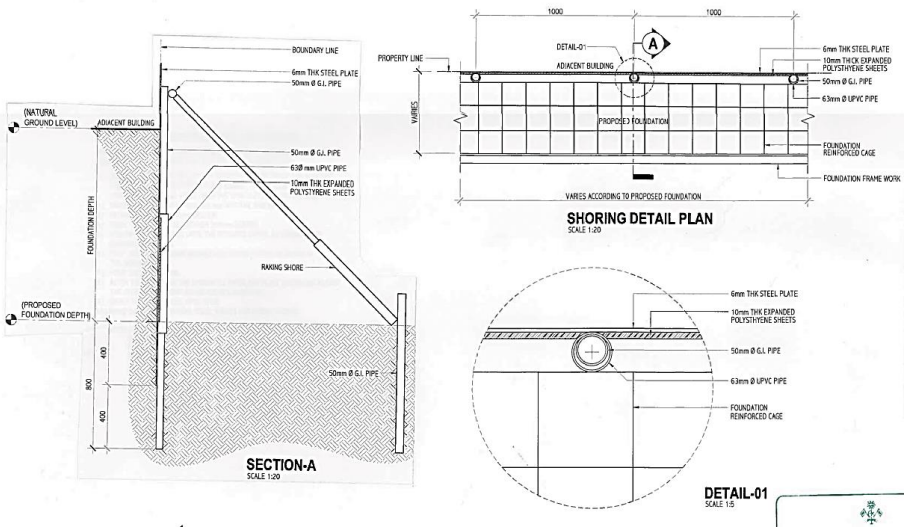


Figure 12: Shoring plan

4.5.9 Dewatering

It is estimated that around 1,700m^3 of groundwater will require to be dewatered from the plot. Prior to dewatering, permit will be obtained from Environment Protection Agency (EPA) and will use machinery of Male' Water and Sewerage Company (MWSC) for all dewatering needs and confirmation from MWSC has already been given to the contractor. A dewatering pipeline from the plot to the main junction has already been laid by MWSC.

It is estimated that around 40 - 56 days will be required to complete the dewatering works with approximately 42.5 - 30.5m^3 dewatered on a daily basis. Dewatering will be initiated upon obtaining a dewatering permit from EPA, which will be extended as per the requirement of dewatering works.

During the operation of dewatering, necessary signboards will be placed as per the requirement of Dewatering Regulation.

4.5.10 Foundation Works

4.5.10.1 Type of Foundation and Details

A raft foundation will be laid for the proposed building.

A raft foundation is a spread of concrete slabs further supported by incorporating concrete beams into the foundation, which will be laid covering the whole building area. The entire

building will be supported by the raft foundation. Raft foundation is normally undertaken in loose soils with low bearing capacity in order to support the loads over a large area.

The depth of the foundation will be 2.3m except for the lift area, where the depth will be 3.3m with foundation thickness of 300mm. All exposed surfaces of foundation will be applied with bituminous based protection coating and all main bars will have U bends.

A concrete mix ratio of 1:2:3 has been considered for the foundation.

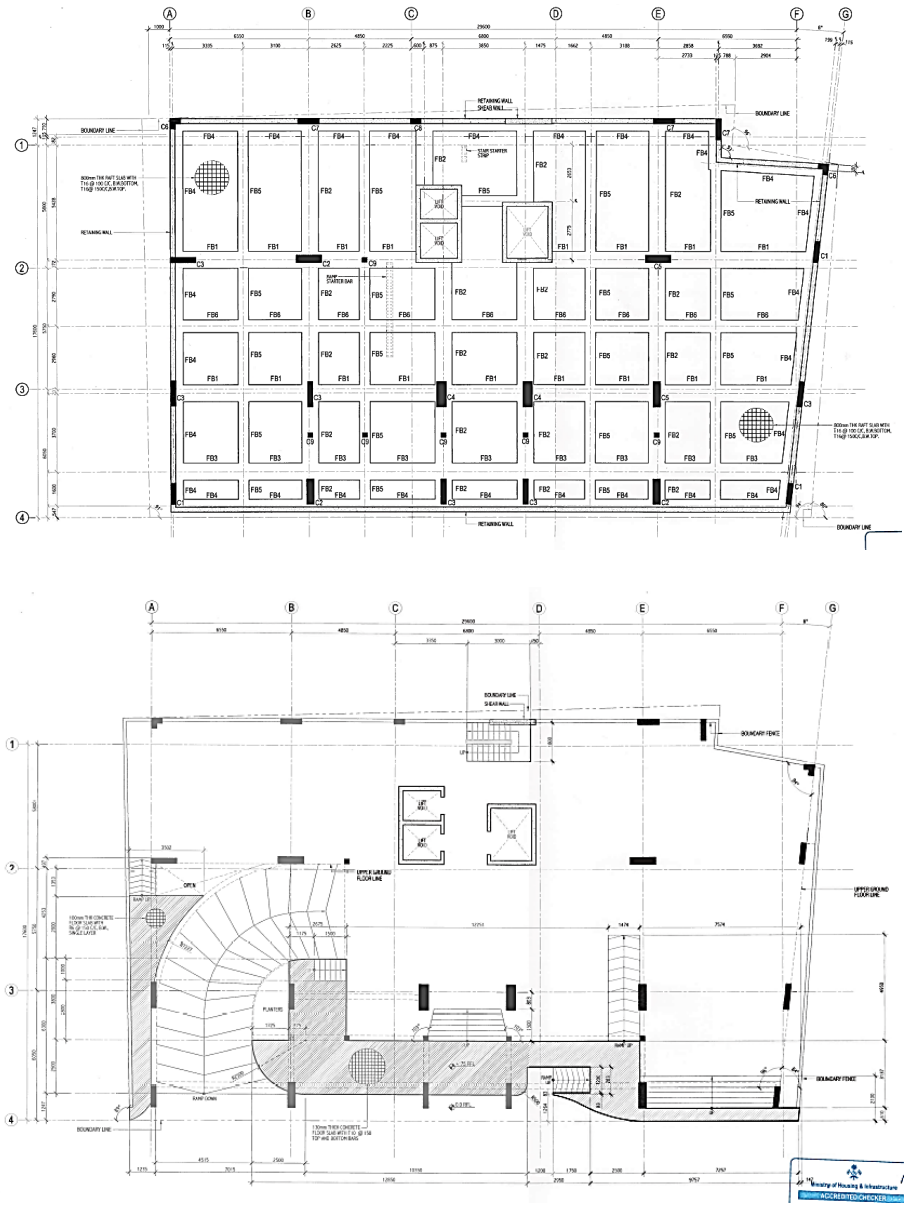


Figure 13: Foundation plan of the proposed building

The details of the foundation are attached in **Appendix 6.**

4.5.10.2 Carrying Capacity of Foundation

The approximate design load of the building has been estimated to be 125kPa for an allowable settlement of 100mm.

4.5.11 Construction Works

All construction works including structure development with concrete floor sheets, reinforced beams and slaps will be developed as the structural building frame upon completion of the foundation works. All construction works will be undertaken within a building safety framework and adequate lead time will be allowed in between the structural work requirements.

Light-weight concrete blocks will be used in all walls plastered with cement on either side of the wall. Electricity and telecommunication cable networks, water and wastewater pipe networks required for the overall building including shops, apartments and rooftop be laid upon completion of the structural works. All finishing works including wall sealing, painting and electric and water fixing works will be undertaken at the last stages of the construction.

4.5.12 Electricity Requirements

The energy requirements during the construction phase of the project will be obtained from STELCO sources in Male'. Initial discussions and finalization of machinery requirements have already been undertaken. It is estimated that between 50 - 75kW of electricity per day will be required during the construction phase of the project mainly to operate construction machinery, tools, lighting, lifting, welding, etc.

A STELCO power box is available at the plot, where temporary requirements for electricity can be easily obtained.

4.5.13 Freshwater Requirements

Only desalinated water will be used for all construction water requirements during the construction phase, which will be sourced from MWSC sources in Male'. Temporary arrangements for connecting freshwater to the project site has already been undertaken with MWSC. It is estimated that around 2.5 - 5m^3 of desalinated water per day will be required for all the construction operations.

Drinking water for labour workers will be fresh bottled water supplied from shops found nearby. No groundwater will be used during construction.

4.5.14 Construction Waste Management Plan

Large amounts of construction waste are believed to generate from the proposed project during the process of building development. During construction, construction waste from concrete, empty cement bags, wood and wood pallets, iron, steel, broken pieces of concrete blocks, nets, rods, cardboards, etc will form the bulk of construction waste.

Some of the construction waste generated at the site will be re-used, while disposable waste will be disposed off from the site.

Also, construction waste will be regularly transported to the waste management area in Male'. Two options will be looked at for managing construction waste. In this regard, construction waste will be transported to designated waste collection area in Male' by the contractor by using own vehicles. The other option will be to contact Waste Management Corporation (WMC) for their services of transporting construction waste on a regular basis.

In any option, handling and transportation of construction waste will be done as per the requirements of Waste Management Regulation implemented by EPA. If the project decides to transport waste by own means, a license will be obtained from EPA. If waste management will be given to WMC, they already have license and their transporting vehicles are according to the requirements of the regulation.

Wastewater during construction phase will not be disposed into the sewer network as construction wastewater contains large quantities of cement and other elements which may block the sewer. This wastewater will be either disposed into the ground by using soil pits or collected by using containers, where it will be transported to designated areas.

4.5.15 Traffic Management

Shaheed Kudanevi Thuthu Manik Hingun is a one-way road (from east to west) and access to the road is only from Chandhanee Magu. A parking zone for cars and motorcycles is found opposite the proposed plot area on the southern side of the road. Parking from this zone will require to be temporarily closed at the time of building construction for safety reasons.

Managing traffic access to the road will be an important aspect during construction phase of the building. Once the existing parking zone is temporarily moved, traffic can easily flow even during construction stages.

This requirement will be formally communicated to Ministry of Housing and Infrastructure and arrangements for vehicle access as well as temporarily moving parking areas will be undertaken before initiating construction works at the site.

Considering Chandhanee Magu is a heavy traffic area and large portion of this traffic gets diverted to Shaheed Kudanevi Thuthu Manik Hingun, traffic management during heavy traffic hours, during loading and unloading periods will be carefully planned.

Figure 14: Parking zone on the opposite side of the plot

4.5.16 Compensation Plan for Dewatering and Construction Related Damages

During the process dewatering, a seepage from the surrounding areas to the excavated area is believed to occur, however, will be minimized to a great extent due to proposed shoring methodology for site protection by use of sheets surrounding the entire excavated area. Damages to the surrounding areas due to dewatering will be temporary, hence long-term damages are unlikely. Care will be taken to reduce discharges into surrounding area during dewatering.

There are residential buildings on the immediate adjacent sides of the proposed building and as well as shops and offices in the vicinity. The boundary for the compensation plan has been considered for adjacent buildings and buildings within a 30m radius of the plot.

If there are any compliant from neighbors during dewatering and construction operations, the work will be immediately stopped and the extent of damage will be assessed and verified before it will be rectified. Monetary and physical compensation means in close collaboration with regulatory authorities will be considered depending on the magnitude of the damage. In case of any water shortages in the surrounding areas due to dewatering, water will be provided by the proponent until the issue is rectified.

A formal letter has been sent to all adjacent plot owners informing of the proposed development at Alidhooge with all contact details from the contractor side where the adjacent plot owners can directly communicate if there are any concerns from the development and if there are any damages and disturbances as a result of construction activities at the site.

The contact details are;

i) Ahmed Areeb, Operations Manager 7788562
ii) Ismail Shamil, Admin and HR Manager 7788103
iii) Jit, Project Manager 7676730
iv) Office, 7772054

The copies of the letters are attached in **Appendix 7.**

4.5.17 Waterproofing of Basement Area

A number of measures have been considered for waterproofing of the basement area. In this regard, the new ground level will be at 1400mm higher than normal ground level in order to stop potential flooding from outside.

All the walls of the basement will be concealed with a waterproofer and a water sealer. The waterproofer expands as it dries to become part of the wall. The water sealer will act as waterproof concrete as it take moisture of the wall to form its waterproof crystalline structure.

Additionally, s sump pit with a pump will be installed at the basement area to regularly pump water out from the sump. The sump will be connected with a perforated drainage pipe to collect water and then pumped out from a sump well. This will keep the basement dry at all times.

4.5.18 Occupational Health and Safety

Occupational health and safety issues will be dealt with at all times during the construction process of the proposed project. Health and safety briefings will be undertaken on a regular basis. All required equipment will be made available. In this regard, all construction workers will wear safety clothing including overalls, gloves, safety helmets, masks and safety boots during work at all times. Construction safety measures such as safety nets all around the building framework will be placed at all times. Other safety measures such as use of welding masks and use of safety belts will be made mandatory.

The site operations manager and site engineer will regularly supervise safety measures during construction period of the project.

Areas that accumulate water will be regularly cleaned to avoid potential mosquito breeding.

First aid kits will be made available on site for treating smaller wounds and cuts onsite. For serious and emergency issues, injured will be immediately taken to IGMH or ADK Hospitals for treatment.

Fire extinguishers and blankets as well as access to water will be made available at the project site in case of potential fire accidents.

4.5.19 Demobilization and Inspection

Towards the end of the construction period of the project, the demobilization process will be initiated. Demobilization will be undertaken after completing required construction works and finalization of the project. Upon demobilization of machinery and equipment, site inspection by the concerned agencies such as Ministry of Housing and Infrastructure, EPA, Maldives Energy Authority (MEA), etc will be requested.

Prior to demobilization, all construction waste as well as all other items not required in the site will be transported out of the site and the building will be cleaned.

4.6 OPERATIONAL PHASE

Following are the aspects that will be covered during the operational phase of the project.

4.6.1 Provision of Electricity

All electricity requirements during the operational phase will be obtained from STELCO. It is estimated that around 200-300kW of electricity per day will be required during the operation. There are no issues with STELCO to have the required electricity capacity during the operation of the proposed project.

They are currently upgrading their systems in selected zones in Male' especially in areas where there are major development projects.

As per the requirements of STELCO, electricity related services areas will be developed on the ground floor including LV switch room, transformer and LV meters in the M & E room.

4.6.2 Provision of Freshwater and Discharge of Wastewater

All freshwater requirements for the building will be desalinated water obtained from sources of MWSC. It is estimated that around 75 - 90m^3 of desalinated water per day will be required for the building, which can be met from the existing MWSC production capacity. For the purpose of discharging all wastewater from toilets, kitchens, laundries, etc will use the main sewerage network of MWSC.

Water meter and booster pump room will be developed on the ground floor at the M & E room, which will have easy access to these facilities.

MWSC has recently introduced hydraulic booster pumps to pump water to high-rise building at high pressure. These hydraulic booster pumps will be used to pump freshwater to all floors of the building.

Wastewater from the building will be collected by tanks installed on Shaheed Kudanevi Thuthu Manik Hingun on two locations to reduce loads on the main sewer line.

4.6.3 Waste Management

Large amounts of waste, mainly household waste will be generated from the building once it starts operation. It is estimated that around 200 - 250kg of waste per day from the building including commercial (shops) and residential areas will be generated.

Each floor will have a designated waste chute and a designated landing and collection point at ground level. The area at the ground level will also have bin cart for collecting waste, with a separate access to the area. Waste from the building will done by Waste Management Corporation (WAMCO) as per the recently introduced mechanism of household registration to the service.

4.6.4 Management and Maintenance

The building will be managed and maintenance services will be provided by the project proponent. These include regularly checking for damages and undertake repair works, undertake services requirements such as cleaning, security and servicing to the building.

Also, oversee the management of commercial area and parking area established at ground and first floors including maintaining cleanliness of the areas at all times. Maintaining a good and healthier environment outside of the building will be ensured.

4.6.5 Fire Fighting Measures

Necessary firefighting equipment will be installed in all floors, shops and basement of the building. Additionally, rooftop water tanks will be developed at the top floor area with sprinkler pumps and hose reel.

Furthermore, lifts for passenger and services as well as stretcher lift will be developed in the building one of which can be designated during emergencies.

A staircase for the building will also be available to be used in case of fire and emergencies. A fire escape route in a map will be fixed on all floors.

4.7 PROJECT INPUTS AND OUTPUTS

Following are the key project inputs and outputs.

Key Project Inputs during construction and operation phases.

Project Input	Project Phase	Type	Source
Construction Labor	Construction	Foreign / local	Contractor (140/100 persons)
Permanent staff	Operation	Foreign / local	Proponent (15/20 persons)

Technical personnel	Construction	Foreign / local	Contractor (5/5persons)
Material	Construction	Steel bars, iron, river sand, cement, aggregate, timber, wood, electrical and telephone, cables, pvc pipes, building blocks, tiles, plywood, gypsum board, lysaght roofing material, paint, varnish, chemicals, thinner, nets, etc	Import, local suppliers and contractor's material
Machinery	Construction	Excavator, pickup, trucks, tools	Contractor's machinery
Spare parts	Construction	Spare parts for all machineries	Contractor and local suppliers
Water supply	Construction	For construction needs 2.5-5m^3 per day	From MWSC
Water supply	Operation	For operation needs 75-90m^3 per day	From MWSC
Electricity Supply	Construction	50 - 75kW of electricity per day	From STELCO
Electricity supply	Operation	200-300kW of electricity per day	From STELCO
Fuel supply	Construction	Diesel, petrol, lubricants	Locally purchased from Male'
Food and accommodation	Construction	During construction	Contractor labour quarters
Health and safety	Construction/ operation	Fire extinguishers, first aid, safety equipment, water	Contractor equipment during construction and proponent equipment during operation

Table 1: Key project inputs

Key Project outputs during construction and operation phases

Project Output	Project Phase	Quantity	Disposal Method
14-storey building with basement	Operation	1	Contract management
Construction waste	Construction	100kg - 200kg per day	Transported to waste collection yard in Male'
Excavated material	Construction	607m^3	Transported to MHI designated sites
Water from Dewatering	Construction	1,700m^3	To MWSC mains
Operation waste	Operation	200kg – 250kg per day	Transported to waste collection yard in Male'
Wastewater	Operation	50 - 0t per day	Use MWSC Male' sewerage network
Oil and lubricant waste	Construction	Small	Re-used or stocked to transfer for final disposal in Thilafushi
Dust and Noise Pollution	Construction	Small	Fixed working hours

Table 2: Key project outputs

4.8 AFFECTED BOUNDARIES

The proposed project is likely to generate some environmental impacts that may be carried to the surrounding areas especially during construction stages. An impact boundary within 30m radius especially buildings all around the plot are estimated. These impacts are mostly envisaged to be relating to noise and dust. As most of the adjacent buildings and nearby are multistorey residential buildings where people currently reside, the impacts will be immediately felt by the people residing in these buildings. Some shops are found on the road where impacts of noise can be felt. However, these impacts will be temporary and will be mostly felt during early stages of the development. Other major impact will be from dewatering as large volumes of water will be required to dewater from the site. There is possibility that within a radius of 30m, groundwater may be affected.

Also, depending on the prevailing wind, especially during SW monsoon where winds are predominantly north-eastwards, implications of noise and dust may be felt on the building on the northern and north-eastern side. During the NE monsoon, similar effects will be seen for the buildings found on the southern and south-western side of the plot.

There are large schools in close proximity to the project site, however, most of these schools are found on Chandhanee Magu, namely Iskandhar School (83m), Aminiya School (140m), Aribiyya School (140m) and on CHSE (200m) on Lily Magu, It is not expected that these schools will be disturbed from construction noise, however, effects of ducts may be a possibility depending on the season, such as SW monsoon most likely effect.

With regards to minimizing these impacts, appropriate measures will be taken including restricted working hours, restricted loading and unloading hours and use of nets around the entire building area as well as halting constructions during school examination times as well as compensation in case of damages will be undertaken as key measures.

Figure 15: Expected impacts boundary (orange) in relation to project plot (red)

Most direct impacts such as construction waste and visual impacts are believed to be confined to the project site while indirect impacts of public nuisance from construction noise and dust as well as potential dewatering impacts are believed to occur in the surrounding environment as shown in the figure.

As this is a high traffic area, especially during afternoon and evening hours, impacts on traffic movement will occur during the initial stages of the development. However, with appropriate traffic control measures, the impacts on traffic will be minimal.

During the operation phase the main environmental impact will be from generation of solid waste at the premise as well as increased traffic as a result of residents and shops at the premises.

5. LEGAL FRAMEWORK

The following section looks into relevant laws and regulations as well as key government policies that have a direct bearing to the proposed 14 storey building development at Alidhooge in terms of environmental management and protection in the country.

5.1 APPLICABLE LAWS AND REGULATIONS

There are a number of laws and regulations relating to environmental protection and management in the country. Only relevant laws and regulations in relation to the proposed building development have been outlined in this section.

5.1.1 Environmental Protection and Preservation Act (Law No. 4/93)

The Environmental Protection and Preservation Act of the Maldives, EPPA (Law No. 4/93) provides the basic framework for environmental management including Environmental Impact Assessment (EIA) process in the Maldives, which is currently being implemented by Environmental Protection Agency (EPA) on behalf of Ministry of Environment and Energy (MEE).

Clause 2 of the EPPA mandates the Ministry of Environment and Energy to formulate policies, rules and regulations regarding the environment.

Clause 5 of this Act specifically provides for environmental impact assessment (EIA), a tool implemented to attempt to integrate environmental issues into development decisions. According to the Clause, environmental impact assessments are a mandatory requirement for all economic development projects.

Clause 6 of the EPPA gives the Ministry of Environment and Energy the authority to terminate any project that has an undesirable impact on the environment.

Clause 7 of the EPPA refers to the disposal of oil, wastes and poisonous substances in to the Maldivian territory. According to this clause, any type of waste, oil, toxic gas or any substance

that may have harmful effects on the environment should not be disposed within the Maldivian territory. If, however, the disposals of such substances become absolutely necessary, the clause states that they should be disposed only within the areas designated for that purpose and if incinerated, appropriate precautions should be taken to avoid harm to the health of the population.

The Environmental Act or Law 4/93 is the single most important legal instrument with regards to environmental management and it gives very high prominence towards safeguarding the environment with regard to all the development activities. Under this Act, the Ministry of Environment and Energy have developed regulations and guidelines concerning the environmental protection through implementation of EIA procedures.

Applicability

The EIA has been prepared as per the EIA Regulations 2012 developed directly under the Environmental Protection and Preservation Act and identifies that development of such buildings exceeding 31m in height and with basements or over 10 storeys with greater than 5ft foundation require an EIA to be undertaken and approved by EPA before commencement of construction. This EIA is mandatory as the project exceeds all requirements.

5.1.2 Maldives EIA Regulation, 2012 and Amendments

The most important regulation concerning the proposed development is Environment Impact Regulations, 2007, which was amended in 2012 is enforced under Environment Protection and Preservation Act (Law No. 4/93) by EPA.

The Schedule D of the EIA Regulation and Amendments prescribes that all major housing development project shall undertake an EIA prior to commencement of the project if the building exceeds 31m in height, have more than 10 sheets, the foundation exceeds 5ft, have basements or have more than 10 storeys. As the proposed project is a mixed use residential development, hence, preparation and approval of an EIA is mandatory.

The EIA regulation further explains implementation of mainstream EIA process in the Maldives and provides guidelines for preparing relevant EIA to environmental clearance in the form of an Environmental Decision Statement.

Applicability

The EIA has been done as per the requirements prescribed in Schedule D, which enlists that development of buildings exceeding 31m in height, have more than 10 sheets, have foundation exceeding 5ft, have more than 10 storeys and have basements shall prepare and approved an EIA before commencement of construction. This EIA is mandatory as the project exceeds all requirements.

5.1.3 Environmental Damage Liabilities Regulation, 2011

Under the Environmental Protection and Preservation Act (No. 4/93), the Ministry of Environment and Energy 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 subject to this Regulation for any activity outside of the EIA scope and Environmental Decision Statement.

Applicability

If the proposed project have an irreparable damage to the environment within and outside of its boundary, the provisions of the regulation can be applied in terms of compensating the damages caused.

5.1.4 Waste Management Regulation, 2013

Waste Management Regulation (No. 2013/R-58) is more recent coming into effect on 6 February 2014. The Regulation was gazetted on 05 August 2013. The regulation is provides set of comprehensive guidelines and on collecting, storing, transporting and managing waste as well as management of hazardous waste. The waste management regulation identifies the following areas prohibited from dumping of waste; protected areas under the Environmental Protection and Preservation Act, mangroves, lagoons of islands, coral reefs, sand banks, beaches of islands, coastal vegetated areas of islands, harbors, parks and roads.

With regards to handling and transport of waste on land and sea, the following guidelines have been established. For those who are collecting, handling, transporting, storing, landfilling waste, a permit shall be obtained from EPA. During transport of waste on land and sea, the waste shall be completely covered to prevent odour and spilling. Also, the regulation prohibits importing and burning of hazardous waste. Similar to other waste, hazardous waste shall also be transported in sealed containers.

For all economic development projects, an appropriate site shall be identified for managing waste and waste shall be sorted and clearly labeled.

The entire provisions outline in the regulation will be strictly followed by the project proponent.

An annual waste management report by the licensed party shall be submitted to the Ministry of Environment and Energy.

Applicability

Waste handling, transportation and disposal as a result of the proposed development and operation of the proposed project must comply with the provisions of the regulation.

As part of the proposed project development and operation, WAMCO will be involved in collection and transportation of waste from the building, hence the above regulation and its components will be complied.

5.1.5 Dewatering Regulation, 2013

A Dewatering Regulation (No. 2013/1697) under the Maldives Environmental Protection and Preservation Act came into force in December 2013. The main purpose of the regulation is to protect groundwater resources found in the islands from impacts of dewatering, pollution and protect the environment from release of groundwater by dewatering. As per the regulation, a dewatering permit shall be obtained from EPA prior to any dewatering operations required for all development projects. Further, the regulation states that 30m radius boundary shall be considered as impact area from all dewatering operations and any entities within the boundary shall be informed 24hrs before the dewatering operation. EPA approved dewatering signage must be placed during the process of dewatering.

Applicability

A dewatering permit will need to be issued by EPA prior to any dewatering operation and as prescribed in the regulation, the required dewatering signage will need to be placed at the project site during dewatering operation. If dewatering cannot be completed within the given time period, an extension can be applied.

5.1.6 Management, Use and Control of HCFC Substances Regulation, 2010

The HCFC Regulation is developed under the Environmental Protection and Preservation Act (4/93) towards regulating phasing out of import, use, selling of HCFC substances by 2011 and completely eliminating use of HCFC substances in the Maldives by 2020 through controlling importers, registering importers, establishment of a quota system, control mechanisms for selling, maintenance of import, selling, purchase and service providers statistics.

Applicability

This is an obligation that has to be met by the Maldives, hence the provisions in this regulation will be adhered to. All air-conditioning and cooling done for the building will consider HCFC free equipment in order to support the efforts of the country to eliminate HCFC by 2020.

5.1.7 Environmental Guidelines for Concrete Batch Plants, 2014

The Environmental Guidelines for Concrete Batch Plant has been prepared by EPA to guide operations of concrete batching plants in an environmentally friendly manner and to mitigate and avoid adverse environmental impacts on environmental elements.

Some key environmental considerations outlined in the guideline include;

Site considerations where the plant should be located in an area where contaminated storm water and process wastewater can be retained on-site, siting of the plant shall minimize spread of dust by natural means such as prevailing winds and artificial means by trees, fences and landforms and maintain a minimum of 100m buffer distance between plant and sensitive land uses.

Minimize wastewater and measures to re-use wastewater to reduce impacts on ground water due to potential contamination.

Covering of sand, cement and aggregates during storage and delivery to the plant as well as implementing noise reduction measures during plant operation.

Applicability

At present there is no direct relevance of the guideline to the project as batching is not planned to be used within the plot or elsewhere. However, if the proponent or the contractor decides to use a batch plant, the guidelines will be strictly followed.

5.1.8 Regulation on Fuel Handling and Storage (2015/R-160)

The Regulation on Fuel handling and Storage (2015/R-160) has been developed under the 7th and 46th Clause of the "Sifainge Gaanoon 1/2008)" and is implemented by Ministry of Defense and National Security (MDNS).

The main purpose of the regulation is to prevent fair risks and protect human life and goods from such risks, strengthen general awareness on preventive measures during handling of fuel as well as ensure common safety measures during storing and selling of fuels in the country.

As per the regulation, all fuel storing facilities and handling shall be done with all preventive measures including availability of firefighting equipment. A written permit shall be obtained from MDNS prior to storing fuels at any location. A random monitoring will be undertaken by MDNS to ensure such facilities are operated in accordance with the regulations.

The regulation also outlines standards for developing petrol storing facilities and states that such facilities shall be isolated from any other establishment and that proper protective signage such as NO SMOKING, NO NAKED LIGHTS, FLAMMABLE LIQUID shall be visible as well as the signage of PETROL shall be visible for people coming from both sides.

Similar to standards of petrol storing facilities, the storing facilities for diesel and kerosene shall also be maintained in accordance with the regulation such as storing in an isolated facility for diesel and kerosene.

Appropriate piping shall be developed from storing facilities to fuel meters or up to the jetty in the case of the islands.

Applicability

There is no direct relevance of this regulation to the proposed project as fuel will not be stored at the proposed project site. However, once the building is completed, firefighting measures and equipment installed in the building will be required to be checked and approved by MNDS.

5.1.9 Maldivian Land Act, 2002

The Act governs the allocation of Maldivian land for different purposes and uses and other issues regarding the issuing of land, issuing of state dwellings for residential purposes, conduct regarding state dwellings or private dwellings constructed for residential purposes and the sale, transfer and lease of Maldivian Land.

In accordance with section 3 of this Act, land shall be allocated for the following purposes and uses.

a. For the construction of households and buildings for residential purposes.
b. For commercial use.
c. For social use.
d. For environmental protection.
e. For government use.

Applicability

The proposed development conforms to the provision set out in (a) outlined above as the plot has been designated for construction of household and building for residential purpose.

5.1.10 Land Use Plan and Implementation Regulation

Under the Maldivian Land Act of 2002, all lands in the islands under the lands development policy, a Land Use Plan shall be developed and approved from Ministry of Housing and Infrastructure prior to use of the lands. The regulation outlines key aspects that need to considered while preparing land use plans as well as describes guidelines on developing and allocating lands for various purposes. In this regard, various categories of lands are identified under which a government agency shall implement the land use plan.

Applicability

There is no direct relevance of the proposed project with the Land Use Plan Regulation as the development will be undertaken as a residential development in a privately owned land.

5.1.11 Male' Planning Regulation, 2015

The regulation was initially developed in 2008 and realigned to the Maldives Land Act 2002 in 2015 as 2015/R-192. The regulation is annexed to clause 6.3 of the Land Use Planning Regulation and is divided into two parts. Part One deals with regulatory planning requirements for Henveiru, Galholhu, Machchangolhi and Maafannu wards and Part Two deals with regulatory planning requirements in Villingili ward. The regulation is implemented by Ministry of Housing and Infrastructure.

The main requirement of the regulation under Part One includes; approving the development concept and obtaining a construction permit prior to undertaking any construction activity.

The regulation outlines the following;

- The construction permit shall be displayed at the project site.
- A foundation protection method shall be approved and all foundation works shall be undertaken in accordance with the approved foundation protection plan.
- Any demolition work of an existi9ng building shall be undertaken after consulting with utility service providers including water and sanitation, electricity, etc.
- All construction activities shall be undertaken by taking into appropriate measures to protect surrounding buildings
- The height of the building shall be determined by taking into consideration the size of the plot, length and width of the plot as well as the width of the road/street in which the plot is found
- Also, the height of the building can be determined by taking into consideration its area
- In this regard, if the area of the plot exceeds 9.291 sqm, a building can be developed and if the width of the road/street exceeds 3.048m, a building having a height of 30.48m can be developed.
- If the area of the plot is less than 4,000 sqft (371.612 sqm), than the maximum height allowed under the regulation can be developed.

- The maximum allowable height of a building in Male' is 45m, which is only allowed for plots having an area exceeding 6,000 sqft.
- Extending the building to the roadside (for sun shading, balcony, etc) is only allowed from 9ft above to a limit of 1.49ft.
- A 10% area from each floor shall be left as opening space for ventilation
- The balconies of the building shall be at 1m height
- A parking area of 15% of the plot shall be allocated if the area of the plot is between 1,000 – 2,000 sqft.
- A fine between 1,000 MVR to 75,000 MVR will be imposed under the regulation depending on the magnitude of an illegal activity.

Applicability

The design of the building and foundation protection plan has already been approved by Ministry of Housing and Infrastructure given that they are in conformity to the requirements of the regulation.

5.1.12 Maldives National Building Code, 2008

The Maldives National Building Code 2008 is a performance based code which is aimed to provide flexibility in design with the possibility for regular change to the compliance documents and standards it refers to, depending on development in the construction industry. The advantage of a performance based Building Code is the flexibility. It contains no prescriptive requirements stipulating that certain products or designs must be used. This flexibility allows developments and innovation in building design, technology and systems. The purpose is to create the enabling environment to achieve a safe and usable building design rather than aiming for the best building design.

The Maldives building code does not consist of sets of "prescriptive" technical specifications but instead consist only of sets of "performance requirements" that each building has to meet. Hence the code is a "performance-based code" which means the code does not prescribe how work should be done, but states how completed building work and its parts must perform.

The code consists of two general clauses outlining classified building uses and interpretations and 35 technical clauses which cover aspects such as structural stability and durability, fire safety, access, moisture control, safety of users, services and facilities and energy efficiency.

The key aspects and requirements outlined in the building code are;

- Stability
    - Structure – Buildings, building elements and sitework shall withstand the combination of loads that they are likely to experience during construction or alteration and throughout their lives.
    - Durability - Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.
- Fire Safety
    - Means of escape - Give people adequate time to reach a safe place without being overcome by the effects of fire, and give fire service personal adequate time to undertake rescue operation.
    - Spread of fire - Buildings shall be provided with safeguards against fire including means of protecting adjacent buildings.
    - Structural stability during fire - Buildings shall be constructed to maintain structural stability during fire to allow people adequate time to evacuate safely, allow fire service personnel adequate time to undertake rescue and firefighting operations and avoid collapse and consequential damage to adjacent household units or other property.
    - Access and facilities for the fire services - Buildings shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.
- Access
    - Access routes - Where a building is provided with loading or parking spaces, they shall be constructed to permit safe and easy unloading and movement of vehicles, and to avoid conflict between vehicles and pedestrians.
    - Mechanical installations for access - Mechanical installations for access into, within and out of buildings shall provide for the safe and easy movement of people, and for the safety of maintenance personnel.
- Moisture
    - Surface water - Buildings and sitework shall be constructed in a way that protects people and other property from the adverse effects of surface water.

- External moisture - Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.
- Internal moisture - Buildings shall be constructed to avoid the likelihood of: Fungal growth or the accumulation of contaminants on linings and other building elements, free water overflow penetrating to an adjoining household unit, and damage to building elements being caused by presence of moisture.

- Safety of Users
  - Hazardous agents on site - Buildings shall be constructed to avoid the likelihood of people within the building being adversely affected by hazardous agents or contaminants on the site.
  - Hazardous building materials - Building materials which are potentially hazardous, shall be used in ways that avoid undue risk to people.
  - Hazardous substances and processes - Buildings where hazardous substances are stored and hazardous processes undertaken, shall be constructed to provide adequate protection to people and to other property.
  - Safety from falling - Buildings shall be constructed to reduce the likelihood of accidental fall.
  - Construction and demolition hazards - Construction and demolition work on buildings shall be performed in a manner that avoids the likelihood of objects falling onto people on or off the site, objects falling on property off the site, other hazards arising on the site affecting people off the site and other property, and unauthorized entry of children to hazards on the site.
  - Lighting for emergency - Buildings shall be provided with adequate lighting within all escape routes in an emergency.
  - Warning system - Buildings shall be provided with appropriate means of warning people to escape to a safe place in an emergency.
  - Signs - Signs shall be provided in and about buildings to identify escape routes, emergency related safety features, potential hazards, and accessible routes and facilities for people with disabilities.
- Services and Facilities
  - Personal hygiene - Buildings shall be provided with appropriate spaces and facilities for personal hygiene.

- Laundering - Buildings shall be provided with adequate space and facilities for laundering.
- Food preparation and prevention of contamination - Buildings shall be provided with space and facilities for the hygienic storage, preparation and cooking of food, that are adequate for the intended use of the building.
- Ventilation - Spaces within buildings shall be provided with adequate ventilation consistent with their maximum occupancy.
- Interior environment - Buildings shall be constructed to provide an adequate, controlled interior temperature, adequate activity space for the intended use, and accessible spaces and facilities.
- Airborne and impact sound - Building elements which are common between occupancies shall be constructed to prevent undue noise transmission from other occupancies or common spaces, to the habitable spaces of household units.
- Natural light - Habitable spaces shall provide adequate openings for natural light.
- Artificial light - Spaces within buildings used by people, shall be provided with adequate artificial lighting which, when activated in the absence of sufficient natural light, will enable safe movement and activity.
- Electricity - Where provided in a building, electrical installations shall be safe for their intended use.
- Piped services - In buildings provided with potentially hazardous services containing hot, cold, flammable, corrosive or toxic fluids, the installations shall be constructed to provide adequate safety for people.
- Gas as an energy source - In buildings where gas is used as an energy source, the supply system shall be safe and adequate for its intended use.
- Water supplies - Buildings, provided with drinking water outlets, sanitary fixtures or sanitary appliances, shall have a safe and adequate piped water supply.
- Foul water - Buildings, in which sanitary fixtures and sanitary appliances using water-borne waste disposal are installed, shall be provided with an adequate plumbing and drainage system to carry foul water to appropriate outfalls.

- Industrial liquid waste - Buildings, in which industrial liquid waste is generated shall be provided with adequate spaces and facilities for the safe and hygienic collection, holding, treatment and disposal of the waste.
- Solid waste - Buildings shall be provided with space and facilities for the collection, and safe hygienic holding prior to disposal, of solid waste arising from the intended use of the buildings.

- Energy Efficiency
  - Energy efficiency - Buildings, throughout their lives, shall have provision for ensuring efficient energy use in controlling indoor temperature when that energy is sourced from a public electricity supply, or any other depletable energy resource.

Applicability

The recommendations prescribed in the Building Code will be met throughout the development and operation of the proposed project.

5.2 RELEVANT POLICIES

5.2.1 National Framework for Development, 2009-2013

One of the most important environmental policy guidance is given in the Strategic Action Plan (SAP) of the National Development Framework for 2009-2013. Due to the fragile nature of the country's environment, all the development activities must ensure that appropriate care is taken to protect the environment. Environmental sustainability is the basis for socio-economic development, hence, the SAP outlines the key environmental policies that will be implemented in the country for environmental protection and sustainability, while one of the key environmental goals of the country is to protect and preserve the natural environment to ensure prosperous economic development. The environmental policies outlined in the SAP include;

Policy 1: *Strengthen EIA process with an emphasis on EIA monitoring*

Policy 2: *Conserve and sustainably use biological diversity and ensure maximum ecosystem benefits*

Policy 3: *Develop resilient communities addressing impacts of climate change, disaster mitigation and coastal protection*

Policy 4: *Strengthen adaptation and mitigation responses for beach erosion and develop a system to assist communities where livelihood and property are affected by beach erosion*

Policy 5: *Ensure management of solid waste to prevent impact on human health and environment through approaches that are economically viable and locally appropriate*

Policy 6: *Ensure protection of people and the environment from hazardous waste and chemicals*

Policy 7: *Improve air quality to safeguard human health*

Policy 8: *Enable a fully functional decentralized environmental governance system*

Policy 9: *Develop a low carbon economy to achieve Carbon Neutrality by 2019*

Policy 10: *Inculcate environmental values in the society and enable environmentally friendly lifestyle*

The Ministry of Environment and Energy and Environment Protection Agency takes the lead role in implementing the above national policies through various strategies and regulatory measures.

5.2.2 3rd National Environmental Action Plan, 2009-2013

NEAP 3 sets out the agenda for environmental protection and management in the Maldives for the five year period 2009 – 2013. This plan is targeted to achieve measurable environmental results that matter to the people of the Maldives.

The aim of developing NEAP 3 is to protect and preserve country's environment and properly manage natural resources for sustainable development of the country and encompasses ten principles, six strategic results with targeted goals to be achieved under each result.

The key principles of the NEAP 3 are;

Principle 1: *Environmental protection is the responsibility of every individual*

Principle 2: *Achieve results*

Principle 3: Promote and practice sustainable development

Principle 4: Ensure local democracy

Principle 5: Inter-sectoral co-ordination and co-operation

Principle 6: Informed decision making

Principle 7: Precaution first

Principle 8: Continuous learning and improvement

Principle 9: Right to information and participation

Principle 10: Environmental protection complements development

The six strategic results of NEAP3 are: resilient islands; rich ecosystems; healthy communities; safe water; environmental stewardship; and a carbon neutral nation with 30 result oriented environmental goals that will be achieved in the span of the NEAP 3.

5.2.3 Maldives National Strategy for Sustainable Development, 2009

The Maldives National Strategy for Sustainable Development (NSSD) outlines the key objectives, principles and goals that the country will embark toward achieving sustainable development. Hence, the overall direction of the NSSD is to build a nation which appreciates the true value of the natural environment, utilizes its natural resources in a sustainable manner for national development, conserves its limited natural resources, has built the capacity to learn about its natural environment and leaves a healthy natural environment for future generations.

The guiding principles outlined in the NSSD are;

Principle 1: Promotion and protection of fundamental human rights

Principle 2: Equity within and between generations

Principle 3: Democratic and open society

Principle 4: Full participation of businesses and civil society

Principle 5: Policy coherence and coordination

Principle 6: Use best available knowledge

Principle 7: *Precaution first*

Principle 8: *Make polluters pay*

While the country will be steered in accordance with the underlying principles of NSSD, the country aims to achieve very important environmental goals, including; adapting to climate change, protecting coral reefs, achieving carbon-neutrality in energy, ensuring food security, establishing a carbon neutral transport system, protecting public health and achieving full employment and ensuring social security.

5.2.4 National Solid Waste Management Policy, 2007

As waste management has been identified as a key environmental issue in the Maldives, a National Solid Waste Management for the Republic of Maldives was developed in 2007 as an important step towards mainstreaming waste management in the country. The key strategic principles outlined in the document include; establishing polluter pay principles, integrated solid waste management, best practice environmental option (BPEO), best available technology not entailing excessive costs (BATNEEC), proximity principle and private sector participation. It is an important priority of the Government of Maldives as identified in the policy document to setup regional waste management facilities and island waste management centers and decentralizing waste management administration. Hence, the key policies relevant to this project include;

Policy 1: *Establish a governance structure for solid waste management which will distribute clearly delineated roles and responsibilities for solid waste management at island, regional and national levels*

Policy 2: *All waste producers have a duty to manage the waste they generate*

Policy 3: *Waste will be management and disposed as close as possible to the place of their generation*

Policy 8: *Private sector participation (PSP) will be facilitated where it is financially for both government and private sector.*

Establishing a proper mechanism of waste management and disposal will be vital for the overall operation of the project and the waste management practices both during construction and operation of the project will closely adhere to the policies and principles taken as a priority of the government.

5.2.5 Maldives National Housing Policy, 2008

The first ever housing policy in the Maldives was developed in 2008 by the then Ministry of Housing and Urban Development. The key aspects covered in the housing policy include;

a. *Develop strategic goals/targets for housing and urban development and give priority to these goals in national development*
b. *Formulate effective laws and regulations on reclamation, development and ownership of land and under an effective framework, on shelter*
c. *Provide access to safe drinking water, sewerage and other basic amenities for all*
d. *Promote low-cost, effective, safe, environmentally friendly, energy saving and healthy means in housing construction*
e. *Support and promote the role of private sector in the housing delivery mechanism to facilitate affordable housing*
f. *Establish an appropriate housing finance mechanism with joint effort by the public and private sector*
g. *Facilitate easy access to services and facilities for all households under an effective mechanism and facilitate upgrading of substandard housing*

5.3 RELEVANT AUTHORITIES AND SERVICES PROVISIONS

5.3.1 Ministry of Environment and Energy, MEE

The primary environmental institution in the Maldives is MEE. It is mandated with formulating policies, strategies, laws and regulations concerning environmental management, protection, conservation and sustainable development. The Minister of Environment or a designate gives the environmental approval or clearance to EIA by an Environmental Decision Statement. Additionally, MEE is responsible for formulating relevant laws and regulations, policies and strategies concerning energy, water and sanitation as well as waste management.

5.3.2 Environment Protection Agency, EPA

EPA is the key regulatory body on environment, which is an autonomous body formed under the umbrella of MEE. It is mandated with implementing the EIA process in the Maldives, implementing the Environment Act and subsequent regulations on behalf of MEE, regulating

water and sanitation, biodiversity conservation, waste management and coastal zone management. Also, it is responsible for developing environmental standards and guidelines in the country.

5.3.3 Ministry of Housing and Infrastructure, MHI

MHI has the broad mandate for planning, developing, implementing as well as regulating housing and infrastructure development in the Maldives. In this regards, land use plans for each inhabited island and various development areas are approved by the Ministry. Additionally, the Ministry has developed a draft Building Code where it sets standards and controls for various building development in the country including guidelines for construction and safety measures that needs to be implemented.

The Ministry of Housing and Infrastructure approves all engineering and detailed designs of buildings developed in the country mainly for housing, residential and commercial purposes.

5.3.4 Maldives Land and Survey Authority, MLSA

Maldives Land Survey Authority was established to realize the need for a separate agency to conduct surveys and collect and update information on the most beneficial use of lands, lagoons and reefs of the Maldives. The Land and Survey Authority approve all the land surveys undertaken in the islands for various development purposes. This authority is administered by Ministry of Housing and Infrastructure.

5.3.5 Ministry of Defense and National Security, MDNS

Certain aspects of the buildings and operations are quite relevant for the work of the Ministry of Defense and National Security. The Ministry is responsible for implementing fuel handling and storing regulation as well as ensuring implementation of fire safety measures in the resorts and in buildings as per the requirement of Building Code.

5.3.6 Maldives Energy Authority, MEA

The MEA is part of Ministry of Environment and Energy and it regulates the standards for energy in the country. The electricity wiring and networking shall be undertaken by MEA licensed electricians.

5.3.7 Health Protection Agency, HPA

Public health and occupation health and safety issues are regulated by HPA. A Public Health Act is currently drafted. HPA has developed a set of guidelines and recommendations that needs to be followed with regards to protecting public health and occupational safety issues.

5.3.8 Male' Water and Sewerage Company, MWSC

Freshwater intake pipelines and wastewater outflow pipeline has to be done in accordance with the requirement of MWSC and these services will be connected with the building by MWSC.

5.3.9 State Electric Company, STELCO

The required electricity for the building during construction and operation phases of the project will be provided by STELCO. They will inspect the site prior to providing the service and recommends certain measures for appropriate use of electricity.

5.4 PERMITS OBTAINED AND REQUIRED

The following permits as per the laws and regulations addressed in this section are required in order for the project to start implementation. These include;

5.4.1 Project Development Concept

The project development concept of the building has already been approved by Ministry of Housing and Infrastructure on 19 March 2017 and attached to this EIA report.

5.4.2 EIA Terms of Reference (TOR)

The Terms of Reference (TOR) for the EIA was approved on 3 August 2017 and is attached to this EIA Report.

5.4.3 EIA Approval

The most important environmental permit to initiate the proposed building project in Male' would be a decision regarding this EIA from the EPA. The EIA Decision Statement, as it is referred to, shall govern the manner in which the project activities must be undertaken. It is the final environmental clearance granted by the EPA for the proposed project.

5.4.4 Construction Permit

Prior to commencement of all the construction activities on site, a Construction permit shall be obtained from Ministry of Housing and Infrastructure. This will be done upon issuance of EIA Decision Statement to the EIA.

5.4.5 Dewatering Permit

A Dewatering Permit shall be obtained from EPA prior to undertaking any dewatering activities within the plot. This will be done upon issuance of EIA Decision Statement to the EIA.

6. EXISTING ENVIRONMENT

This section outlines the key existing environmental conditions of the project site and surrounding areas, especially boundaries where the project is believed to impact the environment.

6.1 DATA COLLECTION METHODS

This EIA is based on both qualitative and quantitative data collected from the proposed project area. Also, the report addresses major information requirements as outlined in the Terms of Reference (TOR) for preparing this EIA Report.

Following are the key environmental components and the ways and methods used to gather relevant data for the project.

6.1.1 Climate Environment

The climate information was collected from secondary sources, mainly from published information from Maldives Meteorological Services (MMS), which is used in the general description of the climate environment.

6.1.2 Physical and Biological Environment

In order to obtain physical and biological environment information as required in the TOR, the following methods have been undertaken on environmental various components. These include obtaining noise levels in and around the project site by using a sound meter for three periods coinciding with the traffic assessment; traffic flow and direction was obtained by undertaking a traffic survey for a period of 1 hour for three periods (10:00-11:00hrs, 18:00 – 19:00hrs and 21:00-22:00hrs); general water quality of the plot was analysed from MWSC laboratory; air quality information was also obtained from published information. No information on vegetation and other biological components were included as the plot is empty.

6.1.3 Structural Environment

Structural environmental information was obtained from general observations and photographic analysis of nearby buildings, surrounding roads and existing structures.

6.1.4 Socio-economic Environment

Relevant socio-economic data from Male' was collected from published information, which is referenced.

6.1.5 Uncertainties in Data Collection Methods

Some of the environmental assessments undertaken for the EIA are done on general observations such as structural environment of the adjacent buildings. Thus the degree of structural complexity that exists within these buildings will be difficult to understand. Also, some of the quantitative assessments undertaken are time bound such as assessment of traffic volume and noise levels, which may differ from time-to-time and day-to-day. Thus, there is some degree of uncertainties that may exist on the data collected.

6.2 CLIMATE ENVIRONMENT

6.2.1 Climatic Setting

Maldives is located on the equator and therefore experiences monsoonal climate. There are two distinct seasons, dry season (Northeast Monsoon) and wet season (Southwest Monsoon). In these two seasons the temperature varies hardly. Northeast monsoon extends from January to March. Since Maldives consists of small islands and are surrounded by sea, hot days are often tempered by cooling sea breezes and balmy evening temperatures.

6.2.2 Monsoons

Maldives is in the Monsoonal Belt in the North Indian Ocean. Therefore, climate in the Maldives is dominated by south-west (Hulhangu) and north-east (Iruvai) monsoons. The southwest monsoon is the rainy season which lasts from May to September and the north-east monsoon is the dry season that occurs from December to February. The transition period of the south-west monsoon occurs between March and April while that of the northeast monsoon occurs from October to November. These monsoons are relatively mild due to the country's

location on the equator and strong winds and gales are infrequent in the Maldives. However, storms and line squalls can occur, typically in the period May to July. The winds usually get stronger in the south west monsoon especially during June and July.

6.2.3 Temperature

Throughout the year, temperature remains almost same in the Maldives. However, daily temperature ranges from around 31o in daytime to 23° Celsius in night time. The highest temperature ever recorded in the Maldives was 36.8°C, recorded on 19 May 1991 at Kadhdhoo Meteorological Office. Likewise, the minimum temperature ever recorded in the Maldives was 17.2°C, recorded at the National Meteorological Centre on 11th April 1978.

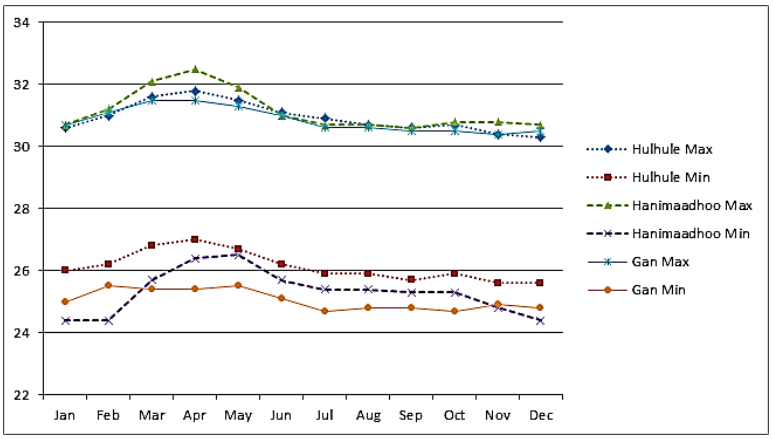


Figure 16: Average maximum and minimum temperatures (from 2000 – 2015) in the Maldives (Source: www.meteorology.mv)

As can be seen from the above figure, there is very little temperature variation throughout the country. The maximum temperature is between the ranges of 30 - 32^{o}C and minimum temperature is between the ranges of 24 - 27^{o}C.

Assessments in the surrounding environment of the plot was undertaken in August 2017 and as climate data for August 2017 were unavailable, temperature comparison for 2015 and 2016 for the month of August recorded from the nearest weather station, which is Hulhule Met Center was obtained from Maldives Meteorological Service (MMS).

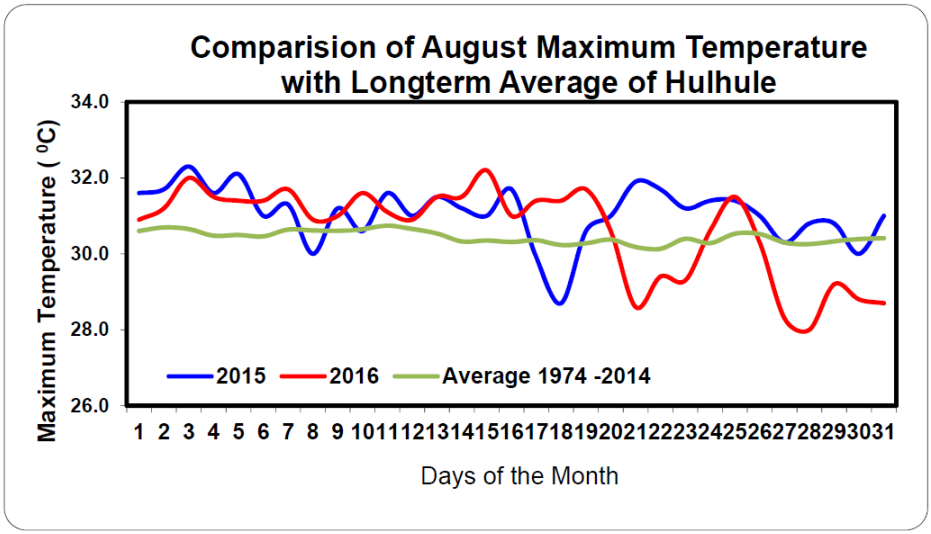


Figure 17: Comparison of max temperature for August 2015 and 2016 (Source: www.meteorology.mv*)*

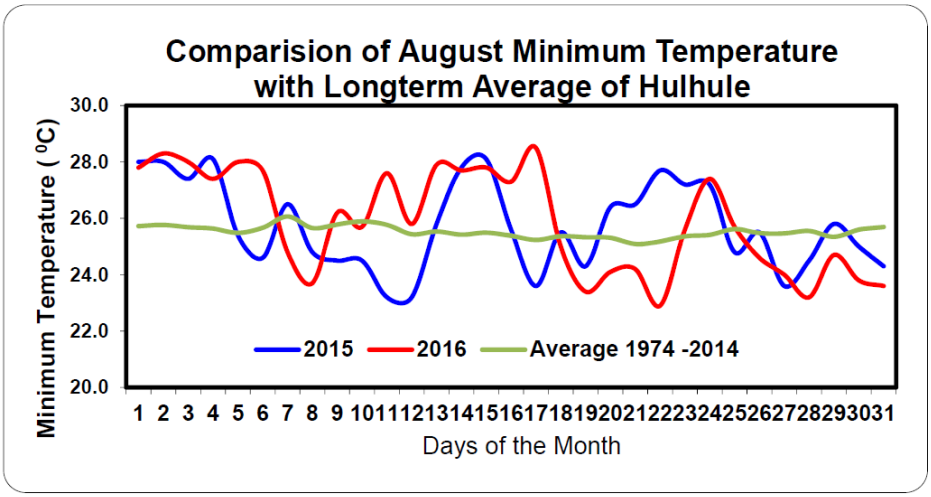


Figure 18: Comparison of min temperature for August 2015 and 2016 (Source: www.meteorology.mv*)*

The highest temperature recorded in central part of the Maldives in August 2016 was 32 degree Celsius, which was recorded on the 15th. The minimum temperature recorded in the same area for the last month was 23 degree Celsius and was recorded on the 22nd of August. On the other hand, the highest temperature recorded in August 2015 in central part of the country was also 32 degree Celsius, which was recorded on the 3rd. Furthermore, the minimum temperature recorded in the central part in August 2015 was also 23 degree Celsius, recorded on the 11th. Figure above shows daily maximum and minimum temperature (2015 and 2016) and average maximum and minimum temperature for the Month of August for central part of Maldives.

6.2.4 Rainfall

The wet season; southwest monsoon runs from mid-May to November. In this season Maldives experiences torrential rain. The highest rainfall ever recorded in the Maldives with in a 24 hour period was recorded on 9th July 2002 at Kaadedhdhoo Meteorological Office and amounts to 219.8mm of rainfall.

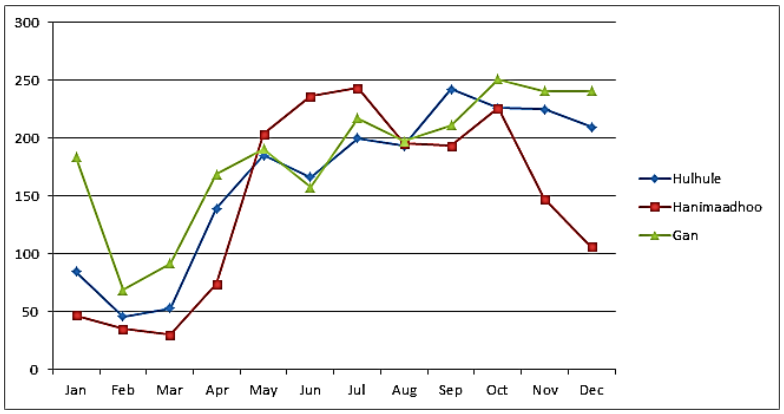


Figure 19: Average rainfall (from 2000 – 2015) in the Maldives (Source: www.meteorology.mv)

As can be seen from the average for the past 15 years, the latter half of the year experiences more rain in the country.

Comparison of rainfall for the month of August 2015 and 2016 was also undertaken in order to understand the general rain pattern of the region during the field assessment period.

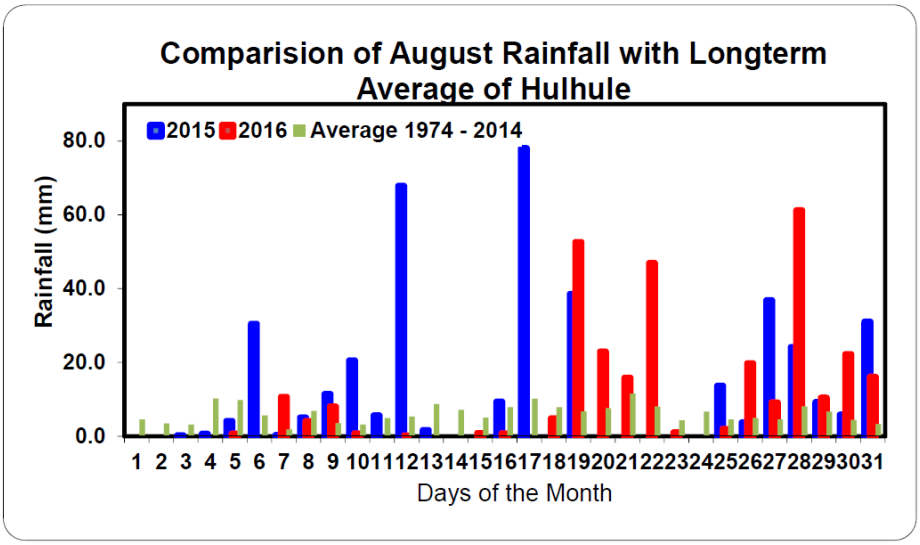


Figure 20: Comparison of rain for August 2015 and 2016 (Source: www.meteorology.mv*)*

August 2016, central part of the country received a total rainfall of 310mm. The highest rainfall within 24 hours was recorded on the 28th and amounts to 61mm of rainfall. The rainfall received in August 2015 was 87mm more than that of August 2016. Figure above shows daily total rainfall (2015 and 2016) and daily average rainfall for the Month of August for central part of Maldives.

6.2.5 Wind

The average wind speed for the sum of the years (2002-2015) is 9 knots for the entire country and the predominant wind directions are W, WSW and WNW, which is the main feature during the SW monsoon. During the NE monsoon, predominant wind occurs from ENE direction with an average wind speed of 6-7 knots. Thus, strong winds are associated with the southwest monsoon season. Gales are uncommon, and cyclones are very rare in the Maldives.

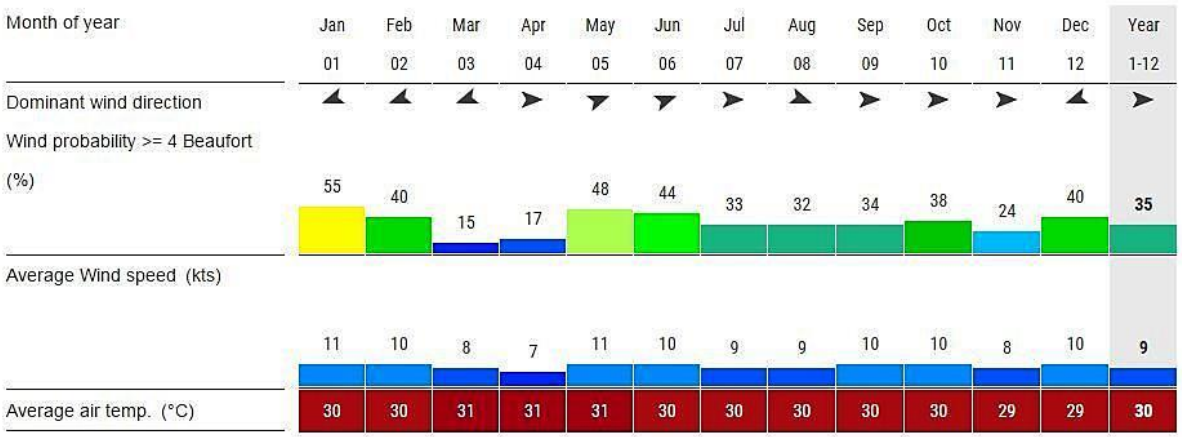


Figure 21: Monthly wind speed and direction (www.windfinder.com)

August 2016, the maximum wind speed in Central part of the country was experienced on the 8th at 18:19 hours from west at a speed of 46 mph. However, the maximum wind speed in central part in August 2015 was recorded on the 6th at 14:38 hours at a speed of 45 mph from west. Figure below shows daily maximum wind speed (2015 and 2016) for the month of August for the central parts of Maldives.

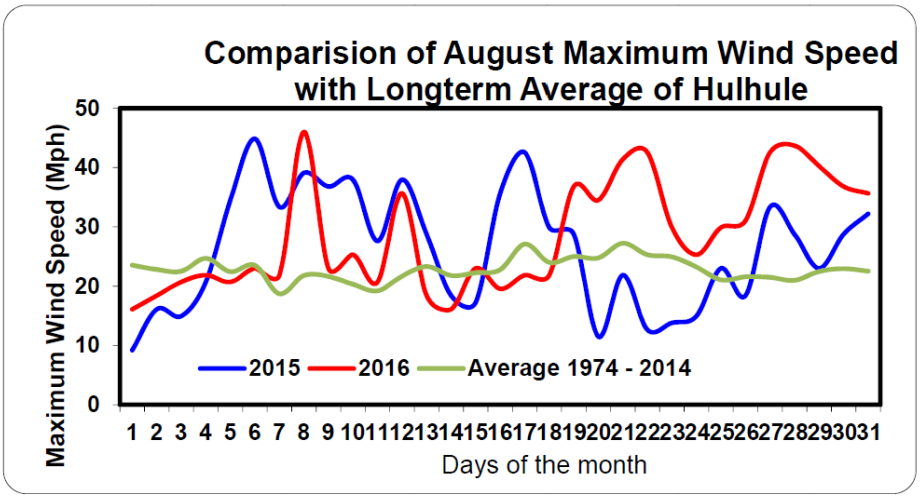


Figure 22: Comparison of winds for August 2015 and 2016 (Source: www.meteorology.mv)

Following is a wind frequency chart (wind rose) for Hulhule for August 2016. The field assessments at the plot was carried out in August 2017, hence wind data for August 2016 from Hulhule, which is the closest weather station was used as reference.

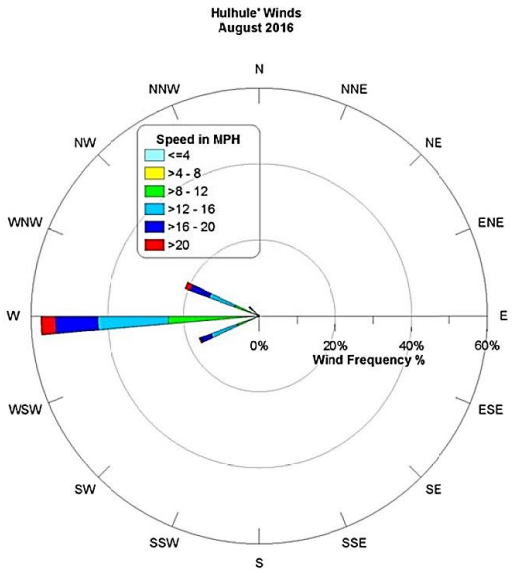


Figure 23: Wind frequency chart of Hulhule for August 2016 (Source: www.meteorology.mv)

This is the wind rose for Hulhule based on hourly wind data of the month August 2016. This rose shows that the winds at Hulhule during the period blow from the west much of the time. In fact, the spoke in the direction west-south-west and west-north-west comprises about 40% of all hourly wind directions. This also shows that the wind rarely blows from other directions.

6.2.6 Waves and Swells

Only the south-eastern side of Male' has the famous surf break area known Varunulaa Ralhugandu, where a number of surfers used to surf in this area due to occurrence of seasonal waves. However, as a result of ongoing construction works of the linking bridge, surfing has been banned and the waves have been observed to be fairly smaller. This may be as a result of piles of the bridge construction deck, where SE swells are believed to be greatly affected.

Information obtained from secondary sources indicate that the south-eastern side of Male' Atoll generated swells of 0.9m high during the month of August. The swells reduce in height to 0.5m as it enters the atoll, where the reefs play a major role in reducing the heights of the swells. According to the information, swells ranging 1.3m – 2m will be experienced in 54% of the time.

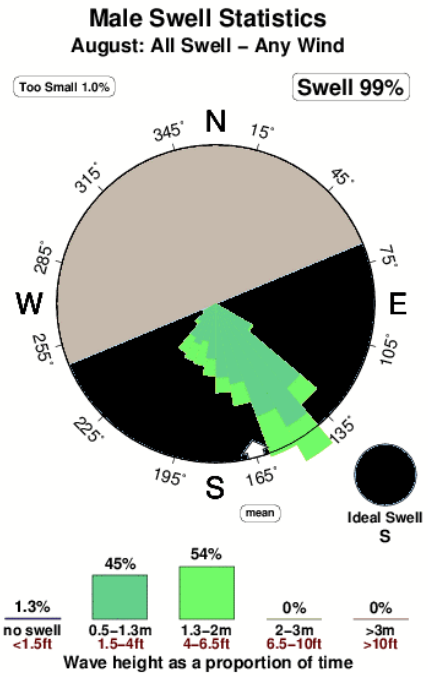


Figure 24: Swells map for North Male Atoll (www.surf-forecast.com)

6.3 PHYSICAL AND BIOLOGICAL ENVIRONMENT

6.3.1 Ambient Noise Levels

Average noise levels were recorded by using a digital sound meter on five different locations in the vicinity of the proposed site. Noise level readings in decibels (dB) were taken in three

periods (10:00hrs, 18:00hrs and 21:00hrs) on 6 August 2017, which coincides with the regular and peak traffic periods in the area. Only average noise levels recorded were taken as baseline. Three locations from Chandhanee Magu and 2 locations from Shaheed Kudanevi Thuthu Manik Hingun have been assessed for noise levels (Figure 25) at different time periods.

Figure 25: Noise level recorded locations

Following figure shows the noise levels recorded in the vicinity of the proposed plot in different time periods.

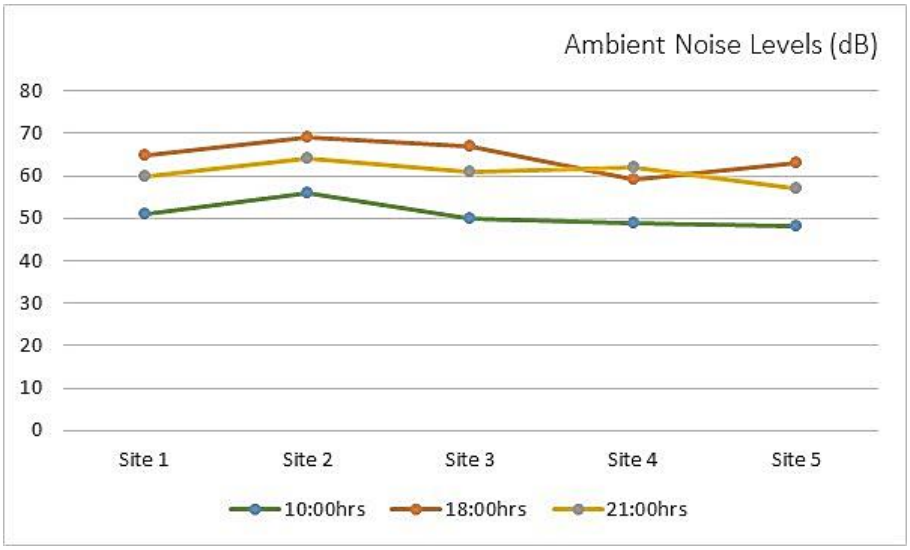


Figure 26: Noise levels recorded from the sites

Noise levels recorded from the sites were Site 1 51dB (10:00hrs), 65dB (18:00hrs) and 60dB (21:00hrs), Site 2 56dB (10:00hrs), 69dB (18:00hrs) and 64dB (21:00hrs), Site 3 50dB (10:00hrs), 67dB (18:00hrs) and 61dB (21:00hrs), Site 4 49dB (10:00hrs), 59dB (18:00hrs) and 62dB (21:00hrs) and Site 5 48dB (10:00hrs), 63dB (18:00hrs) and 57dB (21:00hrs). Based on noise level records, 18:00hrs, which coincided with schools afternoon session finish period was recorded to have the highest noise levels on all sites except for Site 4 where highest noise level occurred at 21:00hrs. The highest noise levels were recorded from Chandhanee Magu, which is a main road in Male' City where there is greater traffic movement most of the time.

The morning noise levels at 10:00hrs on all sites were relatively low compared to other time periods.

Compared to all Sites, Site 2 located on Chandhanee Magu in the vicinity of the project site had the highest noise levels during all time periods.

6.3.2 Traffic Flow and Volume

In order to understand the general traffic flow and volume by the project site, an hourly traffic survey was conducted during three time periods (10:00hrs, 18:00hrs and 21:00hrs) on Chandhanee Magu and Shaheed Kudanevi Thuthu Manik Hingun.

Figure 27: Heavy traffic on Chandhanee Mahu at 18:00hrs

Figure 28: Traffic and traffic diversion to Shaheed Kudanevi Thuthu Manik Hingun at 18:00hrs

Figure 29: Traffic on Chandhanee Magi at 21:00hrs

Figure 30: Traffic entering Shaheed Kudanevi Thuthu Manik Hingun at 21:00hrs

The following figure outlines the traffic volume on the two roads during the three time periods.

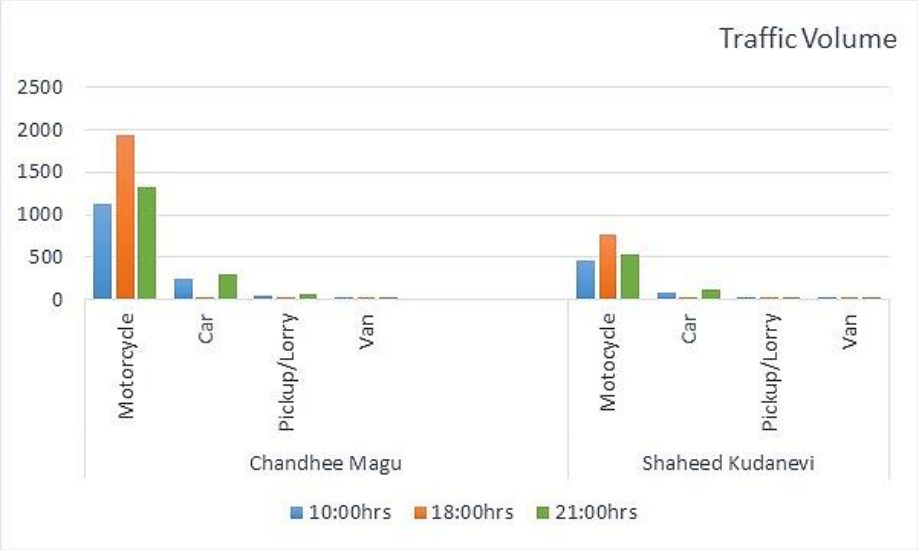


Figure 31: Traffic volume on Chandhanee Magu and Shaheed Kudanevi Thuthu Manik Hingun

The traffic volume was assessed to be generally high especially on Chandhanee Magu which is a main road in Male' City. The highest traffic on both roads were recorded at 18:00hrs time period. This is mainly because the three school on Chandhanee Magu, Iskandhar School, Aminiya School and Arabiyya School finish their afternoon sessions at this time slot. The highest traffic volume at this period was from motorcycles having 1,942 on Chandhanee Magu and 773 on Shaheed Kudanevi Thuthu Hingun. All other traffic types including cars, pickups and lorries were recorded to be very low as such vehicles are not allowed during school rush hours. Pedestrian movement at this time was also observed to be extremely high.

Night time traffic on both roads were recorded to be lower than the 18:00hrs time period. The highest traffic movement at night is also from motorcycles having 1,320 on Chandhanee Magu and 528 on Shaheed Kudanevi Thuthu Manik Hingun. Car volume was recorded to be highest at night compared to 10:00hrs and 18:00hrs time periods on both roads. A total of 300 cars on Chandhanee Magu and 120 cars on Shaheed Kudanevi Thuthu Manik Hingun was recorded.

Morning time traffic at 10:00hrs was recorded to be the lowest among the three time slots. Even at this time, motorcycles had the highest volume, having 1,128 on Chandhanee Magu and 452 on Shaheed Kudanevi Thuthu Manik Hingun. Considerable amount of car volume was also observed on the two roads including 252 on Chandhanee Magu and 81 on Shaheed Kudanevi Thuthu Manik Hingun.

The above figure presents traffic volume recorded on two roads at three time periods.

Figure 32: Traffic flow by the project site

General traffic flow by the project site is from two roads, Chandhanee Magu and Shaheed Kudanevu Thuthu Manik Hingun, both of which are one-way roads. Chandhanee Magu traffic flow is from north to south and Shaheed Kudanevi Thuthu Manik Hingun traffic flow is from east to west.

6.3.3 Soil Condition

The soil condition of the plot area was studied by digging two soil pits. The condition of the soil plays a key role in determining the type and depth of the foundation proposed for the building.

The soil of the plot mainly consists of dark loose coral sand with fragments of coral rubble on the upper layer and dense coral sand on the lower layer of the soil. The lower layer has more fine sand right up to the groundwater level and beyond. Some weathered coral rocks are also found at the lower layer.

Groundwater table is found at a depth of 1.2m below the surface.

Figure 33: Soil profiles

6.3.4 Groundwater Quality

A groundwater sample was collected from the plot and was tested for parameters such as conductivity, salinity, nitrate, sulphate, phosphate, TDS, turbidity and pH as well as DO and faecal coliform. The results of the groundwater analysis show that the groundwater of the area is good and free from contamination and pollution. The faecal colifirm levels were at 0 and salinity levels were at $0.65^{0}/_{00}$.

The results of the groundwater test from MWSC are attached in **Appendix 8.**

6.3.5 Ambient Air Quality

Ambient air quality data was not obtained for the proposed project, however, general air quality of Male' was assessed in 2010 as part of the study conducted for airport development project at Hulhule (AECOM, 2010). An air quality monitoring station was set up at Hulhumale', Hulhule and Male' as part of this study. The objective of the ambient air quality monitoring is to access background environment status and to check the conformity to the applicable standards of ambient air quality.

The air quality monitoring was carried out using PM10, PM2.5, Sulphur dioxide (SO_2), Oxides of nitrogen (NOx), Carbon Monoxide (CO) as the parameters by sampling continuously during the sampling period.

The ambient air quality results obtained from the monitoring undertaken indicate that all parameters were within the WHO guidelines for ambient air quality.

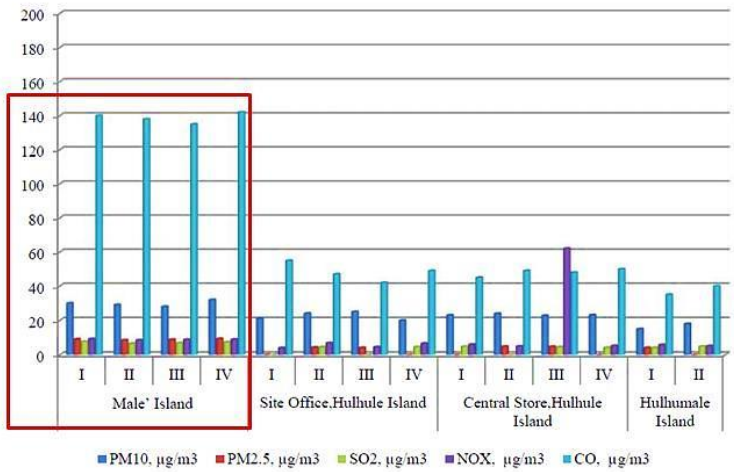


Figure 34: The ambient air quality for Male' (inside red box) taken from EIA for INIA Reclamation and Expansion by Water Solutions Pvt. Ltd., July 2014

Except for CO levels, the particulate matters and NOx and SO_2 are found to be generally low in Male'. The CO levels were observed to be highest for Male' compared to Hulhule and Hulhumale', which is believed to be due to the presence of increased vehicles in Male'.

It will be difficult to establish air quality baseline as part of the project since there are a number of ongoing construction projects nearby as well as within the region where the ambient air may contain high levels of PM.

6.3.6 Vegetation

There are no vegetation or mature trees found within the plot. Hence, no vegetation assessment was undertaken.

Figure 35: Bare land of the plot

6.4 STRUCTURAL ENVIRONMENT

6.4.1 Condition and Uses of Nearby Buildings

The neighbourhood of block 194 as well as nearby blocks (195 and 196) has a number of multistorey buildings, most of which are believed to be used for residential purpose except for the ground floor of these buildings where it is used for commercial purpose such as shops. However, on the adjancent of Alidhooge plot, only one multistorey is found, which is located on the eastern side at Shimaagu. The buildings is currently under construction and 6 sheets have been completed out of 10 sheets. Other plots on the adjacent of Alidhooge at Gurumful on the northern side has 2 storey building and Anbaraa on the western side has a single storey building. The structure of Shimaagu is 2 - 3 years old. The buildings at Gurumful is less than 5 years old.

Figure 36: Construction of multistorey building at Shimaagu on the eastern side (left) and two storey building at Gurumful on the northern side (right)

Beyond the adjacent buildings of Alidhooge, a number of multistorey buildings have been developed for residential use. These buildings are believed to be less than 10 years. No major structural impacts and damages were found in these buildings.

Figure 37: A 7 Storey building approx. 6 years (left) and 8 Storey residential buildings approx. 5 years (right) found on the western side beyond the plot of Alidhooge

On the opposite side of Alidhooge on Shaheed Kudanevi Thuthu Manik Hingun, 3 major buildings were found, which are located nearby the proposed plot.

Figure 38: Muiltistrey buildings found on the opposite side of the plot

The buildings found on the left side of Figure 38 (7 storey and 8 storey) are believed to be over 10 years old, however do not have major physical and structural damages. The building on the right side of Figure 38 is 9 storey and less than 5 years old. As this building is relatively new, no physical and structural damages are found.

The upper floors of all these building are used for residential purpose.

6.4.2 Condition of Roads

Both Chandhanee Magu and Shaheed Kudanevi Thuthu Manik Hingun are the key roads that will be used for accessing Alidhooge. Both these roads were observed to be in good condition. No physical structural damages were found from vicinity of the project site.

Figure 39: Condition of Shaheed Kudanevi Thuthu Manik Hingun (left) and Chandhanee Magu (right).

6.4.3 Existing Uses of the Site

Currently the proposed project site is not used for any purpose except for storing some materials for temporary use for getting site ready for construction.

6.5 SOCIO-ECONOMIC ENVIRONMENT

6.5.1 Population of Male'

According to the Preliminary Results of the Population and Housing Census of 2014, the total population of Male' is 153,379 divided into 83,429 males and 69,950 females. A large population of foreigners are also living in Male' and included in the total population, a total of 20,360 persons divided into 17,274 males and 3,086 females currently reside in Male'. According to the Census 2014, 38.98% of the country's population now reside in Male' (DNP, 2014).

The population has rapidly grown in Male'. In 2006 Census, the total population of Male' was 103,693 persons divided into 51,992 males and 51,701 females. Hence, over the last 9 years, the population of Male' has grown by 32%. The rapid growth of population in Male' is believed

to be for various reasons including employment, education, health as well as for various economic activities, given that Male' is the business hub of the country.

Figure 40: Transformation of Male': in 1930s (from www.maldivesroyalfamily.com) (left), and in 1960s (from www.flickr.com) (right)

Figure 41: Male' in 2014: where 38.98% of the country's population live (www.earthporm.com)

6.5.2 Population of Adjacent Buildings

The proposed building at Alidhooge is located in a highly urbanised residential as well as commercial and public area. Almost all buildings within a radius of 30m are multi storied having between 2 – 8 floors. A total of 18 such buildings exist within this range. Almost all ground floors in these buildings are used for commercial purpose such as shops, offices, cafes and markets.

As it was difficult to get access to most of the residential units in these buildings, the exact number of population residing in these buildings are unknown. Hence, only estimation was

done taking into consideration the average household size in Male'. In this regard, the population within the 30m radius region is estimated to be between 550 – 700 persons.

6.5.3 General Socio-economic Environment of Male'

6.5.3.1 Education

Education in Male' is provided by 36 schools, which comprises of 13 government schools, 4 community schools and 19 private schools (Ministry of Education, 2013).

The student population in Male' is amongst the highest in the country having a total of 27,204 in all schools from 86,096 total student population in the country, which is 31.5% of all the student population (Ministry of Education, 2013). The total number of teachers in Male' schools are 1,878, hence, the student-teacher ratio is 14.48 students per teacher (Ministry of Education, 2013).

6.5.3.2 Health

There are two major hospitals in Male' namely Indhira Gandhi Memorial Hospital (IGMH), which is the government owned hospital and ADK, which is the private owned hospital, who provide major health services to the residents of Male' and for those who come to Male' from the Atolls. In addition to these two major hospitals, there are number of specialist clinics established in Male' who provide specialist health services in Male'. Also, Dhamana Veshi (Male' Health Centre) provides health monitoring, vaccination and family planning services.

The in-patients in IGMH in 2013 were 13,058 and the average occupancy ratio was 71.4% for the same year (DNP, 2014). The average duration of stay was 5.5 days in 2013 (DNP, 2014). No statistics for ADK Hospital was available at the time EIA preparation.

Male' is believed to receive the highest number of in-patient and out-patients given that the major hospitals are located in the Male' with modern facilities and services.

In addition to major hospitals is Male' there are a number of private clinics providing general and specialist health services. Pharmacies, who play a major role in providing medicines and pharmaceuticals are also found in great numbers and are mostly located by the hospitals and clinics in Male'.

6.5.3.3 Utilities

Utility services are supplied by the existing utility service providers in Male', namely State Electric Company (STECLO), who provide electricity services and Male' Water and Sewerage Company (MWSC), who engage in providing water and sanitation services in Male'. Recently, Waste Management Corporation (WAMCO) is created for providing waste management services in Male' and Greater Male' region in addition to Addu City and Fuahmulah City.

STELCO has its largest operation in Male', with an installed capacity of 61.42MW, and a 26 km underground 11kV distribution network feeding power to 99 distribution transformers to provide electricity to 33,341 customers (www.stelco.com.mv). In 2013, the electricity use in Male' reached over 232,023 kWh (DNP, 2014).

Established on the 1st of April 1995, MWSC is the pioneer organization in the Maldives to institute a water production and wastewater management system to counter the issue of water shortages and a lack of an appropriate sewer system in the capital island Male'. Since then, the Company has worked diligently to provide the people of Male' with potable water and managing wastewater sustainably. The company has 29,278 customers in Male' (DNP, 2014). In 2013, over 4,509 MT of desalinated water was used in Male' of which majority 81% were used for residential purposes (DNP, 2014).

WAMCO currently provides household waste collection, transportation and disposal services based on a tipping fee. WAMCO is licensed by EPA to handle and transport waste in the country.

6.5.3.4 Transport

No specific data of vehicles in Male' were available at the time of EIA Report preparation. However, with increased population in Male', subsequently increases total number of vehicles in Male', hence has been experiencing traffic issues as a result. Traffic lights have been installed in major traffic movement areas as a safety and traffic control measure.

It is believed that Male' has the highest number of vehicles imported to the country. In 2013, over 61,413 vehicles were registered including motorcycles, cars, pickups, lorries, vans, trucks, etc, out of which motorcycles are amongst the highest having 50,777 cycles registered (DNP, 2014). Also, in 2013, over 4,878 vehicles have been registered, most of which were motorcycles, having 4,341 registrations (DNP, 2014). Increased vehicles in Male' are experiencing major traffic issues, including increased road accidents and increased traffic

congestions. In order to reduce traffic related issues in Male', the majority of the roads have been made one-way roads.

6.5.3.5 Unemployment

Currently Male' has an unemployment rate of 9.2% out of the working population above 15 years of age of 82,289 (DNP, 2014).

6.5.3.6 Waste

Over 211,579 tonnes of solid waste including industrial and domestic waste from Male' were transported to Thilafushi Island in 2013 (DNP, 2014). Increased population also means increased solid waste. The waste generated in Male' is transported to Thilafushi for final disposal as land is scarce in Male'. However, a waste collection yard has been designated in the southern side of Male' before it is transported to Thilafushi.

Recently, Waste Management Corporation (WAMCO) has taken over waste collection, handling and transportation in Male' with a tipping between MVR 100 – MVR 150 per household.

Figure 42: Waste collection by WAMCO vehicles in Male'

6.5.3.7 Economic Activities

Male' is the major economic and commercial centre of the country, hence a number of economic activities are undertaken which contribute to the local economy. The construction sector in Male' is believed to be the largest economic activity as well as real estate development and management also plays a key role in the economy. Public and private sector employment is also believed to be a key economic activity in Male'. Additionally, tourist-related services

including operation of travel agencies, guest houses and hotels, operation of supermarkets and daily goods shops, garments shops, pharmacies as well as operation of cafés and restaurants are also important economic activities in Male'. Most of the imported goods arrive to Male' and gets distributed to the islands.

6.5.4 Main Economic Activities in the Surrounding Area

As the proposed building is found in a major area in Male', a number of economic activities are undertaken within the region. Most common economic activity is varieties of shops on Shaheed Kudanevi Thuthu manik Hingun and Chandhanee Magu including garment shops, shoes shops, gadget shops, sportswear shops, gift shops, tailors, saloons, supermarket (Red Wave), bookshop (Asrafee Bookshop). Other activities such as offices are also found on the two roads in close proximity to the proposed project site.

Figure 43: Some shops found on Chandhanee Magu

The ground floor of the proposed building will also have shops and a mini mart, hence will play a vital role in the economic activities of the area.

6.5.5 Plans for Evacuation in the Case of an Accident and Fire

In order to cover potential accidents, each floor will have access to a first aid kit installed in the common areas including basement, car park, restaurant and residential units. For serious injuries, prompt attention will be given to transfer the injured by use of one of the lifts in the building.

With regards to addressing potential fire accidents, the rooftop area will have water tanks as installed with hose reel, wet raiser and sprinkler pumps. In case of fire, only staircases will be advised for use. Fire escape routes will be displayed on each floor by each apartment and shops in case of emergencies.

6.6 GENERAL VULNERABILITY

The following information on the vulnerability of the islands in the Maldives are taken from published literature such as Natural Hazard and Physical Vulnerability Assessment Report by UNDP (2008) as site –specific information on vulnerability of the proposed plot or the surrounding area was not available. According to the UNDP (2008) the natural vulnerability of the islands and atolls of the country to potential environmental hazards have been modeled to understand the risk factors of the country.

6.6.1 Major Natural Hazards

According to the UNDP assessment report, the natural hazards prevailing in the Maldives can be classified into 4 categories. These are;

- Geological hazards i.e. earthquakes and coastal erosion;
- Meteorological hazard i.e. tropical cyclones and storms, thunder storms, waterspouts, heavy rainfall, and drought;
- Hydrological hazards i.e. floods induced by heavy rainfall, storm surges, swell waves, udha, and tsunamis;
- Climate-related hazards i.e. accelerated sea level rise, sea surface temperature rise, changes in monsoon pattern.

Among those listed above, floods (induced by tsunamis, abnormal swell waves, and heavy rainfall), windstorms, droughts, and earthquake are counted as major natural hazards prevailing in the Maldives.

The general patterns of the major natural hazards prevailing in the Maldives can be well summarised in Figure 44.

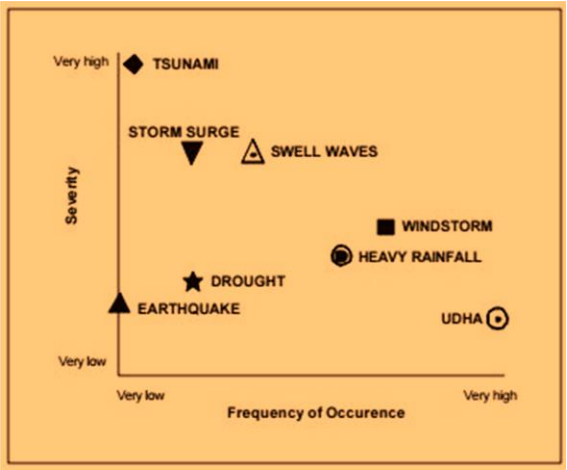


Figure 44: Relationship between hazard intensity and frequency of major natural hazards in the Maldives (UNDP, 2008)

6.6.2 Distribution Pattern of Natural Hazards

The major natural hazards in the Maldives are strictly controlled by their geophysical and climatic settings and show quite different patterns in their distribution, as shown in Figures 45 and 46. Tropical cyclones and correspondingly storm surges and droughts predominantly prevail in the north of the Maldives. In contrast, swell waves and heavy rainfalls are more prominent in the southern and western islands of the Maldives. The southern islands of the Maldives are threatened earthquakes from the seismis zone of Carlsberg Ridge.

There are also longitudinal variations in hazard distribution. The most notable is the occurrence of tsunami waves and their impacts. The eastern rim islands are subject to tsunamis and waves of a higher intensity due to their direct exposure to these hazards, whereas the western rim and atoll lagoon islands are protected by the atoll formation patterns. Impacts of swell waves and udha events are also expected to be highest on the western rim island due to the south westerly and westerly approach of these events. However, their impacts aren't totally reduced on the eastern rim islands due to the propagation of swell waves through reef passes and fetch within atoll lagoon.

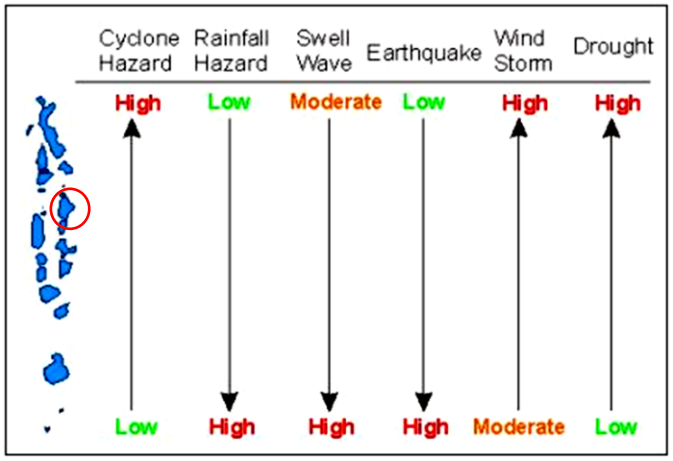


Figure 45: Latitudinal variations of major natural hazards across the Maldives (UNDP, 2008).

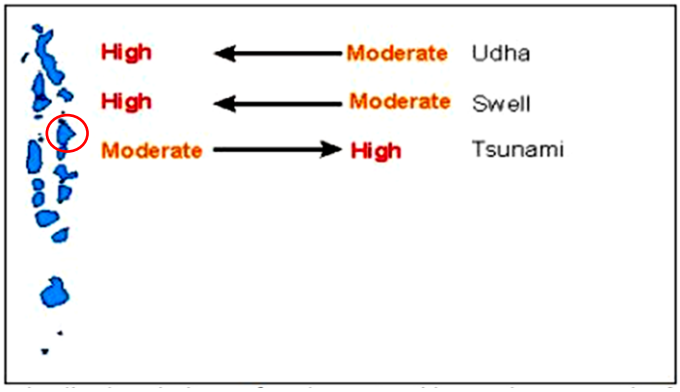


Figure 46: Longitudinal variations of major natural hazards across the Maldives (UNDP, 2008)

Based on the above analysis, it can be said that Male' is relatively in a safe zone from major natural disasters due to its location in the central parts of the country.

However, there is moderate potential for Udha and swells generated from the western side in between the western and eastern atoll and high potential for Tsunami from the eastern side that may directly affect Male' Atoll. Furthermore, flooding risks in heavy rain in the central parts of the country has been identified to be moderate.

6.7 SITE VULNERABILITY

The entire country including Male' City is vulnerable to climate change and subsequent sea level raise due to the low lying nature of the country. A case study was done to project impacts over different time periods at different scenarios as a result of sea-level raise on Male' City

was presented in the First National Communication of the Republic of Maldives to the United Nations Framework Convention on Climate Change in 2001 (MHAHE, 2001).

The case study presents digital elevation map of Male' City and inundation impacts based on projected scenarios.

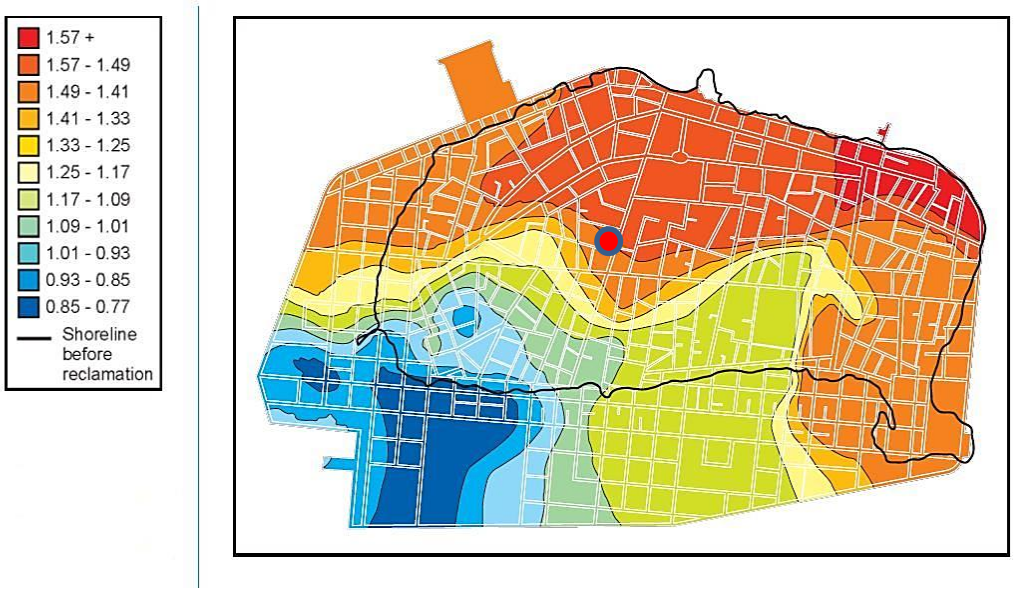


Figure 47: Digital elevation map of Male' City (MHAHE, 2001)

According to the case study, the northern side of Male' City has an average elevation of 1.50m above MSL and the south western side of Male' City has an average elevation of 0.85m above MSL. The red dot on the map is the region where the proposed building development project will be undertaken and has an average elevation of 1.49m above MSL.

The following are the major impacts predicted on Male' City over different sea level raise scenarios where different parts of Male' will be inundated as projected sea level raise continues.

Figure 48: Male' in 2025 (left) and 2050 (right)

In 2025 high case scenario, 15% of Male' City will be inundated and in 2050 in the same case scenario, 31% of Male' City will be inundated. During this time period, the proposed project area will be unaffected.

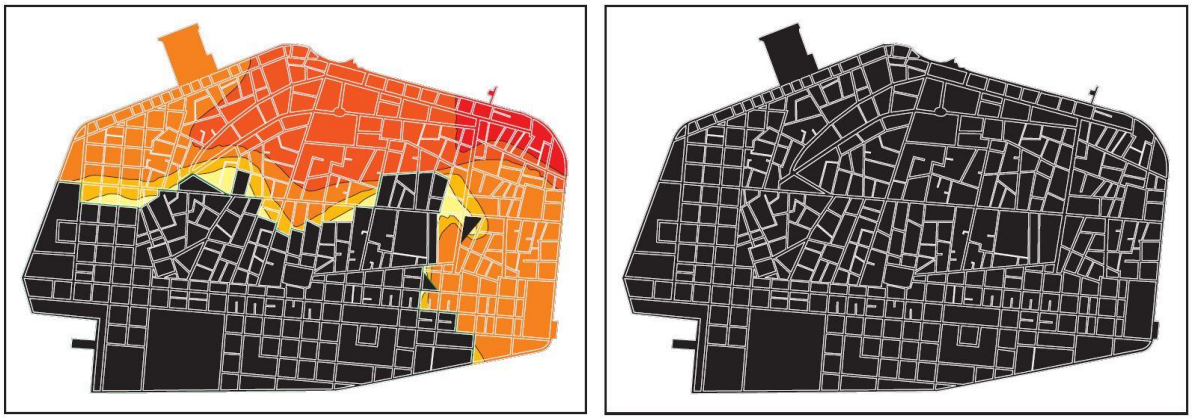


Figure 49: Male' in 2100 at low scenario (left) and 2100 high scenario (right)

More than 50% of Male' City is projected to be impacted on low scenario and the entire Male' City is projected to be impacted on high scenario cases which will affect all land and infrastructure on Male'.

According to the previous section on general vulnerability of Maldives, the central parts of the country has a relatively low rainfall hazard and given the findings of the case study presented on elevation of Male', it is believed that the project site do not have major risks of flooding from rainfall.

7. ENVIRONMENTAL IMPACTS

The following section predicts potential environmental impacts from the proposed 15-storey building to be developed at Ma. Alidhooge, Male'. Once the potential environmental impacts are identified, the impacts are evaluated to identify their significance. In order to identify and analyze environmental impacts, the following methods have been used.

7.1 METHODS

7.1.1 Impact Prediction

First of all, most of the environmental impacts that may be generated as a result of the project is predicted and is distinguished from construction and operation phases of the project. The impacts for both phases have been predicted by using a descriptive checklist. The prediction of environmental impacts also to a great extent incorporated expert judgment and professional opinion of the EIA consultant involved in the preparation of the report as well as information reviewed from other relevant EIAs outlined in this EIA Report.

7.1.2 Impact Evaluation

The environmental impacts are assessed in terms of significance. Significance is the function of magnitude of the impact and the likelihood of the impact occurring and the impact magnitude is a function of the extent, duration and intensity of the impact. The criteria used to determine impact significance are summarized in the following table (adapted from Environmental Resource Management, 2008).

IMPACT MAGNITUDE		
Extent	On-Site	Impacts that are limited to the boundaries of the development site
	Local	Impacts that affect an area in a radius of 1km around the development site
	Regional	Impacts that affect regionally important environmental resources, administrative boundaries determined by bregional scale
	National	Impacts that affect nationally important environmental resources or have macro-economic consequences
Duration	Temporary	Impacts are predicted to be of short duration and intermittent / occassional
	Short-term	Impacts that are predicted to last only for the duration of the construction period
	Long-term	Impacts that will continue for the life of the project, but stops when the project ceases operation
	Permanent	Impacs that cause a permanent change in the affected receptor or resource
Intensity		*BIOPHYSICAL ENVIRONMENT*
	Negligible	Impact on the environment is not detectable
	Low	Impact affects the environment in such a way that the natural funclions and processes are not affected
	Medium	Where the affected environment is altered but natural functions and processes continue
	High	Where natural functions or processes are altered to the extent that they will temporarily or permanently cease
		SOCIOECONOMIC ENVIRONMENT
	Negligible	There is no perceptible change to people's livelihood
	Low	People/communities are able to adapt with relative ease and maintaine pre-impact case
	Medium	People/communities are able to adapt with some difficulty and maintain pre-impact case but only with a degree of support
	High	People/communities will not be able to adapt to changes or continue to maintain pre-impact case
Likelihood	Unlikely	The impact is unlikely to occur
	Likely	The impact is likely to occur in most consitions
	Definite	The impact will occur

Table 3: Impact significance criteria

Once a rating has been determined for magnitude and likelihood, the following matrix has been used to determine the impact significance.

SIGNIFICANCE				
		LIKELIHOOD		
		Unlikely	**Likely**	**Definite**
MAGNITUDE	**Negligible**	Negligible	Negligible	Minor
	Low	Negligile	Minor	Minor
	Medium	Minor	Moderate	Moderate
	High	Moderate	Major	Major

Table 4: Significance rating matrix

The different ratings of impact significance are then given a colour scale for easily understanding the overall magnitude of the impact. The following colour scale has been used.

Negative Ratings	Positive Ratings
Negligible	Negligible
Minor	Minor
Moderate	Moderate
Major	Major

Table 5: Significance colour scale

7.1.3 Limitations and Uncertainties

The potential environmental impacts from the proposed project are all predicted and assumed, hence there may be variables affecting the accuracy of these impacts due to natural variations and unforeseen events.

Although there are buildings having 25 floors proposed to be developed in Male' region (IGHM Building in Male; and Ministry of Finance and Treasury Building in Hulhumale'), no buildings exceeding 15 floors have been completed yet, hence, there is difficulty in understanding the type and magnitude of environmental and social impacts that may be associated with proposed development.

EIA studies undertaken in similar environmental settings and technical experience as well as professional judgment of the EIA team have been used as support while predicting and evaluating these environmental impacts.

7.1.4 Justification of Methods Used

There are many ways and a number of methods in which environmental impacts that arise from development projects can be assessed and evaluated. The methods used for the purpose of predicting and evaluating the significance of environmental impacts is an accepted and internationally recognized as well as widely used methods throughout the world in a number of development projects. Although it is adapted for the condition of the project by the EIA consultant from Environmental Resource Management, 2008 literature, the approach as well as intended outcomes still remain same.

EIA is a decision-making tool, hence, needs to be understood by both technical and non-technical people. The use of colour codes for determining the significance of impacts in the methods used has been demonstrated to be quite effective, especially with non-technical people.

7.2 IMPACT PREDICTION

The environmental impacts that may be associated with the proposed 14-stroey building project are predicted in this section by using a simple descriptive matrix. The following matrix distinguishes the types of environmental impacts that may be associated with various project

actions on key environmental components and distinguishes whether these impacts occur during construction period or during post-construction and operations period.

PROJECT ACTIONS	ENVIRONMENTAL COMPONENTS AND ENVIRONMENTAL IMPACTS					IMPLICATION PERIOD
	Physical and biological	**Structural**	**Air quality**	**Ground water**	**Social**	
Excavations	Potential impact to soil environment	Potential threat to nearby buildings and roads				During construction
Dewatering		Potential threat to nearby buildings and roads		Short-term loss of ground water within boundary and vicinity	Potential to increase in induration of saltwater within neaighbour areas	During construction
Construction activities	Potential physical damages to adjacent buildings	Potential threat to nearby buildings and roads	Short-term exposure to dust	Impacts due to wastewater disposal from concretion and washing	Exposure to noise and road blocking	During construction
Operation of construction machinery and vehicles	Disturbance to residents and physical damages to adjacent buildings	Potential to damage roads from heavy machinery	Short-term exposure to dust, CO and PM	Impacts due to wastewater disposal from concretion and washing	Exposure to noise and road blocking	During construction
Construction waste	Land degradation and aesthetic impact			Potential to pollute ground water	Potential health issues and nuisance Potential mosquito breeding	During construction
Increased traffic			Exposure to CO and PM		Potential health issues and nuisance and increased noise levels	During operation
Solid waste	Aesthetic impacts due to improper management				Potential health risks	During operation

Table 6: Impact prediction table

The above table shows the main project activities and the main components upon which the environmental and social impacts will occur. The environmental impacts on various environmental components during the construction phase of the proposed project seem greater than those of the operation phase.

7.3 CONSTRUCTION PHASE IMPACTS

7.3.1 Excavation

It is estimated that around 2,125m^3 of sand from the plot will be excavated for laying the foundation and development of basement of the 14-storey building. Sand from the proposed building boundaries will be excavated by using excavators. Although there are no major environmental impacts from sand excavation due to absence of significant habitats and vegetation, very low levels of impacts to the soil environment is believed to occur including displacement of some soil organisms.

There will be no impact on terrestrial flora and fauna due to absence of such within the proposed plot.

Also, structural impacts to the nearby buildings and roads are unlikely, however, it has been identified as having potential implications, if excavation works are not undertaken carefully. Site protection methods including shoring have been presented in the project description section.

7.3.2 Dewatering

It is estimated that around 1,700m^3 of groundwater will require to be dewatered from the proposed area. The environmental impacts associated with dewatering will be short-term in nature, including loss of groundwater from the project boundary and immediate surrounding. It is unlikely that the quality of groundwater will be severely affected, however, slight changes to certain water parameters may occur. These include increased salinity, turbidity and dissolved solids during dewatering operation within the vicinity areas for short period of time. As a result of dewatering, there is also potential for physical and structural damage to adjacent buildings as a large volume of groundwater will be dewatered in the process.

If the activity is mismanaged, there is potential of flooding within the excavated plot and the surrounding environment from dewatering.

As a result of dewatering, groundwater within a radius of 30m is believed to be affected, which may cause some social concerns within these areas. The proponent has already communicated with residents of adjacent plots and nearby areas as to inform details on addressing any physical and social impact from the proposed project.

7.3.3 Construction Activities

As a relatively large building will be constructed at the plot, a number of construction activities will occur including cladding, concrete mixing, safety framework development, site preparation, transport of excavated material, transport of construction material, welding, woodworks, transport of construction waste, etc. These construction activities are believed to generate a number of environment and social impacts. Most of these environmental impacts include potential structural damages to the roads and adjacent buildings due to careless operations, decreased air quality from increased dust and particulate matter and some social impacts such as exposure to increased noise levels as well as nuisance from road blocking and traffic congestion.

During laying of the foundation, some disturbances may occur to the pedestrians and traffic due to regular movement of material and equipment during assembling work. Of particular concern will be impacts to traffic and pedestrians that enters Shaheed Kudanevi Thuthu Manik Hingun. As a result, traffic blockade on Chandhanee Magu especially during peak traffic hours such as schools rush hours will be likely.

However, large-scale impacts to pedestrians and traffic especially on Shaheed Kudanevi Thuthu Manik Hingun due to construction activities is believed to be controllable as all construction operations including foundation development will be undertaken in an appropriately fenced project boundary.

7.3.4 Operation of Construction Machinery and Vehicles

As part of the proposed project, construction machinery such as concrete machine, welding machine, lifting machine and vehicles such as excavators and trucks and supply lorries will be used in the construction operations. During the operation of these vehicles and machinery, impacts from higher noise levels, presence of CO, PM and dust are envisaged. Noise and dust

pollution may have health implications to the people living nearby areas. Also, occasional road blocking may occur at the time of operations which may be a nuisance to nearby people and to the traffic movement in the area especially on Shaheed Kudanevi Thuthu Manik Hingun and traffic and pedestrians that enters the road from Chandhanee Magu.

As the area was observed to have a fairly large population, increased traffic especially during peak hours as well as public places such as schools, impacts from vehicles and machinery as well as general construction activities may be quite notable.

7.3.5 Construction Waste

Any project that involves construction generates large amount of solid waste particularly construction waste. Construction waste involving packaging waste such as cement bags and cardboards, concrete waste, iron, timber, aluminum, nets, wastewater, etc that are generated from construction activities if inappropriately disposed have the potential to degrade environmental conditions in disposed areas. Also, as a result, aesthetic conditions of the surrounding environment will be lost in addition to health risks and nuisances for nearby residents. Additionally, waste oil and lubricants if disposed at site will contaminate and pollute the groundwater.

Construction wastewater and washing wastewater that have high cement content as well as oils if disposed into the main sewer may have the potential to block the sewerage system, which may affect the entire region.

Also, as water will be released into the concrete sheets on a regular basis as well as maintaining water in containers, there will be potential for mosquito breeding in these areas. As a result of mosquito breeding, there is potential health risks and disease outbreaks which may affect the population of the surrounding areas.

7.3.6 Pedestrian and Traffic Issues

During construction, due to partial blocking of the roadside and due to frequent parking of vehicles bringing in construction material, the pedestrian and traffic may have to face difficulties, however, will only be limited to the time of material delivery.

Even for a short period time if the traffic is blocked on Shaheed Kudanevi Thuthu Manik Hingun especially during peak hours such as schools rush hours and night time (6:55 - 7:30; 12:55 – 13:30; 17:55 – 18:30 and 21:00 – 22:00 hrs), it will have a major impact on the southern

side of Chandhanee Magu in terms of traffic jams as well as difficulty for pedestrians to move around. A bottle-neck effect will be created by the traffic light area of Chandhanee Magu and Majeedhee Magu junction area. This is believed to impact traffic and pedestrian movement on Majeedhee Magu as well.

7.4 CONSTRUCTION RELATED HAZARDS AND RISKS

7.4.1 Pollution of Natural Environment

Contamination of groundwater is believed to occur as a result of wastewater disposal mostly from concrete works and washing of machinery and vehicles. This may have some negative impacts on the groundwater of the area and there may be some public complaints regarding the issue.

7.4.2 Noise, Dust and Emissions

During construction stages, increased noise, dust and emission from vehicles are likely to cause some public concern, which may also have some potential health implications. As the area has fairly large resident population, schools and commercial use areas, increased risks on public health may be a concern from noise, dust and emissions. The immediate impact is envisaged to be on people living in adjacent buildings as well as on people living in buildings opposite side of the road. Health issues such as increased flu are likely causes of dust and emissions.

7.4.3 Weather Related Hazards and Risks

Extreme weather events such as heavy rain and heavy wind may have the potential to flood the plot area and bring about some physical damages to the site and work that is being carried out. Also, some serious damages to construction material such as cement due to rain and falling off of objects due to heavy wind from the construction site are potential risks.

7.4.4 Risk of Accidents to Workers

Potential risks to workers during construction of the proposed building include accidents due to negligence and risks due to avoiding use of required safety measures and equipment during work. Mandatory use of safety equipment by all workers at all times will be ensured. All

construction activities will be carefully monitored and supervised to reduce accidents to workers from construction activities.

7.4.5 General Public Health and Safety Issues

As described earlier, there are some public health and safety issues especially from construction sites undertaken in residential areas. These issues include health risks from dust, noise and emissions emanating from construction activities as well as potential injury and property damage as a result of carelessness and mismanagement during construction activities.

As the proposed project is within a residential area as well as having a number of schools and shops, there is regular movement of people within the project area, hence, the project is not free from such issues. With careful planning and proper management, such issues can be minimized.

7.4.6 Fire Risks

Potential for fire during construction phase will be unlikely as the site will not have any storage facilities such as fuel shed. The required fuel for vehicles will be loaded outside as most of the machinery used will be electrical. Nonetheless, if there may be incidence of an accidental fire, the site will have adequate facilities such as fire blankets, water and extinguishers in case of a need.

7.5 SOCIO-ECONOMIC IMPACTS

There are both positive and negative socio-economic impacts from the proposed project. The positive impacts will be outlined later. Most of the negative impacts have been outlined previously including potential impacts from dewatering, noise, emission and dust issues, potential health risks as well as impacts to traffic movement in the area have been identified to be major negative impacts on socio-economic environment.

Additionally, physical and structural risks to adjacent buildings during excavation and dewatering process as well as regional impacts to groundwater from dewatering have been identified to have some social implications.

7.6 OPERATION PHASE IMPACTS

7.6.1 Household Solid Waste

During the operational phase of the project, the largest environmental impact will be from generation of household and domestic waste from the residential units. Household waste mostly includes food waste and other household items. Piling of household waste by the project area is believed to generate serious environmental implications including decreased aesthetics and higher risks of disease outbreaks. Additionally, it will be a nuisance for people who are living in nearby premises and aesthetically very unattractive.

Piling of such waste by the area will not only affect people living in the premises but will to a large extent impact others living in the vicinity.

7.6.2 Increased Traffic

Upon completion of the project, it is believed that the total population within the building is expected to be around 300. Some traffic is believed to be diverted to the area mostly for use of the residents and as well as shop visitors, hence the traffic is deemed to be slightly increased as result of the proposed development. Major environmental impacts from increased traffic to a certain area include increased dust, CO and PM levels in the area, which may have some health implications on a longer term.

7.7 POSITIVE IMACTS

The proposed development of 14-storey building will bring numerous social and economic benefits. The building in full occupancy can accommodate around 300 persons, hence will contribute towards alleviating housing stress in Male' region. As part of the proposed development, it is expected that some new job opportunities will be created including building management and services, shops, security, etc.

Additionally, as the building will have large commercial areas, economic opportunities as well as indirect opportunities for employment is expected to be high.

Male' has heavy traffic and limited parking space. The proposed building with private car parking areas will contribute to eliminating some traffic stress in the region and in particular on Shaheed Kudanevi Ththu Manik Hingun.

Overall, the proposed project for developing the 14-storey building will bring numerous social and economic benefits, hence the project has a very positive outlook.

7.8 CUMULATIVE IMPACTS

Male' is seen rapid development especially a number of construction projects of muiltistorey buildings. Similarly there some buildings in the vicinity of the proposed building and as a result of these developments, similar environmental impacts such as increased dust and emissions, increased traffic, impacts related to dewatering, generation of construction waste around the area is believed to happen simultaneously. Thus, in general the magnitude of these impacts may be higher on a collective basis.

7.9 INDIRECT IMPACTS

As this is a large construction project, there will be some unforeseen impacts which are believed to occur as a result of unforeseen events such as natural disasters and accidents which may affect the overall project schedule.

Additionally, due to the location of the proposed building in a central location in Male', close to major schools and commercial areas, the land value and the rent of residential units from the building may be increased.

7.10 IMPACT ANALYSIS AND EVALUATION

The following section analyses and evaluates the previously described environmental impacts during construction and operation in order to identify their significance.

	IMPACT MAGNITUDE					
ACTIVITY/IMPACT	**EXTENT**	**DURATION**	**INTENSITY**	**LIKELIHOOD**	**MAGNITUDE**	**COLOUR SCALE**
Land excavation	Onsite	Temporary	Negligible	Likely	Negligible	
Dewatering	Onsite	Short-term	Medium	Likely	Moderate	
Construction activities	Onsite	Short-term	Medium	Likely	Moderate	
Operation of construction machinery	Onsite	Short-term	Medium	Likely	Moderate	
Construction waste disposal	Onsite	Short-term	Low	Likely	Minor	
Podestrian and traffic issue	Onsite	Short-term	Medium	Likely	Moderate	
General pubic health and safety	Local	Short-term	Medium	Likely	Moderate	
Domestic solid waste disposal	Onsite	Long-term	Medium	Definite	Moderate	
Increased traffic	Local	Long-term	High	Likely	Major	
Creation of employment opportunities (Positive)	Local	Long-term	Medium	Definite	Moderate	
Contrubuting to local economy (Positive)	Local	Permanent	High	Likely	Major	
Cumulative impacts	Local	Long-term	Medium	Likely	Moderate	
Indirect impacts	Local	Long-term	Low	Likely	Minor	

Table 7: Impact evaluation and analysis table

The above environmental impact analysis indicates the overall environmental impacts from the proposed development are minor to moderate. The moderate impacts that occur during the construction phase are mostly associated with dewatering, construction activities and operation of construction machinery at the project site, pedestrian and traffic issues, general public health and safety issues as well as cumulative impacts (both construction and operation) due to ongoing construction projects within the vicinity. Minor impacts during the construction stage are mainly from construction waste as these are very short-term impacts. Although indirect impacts are minor, they will be felt on a long-term basis (mostly during operation). The geographic ranges of the impacts are distributed mostly within the project boundary as well as most of the impacts are confined to the project site.

However, during the operation stage of the project, long-term impacts are believed to occur including generation of solid waste and increased traffic around the area. Impacts related to increased traffic in the area has been identified to be significant.

Some of the socio-economic impacts are believed to be negative such as public nuisance, noise and dust issues, potential physical and structural threats to nearby buildings. However, some social impacts have a positive outlook. Creation of employment opportunities have been identified to be moderate and contribution of the project to the local economy has been identified to have a major implication mainly envisaged due to the commercial aspects integrated as part of the proposed development.

8. MITIGATION MEASURES

The following section outlines key environmental management and mitigation measures that will be undertaken and followed with regards to minimizing and reducing environmental impacts from the proposed project. Mitigation measures have been addressed for all environmental impacts identified in the previous section.

8.1 JUSTIFICATION FOR PREFERRED MITIGATION MEASURES

The environmental management and mitigation measures outlined in this section have been selected by taking into consideration a number of factors. The most important factor considered in selecting these mitigation measures is that these are not just 'paper mitigation measures', it has been selected based on its practicality. Other factors such as economic aspects, technical know-how as well as adequacy and appropriate timing of certain project activities played a key role in determining these environmental management and mitigation measures.

8.2 LIMITATIONS OF MITIGATION MEASURES

The key limitations of the mitigation measures depend on how accurate the predicted environmental impacts are for the proposed project. This includes for instance, the severity and magnitude of environmental impacts from proposed construction and development activities where impact have been predicted. Even with implementation of mitigation measures, the impact boundary could either extend or minimize or the impact magnitude could either increase or decrease. Also, the nature of impacts even from similar project activities undertaken in a different location in the country could behave in a totally different manner.

8.3 CONSTRUCTION PHASE

8.3.1 Mitigation Measures for Excavation Impacts

Excavation of the area to lay the foundation of the building and development of the basement is an important aspect of the proposed development. Excavation has the potential to impact structural environment of the surrounding area.

The following measures will be used to reduce impacts from excavation and reducing threats to structural environment of the surrounding.

- Only excavate required area and complete the work as soon as possible.
- Undertake excavation in sections and install protection and then move on to the next section to reduce physical and structural damages to adjacent buildings and boundary walls.
- The entire boundary will be shored with corrugated sheets supported by iron beams as a safety measure while preparing the site ready for construction. This will also be used as a key protection measure when laying the foundation of the building.
- The excavated material will be immediately transported out of the project boundary to an approved area.
- All excavation works will be done after appropriately fencing the project site so impacts on pedestrian and traffic will be greatly reduced.

Key considerations;

Consideration	Detail
Cost	MVR 450,000 – 650,000
Expected benefits	Protection of adjacent buildings
Expertise	Civil works
Required Manpower	5 - 10
Responsibility	Contractor
Equipment/Technology	Corrugated sheets and iron beams, fencing
Timing	Pre-construction

8.3.2 Mitigation Measures for Dewatering Impacts

Most of the impacts from dewatering are short-term, however occurs quite immediately. The following measures will be undertaken for reducing dewatering impacts;

- All dewatering operations will be undertaken after obtaining necessary permits from EPA and will be undertaken in accordance with planned schedule.

- During the process of dewatering, the EPA approved sign board will be placed in order to inform public that dewatering is ongoing.
- Dewatering operations will be undertaken quickly in order to reduce exposure of prolonged environmental effect in the surrounding environment.
- Dewatering pipeline will be regularly monitored for physical damage and immediately rectify the issue. This will be done if dewatering will be undertaken by contractor's equipment and machinery.
- Regularly check with neighbours if dewatering is affecting groundwater of the surrounding areas.
- Avoid peak traffic hours during dewatering to reduce impacts on traffic and pedestrian.
- Establish compensation mechanisms if there are complaints from neighbors. Key contact persons have already been informed to the neighbours.
- If there are complaints, immediately stop dewatering and rectify the issue including compensation before dewatering works restart.

Key considerations;

Consideration	Detail
Cost	MVR 250,000 (towards compensation)
Expected benefits	Reduce potential flooding
Expertise	Environmental protection
Required Manpower	5 - 10
Responsibility	Contractor
Equipment/Technology	Management
Timing	Pre-construction

8.3.3 Mitigation Measures for Construction Activities Impacts

Most of the environmental impacts are believed to occur during undertaking of construction activities as outlined previously. Therefore, a number of mitigation measures will be implemented throughout the construction period of the project. These include;

- Placement of construction work sign boards and fencing
- Complete the foundation works including framing and concreting in the shortest possible time
- Placement of safety and dust protection nets all around the building frameworks
- Regularly clean concrete sheets from water accumulation to reduce potential risks of mosquito breeding

- All activities generating dust will be undertaken within and inside of dust protection nets
- Do not leave objects free that have potential to fall during heavy winds
- Implementation of mandatory use of safety equipment and gear at all times
- All construction activities to be undertaken within the boundaries of the proposed project to avoid nuisances to nearby people from construction-related activities
- All construction activities will be time bound, hence impacts from excessive noise at night time will be avoided.
- All road blocking will be released soonest possible time upon completion of the work in order to reduce nuisance for nearby people. Ensure road blockings are done only when required.
- Do not allow pedestrian to move by the construction site during operation of construction machinery to avoid potential injuries.
- Ensure that the schools are not disturbed by the ongoing construction activities.
- All construction activities will be halted during prayer times.
- First aid kits will be maintained on site at all times

Key considerations;

Consideration	Detail
Cost	MVR 250,000 – 350,000
Expected benefits	Reduce public health and safety and accidents
Expertise	Environmental protection and project management
Required Manpower	100 - 150
Responsibility	Contractor
Equipment/Technology	Safety equipment, sign board and proper management
Timing	Construction

8.3.4 Minimizing Impacts from Construction Machinery and Vehicles

Construction machinery and vehicles such as concrete machine, excavator and trucks will be largely used during the construction of the buildings. Excessive noise, emission and dust as outlined in the impacts section are expected during the operations of these machinery and vehicles. The following measures will be undertaken to reduce impacts related with operation of construction machinery and vehicles;

- Concrete mixing will be done by using vehicles that drive while mixing so that impacts from noise and dust from the site will be greatly reduced
- The movement of vehicles used for supplying of materials will not be coincided with peak traffic hours found within and around the project site
- Required materials will be supplied bulk in order to reduce the need for frequent transportation, hence reduce impacts from noise and dust
- Operate construction machinery within the project site and only in areas approved by Ministry of Housing and Infrastructure to reduce nuisance to nearby people and avoid frequent road blockades.
- Do not park construction vehicles outside of the project boundary as it will affect traffic movement of the area
- Set times for movement of such vehicles and avoid use of these vehicles at night reduce disturbance to neighbours.

Key considerations;

Consideration	Detail
Cost	0
Expected benefits	Reduce dust and emissions and impacts to traffic
Expertise	Environmental protection
Required Manpower	2 - 4
Responsibility	Contractor
Equipment/Technology	Site Supervisors
Timing	Construction

8.3.5 Avoiding Construction Waste Disposal

As outlined in the impacts section, large amounts of construction waste will be generated from the proposed project. In order to reduce impacts from solid waste disposal on the construction site and the surrounding environment, the following measures will be undertaken;

- Categorically pile all construction waste in an allocated location in the project site
- Reuse material from construction waste wherever possible in order to reduce waste required for disposal
- Regularly transport unusable construction waste to the waste collection yard in Male'
- Avoid transportation of waste during rainy periods
- Designate time slots for waste transportation to avoid peak traffic movement in the region

- Outsource waste management, handling and transportation to EPA licensed parties such as WAMCO and comply with all regulatory requirements at all times
- Waste disposal onsite and within project boundaries will be avoided at all times
- Avoid waste piling in the surrounding areas at all times
- Regularly clean all area including surrounding environment to maintain a clean environment at all time

Key considerations;

Consideration	Detail
Cost	MVR 25,000 per month (waste collection)
Expected benefits	Reduce solid waste onsite
Expertise	Environmental protection
Required Manpower	5 - 10
Responsibility	Contractor
Equipment/Technology	Management and staff
Timing	Construction

8.3.6 Minimize Pedestrian and Traffic Issues

As the area of the proposed building has a relatively large resident population, schools and shops, heavy traffic and pedestrian movement is experienced throughout the day. As a result of the proposed development, some disturbances to the residents, traffic and general public using the area may be experienced.

Care will be taken to reduce and minimize impacts to pedestrians, traffic movement and the general public. In this regard the following measures will be undertaken;

- Use sign boards to notify public that it is a construction site
- Schedule movement of construction vehicles by the project site to avoid traffic congestion in the area
- Restrict time periods for vehicle use to avoid excessive noise especially during night time and prayer times
- Avoid use of construction vehicles during peak traffic times
- Avoid use of construction vehicles when there are large public gatherings in the Artificial Beach area
- Avoid parking of construction vehicles by the project site
- Always keep pedestrians out of the construction site

Key considerations;

Consideration	Detail
Cost	0
Expected benefits	Minimize pedestrian and traffic issues
Expertise	Social protection
Required Manpower	2 - 4
Responsibility	Contractor
Equipment/Technology	Management and site supervisors
Timing	Construction

8.3.7 Minimize Public Health and Safety Issues

As the proposed development will happen in a large residential area, it has potential to raise some public health and safety issues such as exposure to noise and dust during construction, mosquito breeding at the site which may have some health implications, objects falling from the construction site which may injure public are some of the issues already identified.

In order to minimize public health and safety issues, the following measures will be implemented;

- Use sign boards to notify public that it is a construction site
- Regularly clean water accumulated in concrete sheets to avoid potential mosquito breeding
- Use safety nets all around the construction site to reduce spread of dust in the surrounding environment
- Do not leave objects that have potential to fall freely during heavy winds that may harm and injure the public
- Restrict use of construction vehicles to minimize excessive noise in the surrounding environment
- Immediate stop all construction activities if there are any public complaints and rectify the issue before works restart

Key considerations;

Consideration	Detail
Cost	MVR 150,000
Expected benefits	Minimize public health and safety issues
Expertise	Social protection
Required Manpower	2 - 4
Responsibility	Contractor
Equipment/Technology	Management and site supervisors, safety nets
Timing	Construction

8.4 OPERATION PHASE

8.4.1 Manage Domestic Waste

Importance has been given to manage household waste during the operational periods of the project. Following measures will be implemented;

- Piling of domestic waste in the floors by the building will not be allowed
- The building and adjacent areas will be kept clean at all times, free from waste.
- Outsource waste management, handling and transportation to EPA licensed parties and comply with all regulatory requirements at all times
- Ensure that waste goes to waste collection yard in Male'
- Avoid waste transportation during rainy periods to avoid potential health risks
- Designate time slots for waste transportation to avoid peak traffic movement in the region
- Waste disposal onsite and within project boundaries will be avoided at all times
- Keep the restaurant clean and ensure proper hygienic is maintained at all times
- Regularly monitor waste chutes in each floor
- Keep the waste collection area in the ground floor dry and clean at all times

Key considerations;

Consideration	Detail
Cost	MVR 25,000 – 30,000 / month
Expected benefits	Reduce solid waste
Expertise	Environmental protection
Required Manpower	2 - 5
Responsibility	Proponent
Equipment/Technology	Outsourced
Timing	Operation

8.4.2 Minimize Traffic Issues

As large amounts of traffic will be diverted to the area during the operational phase of the project, the following measures will be undertaken;

- Parking of vehicles by the building will be prohibited to reduce traffic congestion in the area
- Residents are encouraged to use car parking provided in the building

Key considerations;

Consideration	Detail
Cost	0
Expected benefits	Good traffic flow
Expertise	Environmental protection
Required Manpower	2 - 4
Responsibility	Proponent
Equipment/Technology	Management
Timing	Operation

8.5 COMMITMENT

The proponent is fully aware of and recognizes the importance of implementing environmental management and mitigation measures as the proposed project is deemed to have certain environmental and health impacts.

The commitment letter from the proponent is attached in **Appendix 8.**

9. ALTERNATIVES

The following section outlines some alternatives to various project activities, which can be implemented as part of the proposed project.

9.1 NO-DEVELOPMENT OPTION

Although there are some environmental and social impacts from the proposed project, a no development option has been looked at in order to understand the weight of the proposed development on environmental, social and economic aspects and the consequences that it will bring if the proposed project chooses no-development option.

As outline in the EIA Report, the main environmental and social impacts from the proposed development is generated during the construction period of the project, including generation of noise and dust from construction activities, potential health risks to neighbours, potential dewatering impacts, potential traffic issues, generation of construction waste and operation of construction machineries. Based on the impact significance evaluation undertaken in the EIA, all these impacts have been identified to have lesser magnitudes, given that most of the impacts are confined to the project boundary and their effects on the natural environment are minimal.

If the proposed project considers no-development option based on the grounds of environmental and social impacts, then opportunities of social and economic development that the proposed project will bring will be forgone. The key socio-economic benefits of the proposed include; development including development of residential units, commercial opportunities and creation of parking spaces, which are important requirements in Male' in addition to employment opportunities.

Considering the demand for space for residential and commercial purpose in Male' and ever increasing housing need, employment opportunity, the proposed project will directly place some residential and commercial space in the market, which will have positive impact on the demand for land and space.

Involvement of private sector in real estate business is improving and proposed development by a local contractor directly contributes to strengthening construction industry in the country.

After careful evaluation of the environmental impacts and socio-economic opportunities and benefits of the proposed development, the No-Development Option has been considered not favourable for the proposed development.

9.2 ALTERNATIVE FOUNDATION OPTIONS

9.2.1 Shallow Footing Foundation

The shallow foundation options considered are square footings, strip or combined footings, and raft foundations.

As this is a 14-storey building, the ultimate carrying capacity and design load needs to be taken into serious consideration taking into account that loose soil layers are found in the proposed plot. The possibility of carrying a 14-storey building on individual and combined footings in such an environment is very low, hence, this option was not further evaluated.

9.2.2 Pile Raft Foundation

Given that shallow foundations such as combined footings are not appropriate for the building, the available option is to go for deep foundation by using mirco piles or bored piles, which will have greater load bearing and carrying capacity given the type of the building and soil conditions found within the plot.

As an alternative method to the raft foundation proposed for the building, an alternative micropile foundation method has been considered. A pile foundation consists of a number of piles driven deep enough (between 5m – 10m deep) into the ground to sustain the building load. This method involves a number of piles driven into the ground by using heavy machinery, which subsequently generates to a great extent sound and vibration. Also, it is often done in environments where soils are not suitable and the substrata consist of hard rock layers. Although the foundation can be done relatively quickly, there are a number of disadvantages, especially in a residential area. These include generation of excessive noise and vibration during the process of pile driving, which may be a nuisance for local residents as well as may physically damage nearby buildings and road infrastructure due to vibration effects.

An example of a building done with pile foundation includes the Jen Hotel building developed in Ameeneege, Male'. During the process of foundation development, over 70 piles were driven into the ground by using heavy machinery including heavy drop hammer to drive piles into the ground. As the process generated some excessive sounds in addition to physical damages of cracks in nearby buildings, there were a number of complaints by the neighbours and as a result the operation was stopped by the authorities.

Given the disadvantages of pile foundation, it was considered not a suitable alternative foundation for the proposed 14 storey building.

9.3 ALTERNATIVE DEWATERING OPTION

As an alternative dewatering option, the proponent proposes to use own machinery and pipeline to do dewatering in accordance to the approval that will be given by EPA.

The following figure outlines an alternative dewatering pipeline route in the case of using own machinery.

Figure 50: Alternative dewatering pipeline route

This option requires over 500m of pipeline to be installed to the northern harbor area of Male'. This option will only be implemented in case of MWSC machinery and pipeline cannot be used for the proposed project.

9.4 JUSTIFICATION FOR PREFERRED ALTERNATIVES

The following statements justify the preferred options over the alternatives proposed that will be undertaken as part of the proposed 15-storey building at Ma. Alidhooge.

- It is preferred that the proposed development should be implemented over the no-development option since the project has tremendous social and economic benefits in terms of adding residential and commercial space in Male' which is an important requirement. Although there are some environmental and social impacts from the project, these can be minimized by implementing proposed mitigation measures as outlined. The benefits of the project are believed to last for decades to come.

- With regards to the foundation method of the proposed high rise building, a raft foundation has been considered given that shallow foundation methods such as footings and pile raft foundation have consequences considering the magnitude of the development and the existing condition of the soil. The load bearing of the building is expected to exceed 125kPa/m^2, hence a raft foundation has been selected.

- Use of MWSC machinery and pipeline has been selected for the project given that they have the capacity to do all dewatering works. Also, they have already done site inspection all equipment are ready to be used upon approval of the EIA and permission obtained from EPA for dewatering. Also, this option will be cost effective.

10. STAKEHOLDER CONSULTATION

In order to identify stakeholder concerns and interests with regards to the proposed project for developing 14-storey building with basement at Ma. Alidhooge, Male', consultation with the key stakeholders have been undertaken.

10.1 KEY STAKEHOLDERS

As per the TOR, the identified key stakeholders relevant for the proposed development are;

1. STELCO
2. MWSC
3. General public by the project area
4. HPA
5. Nearby Schools (Arabiyya, Aminiyya, Iskandhar and CHSE)
6. WAMCO

10.2 MEANS OF CONSULTATION

There is no formal method prescribed in TOR for undertaking stakeholder consultation with regards to addressing concerns and issues relating to the project, hence a number of methods have been used to collect information from key stakeholders identified above. These include; telecommunications with stakeholders and direct on the spot interview with some residents around the project site.

10.3 KEY OUTCOMES

10.3.1 STELCO

Date: 7 August 2017

Time: 10:00 hrs

Type: Telecommunication

Following are the summary of discussions;

- Informed that STELCO has no capacity issue to provide electricity during project construction and operation phases.
- As this is a residential area, connection boxes in the area are readily available.
- STELCO currently engaged in upgrading facilities for providing electricity to Male' residents.
- The design of the building to have easy access to the switchboard room, meters are located on the ground floor of the building.
- Electricity meters used in the building must be approved by STELCO.
- An HV metering system is now implemented by STELCO.

Participants

Name	Details	Contact Details
Mohamed Niyaz	Senior Engineer, STELCO	778 7021

10.3.2 MWSC

Date: 7 August 2017

Time: 10:10 hrs

Type: Telecommunication

Following are the summary of discussions;

- As this development is undertaken in a residential area, there will be no issue in supplying required freshwater to the site during construction and operation of the project, which was confirmed during initial discussions with MWSC.
- May require more than catch pit for wastewater on either side of the building, which will be connected to the main sewer network.
- MWSC is currently upgrading the main sewer in Male' in different sections as well as increasing the diameter of the freshwater pipeline in different sections in Male' given the multitude of developments currently happening in Male', hence there will be no

capacity issue for managing wastewater and supplying freshwater to the proposed building.

- Additionally, some of the pump stations for the main sewer are being upgraded to allow for more volume to be pumped out from the system.
- An alternative dewatering measure needs to be identified in case of MWSC machinery availability at the time of dewatering request.
- Booster hydro pumps are now available at MWSC for lifting water in multistorey buildings.

Participants

Name	Details	Contact Details
Mohamed Naif	Senior Customer Service Officer, MWSC	996 3547

10.3.3 General Public Views

Date: 1 August and 10 August 2017

Time: 13:00 – 20:30 hrs

Type: Letters and telecommunication

Following are the summary of major findings

- Communicated to adjacent building owners regarding contact persons in case of damages as a result of construction works from the proposed building (1 August 2017).
- Adjacent plot owners and residents mostly concerned with noise and dust from construction activities from the building.
- As Shaheed Kudanevi Thuthu Manik Hingun is a narrow street with allocated parking on one side, concerned about traffic congestion during construction period.
- Road blocking on the project site will congest traffic on Chandhanee Magu especially during peak traffic hours and will be nuisance for people and school children.
- Expressed that it will be difficult to park vehicles on the road during construction period.
- Have experienced some difficulty during construction of nearby buildings mostly from noise during construction works, working at late night hours, road blocking, etc

Participants

Name	Details	Contact Details
Aminath Ali	Resident, Gurunful (neighbor)	772 8999
Abdul Rahman Shareef	Resident, Ihuraamge (neighbor)	776 1789
Moomina Ahmed	Resident, Anbaraa (neighbor)	333 0760
Aminath Nazneen	Resident, Shimaagu (neighbor)	No contact
Abdul Rasheed Abdulla	Resident, Shimaagu (neighbor)	782 6563
Abdula Saeed	Niril, Shaheed Kudanevi Thuthu Manik Hingun	777 5553
Ibrahin Yasir	Veneelaage, Shaheed Kudanevi Thuthu Manik Hingun	778 8665
Ibrahin Ahmed	Shop 26, Chandhanee Magu	330 9015
Ismail Rasheed	MC Wear Shop, Chandhanee Magu	782 1234
Ahmed Amir	Arabiyya School Parent	770 6449
Ibrahim Nasheed	CHSE Parent	778 3683
Waheed Abbas	Iskandhar School Parent	777 1837

10.3.4 Schools

Date: 8 – 10 August 2017

Time: Between 10:00 – 12:00 hrs

Type: Telecommunications

Following summary presents a collective view of the schools expressed.

- It is a heavy traffic area and frequent road blocking on Shaheed Kudanevi Thuthu Manik Hingun will greatly impact traffic and pedestrian on Chandhanee Magu especially school children and parents during school opening and closing hours of school sessions (All schools).
- There may be some excessive noise from road blocking and construction works during school hours (Iskandhar School).
- The construction area should be appropriately closed to minimize escape of dust as children may experience difficulty from dust during school hours (Aminiyaa School and Iskandhar School).
- Movement of heavy machinery and vehicles should be avoided at school opening and closing hours of school sessions (All schools).

Participants

Name	Details	Contact Details
Zuna Abdulla	Teacher, Iskandhar School	774 7516
Nazleen Wafir	Principal, Aminiyya School	332 3248
Jeeza Ibrahim	Teacher, Arabiyya School	331 2401
Fathmath Shifa	Teacher, CHSE	332 1330

10.3.5 Health Protection Agency (HPA)

Date: 9 August 2017

Time: 9:30 hrs

Type: Telecommunication

Following are the summary of discussions;

- HPA is more engaged in creating public awareness on public health issues
- Advises the contractors to take safety issues seriously including safety of construction staff as well as safety of pedestrians as there a number of large construction projects that are happening in Male'
- HPA undertakes random checking of construction sites, however, have experienced difficulty in accessing some construction sites
- Mosquito breeding may become a potential health issue for the construction staff as well as for the neighbours, hence cleanliness of the sites need to be ensured

Participants

Name	Details	Contact Details
Aminath Shaufa	PH Programme Coordinator	750 4075

10.3.6 Waste Management Corporation

Date: 10 August 2017

Time: 14:00 hrs

Type: Telecommunication

Following are the summary of discussions

- WAMCO has recently started collection, handling and transport of solid waste from Male'.
- All households are required to register for the service.
- Door step monthly tipping fee in Male' is MVR 150
- Building services monthly tipping fee in Male' is MVR 100
- All households or residential units from the building must be registered to acquire the service of WAMCO for waste collection.
- Currently construction waste cannot be handled by WAMCO due to absence of specialized vehicles.
- Construction waste must be taken to the waste collection yard and from there, WAMCO will transport to Thilafushi

Participants

Name	Details	Contact Details
Ismail Ubaidh	Facilities Manager, WAMCO	798 1008

11. ENVIRONMENTAL MONITORING

11.1 BACKGROUND

Environmental monitoring is important part of the whole EIA. It ensures that how the project has or is impacting the baseline environmental conditions that have been assessed as part of the EIA. It identifies the degrees and magnitudes of the predicted environmental impacts for the project are felt on the environment as a result of project implementation. Thus, it will help in implementing the mitigation measures that are already identified in this report or implement further measures if the impacts are identified to be bigger than anticipated.

11.1.1 Aim

The primary aim of the monitoring is to provide information that will aid impact management, and secondarily to achieve a better understanding of cause-effect relationship and to improve impact prediction and mitigation methods.

11.1.2 Objective

The following monitoring plan is used to measure impacts that occur during the proposed project activities and determine the accuracy of impacts that are predicted and the effectiveness of mitigation measures that are relevant for the proposed project. The objectives of the monitoring plan are to measure:

- Noise levels (EIA baseline)
- Traffic volume and flow (EIA baseline)
- Groundwater quality (EIA baseline)
- Solid waste (During construction and operation)

The monitoring will also ensure that these measurements are kept within the baseline limits and predicted impacts are accurate and mitigation measures taken are effective.

11.2 MONITORING REPORT

A detailed environmental monitoring report will be compiled and submitted to the Environment Protection Agency during construction and post-construction periods of the project based on the data collected for monitoring the parameters included in the monitoring plan outlined for the project.

11.2.1 Report Format

The Environment Monitoring Report will be developed in accordance with the following format;

i) Introduction
ii) Aims and Objectives
iii) Existing Environmental Conditions
    a. Ambient Noise Levels
    b. Traffic Volume and Flow
    c. Groundwater Quality
    d. Solid Waste
iv) Comparison of monitoring data with EIA Baseline Data
v) Conclusion and Recommendations

11.2.2 Reporting Schedule

It is important to ensure that monitoring of the environmental parameters mentioned above will be initiated during construction periods, which will be continued throughout the operation life cycle of the project. In this regard, the following schedule will be followed.

- *During Construction Phase* – Every 4 months
- *During Operation Phase* – Annual Monitoring Report for a period 2 years

11.3 MONITORING PLAN AND COSTS

The following Environmental Monitoring Plan will be followed during and after the construction phases of the proposed 14 Storey Building Development at Ma. Alidhooge, Male'.

Monitoring Requirements	Indicators	Baseline Reference Values	Technique	Frequency	Approx Cost (US$)
Noise Levels	Increase/decrease	Baseline EIA	Sound meter	Every 4 - 6 months	**200.00**
Traffic flow and volume	Increase/decrease	Baseline EIA	Visual Observations	Every 4- 6 months	**300.00**
Groundwater quality	Changes in levels of parameters tested	Baseline EIA	Lab analysis	Every 4 - 6 months	**200.00**
Solid waste (construction and operation periods)	Type and Volume	At the beginning of construction	Data Collection	Every 4 - 6 months	**300.00**
TOTAL COST					**1,000.00**

Table 8: Environmental monitoring plan

11.4 COMMITMENT

The proponent fully commits to implement the proposed environmental monitoring programme. The commitment letter is attached in **Appendix 8.**

12. CONCLUSIONS

Following are the main conclusions of the proposed 14 storey building with basement to be developed at Ma. Alidhooge, Male' based on the EIA undertaken for the project.

a. Apollo Holdings Pvt. Ltd., proposes to develop a 14-Storey Building with Basement at Ma. Alidhooge found on Shaheed Kudanevi Thuthu Manik Hingun, Male' for mixed use and residential purpose. The total area of the plot is 6,531.9 sqft. The development footprint will be 5,274.42sq.ft. An open space of 525.49sq.ft will be left within the plot. The project is expected to be completed in 1.8 years.

b. Once completed, the building will have 13 residential floors with 2 bedroom, 3+1 bedroom and 4+1 bedroom apartments, ground floor for commercial use including shops and a mini mart and basement with car and motorcycle parking, storage, M&E room, chamber, admin, security room. A total of 36 x 2 bedroom, 24 x 3+1 bedroom and 2 x 4+1 bedroom unit will be developed for residential use. The rooftop on the 14th floor will have a play area, swimming pool, gym and a private garden area.

c. The site will be excavated to a depth of 3m to lay the foundations and develop the basement area which will have a floor height of 2.3m. The entire boundary will be sheet piled to depths of 3.5 - 4m with corrugated sheets supported by iron beams as a safety and protection measure while preparing the site ready for construction.

d. The building will rest on a raft foundation.

e. The project requires 2,125m^3 of soil to be excavated and 1,700m^3 of groundwater to be dewatered to lay the foundation of the building.

f. The project has to comply with key laws and regulations implemented by Ministry of Housing and Infrastructure and EPA including Environmental Protection and Preservation Act, EIA Regulations, Dewatering Regulations, Male' Planning

Regulation, Land Act as well as take into account recommendations made in the Maldives National Building Code.

g. There are some concerning environmental impacts from the proposed project, such as excavation, dewatering, construction activities, operation of construction machinery, construction waste generating environmental impacts such as noise, dust and pollution are believed to occur. Social impacts such as traffic congestion, disturbance to nearby residents have been predicted as well as health problems as a result of dust have been identified. During operation period of the project, domestic waste and traffic are believed to increase.

h. With appropriate environmental management and mitigation measures as well as conformity to all the legal and regulatory requirements as outlined in the EIA Report, the project is believed to be able to control or minimize most of the environmental and social impacts both during construction and operation phases of the development. Important considerations with regards to mitigating environmental impacts include closing the boundary of the project area, placing dust nets around the building, regularly transporting construction waste and avoiding material transport during peak traffic hours as well as designating proper time periods for construction works have been identified.

i. Although the project has short-term environmental impacts from the proposed development, the project has more social and economic benefits, which is believed to tremendously contribute to the need for residential and commercial space in Male', create some employment opportunities and contribute to the local economy in Male' in the long-term.

j. Although during construction of the project, negative environmental impacts from construction activities have been envisaged, with appropriate environmental management and mitigation measures, these impacts will be reduced to a considerable level. Also, with positive socio-economic outlook of the project and considering the need for additional space in Male', it is concluded that the project is an important development.

13. REFERENCES

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ENVIRONEMNTAL IMPACT ASSESSMENT For Proposed Mixed-Use Residential Complexes: Amin Avenue in Hulhumale' prepared by M. Zuhair and I. Shakir in 2015

ENVIRONMENTAL IMPACT ASSESSMENT For Proposed Multi-Storey Building at H. Blue Heaven, Male' prepared by Sandcays Pvt. Ltd. in 2016

ENVIRONMENTAL IMPACT ASSESSMENT For Proposed Construction of 25 Storey Building at Indhira Gandhi Memorial Hospital, Male' prepared by CDE Consulting in 2016

ENVIRONMENTAL IMPACT ASSESSMENT for Proposed 20-Storey Rehendhi 5 Building, Male' prepared by Mohamed Zuhair and Ibrahim Shakir in 2016

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14. APPENDICES

APPENDIX 1: EIA Terms of Reference (TOR)

NO: 203-EIARES/PRIV/2017/683

Terms of Reference for Environmental Impact Assessment for the Proposed 14-Storey Building with Basement at Ma. Alidhooge, Male'

The following is the Terms of Reference (ToR) following the scoping meeting held on 3rd August 2017 for undertaking the EIA of the proposed 14 Storey Building with Basement at Ma. Alidhooge, Male'. The Proponent of the Project is Apollo Holdings Pvt. Ltd.

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

1. **Introduction and rationale** –Describe the purpose of the project and, if applicable, the background of the project and the tasks already completed. Clearly identify the rationale and objectives to enable the formulation of alternatives. Define the arrangements required for the environmental assessment and if relevant, including how work carried out under this contract is linked and sequenced with projects executed by other consultants, and how coordination between other consultants, contractors, government institutions will be carried out. List the donors, and the institutions the consultant will be coordinating with and the methodologies used. This should include (but should not be limited to) the following;

    - Name and contact details of the Proponent
    - Rationale and background to the project
    - Aims and objectives of the project

2. **Study area** – Submit a minimum A3-size scaled plan with indications of all the proposed infrastructures. Specify the agreed boundaries of the study area for the environmental impact assessment highlighting the proposed development location and size of the facility. The study area should include adjacent buildings and related infrastructure, nearby environmentally sensitive sites (e.g. mosque).Justification for site selection is required. Relevant developments in the areas must also be considered including residential areas, all economic ventures and cultural sites

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

. Task 1. Literature review:

- Identify the exiting literature regarding the vulnerability and the condition of the current environment for Male'
- Review similar EIAs, EMPs, and other research carried out for Male'
- The consultant shall also explain the mitigation measures proposed for any potential impacts from proposed project related to the vulnerability discussed in the literature.

Environmental Protection Agency
Green Building, 3rd Floor, Handhuvareehingun
Male', Rep. of Maldives, 20392

Tel:	[+960] 333 5949 [+960] 333 5951		Email:	secretariat@epa.gov.mv	
Fax:	[+960] 333 5953		Website:	www.epa.gov.mv	

Task 2. 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. All inputs and outputs related to the proposed activities shall be justified. Provide the following details'

Master plan design concept

a) Main master plan used for the project
b) Master plan concepts in A3 format
c) Parking capacity and access
- Fire emergency evacuation plan

Project development

Provide a schedule outlining the proposed phasing, sequencing and duration of components, including;

a) Pre-construction, construction, operation and decommissioning
b) The activities to date, including baseline assessments, modelling and geotechnical investigations
c) Key factors controlling the schedule and uncertainties relating to the project

Excavation and dewatering

a) Area, depth, volume required for excavation
b) Excavated earth disposal method and location
c) Estimated number of days required for dewatering
d) Dewatered water disposal method and location(s)
e) Shoring methods for particularly on sides with adjacent buildings

Foundation, Piling and Concrete Works

a) Pile specifications, including type, dimensions and max driving length
b) Pile driving method
c) Type of foundation and foundation depth
d) Geotechnical calculations regarding the building weight
e) Concrete batching process and transportation method (if required)

Construction Management

a) Construction waste management
b) Traffic management
c) Project site office and temporary storage area details

Utilities

a) Description of the utility providers during construction and operation stage (Water, Electricity, Power)
b) Sewerage connection plan to Male' main network
c) Water connection plan and water storage tank(s) details
d) Waste management plan during operational phase

Temporary facilities

Describe construction methods, scheduling and operation of temporary facilities including power generation, oil storage, water supply, waste water treatment, accommodation facilities, waste management and decommissioning.

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Green Building, 3rd Floor, Handhuvareehingun
Male', Rep. of Maldives, 20392
Tel: [+960] 333 5949 [+960] 333 5951 Email: secretariat@epa.gov.mv
Fax: [+960] 333 5953 Website: www.epa.gov.mv

Revegetation

a) Details of the source of trees that will be used for revegetation'
b) If vegetation is to be supplied from inhabited islands, approvals from those island councils are required and details of the number of trees should be provided

Project management: Include communication of construction details, progress, target dates, and duration of works, construction/operation/closure of labour camps, access to site, safety, equipment and material storage, water supply, waste management from construction operations (mainly dredged material), power and fuel supply temporary site setup.

Task 3. Description of the environment – Assemble, evaluate and present the environmental baseline study/data regarding the study area and timing of the project (eg: monsoon season). Identify baseline data gaps, and identify studies and level of detail to be carried out by the 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 data must be collected as per the requirements of the EPA Data Collection Guideline (published on www.epa.gov.mv). The report should outline detailed methodology of data collection utilized.

All survey locations shall be referenced with Geographic Positioning System (GPS) including water sampling points, vegetation and noise levels for posterior data comparison. Information should be divided into the categories shown below:

Climate

- Temperature, rainfall, wind and waves
- Risk of hurricanes and storm surges

Physical parameters

- Groundwater quality assessment of the site
- Geotechnical investigation of the site up to 10m depth or soil assessment report
- Noise levels in the vicinity of the site including any noise sensitive locations
- Traffic count

Structural environment

- State of adjacent buildings including photographic records of existing damages as baseline reference;
- Condition of the surrounding roads;
- Existing structures/uses of the proposed site

Biological assessment

- Vegetation assessment (if any)

Socio-economic environment

- Demographic data for Malé and population of adjacent buildings;
- Brief description of social environment of Malé in general and adjacent residential units in particular;
- Identify types of vehicles and peak traffic hours in or near the project site.

Hazard vulnerability

- Vulnerability of the site to flooding

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 4. 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. Legal requirements (but not limited to)

- Reference should be made to Batch Plant Guidelines of EPA
- Fuel storage, handling and transportation regulations of Defence Ministry

Task 5. Potential impacts (environmental and socio-cultural) of proposed project incl. all stages– The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

Impacts on natural environment

- Impacts of noise, vibration and disturbance
- Impacts on terrestrial flora and fauna and from land preparation works, if any
- Impacts on groundwater table and quality as a result of dewatering and groundwater use
- Impacts on soil
- Impacts on landscape integrity/scenery
- Contamination due fuel leakage

Impacts on the socio-economic environment

- Impacts on employment and income such as job opportunities in the constructional and operational phase;
- Disturbances to residents and cultural facilities/activities;
- Impacts on transportation/traffic.
- Impacts of increased demands on utility services especially water and energy and waste management
- Impacts on nearby buildings

Construction related hazards and risks

- Pollution of natural environment (e.g. oil spills, discharge of untreated waste water and solid waste including construction waster)

- Risk of accidents and pollution on workers and local populations, and
- Impacts on social values, norms and belief due to construction workers on local population
- Dust and emission
- Impacts due to foundation works
- General public health and safety issues
- Fire risk due to proximity of fuel shed

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 6. Alternatives to Proposed Project – Describe alternatives including "*no action option*" should be presented. Determine the best practical environmental option. Alternatives examined for the proposed project that would achieve the same objectives including the "no action alternative". This should include alternative location, construction technologies, 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 7. 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. Measures for both construction and operation phases shall be identified. Cost the mitigation measures, equipment and resources required to implement those measures. The confirmation of the 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 case where impacts are unavoidable arrangements to compensate for the environmental effect shall be given.

Task 8. Development of monitoring plan – Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan during and after completion of the proposed project. Reporting requirements shall be outlined. 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.

Task 9. Stakeholder consultation, Inter-Agency coordination and public/NGO participation – Identify appropriate mechanisms for providing information on the development proposal and its progress to stakeholders, government authorities, NGOS, engineers/designers, development managers, staff and members of the general public. The EIA report should include a list of people/groups consulted and summary of major outcomes. The following parties should be consulted;

a) STELCO

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

b) MWSC
c) General public by the project area
d) HPA
e) Nearby Schools (Arabiyya, Aminiyya, Iskandhar , CHSE)
f) WAMCO

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

Timeframe for submitting the EIA report – The developer must submit the completed EIA report within 6 months from the date of this Term of Reference.

Date: 3rd August 2017

Environmental Protection Agency
Green Building, 3rd Floor, HandhuvareeHingun
Male', Rep. of Maldives, 20392
Tel (+960) 333 5949 (+960) 333 5951
Fax (+960) 333 5953
Email secretariat@epa.gov.mv
Website www.epa.gov.mv

APPENDIX 2: Approval Letter

بسم الله الرحمن الرحيم

މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ
މާލެ، ދިވެހިރާއްޖެ.

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

ނަންބަރު: LBD-BS/KF/2017/111

އިމާރާތުގެ ކުރެހުން ފާސްކުރިކަމުގެ ލިޔުން

- ގޯތި ނުވަތަ ބިމުގެ ނަން: މ. އަލިދޫގެ
- ފަންގިފިލާގެ އަދަދު: 15 (ފަނަރަ) ފަންގިފިލާ
- ސްޓްރަކްޗަރގެ ބާވަތް: ކޮންކްރީޓް
- އިމާރާތުގެ އުސްމިން: 45.00 މީޓަރު
- ފަންގިފިލާގެ ބާވަތް: ކޮންކްރީޓް
- މި ލިޔުމުގެ މުއްދަތު: 6 (ހައެއް) އަހަރު
- މުއްދަތު ހަމަވާ ތާރީޚު: 18 މާރިޗު 2023
- ވެރިފަރާތް: އިލްޔާސް އިބްރާހީމް.

1. މި ލިޔުން، (އިމާރާތުގެ ކުރެހުން ފާސްކުރިކަމުގެ ލިޔުން) ހޯދުމަށްފަހު، މި ލިޔުން ދޫކުރިތާ ގިނަވެގެން 6 (ހައެއް) އަހަރުދުވަހުގެ ތެރޭގައި، "އިމާރާތްކުރުމުގެ ހުއްދަ" ނަގާފައިނުވާ ނަމަ، މި ލިޔުން އާކުރަން ޖެހޭނެއެވެ. މި ލިޔުން އާކުރަންވާނީ، މި ލިޔުން ދޫކުރިތާ 6 (ހައެއް) އަހަރުދުވަހުގެ ތެރޭގައި، "މާލޭ ޒޯނިންގ ގަވާއިދު" އާއި އިމާރާތް ކުރުމާބެހޭ އެހެނިހެން ގަވާއިދުތަކާ އެއްގޮތަށް ބަދަލެއް އައިސްފައިވާނަމަ، އެއިރެއްގައި ހިނގާ ގަވާއިދުތަކާ އެއްގޮތްވާގޮތުގެ މަތިން، ކުރެހުންތަކަށް ގެނަންޖެހޭ އިސްލާހުތައް ގެނައުމުންނެވެ.

2. "އިމާރާތްކުރުމުގެ ހުއްދަ" ހޯދުމަށްފަހު، އެ ހުއްދަ ދޫކުރިތާ ގިނަވެގެން 6 (ހައެއް) އަހަރު ދުވަހުގެ ތެރޭގައި، އިމާރާތްކުރަން ނުފަށައިފި ނަމަ، އެ ހުއްދަ (އިމާރާތްކުރުމުގެ ހުއްދަ) ބާޠިލުވާނެއެވެ. އެ ހުއްދަ ބާޠިލުވެފައިވާ ތަނެއްގައި އިމާރާތްކުރުމުގެ މަސައްކަތް ކުރަންވާނީ، އެ ހުއްދަ އާކޮށްގެންނެވެ. އެ ހުއްދަ އާކުރަންވާނީ، "އިމާރާތުގެ ކުރެހުން ފާސްކުރިކަމުގެ ލިޔުން" ދޫކުރިތާ ގިނަވެގެން 6 (ހައެއް) އަހަރު ދުވަސް ފާއިތުވެފައި ނުވާ ނަމައެވެ.

20 ޖުމާދަލްއާޚިރާ 1438
19 މާރިޗު 2017

މުޙައްމަދު މާހިރު ސަލީމް
ޕާމަނަންޓް ސެކްރެޓަރީ

APPENDIX 3: Design Concept

LOCATION PLAN

NOTE:
PLOT AREA = 8531.9F² / 806.83MP
BUILD UP AREA = 5274.42F² / 490.01MP
OPEN AREA = 535.49F² / 48.82MP

BUILDING FOOT PRINT AREA
EXTENSION FROM 1F TO 8F

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Waseem Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by:
PA Perk + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client :
APOLLO HOLDINGS

Project Title :
ALIDHOOGE

Building Name :
ALIDHOOGE

Drawing Title :
LOCATION PLAN

Scale :
1:500

Discipline :
ARCHITECTURAL

Stage :
SUBMISSION

Drawn By :
MOOSA
Checked By :
THALAAL

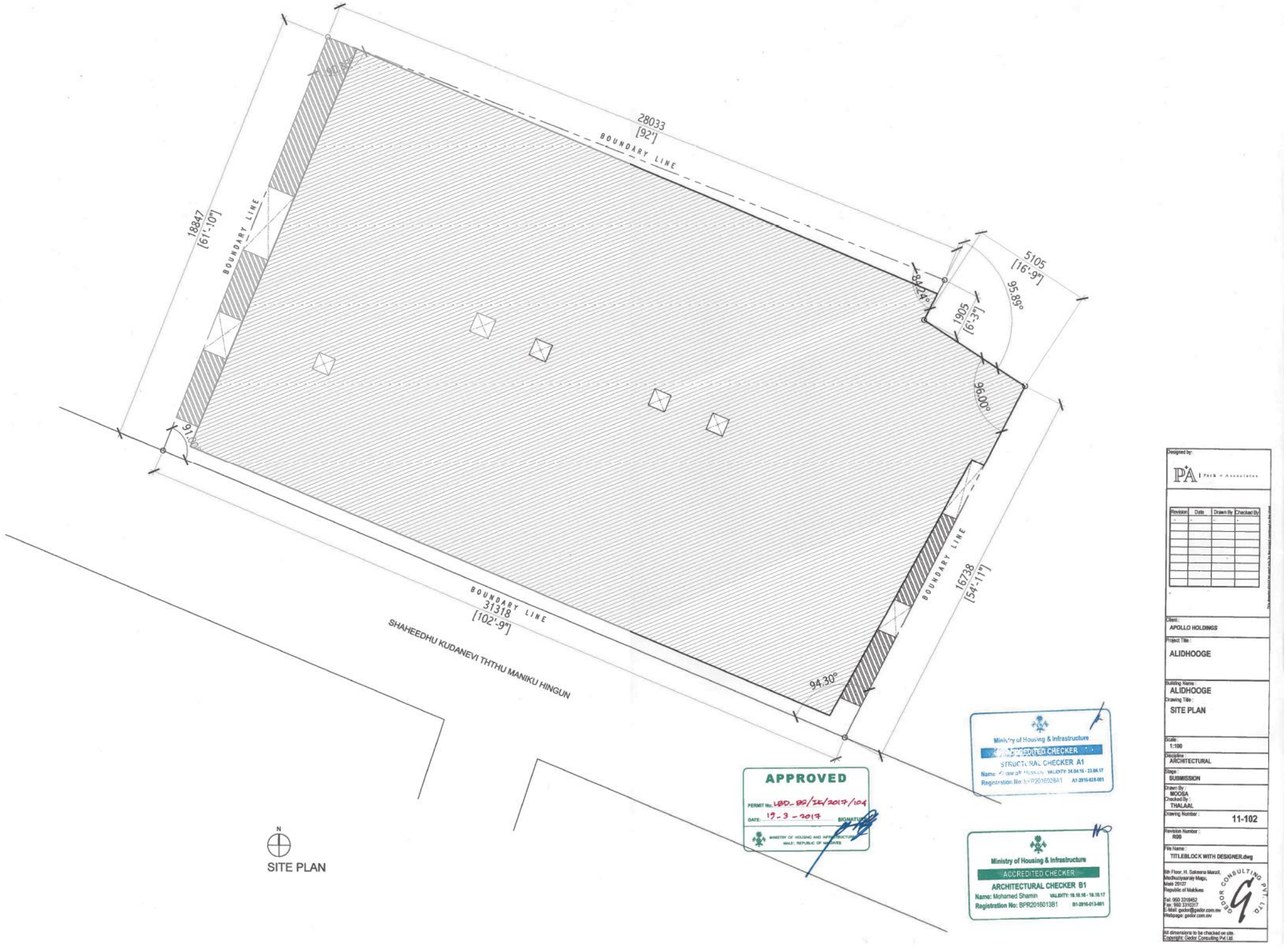
Drawing Number :
11-101

Revision Number :
R00

File Name :
TITLEBLOCK WITH DESIGNER.dwg

5th Floor, H. Sakeena Manzil,
Medhuziyaaraiy Magu,
Male 20127
Republic of Maldives
Tel: 960 3316452
Fax: 960 3316317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv

GEDOR CONSULTING PVT. LTD


28033
[92']
BOUNDARY LINE
18847
[61'-10"]
BOUNDARY LINE
5105
[16'-9"]
95.89°
84.24°
1905
[6'-3"]
96.00°
91.76°
BOUNDARY LINE
31318
[102'-9"]
SHAHEEDHU KUDANEVI THTHU MANIKU HINGUN
BOUNDARY LINE
16738
[54'-11"]
94.30°
N
SITE PLAN
APPROVED
PERMIT No: LBD_88/IA/2017/104
DATE: 19-3-2017
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin
Registration No: BPR2016013B1
Designed by:
PA | Park + Associates
Revision | Date | Drawn By | Checked By
Client :
APOLLO HOLDINGS
Project Title :
ALIDHOOGE
Building Name :
ALIDHOOGE
Drawing Title :
SITE PLAN
Scale:
1:100
Discipline :
ARCHITECTURAL
Stage :
SUBMISSION
Drawn By :
MOOSA
Checked By :
THALAAL
Drawing Number :
11-102
Revision Number :
R00
File Name :
TITLEBLOCK WITH DESIGNER.dwg
6th Floor, H. Sakeena Manzil,
Medhuziyaaraiy Magu,
Male 20127
Republic of Maldives
Tel: 960 3316452
Fax: 960 3310317
E-Mail: gador@gador.com.mv
Webpage: gador.com.mv
All dimensions to be checked on site.
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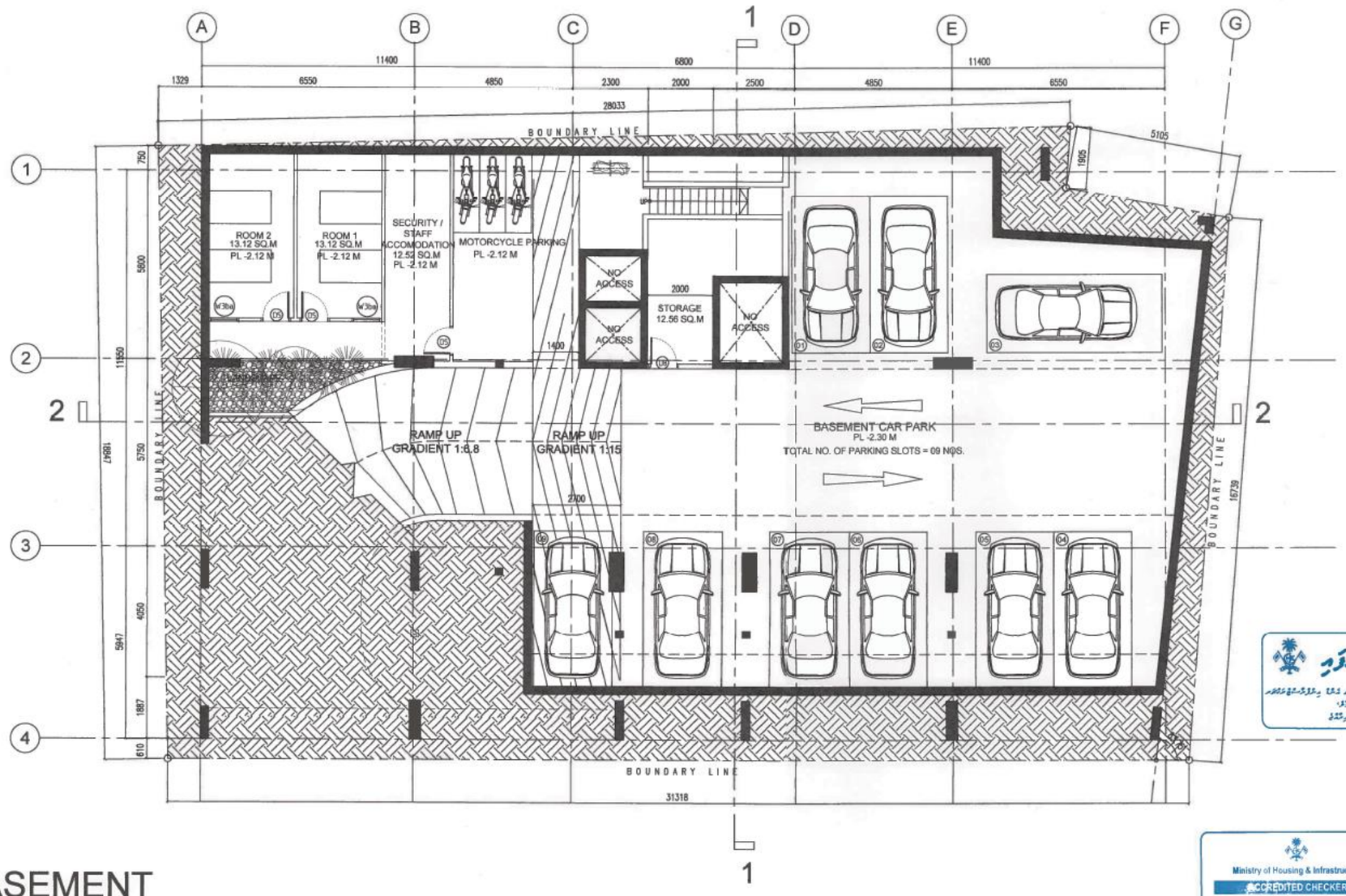

BASEMENT

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaumath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.15 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by:
P'A | Park + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client :
APOLLO HOLDINGS

Project Title :
ALIDHOOGE

Building Name :
ALIDHOOGE

Drawing Title :
BASEMENT FLOOR PLAN

Scale :
1:100

Discipline :
ARCHITECTURAL

Stage :
SUBMISSION

Drawn By :
MOOSA
Checked By :
THALAAL

Drawing Number :
11-103

Revision Number :
R09

File Name :
TITLEBLOCK WITH DESIGNER.dwg

6th Floor, H. Sakeena Manzil,
Medhuziyaaraiy Magu,
Male 20127
Republic of Maldives
Tel: 960 3318452
Fax: 960 3310317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv

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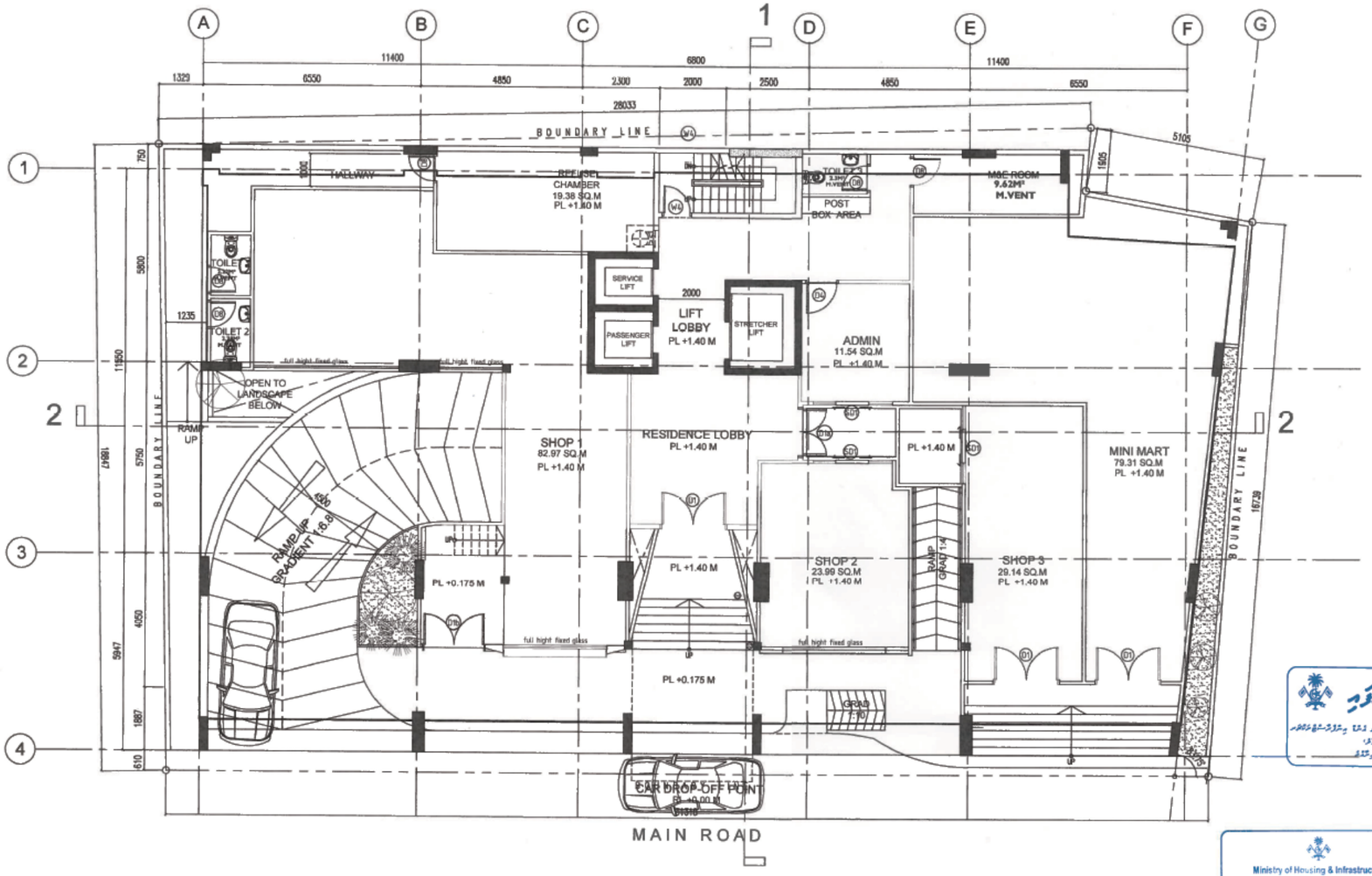

GROUND FLOOR

1

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR201603B1 B1-2016-013-001

Designed by: PA | Park + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client : APOLLO HOLDINGS

Project Title : ALIDHOOGE

Building Name : ALIDHOOGE

Drawing Title : GROUND FLOOR PLAN

Scale : 1:100

Discipline : ARCHITECTURAL

Stage : SUBMISSION

Drawn By : MOOSA

Checked By : THALAAL

Drawing Number : 11-104

Revision Number : R00

File Name : TITLEBLOCK WITH DESIGNER.dwg

6th Floor, H. Sakeena Manzil, Medhuziyaarai Magu, Male 20127 Republic of Maldives
Tel: 960 3318452
Fax: 960 3316317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv

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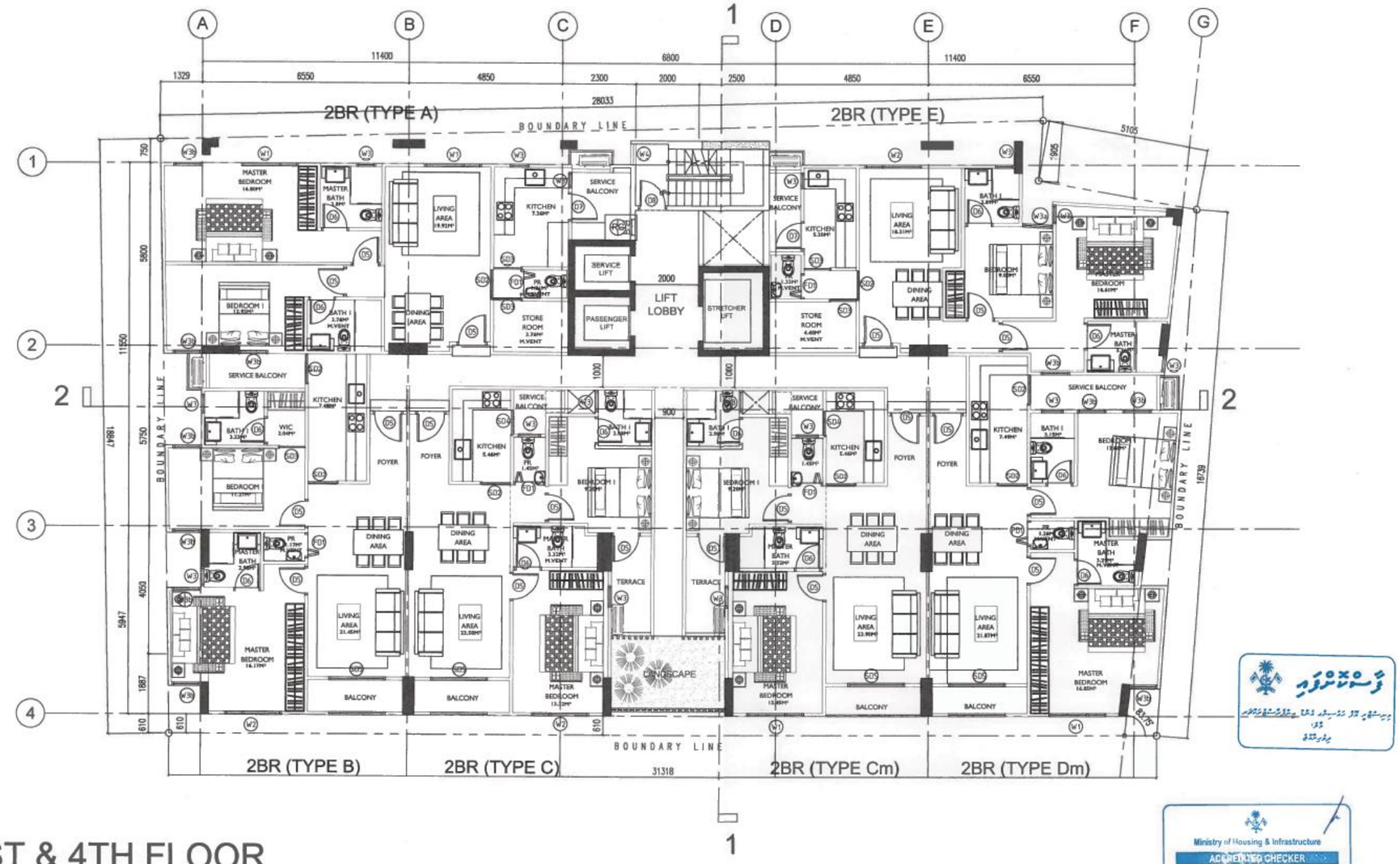
All dimensions to be checked on site.



1ST & 4TH FLOOR

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Khamal Hussain VALIDITY: 24.04.15 - 23.04.17
Registration No: BPR2015025A1 A1-2015-023-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.15 - 18.10.17
Registration No: BPR2016013B1 B1-2015-013-001

Designed by: PA | Park + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client: APOLLO HOLDINGS

Project Title: ALIDHOOGE

Building Name: ALIDHOOGE

Drawing Title: 1ST AND 4TH FLOOR PLAN

Scale: 1:100

Discipline: ARCHITECTURAL

Stage: SUBMISSION

Drawn By: MOOSA

Checked By: THALAAL

Drawing Number: 11-105

Revision Number: R00

File Name: TITLEBLOCK WITH DESIGNER.dwg

8th Floor, H. Sakeena Manzil,
Medhuziyaaraiy Magu,
Malé 20027
Republic of Maldives
Tel: 960 3318452
Fax: 960 3316207
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv

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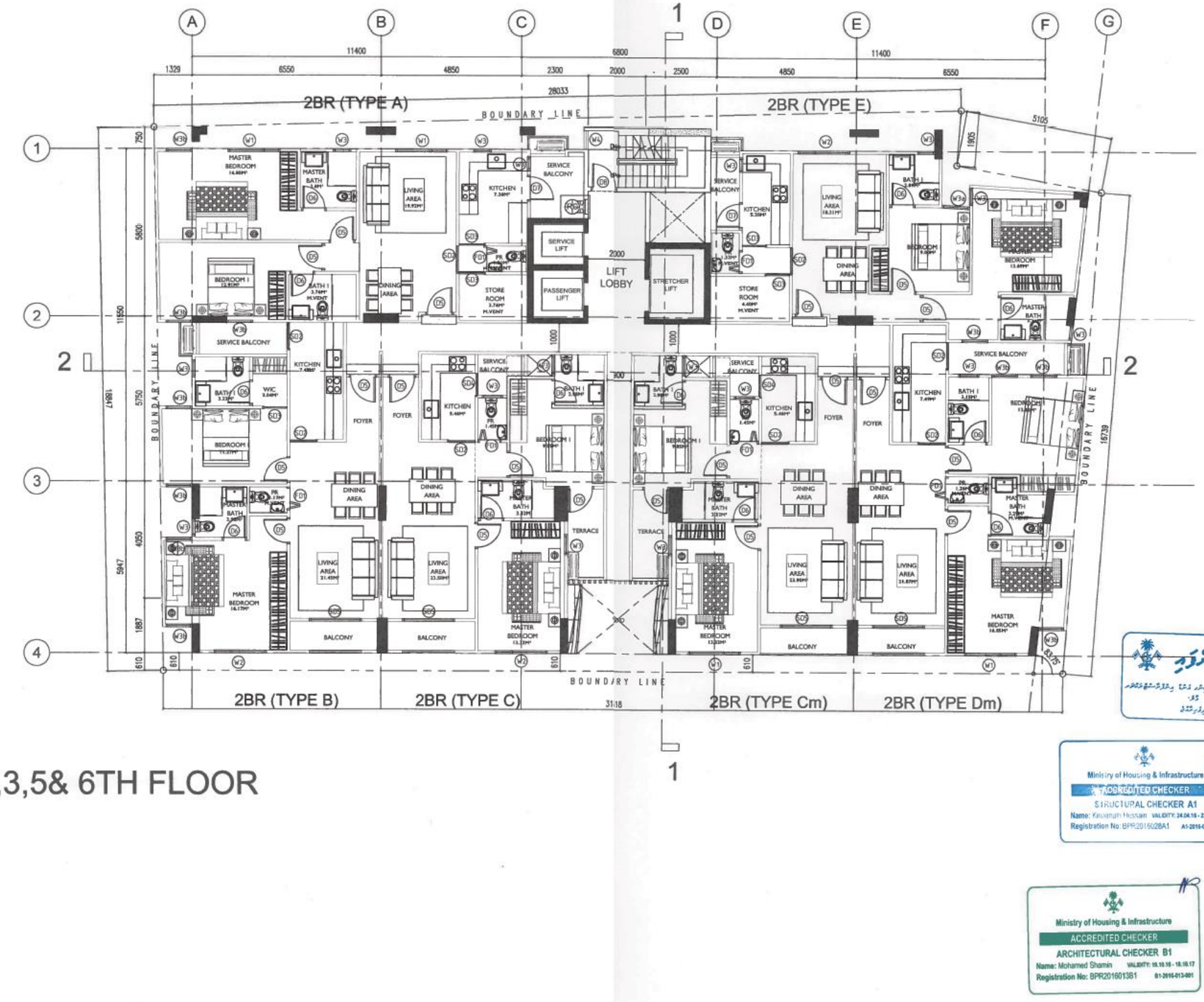

2,3,5& 6TH FLOOR

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kaisangh Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 10.10.16 - 10.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by: PA | Perk + Associates

Revision	Date	Drawn By	Checked By
-			

Client: APOLLO HOLDINGS

Project Title: ALIDHOOGE

Building Name: ALIDHOOGE

Drawing Title: 2ND, 3RD, 5TH AND 6TH FLOOR PLAN

Scale: 1:100

Discipline: ARCHITECTURAL

Stage: SUBMISSION

Drawn By: MOOSA
Checked By: THALAAL

Drawing Number: 11-106

Revision Number: R00

File Name: TITLEBLOCK WITH DESIGNER.dwg

6th Floor, H. Sakeena Manzil, Medhuziyaaraiy Magu, Malé 20127, Republic of Maldives
Tel: 960 3318452
Fax: 960 3318317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv
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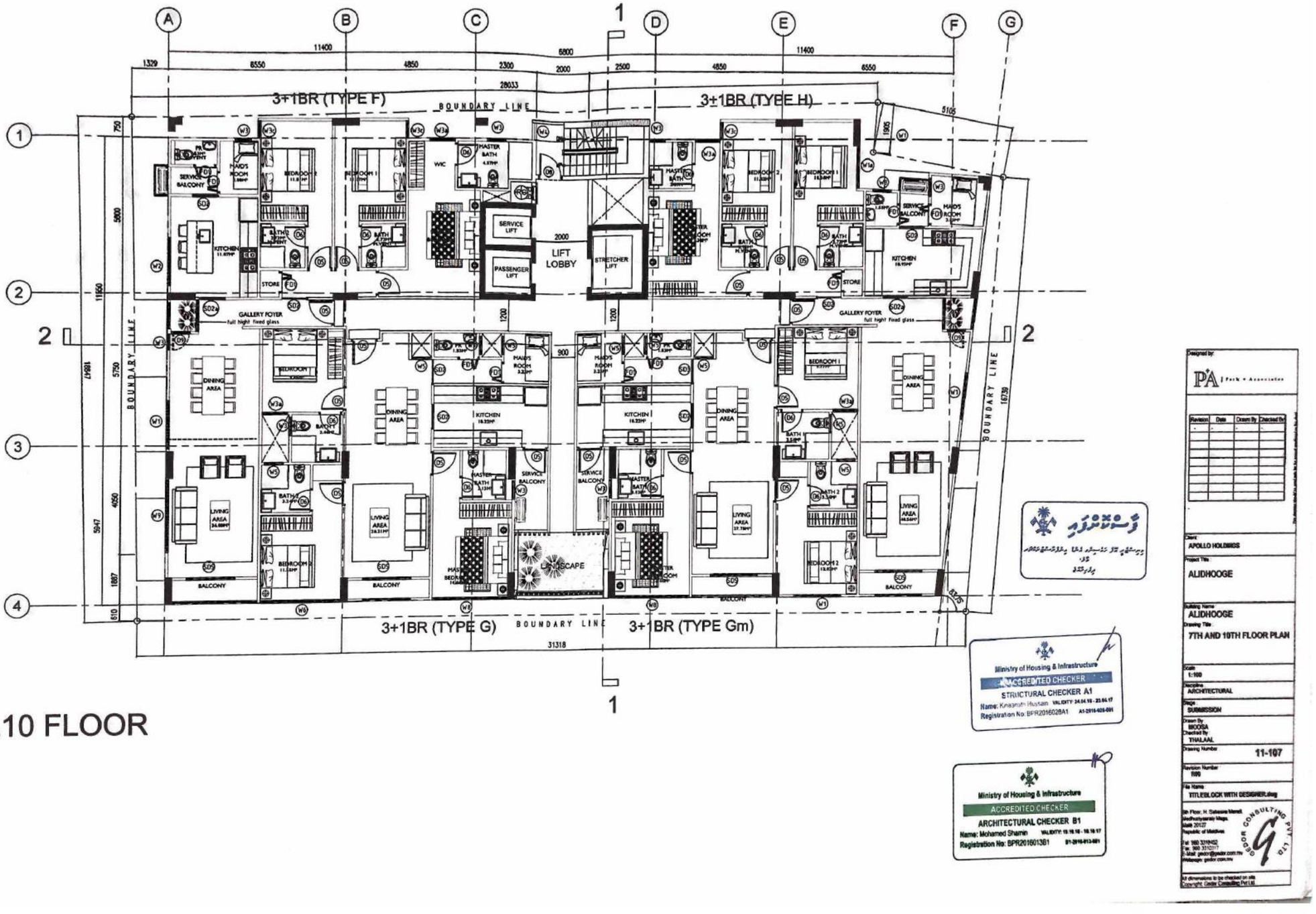

7&10 FLOOR

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Knaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR201601361 B1-2016-013-001

Designed by: PA | Perik + Associates

Revision	Date	Drawn By	Checked By
-	-		

Client: APOLLO HOLDINGS
Project Title: ALIDHOOGE
Building Name: ALIDHOOGE
Drawing Title: 7TH AND 10TH FLOOR PLAN
Scale: 1:100
Discipline: ARCHITECTURAL
Stage: SUBMISSION
Drawn By: MOOSA
Checked By: THALAAL
Drawing Number: 11-107
Revision Number: R00
File Name: TITLEBLOCK WITH DESIGNER.dwg

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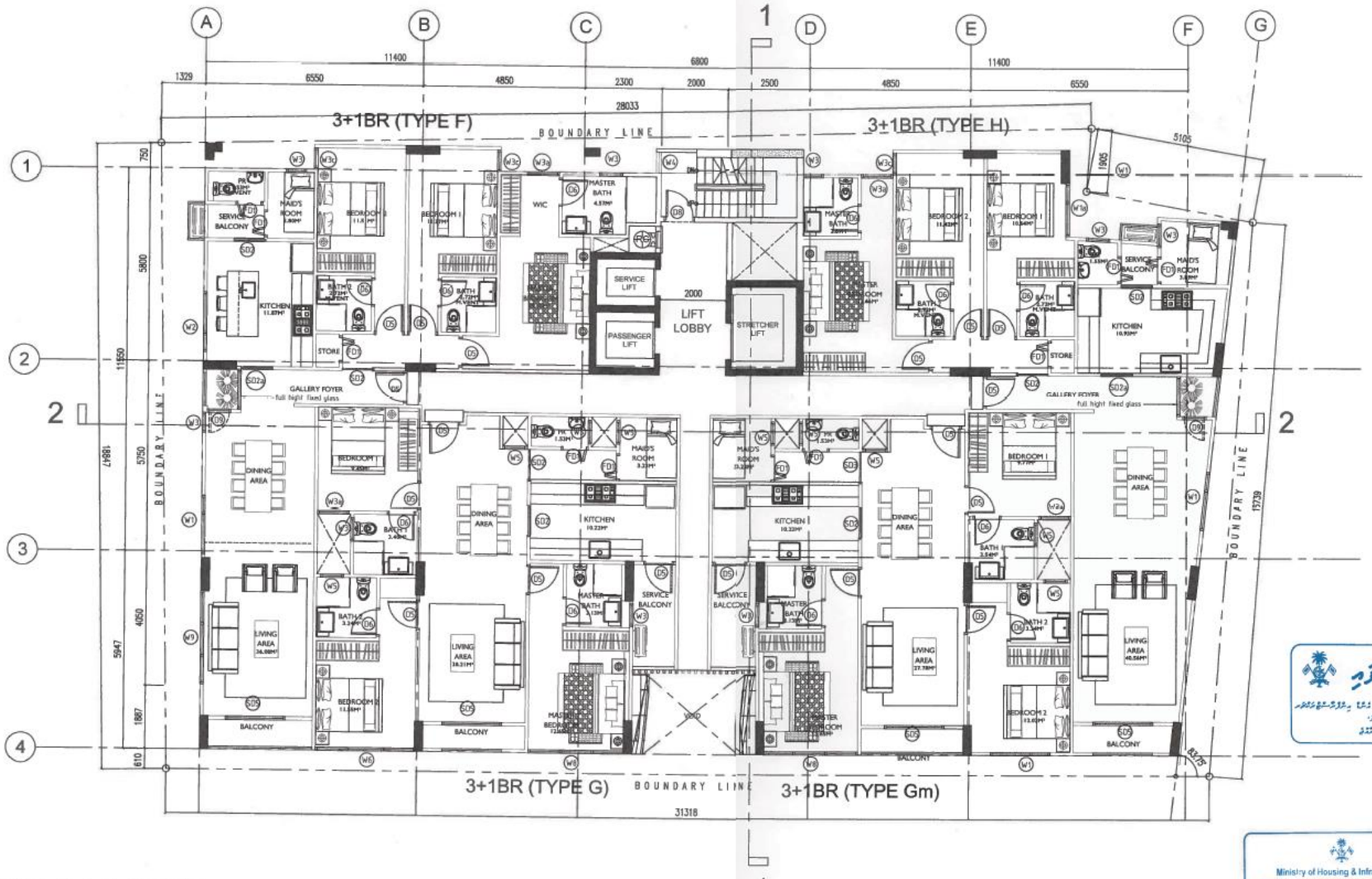

8,9&11 FLOOR

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kneunath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by:
PA | Perk + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client : APOLLO HOLDINGS

Project Title : ALIDHOOGE

Building Name : ALIDHOOGE

Drawing Title : 8TH, 9TH AND 11TH FLOOR PLAN

Scale : 1:100

Discipline : ARCHITECTURAL

Stage : SUBMISSION

Drawn By : MOOSA
Checked By : THALAAL

Drawing Number : 11-108

Revision Number : R00

File Name : TITLEBLOCK WITH DESIGNER.dwg

6th Floor, H. Sakeena Manzil, Medhuziyaaraiy Magu, Malé 20127, Republic of Maldives
Tel: 960 3318452
Fax: 960 3310317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv
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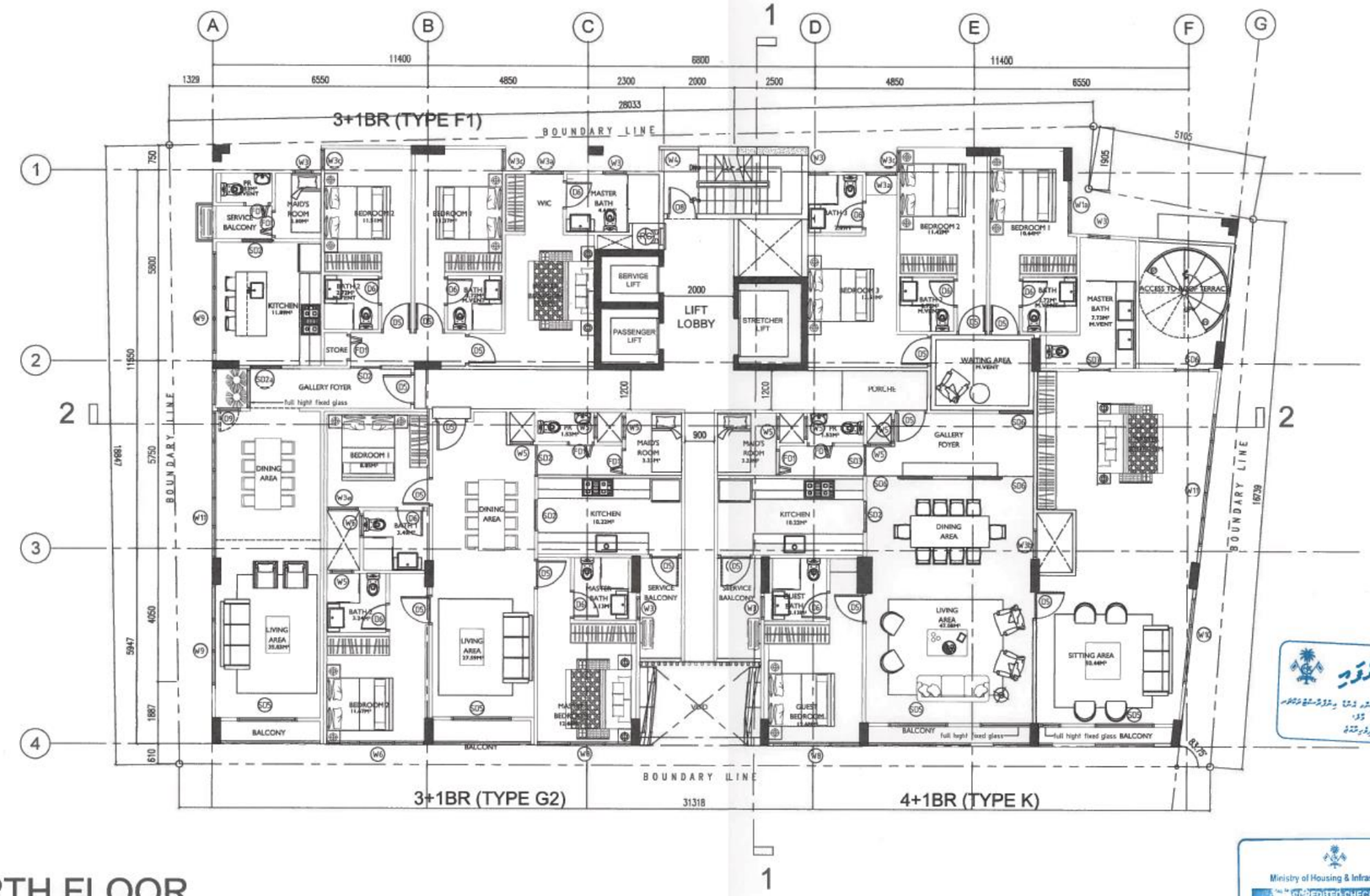

12TH FLOOR

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.15 - 23.04.17
Registration No: BPR2016028A1 A1-2016-023-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 10.10.15 - 10.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by: PA Park + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client: APOLLO HOLDINGS

Project Title: ALIDHOOGE

Building Name: ALIDHOOGE

Drawing Title: 12TH FLOOR PLAN

Scale: 1:100

Discipline: ARCHITECTURAL

Stage: SUBMISSION

Drawn By: MOOSA

Checked By: THALAAL

Drawing Number: 11-109

Revision Number: R00

File Name: TITLEBLOCK WITH DESIGNER.dwg

5th Floor, H. Sakeena Manzil, Medhuziyaaraiy Magu, Male 20127 Republic of Maldives.
Tel: 960 3316452
Fax: 960 3316317
E-Mail: gedor@gedor.com.mv
Whitepage: gedor.com.mv

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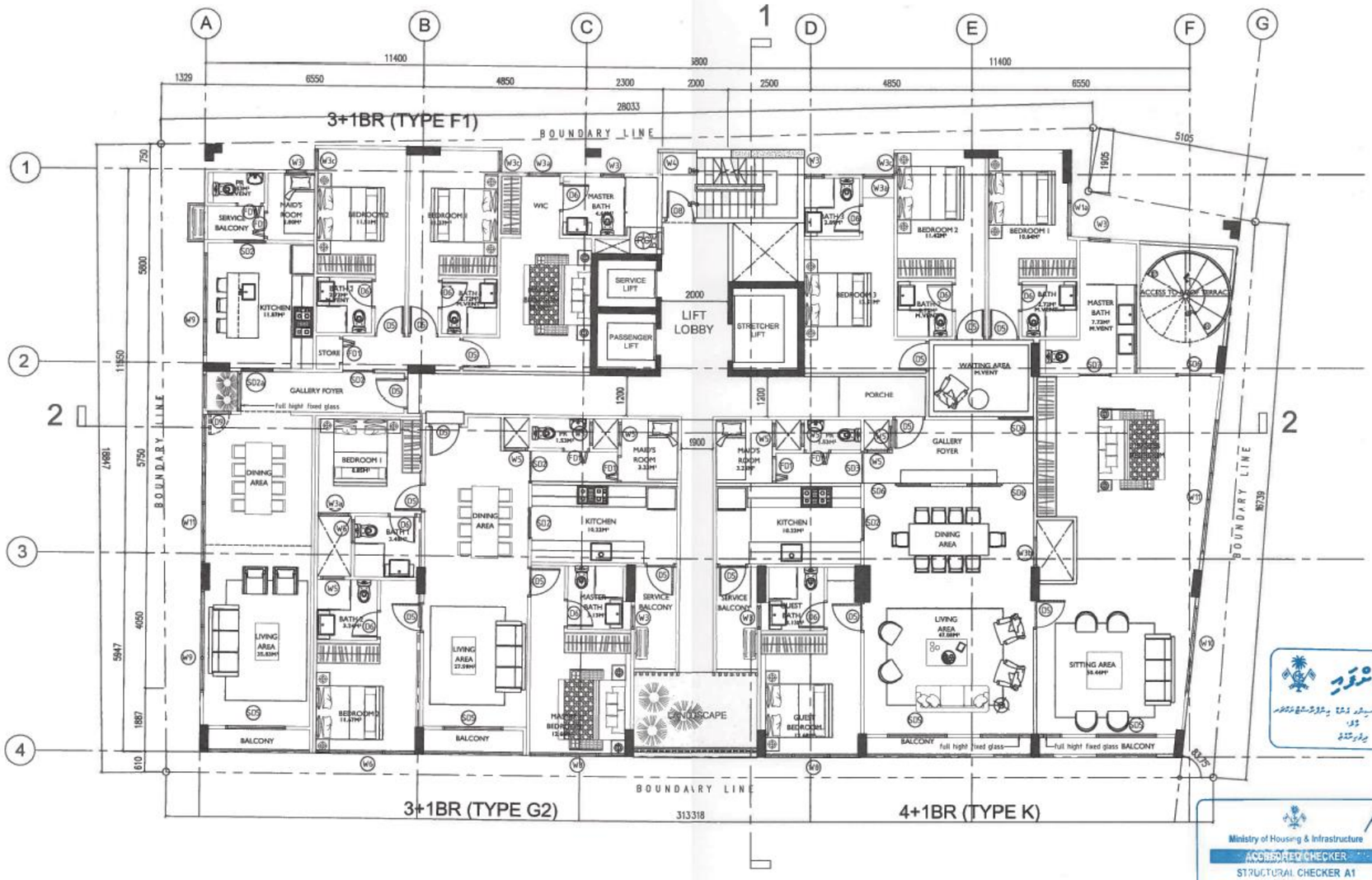

13TH FLOOR

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaan Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by: PA | Park + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client: APOLLO HOLDINGS

Project Title: ALIDHOOGE

Building Name: ALIDHOOGE

Drawing Title: 13TH FLOOR PLAN

Scale: 1:100

Discipline: ARCHITECTURAL

Stage: SUBMISSION

Drawn By: MOOSA
Checked By: THALAAL

Drawing Number: 11-110

Revision Number: R00

File Name: TITLEBLOCK WITH DESIGNER.dwg

6th Floor, H. Sakeena Manzil, Medhuziyaraiy Magu, Male 20127 Republic of Maldives
Tel: 960 3318452
Fax: 960 3310317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv
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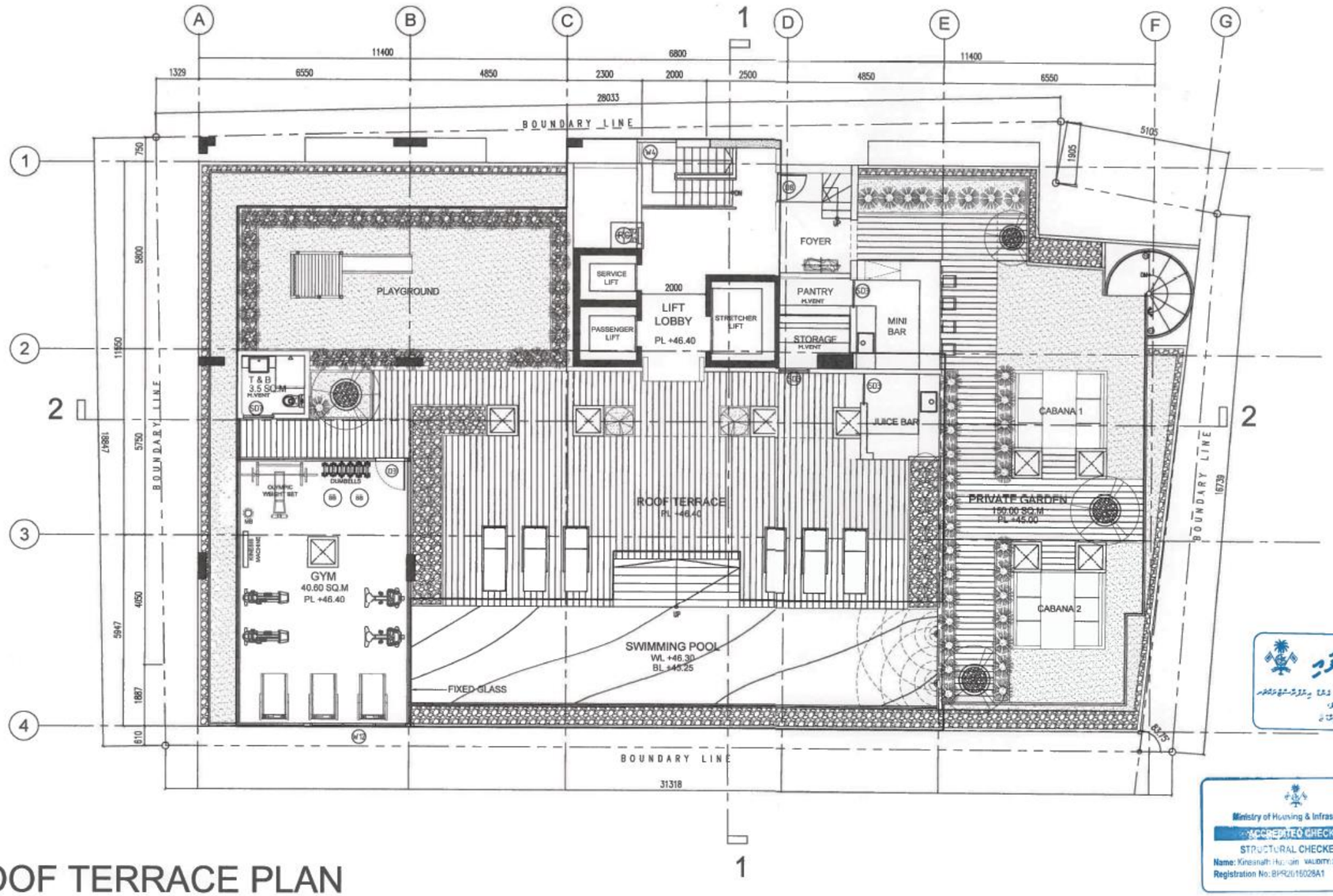
All dimensions to be checked on site.



ROOF TERRACE PLAN

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Designed by: PA | Park + Associates

Revision	Date	Drawn By	Checked By
-	-	-	-

Client : APOLLO HOLDINGS

Project Title : ALIDHOOGE

Building Name : ALIDHOOGE

Drawing Title : ROOF TERRACE FLOOR PLAN

Scale : 1:100

Discipline : ARCHITECTURAL

Stage : SUBMISSION

Drawn By : MOOSA
Checked By : THALAAL

Drawing Number : 11-111

Revision Number : R00

File Name : TITLEBLOCK WITH DESIGNER.dwg

6th Floor, H. Sakeena Manzil,
Medhuziyaaraiy Magu,
Male 20127
Republic of Maldives
Tel: 960 3318452
Fax: 960 3316317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv

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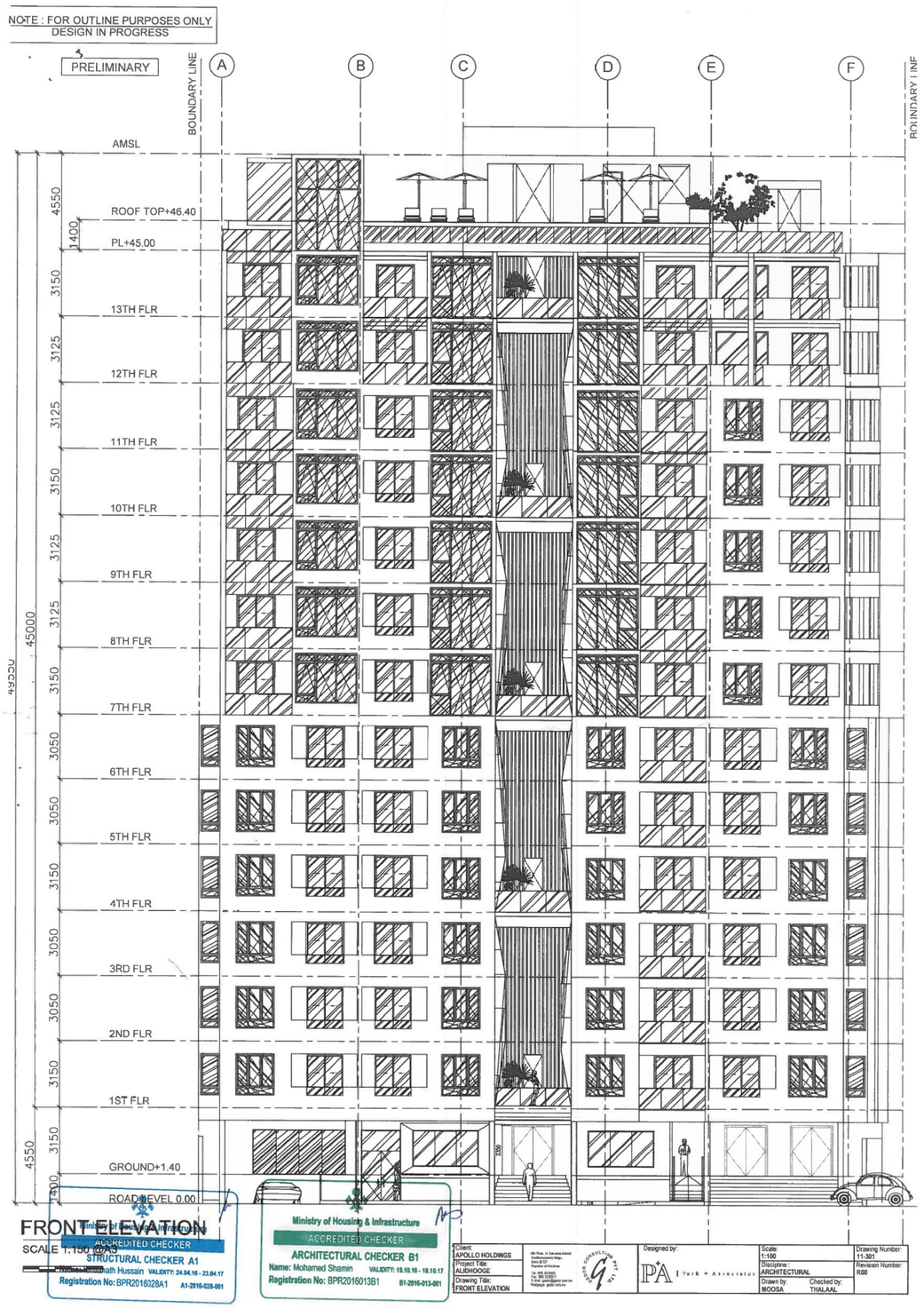
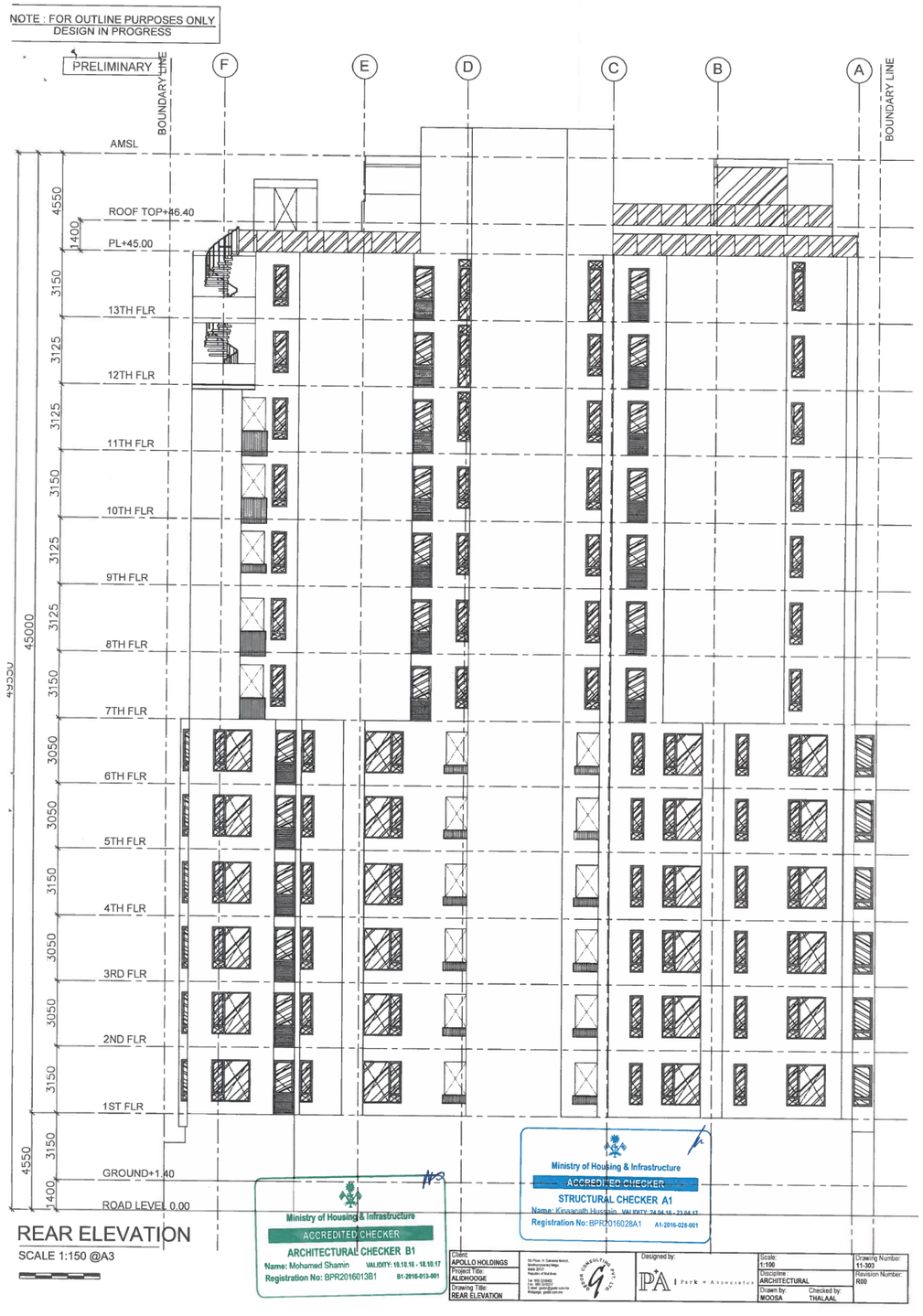


FRONT ELEVATION

SCALE 1:100 @ A3


NOTE : FOR OUTLINE PURPOSES ONLY
DESIGN IN PROGRESS
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E
D
C
B
A
BOUNDARY LINE
AMSL
ROOF TOP+46.40
PL+45.00
13TH FLR
12TH FLR
11TH FLR
10TH FLR
9TH FLR
8TH FLR
7TH FLR
6TH FLR
5TH FLR
4TH FLR
3RD FLR
2ND FLR
1ST FLR
GROUND+1.40
ROAD LEVEL 0.00
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1400
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3125
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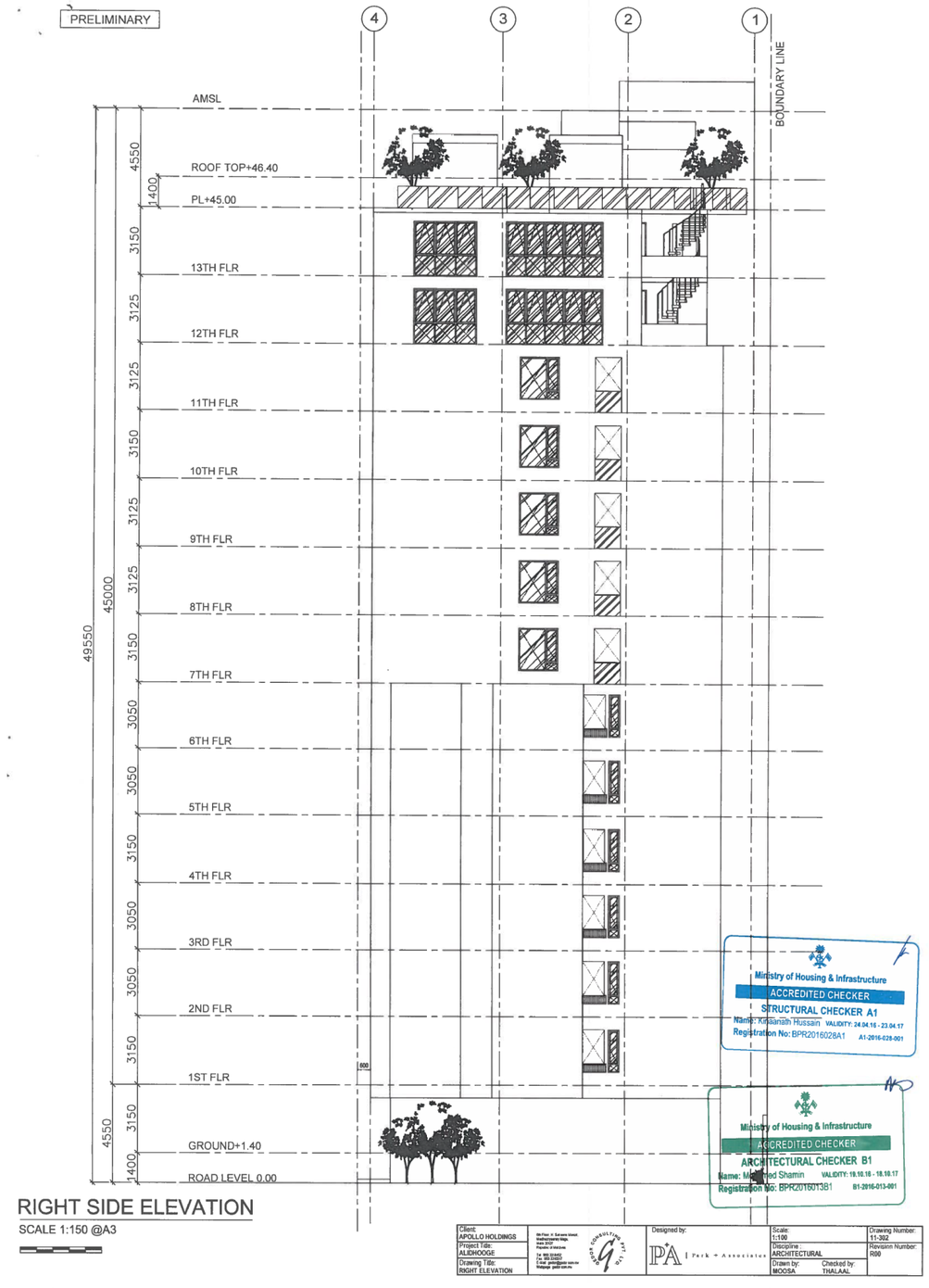
3125
3125
3150
3050
3050
3150
3050
3050
3150
4550
1400
45000
REAR ELEVATION
SCALE 1:150 @A3
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001
Client: APOLLO HOLDINGS
Project Title: ALIDHOOGE
Drawing Title: REAR ELEVATION
Designed by:
PA Park + Associates
Scale: 1:100
Discipline: ARCHITECTURAL
Drawn by: MOOSA
Checked by: THALAAL
Drawing Number: 11-303
Revision Number: R00

NOTE : FOR OUTLINE PURPOSES ONLY
DESIGN IN PROGRESS

PRELIMINARY



RIGHT SIDE ELEVATION
SCALE 1:150 @A3

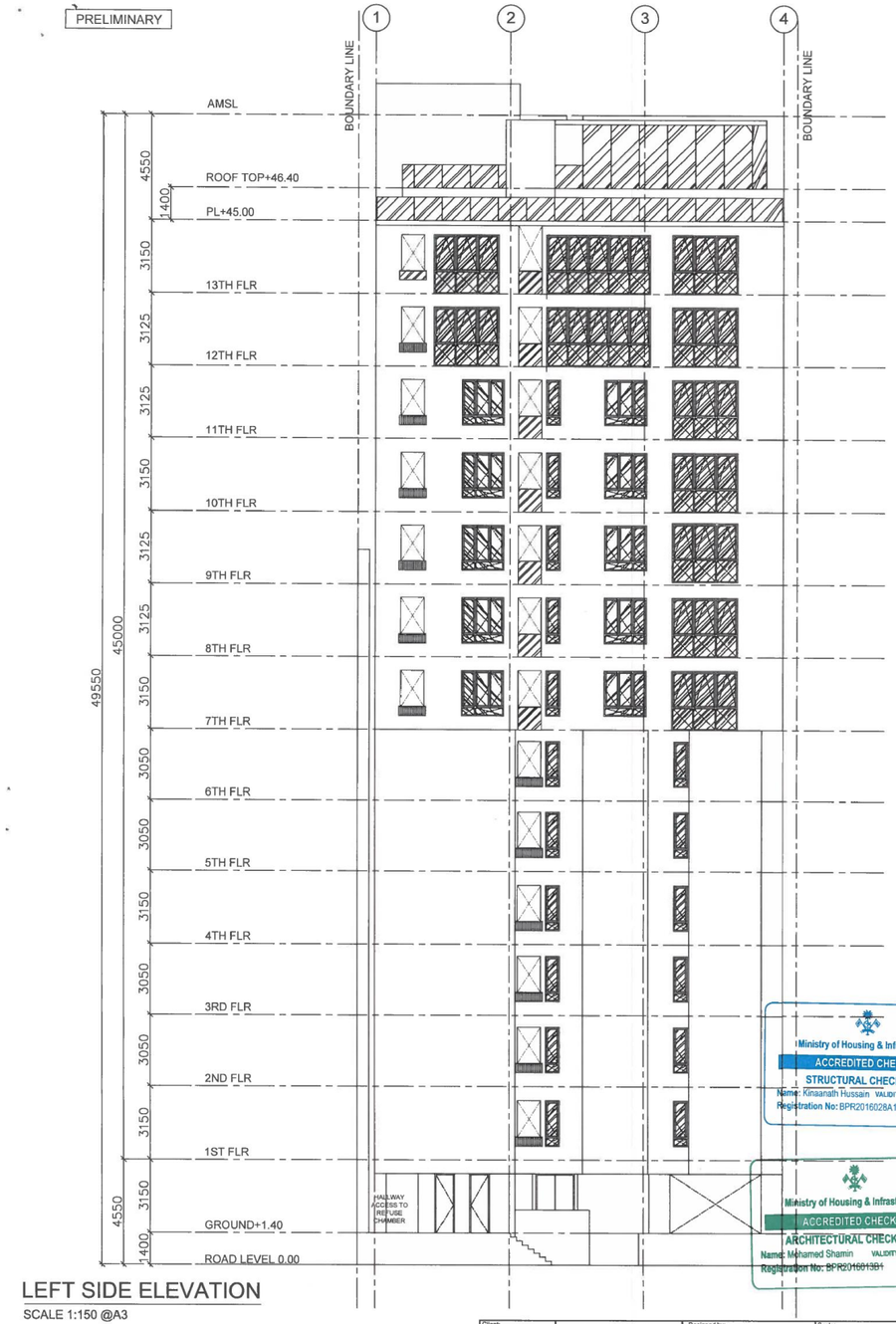
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Client: APOLLO HOLDINGS		Designed by: PA | Park + Associates	Scale: 1:100
Project Title: ALIDHOOGE			Discipline : ARCHITECTURAL
Drawing Title: RIGHT ELEVATION			Drawn by: MOOSA / Checked by: THALAAL
			Drawing Number: 11-302
			Revision Number: R00

NOTE : FOR OUTLINE PURPOSES ONLY
DESIGN IN PROGRESS

PRELIMINARY



LEFT SIDE ELEVATION

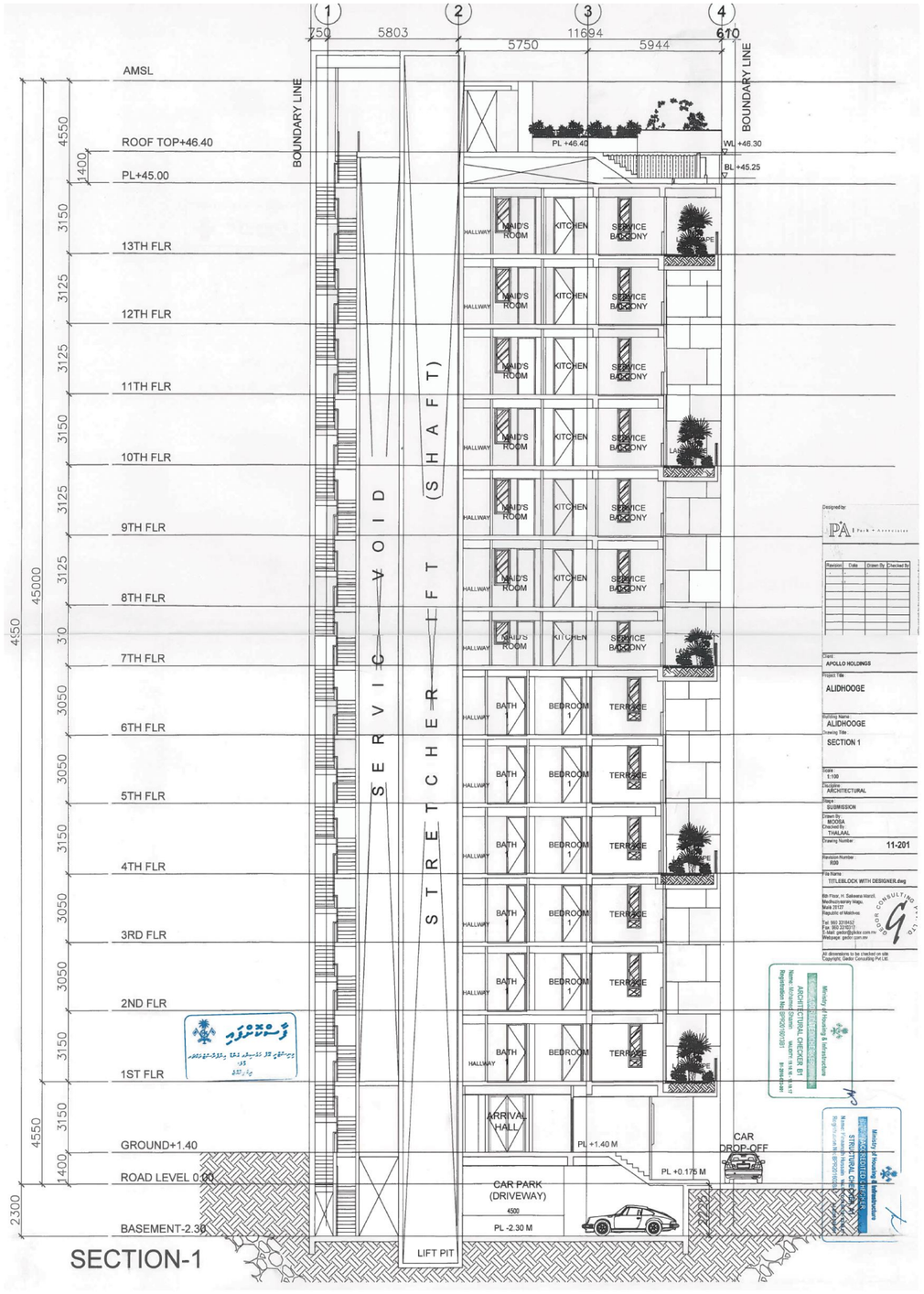
SCALE 1:150 @A3

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

Client: APOLLO HOLDINGS		Designed by: PA | Perk + Associates	Scale: 1:100
Project Title: ALIDHOOGE			Discipline: ARCHITECTURAL
Drawing Title: LEFT FRONT ELEVATION			Drawn by: MIYYA / Checked by: THAI AAI

Drawing Number: 11-304
Revision Number: R00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5803
5750
11694
5944
610
AMSL
ROOF TOP+46.40
PL+45.00
13TH FLR
12TH FLR
11TH FLR
10TH FLR
9TH FLR
8TH FLR
7TH FLR
6TH FLR
5TH FLR
4TH FLR
3RD FLR
2ND FLR
1ST FLR
GROUND+1.40
ROAD LEVEL 0.00
BASEMENT-2.30
4550
1400
3150
3125
3150
3125
3125
3125
30
3050
3150
3050
3050
3150
4550
1400
2300
45000
4450
BOUNDARY LINE
BOUNDARY LINE
SERVICE VOID
STRETCHER LIFT (SHAFT)
PL +46.40
WL +46.30
BL +45.25
HALLWAY
MAID'S ROOM
KITCHEN
SERVICE BALCONY
LANDSCAPE
BATH 1
BEDROOM 1
TERRACE
ARRIVAL HALL
PL +1.40 M
CAR DROP-OFF
PL +0.175 M
CAR PARK (DRIVEWAY)
4500
PL -2.30 M
2225
LIFT PIT
SECTION-1
Designed by:
Revision
Date
Drawn By
Checked By
Client
APOLLO HOLDINGS
Project Title
ALIDHOOGE
Building Name
ALIDHOOGE
Drawing Title
SECTION 1
Scale
1:100
Discipline
ARCHITECTURAL
Stage
SUBMISSION
Drawn By:
BOOSA
Checked By:
THALAAL
Drawing Number:
11-201
Revision Number
R00
File Name
TITLEBLOCK WITH DESIGNER.dwg
All dimensions to be checked on site
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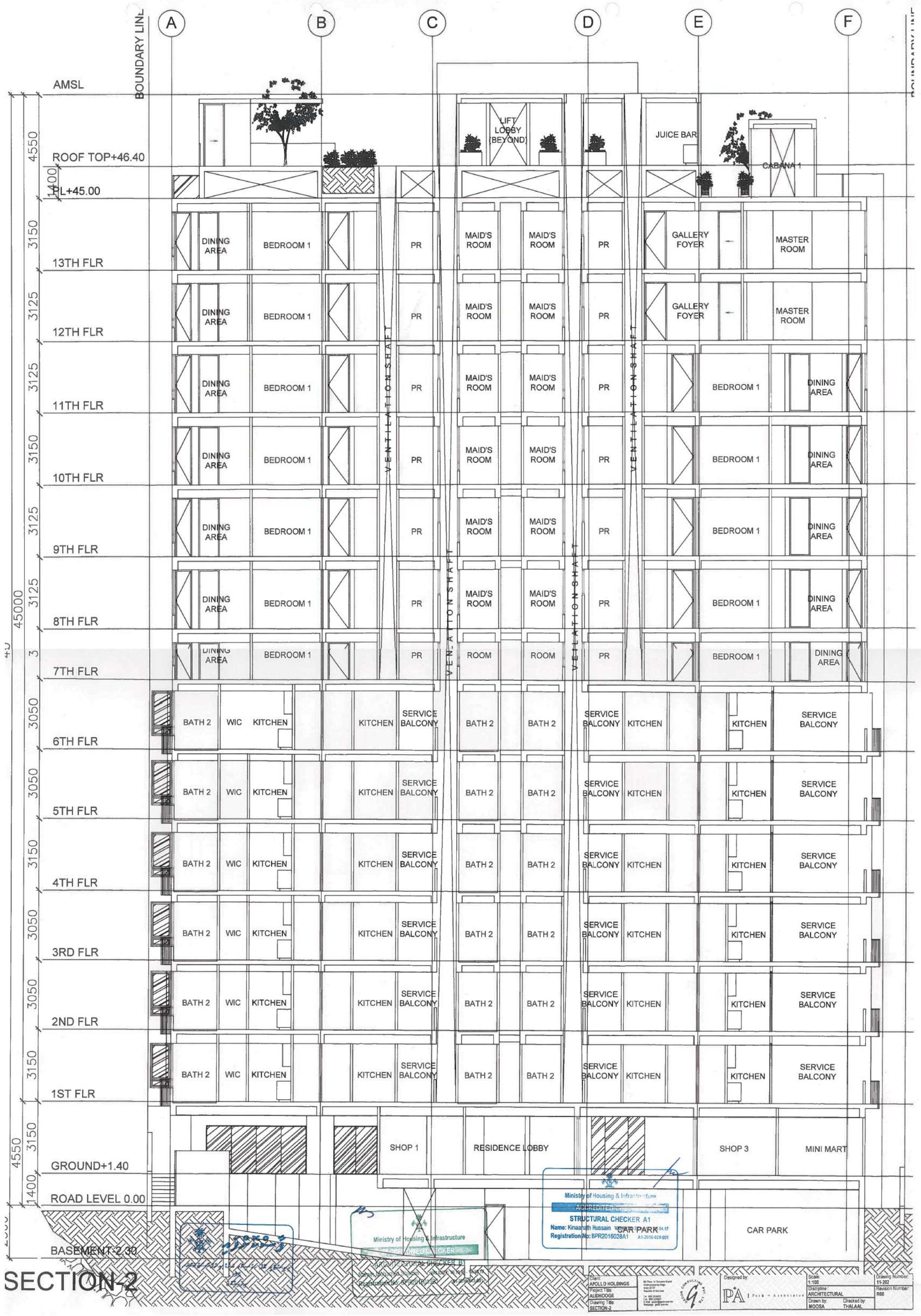
ARCHITECTURAL CHECKER B1
STRUCTURAL CHECKER A1



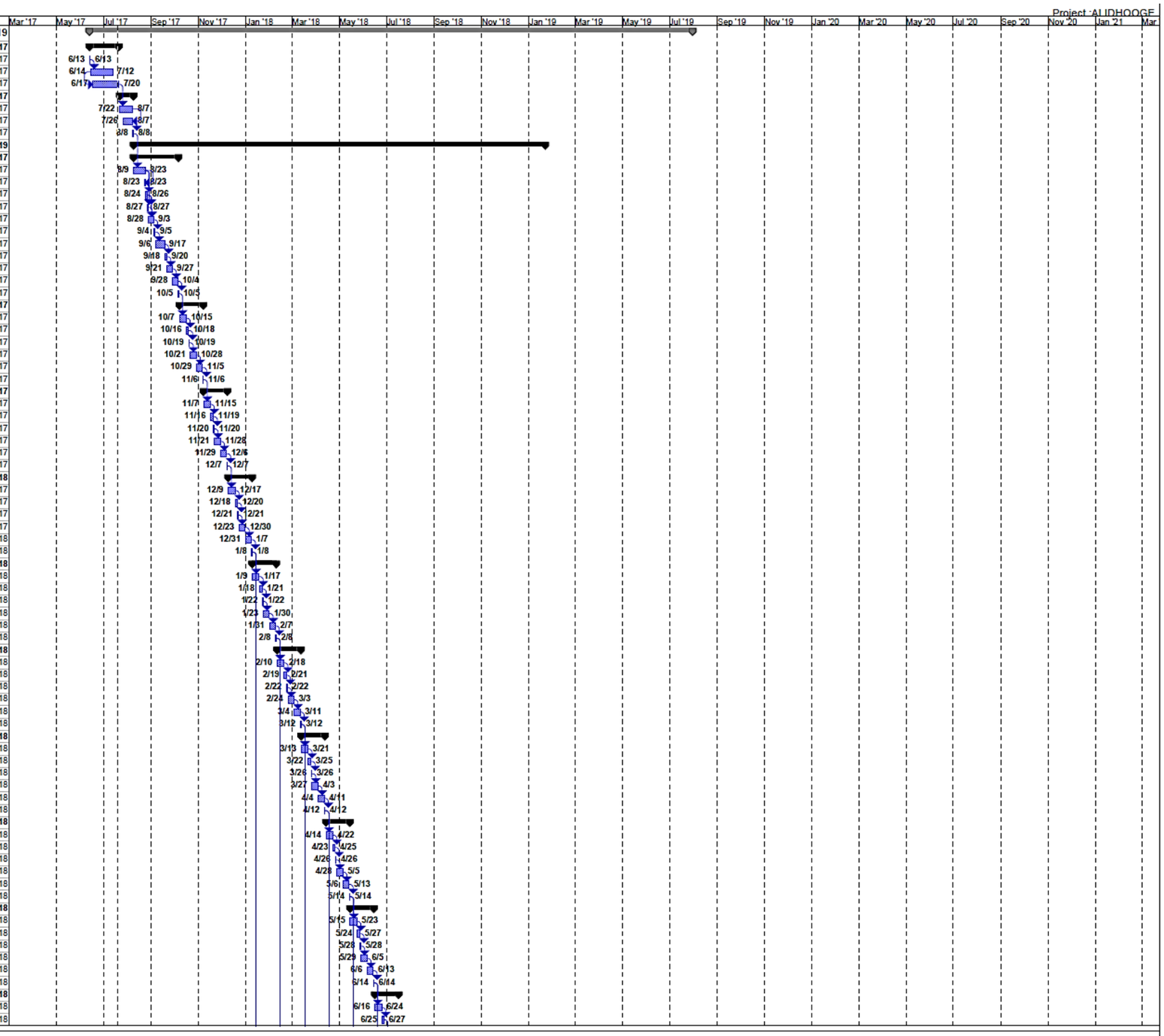
AMSL
BOUNDARY LINE
ROOF TOP+46.40
PL+45.00
13TH FLR
12TH FLR
11TH FLR
10TH FLR
9TH FLR
8TH FLR
7TH FLR
6TH FLR
5TH FLR
4TH FLR
3RD FLR
2ND FLR
1ST FLR
GROUND+1.40
ROAD LEVEL 0.00
BASEMENT-2.30
45000
LIFT LOBBY BEYOND
JUICE BAR
CABANA 1
DINING AREA
BEDROOM 1
PR
MAID'S ROOM
GALLERY FOYER
MASTER ROOM
VENTILATION SHAFT
BATH 2
WIC
KITCHEN
SERVICE BALCONY
SHOP 1
RESIDENCE LOBBY
SHOP 3
MINI MART
CAR PARK
Ministry of Housing & Infrastructure
STRUCTURAL CHECKER A1

SECTION-2

APPENDIX 4: Project Schedule

Project: ALIDHOOGE

ID	Task Name	Duration	Start	Finish
0	**Project duration**	**667 days**	**Tue 6/13/17**	**Tue 7/30/19**
1	**Preliminaries**	**33 days**	**Tue 6/13/17**	**Thu 7/20/17**
2	Site Handover to contractor	1 day	Tue 6/13/17	Tue 6/13/17
3	Mobalization	25 days	Wed 6/14/17	Wed 7/12/17
4	Site Demoliation & cleaning etc	30 days	Sat 6/17/17	Thu 7/20/17
5	**Ground Works**	**16 days**	**Sat 7/22/17**	**Tue 8/8/17**
6	Excavation for foundation	15 days	Sat 7/22/17	Mon 8/7/17
7	Safety precaution for existing buildings	11 days	Wed 7/26/17	Mon 8/7/17
8	Lean concrete for Raft	1 day	Tue 8/8/17	Tue 8/8/17
9	**Concrete Works**	**455 days**	**Wed 8/9/17**	**Mon 1/21/19**
10	**Foundation & Basement**	**50 days**	**Wed 8/9/17**	**Thu 10/5/17**
11	Reinforcement works for Raft & Foundation beams	13 days	Wed 8/9/17	Wed 8/23/17
12	Shuttering etc for raft	1 day	Wed 8/23/17	Wed 8/23/17
13	Reinforcement for Columns	2 days	Thu 8/24/17	Sat 8/26/17
14	RCC for Raft	1 day	Sun 8/27/17	Sun 8/27/17
15	RCC for Foundation beams	6 days	Mon 8/28/17	Sun 9/3/17
16	Back filling for basement	2 days	Mon 9/4/17	Tue 9/5/17
17	Reinforcement,Shuttering & RCC for columns & concrete walll	10 days	Wed 9/6/17	Sun 9/17/17
18	Reinforcement,Shuttering & RCC for stair & lift	3 days	Mon 9/18/17	Wed 9/20/17
19	Shuttering & Reinforcement for GF beams	6 days	Thu 9/21/17	Wed 9/27/17
20	Shuttering and Reinforcement for GF Slab	6 days	Thu 9/28/17	Wed 10/4/17
21	RCC for GF Slab & beams	1 day	Thu 10/5/17	Thu 10/5/17
22	**Ground floor**	**27 days**	**Sat 10/7/17**	**Mon 11/6/17**
23	Reinforcement, Shuttering & RCC for GF Columns	8 days	Sat 10/7/17	Sun 10/15/17
24	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 10/16/17	Wed 10/18/17
25	RCC for Stair & Lift	1 day	Thu 10/19/17	Thu 10/19/17
26	Shuttering and Reinforcement for 1F beams	7 days	Sat 10/21/17	Sat 10/28/17
27	Shuttering and Reinforcement for 1F Slab	7 days	Sun 10/29/17	Sun 11/5/17
28	RCC for 1F Slab incl. beams, stair	1 day	Mon 11/6/17	Mon 11/6/17
29	**First floor**	**27 days**	**Tue 11/7/17**	**Thu 12/7/17**
30	Reinforcement, Shuttering & RCC for 1F Columns	8 days	Tue 11/7/17	Wed 11/15/17
31	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 11/16/17	Sun 11/19/17
32	RCC for Stair & Lift	1 day	Mon 11/20/17	Mon 11/20/17
33	Shuttering and Reinforcement for 2F beams	7 days	Tue 11/21/17	Tue 11/28/17
34	Shuttering and Reinforcement for 2F Slab	7 days	Wed 11/29/17	Wed 12/6/17
35	RCC for 2F Slab incl. beams, stair	1 day	Thu 12/7/17	Thu 12/7/17
36	**Second Floor**	**27 days**	**Sat 12/9/17**	**Mon 1/8/18**
37	Reinforcement, Shuttering & RCC for 2F Columns	8 days	Sat 12/9/17	Sun 12/17/17
38	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 12/18/17	Wed 12/20/17
39	RCC for Stair & Lift	1 day	Thu 12/21/17	Thu 12/21/17
40	Shuttering and Reinforcement for 3F beams	7 days	Sat 12/23/17	Sat 12/30/17
41	Shuttering and Reinforcement for 3F Slab	7 days	Sun 12/31/17	Sun 1/7/18
42	RCC for 3F Slab incl. beams, stair	1 day	Mon 1/8/18	Mon 1/8/18
43	**Third Floor**	**27 days**	**Tue 1/9/18**	**Thu 2/8/18**
44	Reinforcement, Shuttering & RCC for 3F Columns	8 days	Tue 1/9/18	Wed 1/17/18
45	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 1/18/18	Sun 1/21/18
46	RCC for Stair & Lift	1 day	Mon 1/22/18	Mon 1/22/18
47	Shuttering and Reinforcement for 4F beams	7 days	Tue 1/23/18	Tue 1/30/18
48	Shuttering and Reinforcement for 4F Slab	7 days	Wed 1/31/18	Wed 2/7/18
49	RCC for 4F Slab incl. beams, stair	1 day	Thu 2/8/18	Thu 2/8/18
50	**Fourth Floor**	**27 days**	**Sat 2/10/18**	**Mon 3/12/18**
51	Reinforcement, Shuttering & RCC for 4F Columns	8 days	Sat 2/10/18	Sun 2/18/18
52	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 2/19/18	Wed 2/21/18
53	RCC for Stair & Lift	1 day	Thu 2/22/18	Thu 2/22/18
54	Shuttering and Reinforcement for 5F beams	7 days	Sat 2/24/18	Sat 3/3/18
55	Shuttering and Reinforcement for 5F Slab	7 days	Sun 3/4/18	Sun 3/11/18
56	RCC for 5F Slab incl. beams, stair	1 day	Mon 3/12/18	Mon 3/12/18
57	**Fifth Floor**	**27 days**	**Tue 3/13/18**	**Thu 4/12/18**
58	Reinforcement, Shuttering & RCC for 5F Columns	8 days	Tue 3/13/18	Wed 3/21/18
59	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 3/22/18	Sun 3/25/18
60	RCC for Stair & Lift	1 day	Mon 3/26/18	Mon 3/26/18
61	Shuttering and Reinforcement for 6F beams	7 days	Tue 3/27/18	Tue 4/3/18
62	Shuttering and Reinforcement for 6F Slab	7 days	Wed 4/4/18	Wed 4/11/18
63	RCC for 6F Slab incl. beams, stair	1 day	Thu 4/12/18	Thu 4/12/18
64	**Sixth Floor**	**27 days**	**Sat 4/14/18**	**Mon 5/14/18**
65	Reinforcement, Shuttering & RCC for 6F Columns	8 days	Sat 4/14/18	Sun 4/22/18
66	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 4/23/18	Wed 4/25/18
67	RCC for Stair & Lift	1 day	Thu 4/26/18	Thu 4/26/18
68	Shuttering and Reinforcement for 7F beams	7 days	Sat 4/28/18	Sat 5/5/18
69	Shuttering and Reinforcement for 7F Slab	7 days	Sun 5/6/18	Sun 5/13/18
70	RCC for 7F Slab incl. beams, stair	1 day	Mon 5/14/18	Mon 5/14/18
71	**Seventh Floor**	**27 days**	**Tue 5/15/18**	**Thu 6/14/18**
72	Reinforcement, Shuttering & RCC for 7F Columns	8 days	Tue 5/15/18	Wed 5/23/18
73	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 5/24/18	Sun 5/27/18
74	RCC for Stair & Lift	1 day	Mon 5/28/18	Mon 5/28/18
75	Shuttering and Reinforcement for 8F beams	7 days	Tue 5/29/18	Tue 6/5/18
76	Shuttering and Reinforcement for 8F Slab	7 days	Wed 6/6/18	Wed 6/13/18
77	RCC for 8F Slab incl. beams, stair	1 day	Thu 6/14/18	Thu 6/14/18
78	**Eighth Floor**	**27 days**	**Sat 6/16/18**	**Mon 7/16/18**
79	Reinforcement, Shuttering & RCC for 8F Columns	8 days	Sat 6/16/18	Sun 6/24/18
80	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 6/25/18	Wed 6/27/18

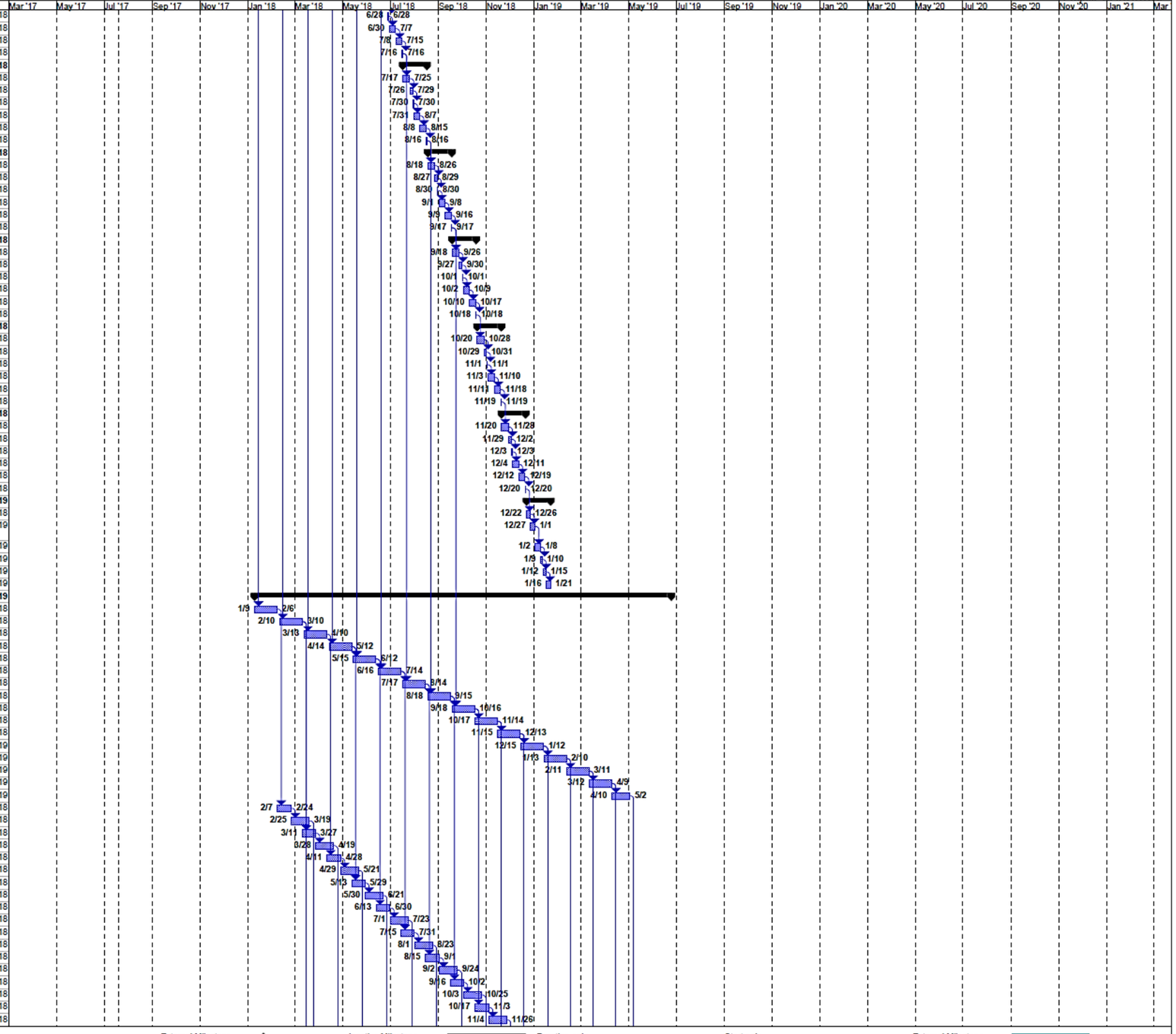


ALIDHOOGE

Task | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary | External Milestone | Inactive Task | Inactive Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Project: ALIDHOOGE

ID	Task Name	Duration	Start	Finish
81	RCC for Stair & Lift	1 day	Thu 6/28/18	Thu 6/28/18
82	Shuttering and Reinforcement for 9F beams	7 days	Sat 6/30/18	Sat 7/7/18
83	Shuttering and Reinforcement for 9F Slab	7 days	Sun 7/8/18	Sun 7/15/18
84	RCC for 9F Slab incl. beams, stair	1 day	Mon 7/16/18	Mon 7/16/18
85	**Ninth Floor**	**27 days**	**Tue 7/17/18**	**Thu 8/16/18**
86	Reinforcement, Shuttering & RCC for 9F Columns	8 days	Tue 7/17/18	Wed 7/25/18
87	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 7/26/18	Sun 7/29/18
88	RCC for Stair & Lift	1 day	Mon 7/30/18	Mon 7/30/18
89	Shuttering and Reinforcement for 10F beams	7 days	Tue 7/31/18	Tue 8/7/18
90	Shuttering and Reinforcement for 10F Slab	7 days	Wed 8/8/18	Wed 8/15/18
91	RCC for 10F Slab incl. beams, stair	1 day	Thu 8/16/18	Thu 8/16/18
92	**Tenth Floor**	**27 days**	**Sat 8/18/18**	**Mon 9/17/18**
93	Reinforcement, Shuttering & RCC for 10F Columns	8 days	Sat 8/18/18	Sun 8/26/18
94	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 8/27/18	Wed 8/29/18
95	RCC for Stair & Lift	1 day	Thu 8/30/18	Thu 8/30/18
96	Shuttering and Reinforcement for 11F beams	7 days	Sat 9/1/18	Sat 9/8/18
97	Shuttering and Reinforcement for 11F Slab	7 days	Sun 9/9/18	Sun 9/16/18
98	RCC for 11F Slab incl. beams, stair	1 day	Mon 9/17/18	Mon 9/17/18
99	**Eleventh floor**	**27 days**	**Tue 9/18/18**	**Thu 10/18/18**
100	Reinforcement, Shuttering & RCC for 11F Columns	8 days	Tue 9/18/18	Wed 9/26/18
101	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 9/27/18	Sun 9/30/18
102	RCC for Stair & Lift	1 day	Mon 10/1/18	Mon 10/1/18
103	Shuttering and Reinforcement for 12F beams	7 days	Tue 10/2/18	Tue 10/9/18
104	Shuttering and Reinforcement for 12F Slab	7 days	Wed 10/10/18	Wed 10/17/18
105	RCC for 12F Slab incl. beams, stair	1 day	Thu 10/18/18	Thu 10/18/18
106	**Twelfth floor**	**27 days**	**Sat 10/20/18**	**Mon 11/19/18**
107	Reinforcement, Shuttering & RCC for 12F Columns	8 days	Sat 10/20/18	Sun 10/28/18
108	Shuttering and Reinforcement for Staircase & Lift	3 days	Mon 10/29/18	Wed 10/31/18
109	RCC for Stair & Lift	1 day	Thu 11/1/18	Thu 11/1/18
110	Shuttering and Reinforcement for 13F beams	7 days	Sat 11/3/18	Sat 11/10/18
111	Shuttering and Reinforcement for 13F Slab	7 days	Sun 11/11/18	Sun 11/18/18
112	RCC for 13F Slab incl. beams, stair	1 day	Mon 11/19/18	Mon 11/19/18
113	**Thirteenth floor**	**27 days**	**Tue 11/20/18**	**Thu 12/20/18**
114	Reinforcement, Shuttering & RCC for 13F Columns	8 days	Tue 11/20/18	Wed 11/28/18
115	Shuttering and Reinforcement for Staircase & Lift	3 days	Thu 11/29/18	Sun 12/2/18
116	RCC for Stair & Lift	1 day	Mon 12/3/18	Mon 12/3/18
117	Shuttering and Reinforcement for Terrace floor beams	7 days	Tue 12/4/18	Tue 12/11/18
118	Shuttering and Reinforcement for Terrace Floor Slab	7 days	Wed 12/12/18	Wed 12/19/18
119	RCC for Terrace Floor Slab incl. beams, stair	1 day	Thu 12/20/18	Thu 12/20/18
120	**Terrace floor**	**27 days**	**Sat 12/22/18**	**Mon 1/21/19**
121	Reinforcement, Shuttering & RCC for Lift/ Columns	5 days	Sat 12/22/18	Wed 12/26/18
122	Shuttering, Reinforcement & RCC for lift machine room slab & beams	5 days	Thu 12/27/18	Tue 1/1/19
123	Shuttering and Reinforcement for Swimming pool	6 days	Wed 1/2/19	Tue 1/8/19
124	RCC for Swimming pool wall	2 days	Wed 1/9/19	Thu 1/10/19
125	Reinforcement, shuttering & RCC for Roof columns	4 days	Sat 1/12/19	Tue 1/15/19
126	Shuttering and Reinforcement for Roof beams & slab	5 days	Wed 1/16/19	Mon 1/21/19
127	**Masonry & finshing works**	**456 days**	**Tue 1/9/18**	**Mon 6/24/19**
128	GF masonry works	25 days	Tue 1/9/18	Tue 2/6/18
129	1F masonry works	25 days	Sat 2/10/18	Sat 3/10/18
130	2F masonry works	25 days	Tue 3/13/18	Tue 4/10/18
131	3F masonry works	25 days	Sat 4/14/18	Sat 5/12/18
132	4F masonry work	25 days	Tue 5/15/18	Tue 6/12/18
133	5F masonry works	25 days	Sat 6/16/18	Sat 7/14/18
134	6F masonry works	25 days	Tue 7/17/18	Tue 8/14/18
135	7F masonry works	25 days	Sat 8/18/18	Sat 9/15/18
136	8F masonry works	25 days	Tue 9/18/18	Tue 10/16/18
137	9F masonry works	25 days	Wed 10/17/18	Wed 11/14/18
138	10F masonry works	25 days	Thu 11/15/18	Thu 12/13/18
139	11F masonry works	25 days	Sat 12/15/18	Sat 1/12/19
140	12F masonry works	25 days	Sun 1/13/19	Sun 2/10/19
141	13F masonry works	25 days	Mon 2/11/19	Mon 3/11/19
142	Terrace masonry works	25 days	Tue 3/12/19	Tue 4/9/19
143	Basement masonry works	20 days	Wed 4/10/19	Thu 5/2/19
144	GF electrical wiring & Plumbing pipe works	15 days	Wed 2/7/18	Sat 2/24/18
145	GF plastering and Screeding	20 days	Sun 2/25/18	Mon 3/19/18
146	1F electrical wiring & Plumbing pipe works	15 days	Sun 3/11/18	Tue 3/27/18
147	1F plastering and Screeding	20 days	Wed 3/28/18	Thu 4/19/18
148	2F electrical wiring & Plumbing pipe works	15 days	Wed 4/11/18	Sat 4/28/18
149	2F plastering and Screeding	20 days	Sun 4/29/18	Mon 5/21/18
150	3F electrical wiring & Plumbing pipe works	15 days	Sun 5/13/18	Tue 5/29/18
151	3F plastering and Screeding	20 days	Wed 5/30/18	Thu 6/21/18
152	4F electrical wiring & Plumbing pipe works	15 days	Wed 6/13/18	Sat 6/30/18
153	4F plastering and Screeding	20 days	Sun 7/1/18	Mon 7/23/18
154	5F electrical wiring & Plumbing pipe works	15 days	Sun 7/15/18	Tue 7/31/18
155	5F plastering and Screeding	20 days	Wed 8/1/18	Thu 8/23/18
156	6F electrical wiring & Plumbing pipe works	15 days	Wed 8/15/18	Sat 9/1/18
157	6F plastering and screeding	20 days	Sun 9/2/18	Mon 9/24/18
158	7F electrical wiring & Plumbing pipe works	15 days	Sun 9/16/18	Tue 10/2/18
159	7F plastering and screeding	20 days	Wed 10/3/18	Thu 10/25/18
160	8F electrical wiring & Plumbing pipe works	15 days	Wed 10/17/18	Sat 11/3/18
161	8F plastering and screeding	20 days	Sun 11/4/18	Mon 11/26/18



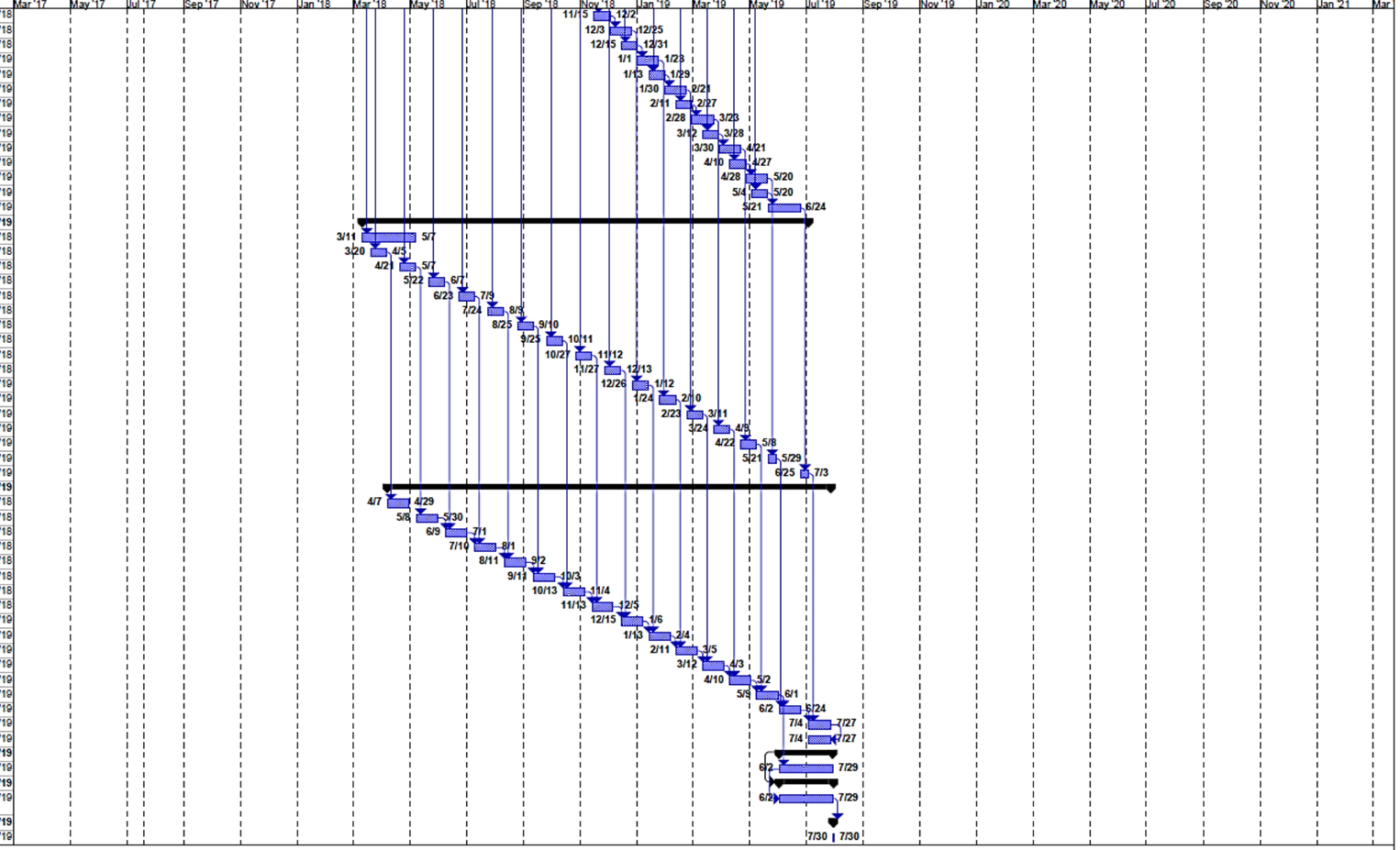
ALIDHOOGE

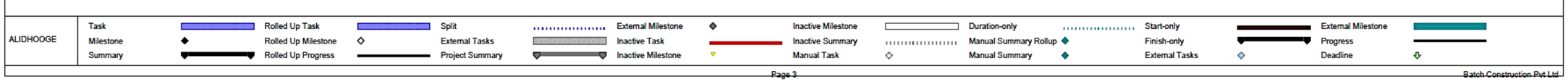
Task | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary | External Milestone | Inactive Task | Inactive Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Batch Construction Pvt Ltd

Project: ALIDHOOGE

ID	Task Name	Duration	Start	Finish
162	9F electrical wiring & Plumbing pipe works	15 days	Thu 11/15/18	Sun 12/2/18
163	9F plastering and screeding	20 days	Mon 12/3/18	Tue 12/25/18
164	10F electrical wiring & Plumbing pipe works	15 days	Sat 12/15/18	Mon 12/31/18
165	10F plastering and screeding	20 days	Tue 1/1/19	Wed 1/23/19
166	11F electrical wiring & Plumbing works	15 days	Sun 1/13/19	Tue 1/29/19
167	11F plastering and screeding works	20 days	Wed 1/30/19	Thu 2/21/19
168	12F electrical wiring & Plumbing works	15 days	Mon 2/11/19	Wed 2/27/19
169	12F plastering and screeding works	20 days	Thu 2/28/19	Sat 3/23/19
170	13F electrical wiring & Plumbing works	15 days	Tue 3/12/19	Thu 3/28/19
171	13F plastering and Screeding works	20 days	Sat 3/30/19	Sun 4/21/19
172	Terrace electrical wiring & Plumbing pipe works	15 days	Wed 4/10/19	Sat 4/27/19
173	Terrace plastering and screeding	20 days	Sun 4/28/19	Mon 5/20/19
174	Basement wiring & plumbing pipe works	15 days	Sat 5/4/19	Mon 5/20/19
175	Basement plastering & screeding	30 days	Tue 5/21/19	Mon 6/24/19
176	**Doors and Windows**	**412 days**	**Sun 3/11/18**	**Wed 7/3/19**
177	Fabrication of doors and windows	50 days	Sun 3/11/18	Mon 5/7/18
178	G F Installation of doors & Windows	15 days	Tue 3/20/18	Thu 4/5/18
179	1F Installation of doors & Windows	15 days	Sat 4/21/18	Mon 5/7/18
180	2F Installation of doors & Windows	15 days	Tue 5/22/18	Thu 6/7/18
181	3F Installation of doors & Windows	15 days	Sat 6/23/18	Mon 7/9/18
182	4F Installation of doors & Windows	15 days	Tue 7/24/18	Thu 8/9/18
183	5F Installation of doors & Windows	15 days	Sat 8/25/18	Mon 9/10/18
184	6F Installation of doors & Windows	15 days	Tue 9/25/18	Thu 10/11/18
185	7F Installation of doors & Windows	15 days	Sat 10/27/18	Mon 11/12/18
186	8F Installation of doors & Windows	15 days	Tue 11/27/18	Thu 12/13/18
187	9F Installation of doors & Windows	15 days	Wed 12/26/18	Sat 1/12/19
188	10F Installation of doors & Windows	15 days	Thu 1/24/19	Sun 2/10/19
189	11F Installation of doors & Windows	15 days	Sat 2/23/19	Mon 3/11/19
190	12F Installation of doors & Windows	15 days	Sun 3/24/19	Tue 4/9/19
191	13F Installation of doors & Windows	15 days	Mon 4/22/19	Wed 5/8/19
192	Terrace floor Installation of doors & Windows	8 days	Tue 5/21/19	Wed 5/29/19
193	Basement installation of doors & windows	8 days	Tue 6/25/19	Wed 7/3/19
194	**Painting Works, Railing & tiling**	**409 days**	**Sat 4/7/18**	**Sat 7/27/19**
195	GF Internal painting, Railing & Tiling	20 days	Sat 4/7/18	Sun 4/29/18
196	1F Internal painting, Railing & Tiling	20 days	Tue 5/8/18	Wed 5/30/18
197	2F Internal painting, Railing & Tiling	20 days	Sat 6/9/18	Sun 7/1/18
198	3F Internal painting, Railing & Tiling	20 days	Tue 7/10/18	Wed 8/1/18
199	4F Internal painting, Railing & Tiling	20 days	Sat 8/11/18	Sun 9/2/18
200	5F Internal painting, Railing & Tiling	20 days	Tue 9/11/18	Wed 10/3/18
201	6F Internal painting, Railing & Tiling	20 days	Sat 10/13/18	Sun 11/4/18
202	7F Internal painting, Railing & Tiling	20 days	Tue 11/13/18	Wed 12/5/18
203	8F Internal painting, Railing & Tiling	20 days	Sat 12/15/18	Sun 1/6/19
204	9F Internal painting, Railing & Tiling	20 days	Sun 1/13/19	Mon 2/4/19
205	10F Internal painting, Railing & Tiling	20 days	Mon 2/11/19	Tue 3/5/19
206	11F Internal painting, Railing & Tiling	20 days	Tue 3/12/19	Wed 4/3/19
207	12F Internal painting, Railing & Tiling	20 days	Wed 4/10/19	Thu 5/2/19
208	13F Internal painting, Railing & Tiling	20 days	Thu 5/9/19	Sat 6/1/19
209	Terrace floor Internal painting, Railing & Tiling	20 days	Sun 6/2/19	Mon 6/24/19
210	Basement internal painting,Railing & Tiling	20 days	Thu 7/4/19	Sat 7/27/19
211	External Painting (for all floors)	20 days	Thu 7/4/19	Sat 7/27/19
212	**Lift**	**50 days**	**Sun 6/2/19**	**Mon 7/29/19**
213	Lift installation	50 days	Sun 6/2/19	Mon 7/29/19
214	**Other works**	**51 days**	**Sun 6/2/19**	**Tue 7/30/19**
215	Door phone system,Lightning arrestor,Fire fighting system, CCTV, AC installation	50 days	Sun 6/2/19	Mon 7/29/19
216	**Site handovering**	**1 day**	**Tue 7/30/19**	**Tue 7/30/19**
217	**Site handover to client**	1 day	Tue 7/30/19	Tue 7/30/19





APPENDIX 5: Approval of the Checkers

copy

ARCHITECTURAL CHECKER'S CERTIFCATE

for architectural design compliance - category B1

1. I, Mohamed Shamin being a registered checker, hereby certifies that I have in accordance with Male' Planning Regulation and other applicable regulations relevant to planning, design and construction of buildings set out by the Government Authorities, have carried out an evaluation and review of the drawings of the building works attached and to the best of my knowledge and belief the drawings do not show any incompliance in the design of the building to be erected or by the works carried out in accordance with those drawings.
2. In arriving at my conclusion, I confirm that I have reviewed and checked the design in accordance with the relevant regulations using the following criteria: -

    a. rules and regulations set out by the authorities in relation to building design and construction;

    b. codes of practice adopted in the design;

    c. standards and specifications of materials;

    d. architectural design concept;

    e. architectural detailing;

    f. appropriate checklists set out by the authorities (included with this Certificate);

    g. others specify.....

Plot Name/No: Ma.Alidhooge

Name of Architect: Mohamed Shamin

City/Atoll/Island: K.Male

Date: 19-12-2016

Type of Building (use): Residential

Reg. Number: BPR2016013B1

Plot Owner's Name: Ilyas Ibrahim

Signature: .....

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

official Stamp of the
Registered Architectural Checker

FOR OFFICIAL USE ONLY

Building Permit No.:	Local Authority's Stamp
.....	APPROVED PERMIT No.: LBD-BS/IK/2017/104 DATE: 19-3-2017 SIGNATURE: MINISTRY OF HOUSING AND INFRASTRUCTURE MALE', REPUBLIC OF MALDIVES

1

STRUCTURAL CHECKER'S CERTIFCATE

for structural design compliance - category A1

1. I Kinaanath Hussain being a registered checker, hereby certifies that I have in accordance with Male' Planning Regulation and other applicable regulations relevant to planning, design and construction of buildings set out by the Government Authorities, have carried out an evaluation and review of the drawings of the building works attached and to the best of my knowledge and belief the drawings do not show any incompliance in the design of the building to be erected or by the works carried out in accordance with those drawings.
2. In arriving at my conclusion , I confirm that I have reviewed and checked the design in accordance with the building regulations using the following criteria:-

    a. Codes of practice adopted in the design;

    b. Including wind load, construction load or dynamic load, (if applicable) checked;

    c. Standards and specifications of structural elements;

    d. Structural design concept and identification of the key structural elements;

    e. Structural analysis and design of all key structural elements including foundation systems;

    f. Stability of structural frame;

    g. Structural detailing;

    h. Others specify.....

Plot Name/No: **Alidhooge**

Name of Engineer: **Kinaanath Hussain**

City/Atoll/Island: **Male'**

Date: **19/12/2016**

Type of Building (use): **Residential (Concrete)**

Checker's Reg. Number: **BPR2016028A1**

Plot Owner's Name:

Checker's Signature: .....

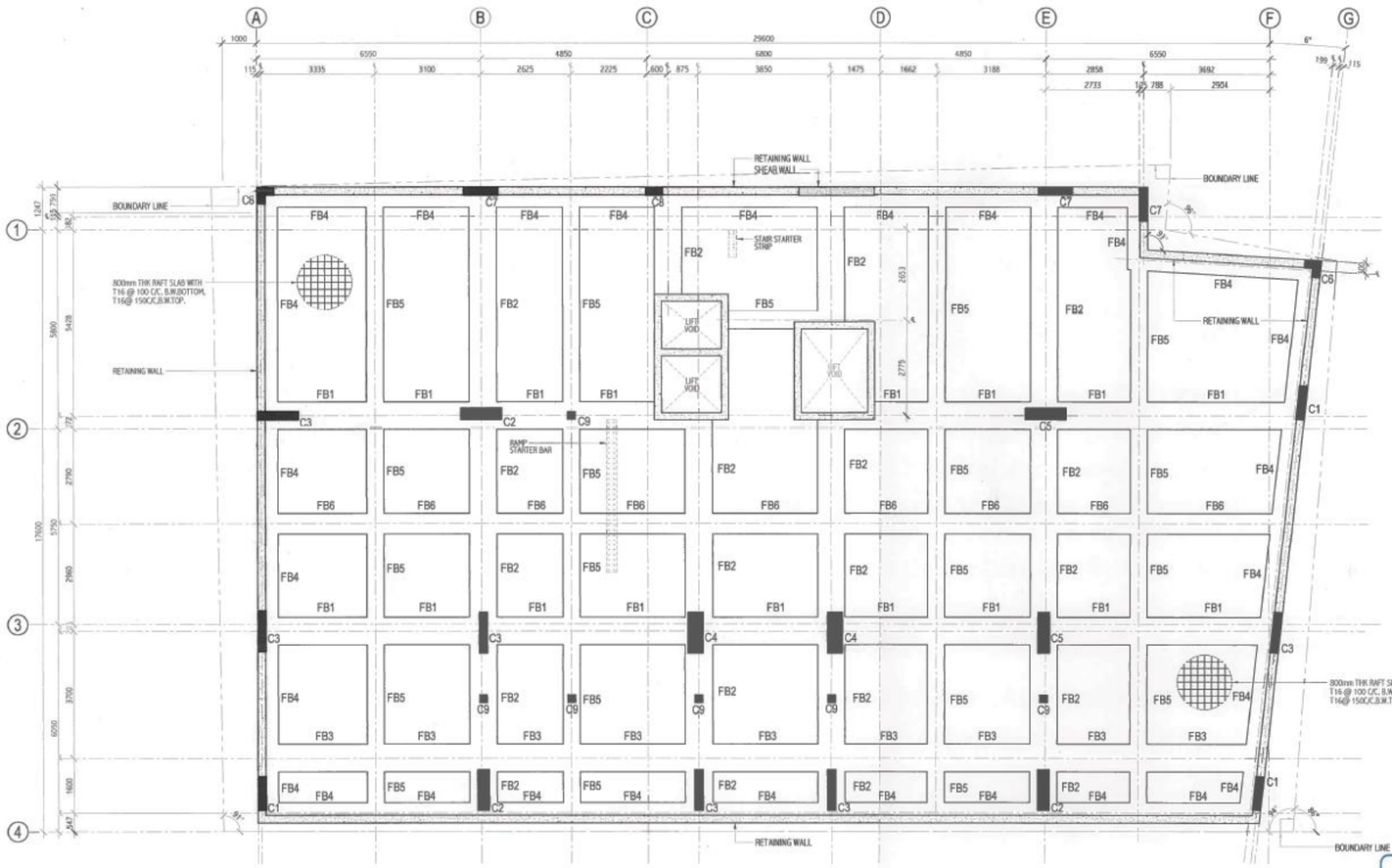
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Official Stamp of the Registered Structural Checker

FOR OFFICIAL USE ONLY

Building Permit No.:	Local Authority's Stamp
.....	APPROVED PERMIT No: LBD-BS/IK/2017/104 DATE: 17-3-2017 SIGNATURE MINISTRY OF HOUSING AND INFRASTRUCTURE MALE', REPUBLIC OF MALDIVES

APPENDIX 6: Foundation Plan



FOUNDATION BEAM AND RAFT SLAB PLAN

SCALE 1:100

0m 5m 10m

GENERAL NOTES

ALL DIMENSIONS ARE GIVEN IN mm. LEVELS ARE GIVEN IN METER EXCEPT IF SHOWN DIFFERENTLY

CONCRETE COVER TO BEAM :
SLAB = 20mm INTERNAL
BEAM SIDES & SOFFIT = 25mm
COLUMN = 40mm
FOUNDATION, GROUND SLAB AND BEAM = 60mm
CONCRETE GRADE FOR DESIGN = 30 N/mm²
CONCRETE GRADE FOR DURABILITY = 40 N/mm²
STEEL GRADE (HIGH YIELD DEFORMED) = 415 N/mm²
STEEL GRADE (MILD-SMOOTH ROUND) = 250 N/mm²

BEAM LAP LENGTHS
10mm Ø BARS : 400mm
12mm Ø BARS : 500mm
16mm Ø BARS : 650mm
20mm Ø BARS : 950mm

SLAB MAT. RESERVATION DRAWING SHOULD BE REFERED BEFORE CASTING SLAB.

TIMBER
ALL TIMBER MEMBERS SHOULD BE OF TREATED TIMBER GRADE = C30 (BS5268) UNLESS OTHERWISE STATED

WATER PROOFING
APPLY WATER PROOFING MEMBRANE:
1. 'BASF MASTERSEAL 439' OR EQUIVALENT TO THE FACE OF CONCRETE SURFACES BELOW GROUND LEVEL.
2. BASF MASTERSEAL 550 OR EQUIVALENT, ON SWIMMING POOLS, WATER FEATURES, TOILETS, BALCONIES AND TERRACES.

PLASTICIZING ADMIXTURES:
1. FOR CONCRETE, BASF MASTERPOZZOLITH 509 OR EQUIVALENT
2. FOR CONCRETE PUMPING MASTERPOZZOLITH AND MASTER GLENIUM 118
3. FOR PLASTERING AND RENDERING BASF MASTERPEL 777 OR FIDMIX DH AND RHEOFIBER OR EQUIVALENT

Revision	Date	Drawn By	Checked By
R01	10-20-2016	HOMER	KINAANATH
R02	12-13-2016	HOMER	KINAANATH
R03	02-11-2017	HOMER	KINAANATH

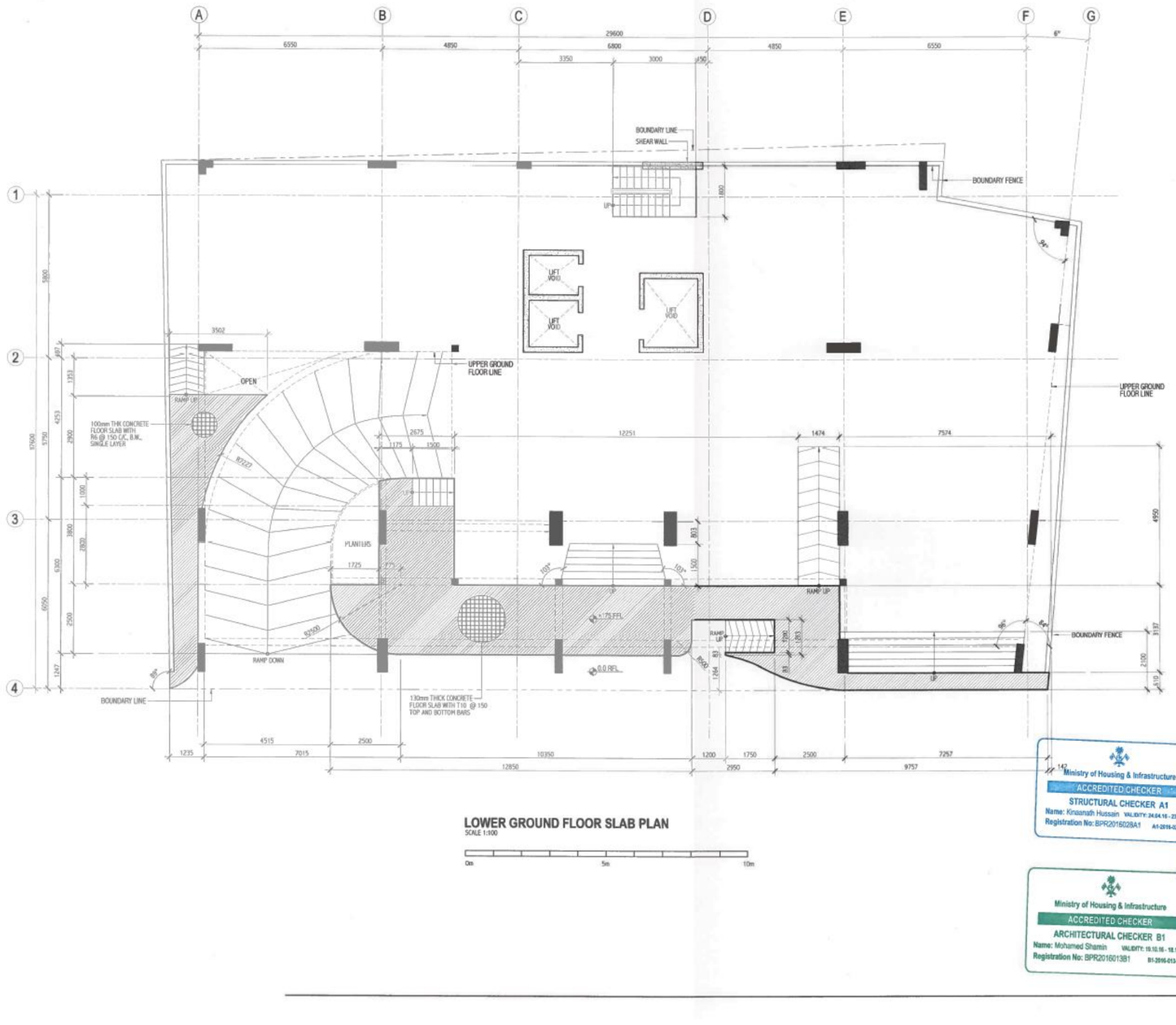
Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 10.10.16 - 10.10.17
Registration No: BPR2016013B1 B1-2016-013-001

LEGEND:
= 230mm THK RETAINING WALL WITH T12 @ 150 C/C (VERTICAL BARS - 2 LAYERS) T12 @ 200 C/C (HORIZONTAL BARS - 2 LAYERS)

Client : APOLLO
Project Title : ALIDHOOGE
Building Name : ALIDHOOGE
Drawing Title : FOUNDATION BEAM AND RAFT SLAB PLAN
Scale : 1:100
Discipline : STRUCTURAL
Stage : SUBMISSION
Designed By : MINAM
Checked By : KINAANATH
Date : AUGUST 2016
Drawn By : KINAANATH
Drawing Number : 21-101
Revision Number : R03
File Name : ALI-21 101R03.dwg

6th Floor, H. Sakeena Manzil, Medhuziyaaraiy Magu, Malé 20127, Republic of Maldives
Tel: 960 3318452
Fax: 960 3318317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv
GEDOR CONSULTING PVT. LTD.



LOWER GROUND FLOOR SLAB PLAN

SCALE 1:100

0m 5m 10m

GENERAL NOTES

ALL DIMENSIONS ARE GIVEN IN mm. LEVELS ARE GIVEN IN METER EXCEPT IF SHOWN DIFFERENTLY

CONCRETE COVER TO REINF.
SLAB = 27mm NORMAL
BEAM SIDES & SOFFIT = 35mm
COLUMN = 40mm
FOUNDATION, GROUND SLAB AND BEAM = 50mm
CONCRETE GRADE FOR DESIGN = 30 N/mm²
CONCRETE GRADE FOR DURABILITY = 40 N/mm²
STEEL GRADE (HIGH-YIELD DEFORMED) = 415 N/mm²
STEEL GRADE (MILD-SMOOTH ROUND) = 250 N/mm²

REINF. LAP LENGTHS.
10mm Ø BARS : 400mm
12mm Ø BARS : 500mm
16mm Ø BARS : 650mm
20mm Ø BARS : 900mm

SLAB M&E RESERVATION DRAWING SHOULD BE REFERED BEFORE CASTING SLAB.

TIMBER
ALL TIMBER MEMBERS SHOULD BE OF TREATED [illegible]
STATED

WATER PROOFING
APPLY WATER PROOFING MEMBRANE;
1. 'BASF MASTERSEAL 420' OR EQUIVALENT TO THE FACE OF CONCRETE SURFACES BELOW GROUND LEVEL.
2. BASF MASTERSEAL 550 OR EQUIVALENT, ON SWIMMING POOLS, WATER FEATURES, TOILETS, BALCONIES AND TERRACES.

PLASTICIZING ADMIXTURES.
1. FOR CONCRETE, BASF MASTERPOZZOLITH 55R OR EQUIVALENT
2. FOR CONCRETE PUMPING MASTERPOZZOLITH AND MASTER GLENIUM 110
3. FOR PLASTERING AND RENDERING BASF MASTERPEL 777 OR FOSMIX OH AND RHEOFIBER OR EQUIVALENT

Revision	Date	Drawn By	Checked By
R01	10-29-2016	HOMER	KINAANATH
R02	12-14-2016	HOMER	KINAANATH
R03	02-12-2017	HOMER	KINAANATH

Client :
APOLLO

Project Title :
ALIDHOOGE

Building Name :
ALIDHOOGE

Drawing Title :
LOWER GROUND FLOOR SLAB PLAN

Scale :
1:100

Discipline :
STRUCTURAL

Stage :
SUBMISSION

Original Drawn By : HOMER
Date : AUGUST 2016
Checked By : KINAANATH
Design By : KINAANATH

Drawing Number : 21-120

Revision Number : R03

File Name : ALI-21-120R03.dwg

H. Sakeena Manzil, 6th flr
Medhuziyaarai Magu
Malé 20127
Republic of Maldives

Tel: 960 3318452
Fax: 960 3310317
E-Mail: gedor@gedor.com.mv
Webpage: gedor.com.mv

GEDOR CONSULTING PVT. LTD.

All dimensions to be checked on site.

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Kinaanath Hussain VALIDITY: 24.04.16 - 23.04.17
Registration No: BPR2016028A1 A1-2016-028-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Mohamed Shamin VALIDITY: 19.10.16 - 18.10.17
Registration No: BPR2016013B1 B1-2016-013-001

APPENDIX 7: Letters to Neighbors

ނަންބަރު: BC/788/2017

އައިމިނަތު އަލީ އަށް

ވެދުން ސަލާމަށްފަހު ދަންނަވަމެވެ.

[illegible]

[illegible]

[illegible]

[illegible]

1. [illegible]، 7788562
2. [illegible] އެންޑް އެޗް އާރް މެނޭޖަރު، 7788103
3. [illegible] މެނޭޖަރު، 7676730
4. އޮފީސް، 7772054

[illegible]

1 އޮގަސްޓު 2017

C-604/2004

(މެނޭޖިންގ ޑައިރެކްޓަރ)

BATCH Construction Pvt Ltd. M. Banafsaa Villa, 1st Floor, HaveereeHingun. Male. Republic of Maldives. TEL: 3345544, 3305544 FAX: 3337024

بسم الله الرحمن الرحيم

ނަންބަރު: BC/789/2017

އަބްދުއް ރަޙްމާން ޝަރީފް އަށް

ފުރަން ސަލާމަށްފަހު ދަންނަވަމެވެ.

ބޭޗް ކޮންސްޓްރަކްޝަން ޕްވޓ އަށް ވަނީ ހއ. އަލިފުށީ ގައި އިމާރާތުގެ ކޮންޓްރެކްޓްގައި ހަވާލު ކުރެވިފައެވެ.
ހއ. އަލިފުށީގެ ފައުންޑޭޝަނުގެ މަސައްކަތް ކުރިއަށް ގެންދާއިރު އަރިމަތީގެ ފަސްފަށް ހިފެހެއްޓުމަށް ދަގަނޑު ފިލާތަކެއް އިމުގެ އެތެރޭން
ފަސްފަށް ހިފެހެއްޓުމަށްޓަކައި ބޭނުން ކުރާނެ ވާހަކަ ޑިޒައިނަރުގެ މައުލޫމާތުތަކާއެކުގައި ދަންނަވާލަމެވެ.

ގޭގެ އިމުގައި ދަގަނޑު ފިލާ ޖެހުމުގެ ރިޕޯޓުގައި، ހއ. އަލިފުށީ ގެ ފައުންޑޭޝަނަށް ކޮންމެވެސް ސަޕޯޓެއް

ތިރީގައިވާ ފަރާތްތަކާ ގުޅުއްވުން އެދެމެވެ.

1. އަޙްމަދު އަރީފް، އޮޕަރޭޝަން މެނޭޖަރ، 7788562
2. އިސްމާއިލް ސަޢީދު، އެޑްމިން އެންޑް އެޗް އާރ މެނޭޖަރ، 7788103
3. ރިޟާ، ޕްރޮޖެކްޓް މެނޭޖަރ، 7676730
4. އޮފީސް، 7772054

އިޙްތިރާމް ފާޅުކުރައްވަން އެދެމެވެ.

31 ޖުލައި 2017

ޑިރެކްޓަރު

މުޙައްމަދު ސަޢީދު

(މެނޭޖިންގ ޑިރެކްޓަރ)

BATCH CONSTRUCTION PVT LTD
C-604/2004
MALE' REP. Of MALDIVES

އިދާރާގެ
މާލެ، ދިވެހިރާއްޖެ

بسم الله الرحمن الرحيم

BATCH

BC/790/2017 :ނަންބަރ

ޖެނެރަލް މެނޭޖަރ ސާހިބު

ފެނަށް ހާލުވެދާނެ ގޮތް.

ބޭކޯ ކޮންސްޓްރަކްޝަން ޕްރައިވެޓް ލިމިޓެޑް ގެ ތެރެއިން ދަތުރުކުރާ ކަނޑުދާ ކުރިން ދަތުރުކުރާ ކަނޑުދާ ދަށުގައި ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން.

ކުރިން ބަލައިގަތް ގަޑިއަށް ވުރެ ދެ ގަޑި ފަހުން، ދާ. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން. ދ. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން. ދ. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން.

ދ. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން. ދ. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން.

1. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން، 7788562
2. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން، 7788103
3. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން، 7676730
4. ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ ގުޅޭ ކަންކަން، 7772054

ތަކެތި ގެންދާ ކަނޑުދާ ތަކެތި ގެންދާ ކަނޑުދާ ބަދަލުކުރުމަށް ބޭނުންވާ ގޮތުގެ ތަފާތު ބަދަލުތައް ކުރުމަށް ހުއްދަ ދިނުމާ.

1 ތަކެތި ގެންދާ 2017

ތަކެތި ގެންދާ ކަނޑުދާ

(ތަކެތި ގެންދާ ކަނޑުދާ)

ތަކެތި ގެންދާ

ކ.ތ، ތަކެތި ގެންދާ

بسم الله الرحمن الرحيم

BATCH

ނަންބަރު: BC/791/2017

އައިމިނަތު ނާޒްނީން އަށް

ވުދުން ސަލާމަށްފަހު ދަންނަވަމެވެ.

ބެޗް ކޮންސްޓްރަކްޝަން ޕްވޓ އަށް ވަނީ މ. އަލިދޫރު ގައި އިމާރާތެއް ކުރުމަށްޓަކައި ހަވާލު ކުރެވިފައެވެ. މ. އަލިދޫރުގެ ފައުންޑޭޝަނުގެ މަސައްކަތް ކުރިއަށް ގެންދާއިރު އަވަށްޓެރިޔާގެ ފަސްގަނޑު ހިފެހެއްޓުމަށް ދަގަނޑު ޝީޓްޕައިލްތައް އިމުގެ އެތެރޭން ފަސްގަނޑު ހިފެހެއްޓުމަށްޓަކައި ބޭނުން ކުރާނެ ވަރަކަ ތިޔަފަރާތުގެ މައުލޫމާތު ދަންނަވާލަމެވެ.

ގޭޓުގެ އިމުގައި ދަގަނޑު ފިލާ ޖެހުމުގެ މަސައްކަތުގައި، މ. އަލިދޫރު ގެ ފައުންޑޭޝަނަށް ކޮންމެވެސް ސަރަހައްދުނާއި އަދި މިގޭ އިމާރާތުވެސް މ. އަލިދޫރުގެ އިމާރާތުގެ ބުރަ ހިއްސާކުރާ ފައުންޑޭޝަނާއި ވީވަރަކަށް ދުރުން ކުރާނެ ކަމަށް އަދި ދިމާވާ ކޮންމެ ގެއްލުމެއް ހަމަ އެގޮތަށް ފުދިގެން ދިޔަ ކަމުގައި ވިޔަސް ކުރާނެ ގޮތް ދަންނަވާލަމެވެ. މިގޭ އިމާރާތުވެސް މ. އަލިދޫރުގެ އިމާރާތުގެ ބުރަ ހިއްސާކުރާ ވީހާވެސް ރައްކާތެރިކަމާއެކު މި ކުންފުނީގެ ޒިންމާގައި ނިންމާނެ ގޮތަށް ދެމެހެއްޓުމަށް މި އިމާރާތް ކުރުމަށްފަހު މި ކުންފުނިން ހަމަޖެހިފައިވާ ކުންފުނީން މ. އަލިދޫރުގެ އިމާރާތް ކުރުމުން ގެއްލުން ވާނަމަ ހިއްސާކުރަން ދަންނަވާލީމެވެ.

މ. އަލިދޫރުގެ އިމާރާތް ކުރުމުގައި އޮޅުންފިލުވުމަށް ފަހަރުވެސް އެއްވެސް ގޮތަކުން ބަލައިގަތުން ހިއްސާކުރުން ދެއްވުމަށް އަޅުގަނޑުމެން ދަންނަވަމެވެ. މ. އަލިދޫރުގެ މަސައްކަތާއި ގުޅޭގޮތުން އެއްވެސް ކަމަކާއި ހިއްސާކުރުން ގުޅުއްވުމަށް ބޭނުންފުޅުވާނަމަ ގުޅުއްވުމަށް ދަންނަވަމެވެ. ތިރީގައި ބަޔާންކޮށްފައިވާ މުވައްޒަފުންނާ ގުޅުއްވުން އެދެމެވެ.

1. އަހުމަދު އަނީސް، ޕްރޮޖެކްޓް މެނޭޖަރ، 7788562
2. އިސްމާއީލް ސަލީމް، އެޑްމިން އެންޑް އެޗް އާރ މެނޭޖަރ، 7788103
3. ޖޯން، ޕްރޮޖެކްޓް މެނޭޖަރ، 7676730
4. ރާޖޭޝް، 7772054

އިޙްތިރާމް ގަބޫލުކުރެއްވުން އެދެމެވެ.

1 އޯގަސްޓް 2017

ޑިރެކްޓަރ

މުޙައްމަދު ސައީދު

(ފައުންޑަރ ޗެއަރމަން)

BATCH CONSTRUCTION PVT LTD
C-604/2004
REP. OF MALDIVES

ކޮޕީ:
މާލެ ސިޓީ ކައުންސިލް

BATCH Construction Pvt Ltd. M. Banafsaa Villa, 1st Floor, HaveereeHingun. Male. Republic of Maldives. TEL: 3345544, 3305544 FAX: 3337024

[redacted]

03/08/17	BC/788/2017	Letter to Aiidhooge neighbour	Aminath Ali, MA. Gulanfuli		Aminath	3-8-2017
03/08/17	BC/789/2017	Letter to Aiidhooge neighbour	Abdul Rahman Shareef MA. Ihuraamge.		Rahman	3-8-2017
03/08/17	BC/790/2017	Letter to Aiidhooge neighbour	Moomina Ahmed MA. Anbaru		Moomina	3-8-2017
03/08/17	BC/791/2017	Letter to Aiidhooge Neighbour	Aminath Naazneen MA. Shimaagu		Mueedh	3-8-2017

APPENDIX 8: Groundwater Analysis

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

MWSC

WATER QUALITY TEST REPORT

Report No: 500175060

Customer Information:
BATCH CONSTRUCTION PVT LTD
M.SNOW FLAKES

Male', Maldives -

Report date: **13/07/2017**
Test Requisition Form No: **900177864**
Sample(s) Recieved Date: **11/07/2017**
Date of Analysis: **11/07/2017 - 12/07/2017**

Sample Description	MA. Alidhooge	**TEST METHOD**	**UNIT**
Sample Type	Ground Water		
Sample No	83189431		
Sampled Date	11/07/2017		
PARAMETER	**ANALYSIS RESULT**		
Physical Appearance	Clear with particles		
Conductivity	1312	Method 2510 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	µS/cm
pH	10.26	Method 4500-H+ B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	-
Salinity	0.65	Method 2520 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	‰
Temperature	22.0	Electrometry	°C
Total Dissolved Solids	656	Electrometry	mg/L
Turbidity	4.16	HACH Nephelometric Method (adapted from HACH 2100N Turbidimeter User Manual)	NTU
Nitrate	12.9	Method 8171 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Nitrogen Ammonia	0.29	Method 8038 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Sulphide	<5 (LoQ 5 µg/L)	Method 8131 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	µg/L
Phosphate	0.33	Method 8048 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, **‰** : Parts Per Thousand, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter, **NTU** : Nephelometric Turbidity Unit, **µg/L** : Microgram Per Liter, **MPN/100ml** : Most Probable Number

Checked by

Nashath Ali
Senior Laboratory Technician

Approved by

Mohamed Eyman
Assistant Manager, Quality

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 provided by the customer

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
FEN Building 5th Floor, Machangolhi, Ameenee Magu, Male', Maldives
Tel: +9603323209, Fax: +9603324308, Email: wqa@mwsc.com.mv

MWSC

WATER QUALITY TEST REPORT
Report No: 500175060

Customer Information:
BATCH CONSTRUCTION PVT LTD
M.SNOW FLAKES

Male', Maldives -

Report date: 13/07/2017
Test Requisition Form No: **900177864**
Sample(s) Recieved Date: **11/07/2017**
Date of Analysis: **11/07/2017 - 12/07/2017**

Sample Description	MA. Alidhooge	**TEST METHOD**	**UNIT**
Sample Type	Ground Water		
Sample No	83189431		
Sampled Date	11/07/2017		
PARAMETER	**ANALYSIS RESULT**		
Physical Appearance	Clear with particles		
Dissolved Oxygen (DO)	6.81	Standard Methods 19th edition APHA	mg/L
Faecal Coliforms	0	Colilert®-18/Quanti-Tray®2000	MPN/100ml

Keys: µS/cm : Micro Seimen per Centimeter, **‰** : Parts Per Thousand, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter, **NTU** : Nephelometric Turbidity Unit, **µg/L** : Microgram Per Liter, **MPN/100ml** : Most Probable Number

Checked by

Nashath Ali
Senior Laboratory Technician

Approved by

Mohamed Eyman
Assistant Manager, Quality

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 provided by the customer

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

APPENDIX 9: Commitment Letter

بسم الله الرحمن الرحيم

APOLLO
HOLDINGS PVT. LTD.

M.Marine Villa (2nd Flr), Varudhee Hingun, Malé 20282, Rep. of Maldives
+960 3328865 +960 3335786 @info@apolloholdings.com.mv www.apolloholdings.com.mv

Ref No: APHL/CD/2017/0144
Date: 7th August 2017

Mr. Ibrahim Naeem
Director General
Environmental Protection Agency
3rd Floor, Green Building
Male'
Maldives

Dear Mr. Naeem,

Re: Commitment Letter for Proposed 14 Storey Building with Basement at Ma. Alidhooge, Male'

As the Proponent of the above mentioned project, Apollo Holdings Pvt. Ltd. hereby commit to finance and implement the environmental mitigation measures and environmental monitoring programme outlined in the EIA Report for the Proposed 14 Storey Building with Basement at Ma. Alidhooge, Male' submitted to Environment Protection Agency (EPA).

Thanking you

Yours sincerely,

Mohamed Waheed
COO

APOLLO HOLDINGS PVT LTD
APOLLO HOLDINGS PVT. LTD.
C-123/93

APPENDIX 10: EIA Report Contributors

Chapter	Page	Chapter Contributors (including data collection)	Consultant Registration Number	Signature
Introduction	20	Mohamed Zuhair	EIA01/2015	
Project Description	33	Mohamed Zuhair Ibrahim Shakir	EIA01/2015	 
Legislative (Project Setting)	53	Mohamed Zuhair	EIA01/2015	
Existing Environment	73	Mohamed Zuhair Ibrahim Shakir	EIA01/2015	 
Impact and Mitigation	101 113	Mohamed Zuhair	EIA01/2015	
Stakeholder Consultation	126	Mohamed Zuhair	EIA01/2015	
Monitoring	132	Mohamed Zuhair	EIA01/2015	
Conclusions	135	Mohamed Zuhair	EIA01/2015	

APPENDIX 11: Consultant CVs

Mr. Mohamed Zuhair

Personal Details

Full Name: Mohamed Zuhair

ID Card: A-045870

Date of Birth: 18 December 1971

Address (Home): H. Eforniumge (South),
4th Floor, Moonlight Hingun/Lonuziyaarai Hingun,
Male' 20023,
Rep of Maldives
Mobile: (960) 777 6800
EMail: moh.zuhair@gmail.com

Marital Status: Married with 3 children

Languages: English (Professional)
Dhivehi (Native)

Education and Training

- **Master of Applied Science (Protected Area Management), 2003**
  James Cook University, Townsville, Queensland 4811
  Australia

- **Certificate in Integrated Management of Coastal and Marine Protected Areas, 1998**
  South Asia Cooperative Environment Program (SACEP) in collaboration with Great Barrier Reef Marine Mark Authority, Male'
  Maldives

- **Certificate in Coral Reef Survey Methods, 1998**
  IOCUNESCO/UNEP/IUCN, Global Coral Reef Monitoring Network (GCRMN) in collaboration with Ministry of Fisheries and Agriculture, Male', Maldives

- **B.Sc (Hons) Combined Studies (Major: Environmental Biology), 1994**
  Bath College of Higher Education, Newton Park, Bath BA2 9BN
  United Kingdom

- **Certificate in Coral Reef Ecology, Theory and Practice, 1990**
  International Center for Ocean Development and Ministry of Fisheries and Agriculture, Male', Maldives

Employment

- **Freelance Environmental Consultant (2011 - Present)**

Provide technical consultancy on environment-related work including development of environmental management plans, preparation of Environmental Impact Assessments (EIA) and environmental monitoring plans, field assessment and environmental analysis of potential development sites, technical input for proposed development projects, as well as assist in project development, etc

Recent Clients: Hotel and Resorts Construction, Leisure Horizons, Amin Construction, Malahini Holdings, Cocoon Investments, Akirifushi Investments, Hanimaadhoo City Hotel Investments, Mr. Ali Zahir, Mr. Hassan Moosa, Mr. Ali Moosa, ABN, CPM Consultants, Cowrie Investments, Oliva Efficient, Island Channels, Sandcays, Beachrock, SAS e Senok JV, Group X, Coastline Investments, Sanken Overseas

- **Director General (2009 – 2011)**

Environmental Protection Agency (EPA), 4th Floor, Jamaaluddin Complex, Nikagas Magu, Male', Rep. of Maldives

Duties: Overall in charge of the Environmental Protection Agency directly reports to Minister and Deputy Minister. Direct, supervise and technical input to the work of the Sections including Environmental Impact Assessment, Biodiversity Conservation, Coastal Zone Management, Waste Management, Water and Sanitation, Physical Oceanography, Resource Valuation and support to implementation of Environmental Protection Act and subsequent Regulations and develop national Environmental Standards, etc.

Recent Consultancies Undertaken

- **Project Proposal**
  Establishment of a Seaweed Mariculture Farm on Funagaadhoo Island, Laamu Atoll, Maldives, 2011

- **Project Proposal**
  Community Development in Thaa Atoll and Establishing a Tourist Resort on Thaa. Fushifaru Island, Maldives, 2011

- **Environmental Impact Assessment**
  Proposed Harbour Development in Noonu Magoodhoo Island, Maldives, 2011

- **Project Proposal**
  Establishment of a Jetty on the Eastern Side of Noonu Henbadhoo Island, Maldives, 2011
- **Marine Environmental Assessment for the Environmental Impact Assessment**
  Coastal Developments at Thulhaagiri Island Resort and Spa, Maldives, 2011

- **Environmental Impact Assessment**
  Proposed Water Supply and Sewerage System in Haa Dhaalu Vaikaradhoo, Maldives, 2012

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development on Banana Island, Qatar, 2012

- **Environmental Impact Assessment**
  Proposed Airstrip Development on Maavarulla Island, G.Dh. Atoll, Maldives, 2012

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development on Kodhipparu Island, K. Atoll, Maldives, 2014

- **Environmental Impact Assessment**
  Proposed City Hotel Development on Hanimaadhoo, H. Dh Atoll, Maldives, 2014

- **Environmental Impact Assessment**
  Proposed Proposed Tourist Resort Development on Maamunagau Island, Raa Atoll, Maldives, 2014

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development on Akirifushi Island, K. Atoll, Maldives. 2014

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development on Kuda Bandos, K. Atoll, Maldives, 2014

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development on Kudafushi Island, Raa Atoll, Maldives, 2014

- **Project Proposal**
  Establishment of Marine Finfish Aquaculture Farm on Fonagaadhoo Island, Laamu Atoll, Maldives, 2014

- **Project Concept**
  Development of Aquaculture, Aquarium Fish Culture, Hydroponics, and Organic Farming in Huruvalhi Island, Raa Atoll, Maldives, 2014

- **Project Proposal**
  Development of Agriculture, Hydroponics, Organic Farming, and Fish Drying in Maarehaa Island, GA Atoll, Maldives, 2014

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development on Ookolhu Finolhu Island, Lhaviyani Atoll, Maldives, 2015

- **Environmental Impact Assessment**
  Proposed Harbour Development in Himandhoo Island, AA Atoll, Maldives, 2015

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Kottafaru Island, Raa Atoll, Maldives, 2015

- **Environmental Impact Assessment**
  Proposed Harbour Rehabilitation in Thoddoo Island, AA Atoll, Maldives, 2015

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Aarah Island, Raa Atoll, Maldives, 2015

- **Environmental Impact Assessment**
  Proposed Coastal Protection Measures in Plam Beach Resort and Spa, Lh. Atoll, Maldives, 2015

- **Hazard Analysis and Risk Assessment**
  Sunken Excavator near Havodda Island, GDh. Atoll, Maldives, 2015

- **Environmental Impact Assessment**
  Coastal Modifications at LUX Maldives, South Ari Atoll, Maldives, 2015

- **Environment Impact Assessment**
  Proposed Agriculture Product Development in Hulhudhoo Island, Baa Atoll, Maldives, 2015

- **Environment Impact Assessment**
  Proposed Coastal Protection Works in Ukulhas Island, AA Atoll, Maldives, 2015

- **Environment Impact Assessment**
  Proposed Mariculture, Hydroponics, Aquaponics and Boatyard Development in Vihamaafaru, AA Atoll, Maldives, 2015

- **Environment Impact Assessment**
  Proposed Coastal Protection Works in Maaenboodhoo, Dhaalu Atoll, Maldives, 2015

- **Situation Analysis Report**
  EIA for Proposed Coastal Modification and Partial Renovation Project, LUX South Ari, ADh. Atoll, Maldives, 2015

- **Technical Study of Erosion and Coastal Protection Measures**
  Northern side of Dharavandhoo Island, B. Dharavandhoo, Malrives, 2015

- **First Addendum:**
  EIA for Coastal Protection Works in Maaenboodhoo, Dhaalu Atoll, Maldives, 2015

- **Environment Impact Assessment**
  Proposed Tourist Resort Development in R. Filaidhoo Island, Raa Atoll, Maldives, 2015

- **Environment Impact Assessment**
  Proposed Agriculture, Water Sports and Training Facility Development in Faadhoo Island, Maldives, 2016

- **Environment Impact Assessment**
  Proposed Tourist Resort Development in Vashugiri Island, Vaavu Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Sunny Lagoon in South Male' Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Access Channel and Mooring Area Deepening in B. Fehendhoo Island, Baa Atoll, Maldives 2016

- **Environmental Analysis Report**
  For Tourist Resort Development in Ethigili Island, Raa Atoll, Maldives, 2016

- **First Addendum to Environmental Impact Assessment**
  Proposed Coastal Protection Works in Ukulhas Island, AA Atoll, Maldives 2016

- **Environment Monitoring**
  Land Reclamation Works at Bodufinolhu, ADh Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Uthuruboduveli, Uthurugasveli, Hurasveli, Meemu Atoll, Maldives 2016

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Maniyafaru Lagoon, South Male' Atoll, Maldives 2016

- **Environmental Impact Assessment**
  Proposed Beach Nourishment Works at Ayada Maldives, GDh. Mugudhuvaa Island, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Beach and Swimming Area Development in K. Himmafushi Island, Male' Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed 11 Storey Building Development at H. Finimaage Aage, Male', Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Land Reclamation and Tourist Resort Development in Maavaru Lagoon, North Male' Atoll, Maldives, 2016

- **Environmental Monitoring**
  Land Reclamation Works at Akirifushi Island, North Male' Atoll, Maldives, 2016

- **Third Addendum to the Environmental Impact Assessment**
  Proposed Tourist Resort Development in Akirifushi Island, North Male' Atoll, Maldives. 2016

- **Second Addendum to the Environmental Impact Assessment**
  Proposed Resort Development in Kodhipparu Island, North Male' Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Aerodrome and Access Channel in the Lagoon near St. Regis Vommuli Resort, Dhaalu Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed 20-Storey Rehendhi 5 Building, Male', Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Hanimaadhoo, HDh. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Hoarafushi, HA Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Farming Development Project at Aidhoo Island, Baa Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Villingili, GA. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Ungoofaaru, Raa. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Milandhoo, Sh. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Guraidhoo, Th. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Kudahuvadhoo, Dh. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Naifaru, Lh. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Water Production and Distribution Facility at Villingili, GA. Atoll, Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in the Lagoon Plot 4.155882 / 73.251890, North Male Atoll, 2016

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Amingiri Lagoon, Kodhipparu Falhu, North Male' Atoll, 2016

- **Environmental Impact Assessment**
  Proposed 10-Storey Mixed Use Residential Complex in Block D10-4C, Hulhumale', Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Mixed Use Residential Complex in Block C4-3, Hulhumale', Maldives, 2016

- **Environmental Impact Assessment**
  Proposed 10-Storey Building with Basement at H. Loveside, Male', Maldives, 2016

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Dhidhoofinolhu Lagoon, Kodhipparu Falhu, North Male' Atoll, 2017

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Dhigudhefaru Island, Baa Atoll, Maldives, 2017

- **Environmental Impact Assessment**
  Proposed Tourist Resort Development in Maarandhoo Island, GA Atoll, Maldives, 2017

- **Environmental Impact Assessment**
  Proposed Coastal Protection Project at Hulhudhoo Island, Addu City, Maldives, 2017

- **First Addendum to the Environment Impact Assessment Report**
  Proposed Tourist Resort Development in Uthuruboduveli, Uthurugasveli and Hurasveli Islands in Meemu Atoll, Maldives, 2017

- **Environmental Audit Report**
  Powerhouse Registration at Malahini Kuda Bandos, North Male Atoll, Maldives, 2017

- **Environmental Impact Assessment Report**
  Proposed Tourist Resort Development in Aanugandufalhu, North Male' Atoll, Maldives, 2017

- **Fourth Addendum to the Environmental Impact Assessment Report**
  Proposed Tourist Resort Development in Akirifushi Island, North Male' Atoll, Maldives. 2017

Professional Certifications

- **Registered EIA Consultant (2015)**
  Registration (EIA01/15) at Environmental Protection Agency
  3rd Floor,
  Green Building
  Male'
  Republic of Maldives

- **PADI Research Diver (1998-Present)**
  Sea Explorers Dive School,
  2nd Floor, Ma. Thuniveli,
  Male' 2001
  Republic of Maldives

Ibrahim Shakir (Shark)

Date of Birth: *18 July 1967*

Contact Address: *Ma Sharky Shark*

Koarukendi Magu

Male' 20-30

Maldives

E-mail: *Sharkydives@gmail.com*

Nationality: *Maldivian*

Contact no: *+9607759695*

Qualifications

Associate Diploma of Land information Management Systems

(Surveying) South Australian Institute of vocational Education (1994), Australia

Certificate from the Group Training Course in Hydrographic Survey (international accredited Category B Course) –

Conducted by the Japan International Cooperation Agency under the International Cooperation Programme of the Government of Japan, Tokyo, Japan (1996)

Certificate of participation in Environment Management at Singapore Environmental Management and Engineering Services Pte Ltd (January 2000)

Relevant Experience

Surveying projects

*Current*_____

AA.Fesdhoo *2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*

Completed _____

K.Fulmoon *2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*

K.Velassaru *2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*

K.Kurumba	*2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*
K.Baros	*2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*
M.Hakuraa Huraa	*2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*
K.Dhonveli	*2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*
AA.Ehlidhoo	*2012 PSM survey to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*
N.fushivellavaru	*2012 Control and as built survey, after establishing PSM to surveying and land surveying standard to tourist properties of Maldives ref to technical brief 2011.*
Gdh.Dhigulaabadhoo	*Topographic survey and Hydrograhic Survey.*
K.Kaashidhoo	*set-out survey for tourist hotel*
B.Vakkaru	*Topographic survey and Hydrograhic Survey including set-out survey for Back of the house*

Laguna Maldives (Male' Atoll) managed by Universal Enterprises

Topographic Survey, Hydrographic Survey, Tree Survey, Set out Survey & Environment impact assessment study.

Konnota Island (Gaafu Dhaal atoll) managed by PCH

Topographic Survey, Hydrographic Survey, Tree Survey and Setout Survey.

Maavelavaru Island (Noonu atoll) managed by Athama Marine

Topographic Survey, Hydrographic Survey and Setout Survey.

Halaveli Tourist Resort (Ari Atoll) / Waterfront Pvt Ltd.

Topographic Survey, Hydrographic Survey, Tree Survey and Setout Survey.

HANDHUFUSHI (Herathere) ADDU Atoll / managed by Yatch tours

Hydrographic Survey of the proposed water villa site

Madoogali Island (Ari atoll)

Topographic survey includes buildings, structures and water villas.

Ariyadhoo Island (North Male' atoll) / managed by VB

Topographic survey and Hydrographic survey, includes buildings, structures and water villas.

Full Moon Maldives / Universal Enterprises

Topographic survey and Hydrographic survey, includes set-out survey for all buildings, structures and water villas.

Baros island Resort / Universal Enterprises

Topographic survey and Hydrographic survey, includes set-out survey for all buildings, structures and water villas.

Dhigufinolhu island Resort / Universal Enterprises

Topographic survey and Hydrographic survey, includes set-out survey for all buildings, structures and water villas.

Palm Beach Resort, Lhaviyani Atoll, Maldives

Provided all consultancy work including equipment layout design and procurement analysis for all F&B areas and laundry

Ari Beach Resort, Ari Atoll, Maldives

Topographic survey and Hydrographic survey, includes set-out survey for all buildings, structures and water villas.

Coco Palm Resort, / Sunland Travels, Baa Atoll, Maldives

Provided all consultancy work including equipment layout design and procurement analysis for all F&B areas, Environment design, Water & Waste Management, Project Management and Laundry Design and Layout in addition, the project included the supervision of the installation of the designed system, surveying and instructing the contractors on construction methodology.

Veligandu Huraa, Maafushivaru (Twin island)

Tree survey, including identification of species and their respective locations through out the island, set-out survey for all structures.

Fesdu Fun island / Universal Enterprises

Reef survey, identification of coral species and condition of the reef with regard to coral bleaching, Tree survey including detailed layout of vegetation line and shoreline, set-out survey.

NakatchaaFushi / Huvafenfushi

Topographic survey, Hydrographic Survey, Tree survey, set-out survey for water bungalows and land villas.

Hilton on Rangali / Crown company

Topographic Survey, Hydrographic survey and set-out survey for water villas, land bungalows, current and wave action surveys, tide measurements for the under water restaurant.

Reethi Rah Resort / One & Only

Environment impact assessment study.

Moofushi island Resort

Topographic survey, including vegetation, shore line, High tide and Low tide line and all structures.

Villivaru & Biyadhoo / Ministry of Tourism

Environment impact assessment study for the bidding project includes Plant identification survey, soil contamination survey, Ground water monitoring, coral diversity and abundance survey, coastal erosion survey, sediment movement and setting studies, beach profiles and land topography survey.

Mushimas Migilli / Dhoani Migilli

Environment impact assessment study including Harbour development.

Keekimini / Fisheries Project

Environment impact assessment study including, Harbour development and set-out survey for infrastructure development.

Hudhufushi island Resort / Abdul Rauf

Topographic survey and Hydrograhic Survey including set-out survey for all buildings and villas.

Ministry of Health, Malé Maldives

Development of a master plan for the provision of safe, adequate and affordable freshwater for Malé (Maldives) including the designing of processes to harness and distribute water on a commercial basis. Includes study on sustainability of utilizing the freshwater aquifer of Malé as well as utilizing airport runway and a loating collector (shallow lagoon) for rainwater catchments vis-à-vis desalination of seawater.

Hinnavaru island, Lhaviyani Atoll, Maldives

Provision of a wastewater collection and disposal systems for a densely populated island.. Design to overcome the problems associated with a high water table and flat low lying island with limitations for proper gradients.

Maadhoo island, Maldives

Environmental impact study on Harbour Development and Recreational Boating Activity for the Management Kandooma island Resort, Republic of Maldives.

Fuah Mulaku

Hydrographic study and Environment impact study on harbour development and commercial boating activity.

Mirihi island Resort

Hydrographic Study, Land survey / and Environmental impact assessment on harbour Development.

Hebadhoo island Resort

Hydrographic Study and Environmental impact assessment on harbour Development.

Embudhoo Finolhu island Resort / Taj

Hydrographic Study and Environmental impact assessment on harbour Development.

Shaviyani Atoll (all inhabited islands)

Hydrographic Study and Environmental impact assessment on Harbour Development.

Hulhumeedu island

Hydrographic Study and Environmental impact assessment on Harbour Development.

Kulhuduffushi island Harbour

Hydrographic Study and Environmental impact assessment on Harbour Development.

Vangaaru(shaviyani atoll)

Dh.Eboodhoo/Olhuveli

Topographic survey and Hydrograhic Survey including set-out survey for all buildings and villas.

Gdh.Gazeera

Topographic survey for resort construction

ADh.Athurugaa

Topographic survey and Hydrograhic Survey

AA.Thundufushi

Topographic survey and Hydrograhic Survey

Ha.Uligamu

Topographic survey and Hydrograhic Survey including set-out survey for buildings.

STO Building

Set-out survey in Male',Maldives.

Velaanaage office Building

Set-out survey in Male',Maldives.

K.Giraavaru

Topographic survey for Resort Construction

Ga.Handahaa

Topographic survey and Hydrograhic Survey including set-out survey for all buildings, Beach Villa and Water Villa.

N.Huivani

Topographic survey and Hydrograhic Survey.

N.Minaavaru

Topographic survey and Hydrograhic Survey.

Gdh.Baulhagilaa

Topographic survey and Hydrograhic Survey.

Rendheli Island (Noonu atoll) managed by INT Management Pvt Ltd.

Setout Survey of Rendheli Island, Noonu Atoll.

Finolhas Island (Baa atoll) managed by Coastline Maldives

Topographic & Hydrographic Survey of Finolhas Island, Baa Atoll.

Kuramathi Maldives (Ari Atoll) managed by Universal Resorts, Maldives.

Topographic Survey (update the site plan) of Kuramathi Maldives, Ari Atoll.

EIA Projects Participated

Environmental Impact Assessment for Tourist Resort Development in Kudafushi Island, Raa Atoll, Maldives, Mr. Ali Zahir

Environmental Impact Assessment for Tourist Resort Development in Kottafaru island, Raa Atoll, Maldives, ABN Pvt Ltd

Environmental Impact Assessment for Tourist Resort Development in Ookolhu Finolhu Island, Lhaviyani Atoll, Maldives, Cocoon Investments, Pvt. Ltd.

Environmental Impact Assessment for Resort Development in K. Kuda Bandos, North Male Atoll, Maldives, Malahini Holdings Pvt. Ltd.

Environmental Impact Assessment for Resort Development in K.Akirifushi, North Male Atoll, Maldives, Akirifushi Investment Pvt. Ltd.

Environmental Impact Assessment for Development of a CityHotel Hanimaadhoo, H.Dh. Atoll, Maldives, Island Expert Pvt. Ltd.

Environmental Impact Assessment for Resort Development in K. Kodhipparu, North Male Atoll, Maldives, Kodhipparu Investment Pvt.Ltd.

Environmental Impact Assessment for Proposed Tourist Resort Development on Raa. Maamanagau Island, Maldives, Bir Hotel Management Pvt. Ltd.

Employment

Managing Director of Beach Rock Investment Pvt Ltd. Ma Sharky Shark, Male', Maldives.

Managing Director of Beach Marine Pvt Ltd. Ma Sharky Shark, Male' , Maldives.

*Managing Partner of Sharkventures LLP, Ma Sharky Shark, Male', Maldives*harkventures LLP, Ma Sharky Shark, Male', Maldives