ENVIRONMENTAL IMPACT ASSESSMENT

Proposed 13 Storey Building Construction at M. Dhimyaath, Male'

Proponent:

Dr. Mohamed Muizzu

Consultant:

Ahmed Jameel (EIA P07/2007)

Hamdhoon Mohamed (EIA P03/2017)

September 2017

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1 Consultants Declaration

This EIA has been prepared according to the EIA Regulations 2012. we certify that the statements in this Environmental Impact Assessment study are true, complete and correct to the best of our knowledge and abilities

Ahmed Jameel (EIA P07/2007)

Hamdhoon Mohamed (EIA P03/2017)

25th September 2017

2 Proponents Declaration

بسم الله الرحمن الرحيم

M. Dhimyaath
Buruzumagu,
Male', Maldives

Date: 26 September 2017

Mr. Ibrahim Naeem,

Director General,

Environmental Protection Agency,

Male', Maldives

Dear Mr. Ibrahim Naeem,

Re: Declaration and Commitment to undertake mitigation measures and environmental monitoring proposed in the EIA for the proposed construction of 13 Storey Building at M. Dhimyaath, Male'

As the proponent I confirm that I have read the report and to the best of our knowledge, all non-technical information provided in the report are complete and accurate.

I would like to confirm my commitment to the proposed mitigation measures and the monitoring programme that has been highlighted in the EIA report that has been specifically prepared for the above referred project.

Sincerely

Dr. Mohamed Muizzu

3 Non-Technical Summary

This report is based on the proposed 13 storey building construction at the residence, M. Dhimyaath in the capital city, Male'. The project is being developed and constructed by Dr. Mohamed Muizzu. He will be undertaking the construction works and project management including overseeing the EIA process.

An Environmental Impact Assessment was necessary for the works outlined in this report as they fall under 'Jadhuvalu R' of the Environmental Impact Assessment Regulations 2012 of the Maldives. In addition to meeting the regulatory requirements, the report would further assist the proponent and important stakeholders to make decisions based on favorable environmental conditions with the main focus on sustainability. The project also adheres to several other rules and regulations in the Maldives and has obtained permit from the Ministry of Housing and Infrastructure to proceed.

The area the project is proposed to be undertaken is a moderately built area in the heart of Male', more towards the south western side. There is no natural terrestrial environment at site. The existing environment therefore was focused on the regional climate of Male', and the traffic distribution, and noise pollution in the area. As could be seen from the data, this area does not encourage much traffic relative to the busier roads in Male'. There were several existing construction sites in the neighborhood. A general exterior overview of the existing structures in the area was also observed. It was found that most of the buildings in the area were in good condition. Older buildings were mostly single storey structures. Therefore, serious structural defects are expected to be at a minimum. However, the report recommends to undertake a structural defects inspection study of the buildings in the same block as the proposed site by civil engineering experts.

The overall environmental impacts of the project have been assessed using frameworks found in literature. Since the development is undertaken in a moderately built area, the results indicate that the proposed project has neutral impact. However, there are some significant impacts on the environment during the construction phase of the project and these needs to be mitigated to avoid any significant damage to the environment. Significance of the impacts and mitigation measures have been provided based on previous similar projects undertaken in the Maldivian environment and based on literature.

The main cause for concern regarding this project is the impact it will have on neighbours residing in this area. As such, several short-term impacts are envisaged including air pollution, noise pollution, aesthetic impacts, and safety concerns. As there are numerous high storey building projects being undertaken in Male', there is no particular long term impact associated with this project. One significant impact specific to this project is the cumulative impact on the neighbourhood due to the sheer no. of construction projects that are simultaneously undertaken in the area. The impacts that do occur however can be easily mitigated to minimise and/or completely nullify them. The first mitigation measure proposed includes creating awareness among the construction staff and neighbours regarding the scope of the project. Other measures include properly demarcating the area, putting up dust screens, and taking other protective measures to ensure people residing and utilising the vicinity will not have to endure the impacts during the construction stage. Foundation protection measures are recommended and are provided as part of the project to prevent impact on neighbouring structures. Dewatering procedure also needs to be undertaken with care, details of which are given in the report. During the operation stage of the project, parking and waste management are issues of note.

Alternatives, including the no project option and alternatives for some project components are also discussed. Regarding project design, a few alternatives are recommended such as providing a green area at the terrace, while the pros and cons of making a larger parking area is also discussed.

An environmental monitoring program is provided at the end of the report, which provides details on the parameters to monitor on site, and the frequency in which it needs to be done. Estimated costs for the monitoring works are given. Implementation of the program is essential for the sustainable development of the project.

In conclusion, it is discussed the impact such major housing projects have for the increasing population density in Male', and how it can be prevented at a policy level. However, taking this project as a standalone development project in an already heavily built island city, it can be concluded that no significant long-term impacts are predicted. Therefore, it is recommended that the project go ahead as proposed with precautions and mitigation measures in place.

ސާދާ ޚުލާޞާ

މި ރިޕޯޓަކީ މާލެ، މާފަންނު ދިރުހާތު ގޯޅިގައި 13 ބުރީގެ އިމާރާތެއް ހެދުމުގެ މަޝްރޫޢަށް ބިނާކޮށް ތައްޔާރު ކުރެވިފައިވާ ރިޕޯޓެކެވެ. ތިމާވެށްޓަށް އަސަރު ފޯރާނެ މިންވަރު ބަޔާންކުރާ ރިޕޯޓް ނުވަތަ 'އީ.އައި.އޭ' މި މަޝްރޫޢަށް ހަދަން ޤަރާރުވެފައިވަނީ މިމަޝްރޫޢަކީ ތިމާވެށްޓަށް އަސަރު ފޯރާނެ މިންވަރު ބަޔާންކުރާ ރިޕޯޓް ހެދުމާ ބެހޭ ޤަވާއިދު 2012 ގެ 'ޖަދުވަލު ރ'ގައި މިފަދަ ރިޕޯޓް ހަދަންޖެހޭ މަޝްރޫޢުގެ ލިސްޓުގައި މިމަޝްރޫޢުގައި ހިމެނޭ މަސައްކަތްތަކާ އެކުލެވިގެންވާތީއެވެ. މިމަޝްރޫޢު ތިމާވެށްޓާއިބެހޭ ޤަވާއިދާއި ޤާނޫނުތައް ފުރިހަމަކުރުމުގެ އިތުރުން، މި އީ.އައި.އޭގެ ސަބަބުން މިމަޝްރޫޢުގެ އުފެދިދާނެ ކަމާބެހޭ އެހެން ފަރާތްތަކަށް މަޝްރޫޢުގެ ޙަޤީޤަތް ކަނޑައެޅުމަށް ބޭނުންވާ މައުލޫމާތު ލިބިގެންދާނެއެވެ. އަދި ދެމެހެއްޓެނިވި ގޮތަކަށް މިމަޝްރޫޢު ކުރިއަށް ގެންދިއުމަށް އެކަމާ ބެހޭ ފަރާތްތަކަށް ލަފާދޭންވެސް ބޭނުންކުރެވިދާނެއެވެ.

މި ރިޕޯޓްގެ ހުރިހާ ބަޔާނުތައް ބިނާވެފައިވަނީ ސެޕްޓެމްބަރ 2017 ގައި މަޝްރޫޢުގެ ކޮންސަލްޓަންޓް ޓީމުން، މި މަޝްރޫޢުގެ ސަރަޙައްދުގެ ތިމާވެށި ދިރާސާކުރުމަށް ކުރިއަށްގެންދިޔަ ތަފްޞީލީ ސާރވޭތަކުން ބަލާލެވުނެވެ. މީގެ އިތުރުން މިފަދަ މަޝްރޫޢުތަކުން ކުރިން ދިރާސާކޮށްފައިވާ އަދި ރިޕޯޓްތައް ބެލުމަށް ކުރިއަށްގެންދިޔަ ތަފްޞީލީ ދިރާސާތަކުން ވެސް ބޭނުންކުރެވުނެވެ. އަދި މަޝްރޫޢުގެ އިދާރާތަކާ، ޖ.މ. ފަރާތްތަކާ މަޝްވަރާ ކުރުމުން ލިބުނު މަޢުލޫމާތުވެސް ބޭނުންކުރެވިފައިވެއެވެ.

މިމަޝްރޫޢު ކުރިއަށްގެންދަން ހަމަޖެހިފައިވާ ސަރަޙައްދަކީ މާފަންނު ބޭރުތެރޭ ސަރަޙައްދެވެ. މިސަރަޙައްދަކީ މާލޭގެ އެހެން ސަރަޙައްދު ތަކާއި ޚާއްސަކޮށް ދިމާވާ ތިމާވެށީގެ ކަންކަން ހުރި ސަރަޙައްދެކެވެ. އަދި މިސަރަޙައްދު އިމާރާތް ކުރުމުގެ ގޮތުން ކަނޑައަޅާފައިވާ ސަރަޙައްދެކެވެ. އެސަރަޙައްދު ތަރައްޤީކުރުމަށް ފުރުޞަތު ދީފައިވާ ބިމެކެވެ. އެ ސަރަޙައްދުގެ ދިރުންތަކުގެ ގޮތުން، މިބިމަކީ އިމާރާތް ކުރުމަށް ކަނޑައަޅާފައިވާ ބިމެކެވެ. މިސަރަޙައްދުގެ އިމާރާތްތަކުގެ ސަރަޙައްދުގެ އެކި އެކި ބިންތަކުގައި ތަރައްޤީކުރުމުގެ މަސައްކަތްތައް ކުރިއަށް ގެންދާ ސަރަޙައްދެކެވެ. މި ސަރަޙައްދުގެ ސަރަޙައްދުގައި އިމާރާތްތަކުގެ ސަރަޙައްދުގެ ތަރައްޤީގެ މަސައްކަތްތަކުން ކުރިއަށްދާ ސަރަޙައްދުގެ ތެރޭގައި ހުރި ގެދޮރު ކަމާބެހޭ ފަރާތްތަކުން ކުރިއަށް ގެންދެވިފައިވާކަމަށް ވާނެއެވެ.

މި މަޝްރޫޢުގެ ސަބަބުން ތިމާވެށްޓަށް ކުރާނެ އަސަރުތަކުގެ ތެރޭގައި އަންނަނިވި ކަންކަން ފާހަގަކުރެވެއެވެ. އެސަރަޙައްދުގެ ބިމުގެ ވަށައިގެން ބަދަލުތަކެއް ނުވަތަ ކޮންސްޓްރަކްޝަން މަސައްކަތުގެ އަދިއެހެން ފަސްގަނޑާއި އެސަރަޙައްދުގައި އުފެދޭ ކުނި އުފެދުން، މަސައްކަތުގެ ކުނިކުނި އާދެވިފައިވާ އަޑުގަދަވުން، ފެންފަރުވާކަން ބަދަލުވުން، ވައިގެ ތަފާތުތަކާއި ގެއްލުންވުން، ޚަރަދު އަދި ގިނަ ވަރަކަށް ދިމާވާ އިމާރާތްތަކާއި ޔޫޓިލިޓީ ތަކުގެ އިތުރުން ގިނަކަން ހިފެހެއްޓުމެވެ. އަދި މިމަޝްރޫޢުގެ ތެރެއިން ރަނގަޅު ފައިދާ ކޮންސްޓްރަކްޝަން ބާޒާރަށް ކުރުވާމުން، ރަނގަޅު ފައިދާ ކޮންސްޓްރަކްޝަން މެނޭޖްމަންޓް ކޮށްފައިވާ ކުރުވާމުން، އަދި މިފަދަ އެހެނިހެން މަޝްރޫޢުތަކުގެ ސަރަޙައްދުގެ އިމާރާތްތަކަށް ހެދޭނެއެވެ. އަދި ހަމަޖެހުން ދެމެހެއްޓުމަށް ފުރުޞަތު ލިބޭގޮތަކަށް މަޝްރޫޢުގެ މަސައްކަތްތަކުން ކުރުމަށް ލަފާދެއެވެ. މިމަޝްރޫޢަކީ ތިމާވެށީގެ ގޮތުން ބާރުގަދަ ނަތީޖާތައް ފޯރުކޮށްދެވިދާނެ ގޮތަކަށް ކުރިއަށްދާ ސަރަޙައްދުގައި ކޮންސްޓްރަކްޝަން މަސައްކަތާ ގުޅިގެން އަސަރުތަކުގެ ކުރިއަށް ގެންދެވޭނެ ކަމަށް ފާހަގަކުރެވިފައިވެއެވެ. މިމަޝްރޫޢުގެ ތެރޭގައި ފައިދާ ކުރެވޭނެ ގޮތުން އިމާރާތްތައް ކުރެވިފައި، މަޝްރޫޢުގެ ސަރަޙައްދުގެ ބަދަލުތައް ކުރެވޭނެ ގޮތުގެ ތަފްޞީލުތައް ކަނޑައެޅިފައިވެއެވެ.

މިރިޕޯޓުގައި ތިމާވެށްޓަށް އަސަރުކުރާ މިންވަރު ހަރުދަނާކުރުމުގެ ގޮތުން ކަނޑައަޅާފައިވާ 'އެންވަޔަރަމަންޓަލް މޮނިޓަރިންގ ޕްލޭން' އެކުލެވިގެންވާނެއެވެ. މި ޕްލޭން ބޭރުގެ ފަރާތަކުން ކޮންސްޓްރަކްޝަން މަސައްކަތުގެ ކުރުމަށް ފަރާތްތަކާ ޙަވާލުކުރެވޭ 2

ހަރަދު ވަންދެންނެވެ. މިމޮނިޓަރިންގ މަސައްކަތަކީ ދިގުމުއްދަތެއްގެ ގޮތުގައި މިމަޝްރޫއު ތަރައްޤީ ކުރުމަށް އޮތް ވަރަށް ދުރުއްކާ ވަސީލަތްތަކެވެ.

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4 Introduction

4.1 The purpose of this EIA

This EIA report is aimed to fulfill the statutory requirements under the Environmental Protection & Preservation Act of the Maldives (Law No. 4/93) and precisely the Environmental Impact Assessment (EIA) Regulation (2007) and First Amendment (2012) to the EIA regulation. These legal frameworks were utilized as a basis for preparation of this document.

The report will look at the justifications for undertaking the proposed project components and it will identify and determine the significance of the potential impacts of the proposed works. Alternatives to proposed components or activities in terms of location, design and environmental considerations would be suggested along with measures to mitigate any negative impact on the environment. Environmental monitoring programme is vital in order to demonstrate the long-term sustainability of the proposed project as well as to undertake mitigation measures before any impact leads to long-term significant effects. Long term monitoring helps to understand uncertainties in impact analysis improving future impact predictions and project implementation. Therefore, a building monitoring and management plan would be suggested.

The major findings of this report are based on qualitative and quantitative assessments undertaken during site visits on February 2016. Available long-term data were collected from available sources, such as long-term data on meteorology and climate from local and global databases. Long-term data on the project site is lacking. However, to compensate for this, data collected over the years in Male' for similar projects will be used.

4.2 Project Title

The project is called construction of 13 storey building in M. Dhimyaath.

4.3 Project Proponent

The project proponent is Dr. Mohamed Muizzu.

4.4 Scope of the EIA and Terms of Reference

As per the approved terms of reference, the scope of this Environmental Impact Assessment is to generally assess, identify and predict the environmental and social impacts of the proposed construction of 13 storey building in M. Dhimyaath. The proposed project is to develop a 13 storey building at M. Dhimyaath. The building would be developed as a mixed residential use building. The basement of the building would be dedicated for parking. The usual area for parking in the basement would be around 136.71 m2. The first floor of the building is designed as such it can be used as a office space. The land area of the proposed building is 186.45 square meter. Importance was given to given to include all the project components and predict the environmental and social impacts which may arise due these project interventions. Furthermore, significance was given to ensure compliance with legal requirements of project of this nature.

This Environmental Impact Assessment study also include the existing natural and social environment of R. Maduvvari and predicts the environmental impacts which may arise due to project and how these impacts can be managed, mitigated and reduced.

The assessment more specifically adheres to the Terms of Reference (TOR) issued by Environmental Protection Agency on 30th August 2017. The TOR is based on scoping meetings held between the stakeholders on 30th August 2017. A copy of the TOR is attached in Appendix A.

The EIA report contains the following main aspects:

- A description of the project including the need for the project, how the project will be undertaken, full description of the relevant parts of the project, methodology used in the assessment, implementation schedules, site plans and summary of project inputs and outputs
- A description of the pertinent national and international legislation.
- Information about the exiting baseline environmental conditions of the site. These include coastal and marine environment of the site and natural hazard vulnerability of the site
- An assessment of the potential impacts during both construction and operational stages of the project as well as identification and cost of the potential mitigation measures to prevent or reduce significant negative impacts during both construction and operation stages of the project
- Assessment of alternatives for the proposed project
- Environment Management Plan
- Details of the environmental monitoring plan
- Conclusions

4.5 EIA Methodology

The methodology adopted to predict identify, predict & assess impacts of the project intervention include the following;

- Assessment of the baseline of the environmental indicators within the project area prior to project work initiation. This assessment was conducted via field survey which was aimed to determine the environmental components as well as the social aspects required under the approved TOR.
- Prediction of impacts on various environmental indicators by the project interventions such as excavation for installment of a piped water network using environmental impact matrix.
- Ranking the predicted environmental impacts using significance analysis.
- Professional judgment, expert opinion and review of similar environmental impact assessment studies were used to for prediction and identification of environmental impacts and evaluation of these impacts.
- A specific section of this report has been dedicated to discuss various methods used for collection of baseline environmental and social data (See Section 4).
- The impact assessment methodology (environmental impact matrix) and significance analysis will be discussed in the Environmental Impact & Mitigation Measures (See Section 6 & 7).

4.6 Reviewed Reports

The following Environmental Impact Assessment reports have been reviewed as background information and for familiarization of project of similar nature. These reports were reviewed as a part of literature review for preparation of this EIA report;

- Environmental Impact Assessment for the proposed 10 storey Residential Development at H. Sandhaleege.
- Environmental Impact Assessment for the proposed 20 storey Proposed Rehendhi 5 Building, Male'.
- Environmental Impact Assessment for the proposed 15 storey building in with Basement at H. Dhoovehi, Male'.
- Environmental Impact Assessment for the proposed 11 storey building construction in Ma. Andhalus, Male'.

All these EIAs were conducted for construction of multi – storey buildings in Male' city which in whole all the major components similar to the proposed construction of 13 storey building in M. Dhimyaath. Hence, these EIAs were used as a reference to understand the environmental impacts involved with dewatering for foundation works and construction of a raft foundation.

4.7 Aims and objective of the project

The key aims and the objectives of the project include the following;

- To develop a mixed-use building for commercial and residential purposes;
- To maximize the space available from the plot;
- To contribute to housing and commercial space needs in Male'

5 Project Description

5.1 The Project Location

The project is based at M. Dhimyaath residence in the Maafannu district in Male', the capital city of Maldives. Location coordinates are at 4°10'21.99"N and 73°30'9.17"E. The road in which the site is located is Buruzu Magu. Buruzu Magu lies parallel to Ameenee Magu, and often the traffic that overflows from Ameenee Magu comes to Buruzu Magu. The area is quite congested much like the rest of Male' and there is virtually no vegetation in the area.

The e location is shown in the Figure 1. A more detailed site plan is given in Annex.

Figure 1: The location and nearby plots of M. Dhimyaath

5.2 Need and Justification

The project is located in the Male' city which is the capital of the Maldives. Male' city is amongst one of the most densely populated island cities in the world. The land area of 2.5 km^2 accommodating a population of 153,379 (Census 2014). Land scarcity is a key challenge in Male' city. Due to high population density, continuous inward migration of the population to Male' city and high demand for residential housing, the solution being explored and implemented is to build high-rise buildings. This option is particularly attractive in Male' where there is limited space for residential housing.

This current project is also part of this continuing trend of vertical development to mitigate the issue of land scarcity. Upon development, the building would provide residential apartments in eleven floors, which would in turn provide housing accommodation to the residents of Male'. The site will also provide much needed commercial space in the ground floor and basement for parking.

Since this project is a commercial project, constructing the building in the landlords privately owned land, the project will be entirely commercial. It is not a government based social housing project, and the units will be rented as real estate developments. Nevertheless, more housing units in Male' would lead to more residential opportunities to the citizens living in the island and would assist in alleviating the housing issues currently faced at the capital. The proposed project is expected to increase the housing units and commercial floor area available in Malé.

5.3 The project

M. Dhimyaath is a 186.45 square metre plot on Block (Figure 3) located on the Buruzu Magu. Currently the site has a 3 -storey building which is used as a guest house. There are no vegetation found within the plot itself. Regarding the public facilities, Indra Gandhi Memorial Hospital (IGMH) is 100 m away from the site. There are commercial units around the site, as is the case anywhere in Male'.

The project area is given in Figure 4and relevant excerpts from the site plan including typical floor plan are given in the Figure 5 to Figure 7.

Figure 2: Picture of the existing 3 storey building at M. Dhimyaath

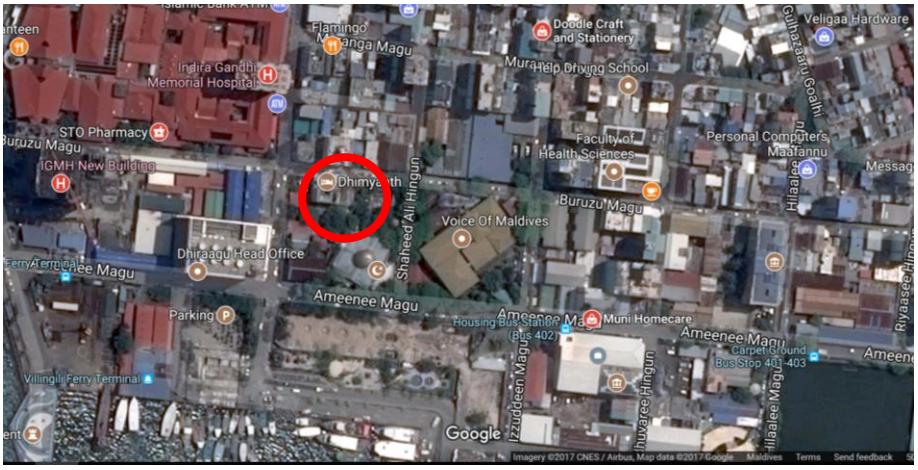

Figure 3: Project Study Area (Source: Google Maps)

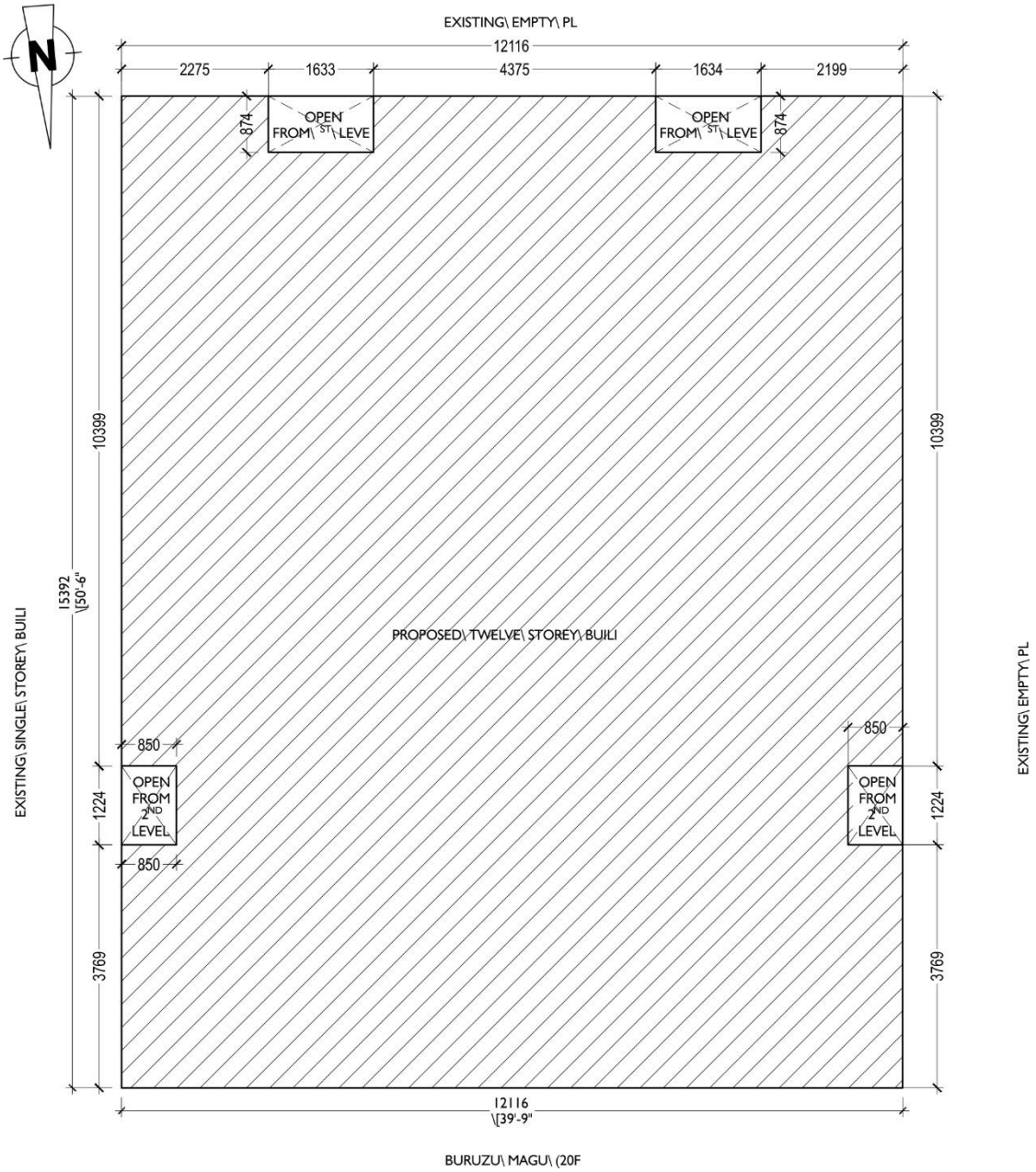

Figure 4: Project Site Plan

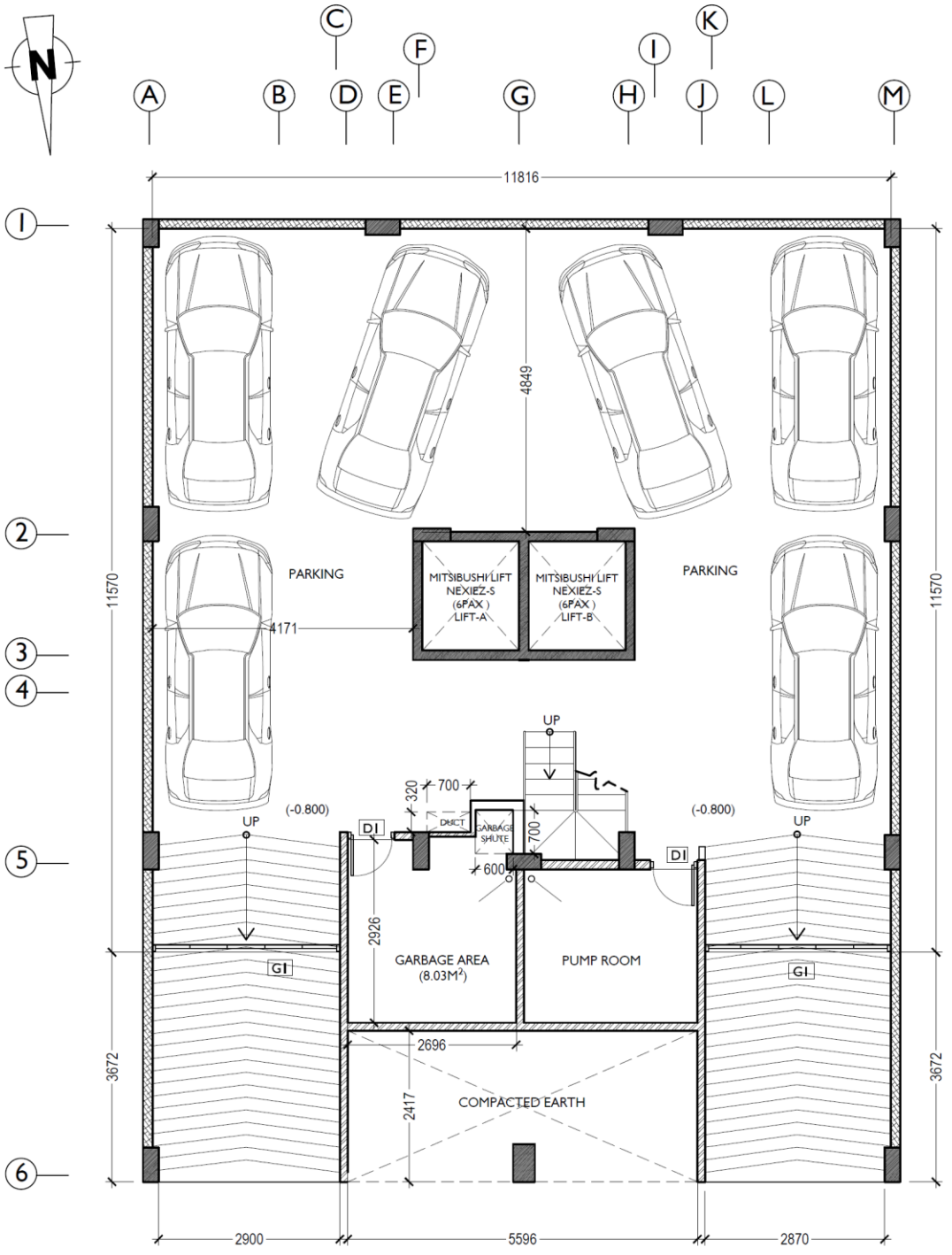

Figure 5: Basement Floor Plan

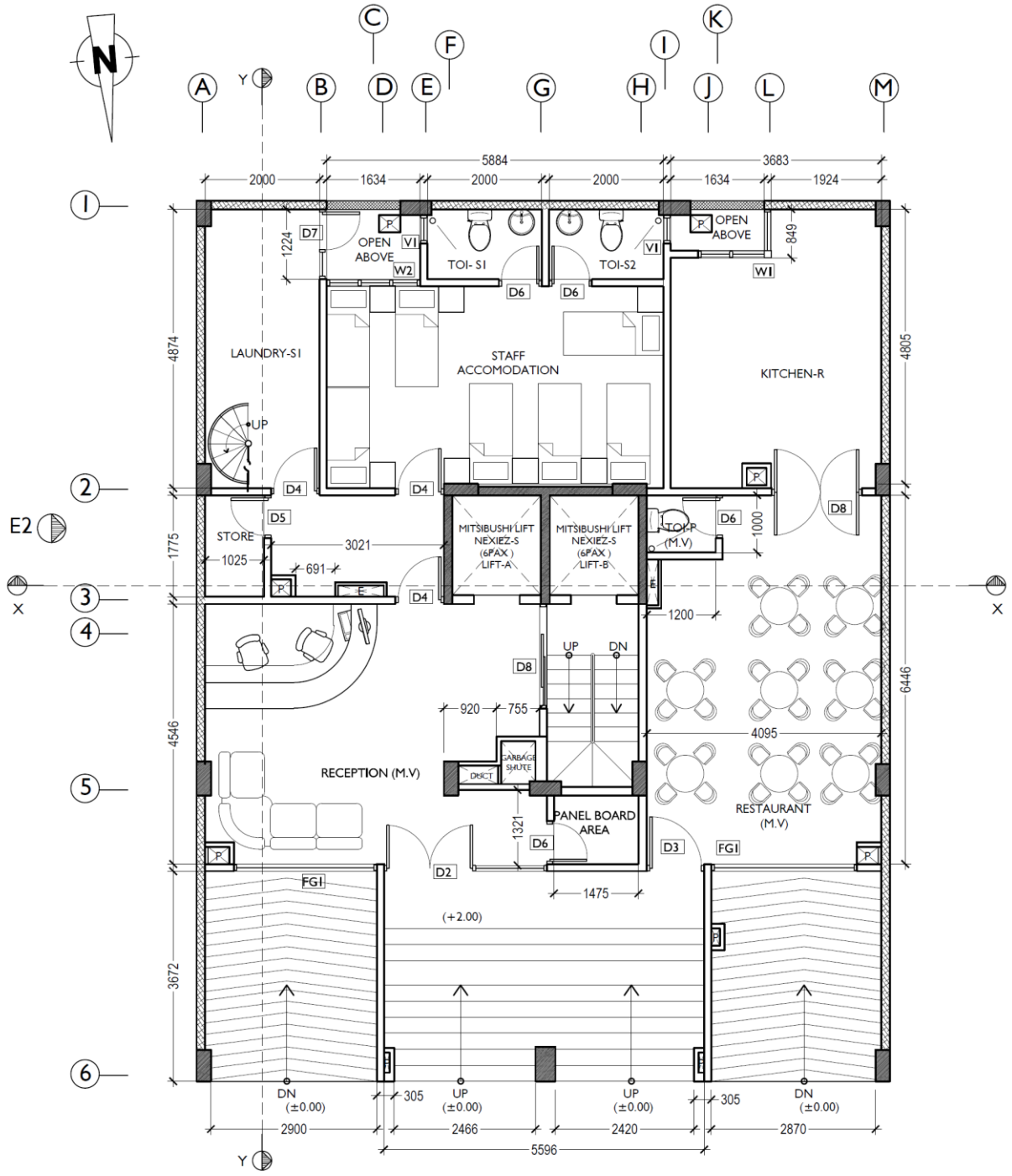

Figure 6: Ground Floor Plan

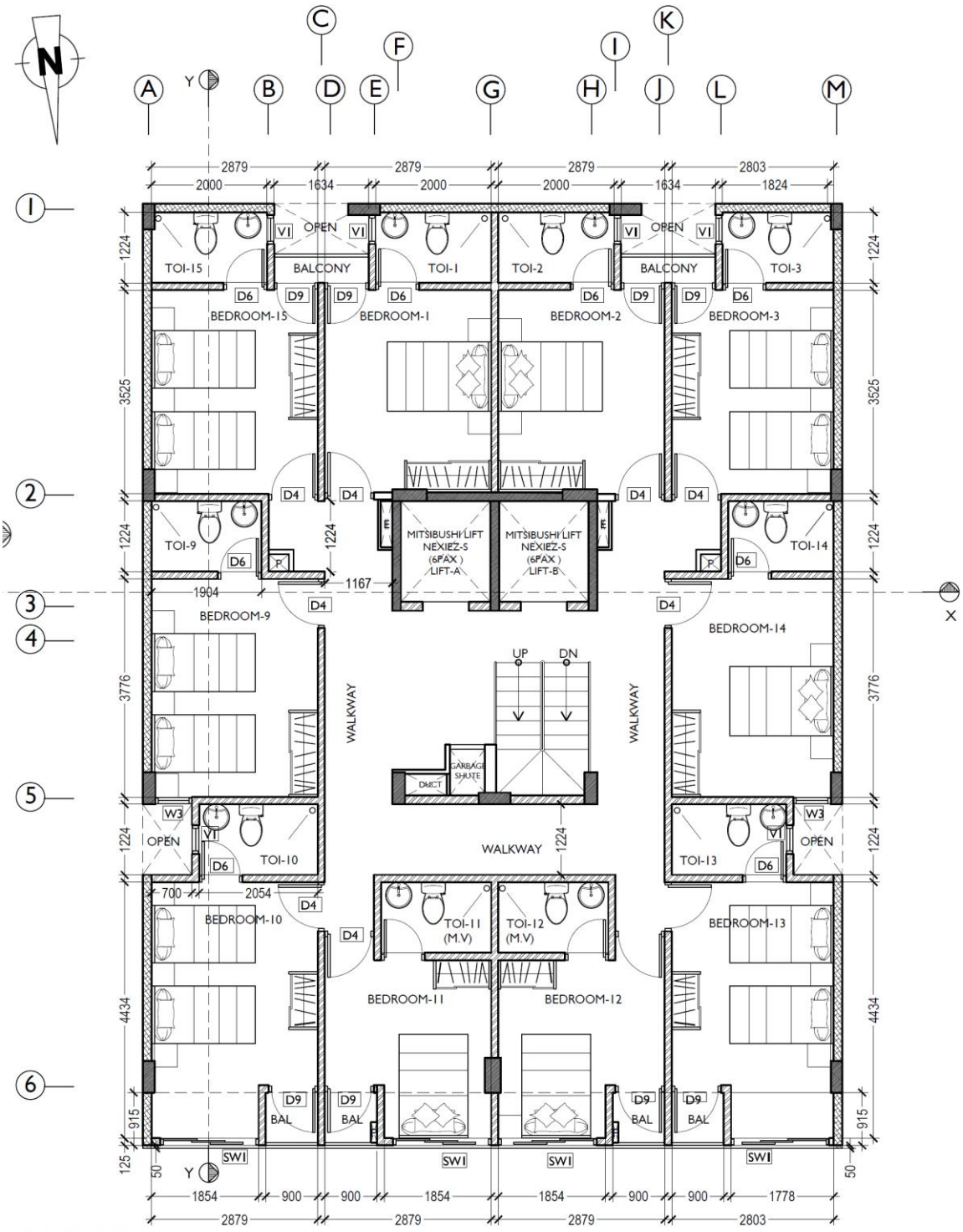

Figure 7: Typical Floor Plan

Figure 8: Front Elevation of the Building

5.4 Design Details

- Development footprint: 186.45 m^2
- Elevation: 43.5 m
- Foundation depth: - 3.980 m
- Foundation type: raft foundation
- Foundation thickness: 1,000 mm
- Terrace use: for recreational use
- Basement use: car parking
- Ground floor use: commercial
- Remaining floor use: mix used
- Estimated population of the building: 120 people.

5.4.1 Demolition of the existing building

Currently three-storey building in the proposed project site. This building will be demolished with the approval of the ministry of Housing and Infrastructure. The demolition waste will be collected at the site and transported to Thilafushi for disposal.

The works were carried out with proper safety precautions, and workers use safety equipment and clothing at all times. Demolition works were carried out using Excavator and Demolition hammer. During demolition, care was taken not to cause any damage to nearby structures.

5.4.2 Excavation works

It has been established that the depth of foundation will be 2 m below the existing ground level. Therefore, maximum depth of excavation will be up to 2.30m. The estimated depth of water table in the area is 1.4m from ground level. As the ground water table is 0.9 m above the proposed foundation depth at nearly all tide levels, dewatering will have to be continuous throughout the period of casting the foundation. Excavation will be undertaken with a backhoe excavator. When all the necessary excavation is complete, a 50 mm thick lean concrete (Grade C15) layer will be laid to provide a level surface to assemble the reinforcement of foundation raft slab and beams.

5.4.3 Foundation Protection

MS sheets, 9mm thick, are proposed to be hammered into the ground between the proposed and the existing adjacent building wall and 50 x 50 mm MS angle shall be fixed vertically and horizontally at 600 mm intervals. Scaffolding GI pipes, 48mm diameter shall be used at 600 mm spacing to prop the MS sheet wall and the wall shall be braced from all directions. A stepped excavation at 600mm centres shall be done to prevent destabilizing of the soil from underneath the adjacent existing foundation.

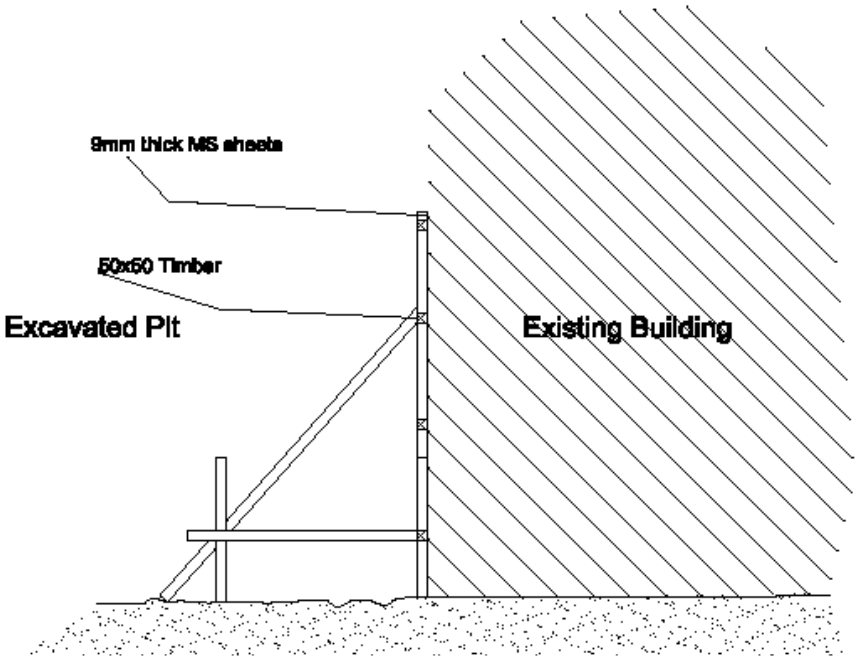

Figure 9: Schematic showing typical Foundation Protection method in place.

5.5 Dewatering

Dewatering is the localized lowering of the groundwater table from its natural level, in order to create a dry environment for construction works. This is a crucial process for creating the correct working conditions to establish the building substructures.

Dewatering will be a continuous process and will be on-going simultaneously while excavation is being undertaken. The process will be continued throughout until casting of the foundation. It is envisaged that 5 to 6 pumps each with an expected flow rate of 30 liters per second will be located along the routes shown in the Figure 10 into the Male' T-jetty area or to the western side.

Figure 10: The proposed route for the disposal of the dewatering effluents.

5.6 Building Foundation

For the foundation works, a raft foundation be used. This is currently the most commonly adopted method of construction in Maldives. It enables to spread the load from a structure over a large area, minimizing the pressure exerted on the base. Beams will then be incorporated into the structure to stiffen the foundation.

Excavation in loose sand requires continuous support, and therefore supports will be placed immediately as excavation commences. Sheets would be closely spaced and horizontal support bracings provided as excavation progresses. Supports and bracings will be placed concurrently with excavation, moving along the periphery of the plot successively. The concrete works for the raft foundation will be done using C30 Grade concrete.

5.6.1 Construction materials and machinery

The construction materials to be used are detailed in Table 2: Main inputs of the proposed 13- storey building in M. Dhimyaath. All the materials such as cement, aggregate and sand will be delivered to the construction site based on the consumption needs. Steel and Plywood will be stored at the contractor's warehouse. Barb bending and carpentry work will be prefabricated at the company work yard or contracted to subcontractors and transported to the site.

5.6.2 Utilities

Water and sewerage facilities will be provided by the MWSC water and sewerage network. Therefore water will be desalinated water from the main supply. And sewage will be disposed untreated along the main water outfall

Electricity will be provided by STELCO. Backup generator will be placed on site by the house owners. A Sound Proof Diesel Generator, with specifications of 100 KW, 125/140 kva will be in place.

The backup generator will be used after construction, when STELCO electricity failures for operation of Lift and lighting at common areas.

It is anticipated that the project site will require approximately 30 kW of power during the construction phase, while 25 m3 per day of desalinated water in anticipated during the construction stage of the development

During the construction, the amount of wastewater generated would be relatively low compared to its generation during the operation phase of the development.

5.7 Project Management

The project is managed by the contractor and developer. Construction works is undertaken entirely in house using company staff, most of which are made up of expatriates.

All labourers will be accommodated at Company Labour Quarters. It is estimated 15 – 30 laborers will be utilised depending on tasks carried out on site. There will be a consulting engineer hired in addition to an in-house site engineer and site supervisor to manage the project.

All operations, work planning for the on-going construction work will be done at Site Office; Major operations will be done at company head office. Heavy machinery such as Excavator, Dump Truck, and Crane will be used during excavation and casting. Most of the machineries are rented while some equipment and machinery are owned by the company.

5.8 Waste Management

Construction debris generated during the demolition work will be cleared from the site and disposed at the Building and Construction waste land fill in Male'. Sand excavated during foundation work will also be transported to this landfill site. Upon completion of foundation works, sand will be purchased from same land-fill for back filling.

It is estimated that during the construction phase, the project will generate wastes around 2 – 4 tons per day which will be collected on site, transported to the waste collection centre at Male' and finally disposed at Thilafushi. None of the waste will be placed outside the project boundary at any time. Temporary waste storage will be within the project-demarcated area.

All waste generated during concrete works phase and finishing phase will be collected at the end of each work day and temporarily stored in the ground floor. Construction solid waste will be transported to land fill site once a week. Hazardous waste such as empty oil-cans (lube-oil), paint cans or strainers will be kept separate and disposed according to the standards established by relevant government authority.

For waste generated during operations, waste collection bins will be kept at ground floor garage area. Garbage chutes will be placed in each floor. On a daily basis waste will be dumped at Male waste yard.

5.9 Road closure and traffic re-routing

The proposed building is located at the Buruzu Magu. Access for the building will be from the main road Buruzu Magu. Prior to casting of foundation or slabs; permit will be taken from *Aanmu Hidhumaiythakaa Behey Bai* (AHBB) under Ministry of Housing and Infrastructure for road blocks in Buruzu Magu between Kanbaa Aisa Rani Hingun & Shaheed Ali Higun. The precise location is shown Figure 11.

However, since the Kanba Aisa Rani Hingun has important public building such as IGMH Hospital and petrol shed, all efforts will be made to open a section of the Burzu Magu for at least motocycles and pedestrians. Road closing will be based on guidelines set by AHBB. In all cases the time will be minimized and for major construction works the Road will be closed at low traffic hours. Road closures need to be undertaken for 2 major project components: foundation work and casting slabs. Maximum no. of hours for foundation work will be 14-15 hours. For each slab casting it will be 8- 10 hours.

Figure 11: Proposed locations for road closure

5.10 Work Schedule

The project is expected to commence soon after the approval of this EIA report, which should take approximately 2-3 weeks from submission.

Dewatering permit will then be obtained.

Initially the architectural and structural design works had been completed and approved before undertaking the EIA. Demolition works are currently ongoing. Dewatering is scheduled to commence next, which will be carried out by MWSC. Upon completion of dewatering, foundation works will begin and soon thereafter structural works will be carried out. Masonry work and interior works will commence afterwards.

The detailed project work scheduled is attached in Annex 5.

5.11 Safety on site

All precautions will be taken for safety of workers during the construction stage. Barricades, warning signs or devices will be placed on the road during casting or road works (connection of water lines and sewer lines) for safety of pedestrians and vehicles.

All workers are given instructions about the health and safety at Site. The Site Engineers and Supervisors will give a brief on daily basis before the work starts to all workers and all proper health and safety precautions will be implemented on site. Safety signs will be used on site, some of which are shown in the following Figure 6.

Personal protective equipment will be available for all the workers, for falling objects, hazardous dust or chemicals, or high working areas. Emergency first aid kit will be at site for minor injuries. First aid kit will be provided in the temporary office on the ground floor, after completion of ground and first floor slab where all safety clothing and equipment will be held. All workers and personnel entering the premises will be given hard hats and safety shoes.

5.12 Accident and hazard scenarios

This section is a description of the potential accidents and hazards which may result during the project construction phase and operational phase. The following hazards and accidents assessment is based on the following 3 stages of the building lifecycle, including the construction, use and maintenance of building. Risk levels and probability are qualitatively assessed based on the following parameters; High, Moderate and Low

Table 1: Accident and hazard scenarios

Performance Consideration	Risk Level	Risk Probability	Responsible Personnel
Presence of hazardous substances, which impact on construction work eg: asbestos, SMF, hydrogen chloride, etc.	High	Low	Project manager, Site Supervisor
Sufficient access / space around new section or building for use of cranes, scaffolding during construction	Moderate	Moderate	Project Engineer
Construction workers will be protected from / proximity to HV electrical, high risk energy sources	High	Moderate	Site Supervisor
Traffic / pedestrian risks are minimised for planned loading & unloading for construction vehicles	High	Moderate	Site Supervisor, Project Manager
Neighborhood construction considerations eg:, school vicinity, site location	Moderate	Low	Project Manager, MHI
Roof design will reduce /eliminate the risk of falls from height during construction	Moderate	Moderate	Project Engineer
Sufficient space is planned for access & to install / major fixed plant or equipment or specialised equipment, plant rooms	Low	Moderate	Project Engineer
Floor loading design has been assessed by engineer to be able to accommodate heavy equipment / plant to be installed in future	Moderate	Moderate	Project Engineer
Floor surfaces – even level with no sudden changes in levels – floor coverings non-slip, suitable for levels of traffic use and suitable for type of tasks to be done	Moderate	High	Project Engineer
Stairs and balcony – edge delineation, slip resistant (SR) stair nosing, construction / design suitable for intended use, handrails, non-horizontal railings in balcony	Moderate	High	Project Engineer
Window positioning and solar glare	Low	High	Project Engineer
Safe Access to lighting fixtures to change fitting, bulbs	Low	Moderate	Project Engineer
Safe Access to plant rooms – locked, lighting.	Low	High	Project Engineer
Access to roof tops – safe access to within safety zone, minimised manual handling of material, equipment tools.	Low	Moderate	Project Engineer
Accessible window cleaning methods	Low	High	Project Engineer
Accessible gutter cleaning methods	Low	High	Project Engineer
Accessible dirt or rubbish collection points	Moderate	Moderate	Project Engineer Maintenance Officer

5.13 Project Inputs and Outputs

This section discusses the project inputs and outputs in terms of type of the resource, the quantity of the resource required and the main sources which the resource is obtained.

Table 2: Main inputs of the proposed 13- storey building in M. Dhimyaath

Input resource(s)	Estimated Quantity	Main sources of resource
Construction workers	01 Project Manager 01 Project Engineer 01 Consultant Engineer 01 Local Supervisors 20 Skilled Foreign Laborers 10 Non-Skilled Laborers 03 Security Staff (24 Hours security)	Contractor's permanent staff. Project staff. Labourers mostly registered workers from Bangladesh.
Machinery and equipment	Excavator Concrete Mixer Dump Truck Crane	Sourced from local rentals.
Energy supply (during construction)	30kW	From STELCO mains
Backup energy supply (during operations)	100 kW	Contractor's own equipment
Cement (Ordinary Portland cement)	5,000 bags	Procured from local supplier
Sand	12,500 bags	Imported from abroad
Aggregates	20,000 bags	Imported from abroad
Ply wood (12mm thick),	1250 No.	Procured from local supplier
Timber (Hard wood)	7500 No.	Procured from local supplier
Steel	85 tons	Procured from local supplier
Painting Exterior (Seamaster, or Equivalent Emulsion) Interior (Seamaster or Equivalent Emulsion)	Not yet determined	Procured from local supplier
Masonry Blocks (300x150x150)	65,000 No.	Procured from local supplier
Hydraulics and Drainages	All the UPVC pipes and fittings shall be used high pressure pipes.	Procured from local supplier
Tiling materials	General Floor - 600x600mm Homogeneous tile. Toilet floor - 200x200mm Non slip Ceramic tile. Toilet wall - 200x300mm Ceramic tile.	Procured from local supplier

Each component of the project has inputs and outputs based on human resources, economics, and the environment. However, since the operation is carried out in house, project inputs and outputs are greatly conserved and limited.

The major inputs and outputs associated with the project as a whole, encompassing all the components, are tabulated below. Table 1 highlights the main inputs, while Table 2 highlights the major outputs.

Table 3 Major outputs from the proposed project

Products and waste materials	**Anticipated quantities**	**Method of disposal**
Waste generated during construction	2-3 tons per day	Collected and sorted ground floor, and taken to Male' Waste collection area.
Waste water (dewatering)	30 litres/second	Established network and effluents will be disposed to coastal water around Male'
Waste oil and grease	Minute quantities	Collected in used containers and transported to waste site
Air pollution	Debris in minute quantities	External influence minimised by site demarcation temporary boundary walls.
Noise pollution	>80 db(A)	Minimised by site demarcation barriers. Ear muffs and safety equipment for workers on site.
Waste generated during operations	1 – 2 tons per day	Collected on site and transported to waste collection site in Male'
Waste water generated during operations	165 tons per day	Via MWSC sewerage network

6 Policy and Regulatory Framework

6.1 Regulatory Considerations

Due to the multitude nature of activities that take place during the construction of 13-storey building in M. Dhimyaath, a number of laws and regulations that fall under the mandates of various government agencies come into play. This section highlights relevant national legislative framework applicable to the proposed project. The relevant national legislative framework provides guidance on several aspects related to planning, construction and operating a 13-storey building in M. Dhimyaath. The legal frameworks pertaining to the proposed project is also aimed at sustainable development, impact mitigation and conservation of the country's natural resources. The main national legislative framework relevant to this proposed project and proposed compliance arrangements are summarized in the below;

6.2 Environmental Protection & Preservation Act (Law no. 4/93)

The Environmental Protection & Preservation Act of the Maldives (EPPA) provides the legal basis for environmental management in the Maldives including the environmental impact assessment (EIA) process in the Maldives. The EIA process in the Maldives is currently implemented by the Environmental Protection Agency (EPA) which is under the umbrella of the Ministry of Environment and Energy (MEE).

The main clauses of the Environmental Protection & Preservation Act which is relevant for the proposed construction of 13-storey building in M. Dhimyaath include the following;

1. Clause 2 of the EPPA mandates the Ministry of Environment and Energy to formulate policies, rules and regulations regarding the environment;
2. 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;
3. 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;
4. 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.

6.2.1 Applicability to the proposed project

The EIA is prepared in order to comply with the Environmental Impact Assessment Regulation (2012) which is a regulation developed under the Environmental Protection & Preservation Act. The EIA regulation (2012) requires an EIA conducted and approved by EPA prior to the construction if the building meet the following requirements;

1. development of a building exceeding the height of 31m and have a basement or
2. Buildings with over 10-storey with a foundation with a depth greater than 5 ft.

6.3 Maldives Environmental Impact Assessment (EIA) Regulation 2012

The most significant regulation which is applicable for the proposed 13-storey building in M. Dhimyaath is Environmental Impact Assessment Regulation (2007) which was amended in 2012 and is under the Environment Protection and Preservation Act (1993).

The schedule D of the EIA regulation prescribes that all major housing development projects shall undertake an EIA prior to the commencement of the project if the building exceeds 31 m in height, have more than 10 sheets, the foundation exceeds 5ft, have basements or have more than 10-storeys. Since the proposed development meet all the aforementioned characteristics, an EIA is mandatory.

The EIA regulation further provide guidance on implementation and mainstreaming of EIA process in the Maldives. Furthermore, the EIA regulation prescribes guidelines for preparation of the EIA reports and environmental clearance process in the Maldives via Environmental Decision Statement issued by the Environmental protection agency (EPA) which is the regulatory body for environmental sector in the Maldives.

6.3.1 Applicability to the proposed project

This EIA has been conducted to meet the requirements prescribed in Schedule D of the EIA regulation which enlists that development of buildings exceeding 31m in height, have more than 10 sheets, have a foundation

exceeding 5ft, have more than 10-storeys and have basements shall prepare and approve an EIA prior to commencement of the construction.

6.4 Waste Management Regulation (2013)

The Waste Mangement Regulation came into effect on 6th February 2014. This regulation was gazette on 5th August 2013. The regulation provides a set of comprehensive guidelines and on collection, storage, transport and management of solid waste as wel as management of hazardous waste. The main areas which the regulation prohibit dumping of waste includes the following;

- Protected areas under the Environmental Protection & Preservation Act
- Mangroves
- Lagoons of islands;
- Habours;
- Parks and
- Roads.

The waste management regulation (2013) also prescribes the following guidelines for handling and transport of waste on land and sea;

- A permit from EPA shall be obtained in order to collect, handle, transport, sort and landfill waste at large scale;
- During transportation of waste in sea or land, it shall be completely covered to prevent odor and spillage;
- Prohibition of import and burning of hazardous waste and similar to general solid waste hazardous waste shall be transported in sealed containers.

The waste management regulation (2013) also requires identification of an appropriate site for waste management. Also, the waste shall be segregated and identified clearly.

6.4.1 Applicability to the proposed project

Handling, transportation and disposal of waste as a result of the proposed construction of 13-storey building in M. Dhimyaath and operation of the aforementioned project must comply all the provisions of the waste management regulation (2013). As a part of the proposed project, during the construction phase and operation phase the proponent proposes to transport disposable waste to designated area in Male' via the service offered by WAMCO which is the national waste management company. Hence the above regulation and its components will be fully complied.

6.5 Dewatering regulation (2013)

Dewatering regulation (2013) came into force in December 2013. This regulation is under the Environment Protection and Preservation Act. The main scope of this regulation is to protect groundwater resources found in the islands from the adverse impacts of dewatering, groundwater pollution and protect the environment from release of groundwater and other sediments by dewatering process.

As per the dewatering regulation (2013), a permit shall be obtained from the EPA for any dewatering operations during any development project. Moreover, the regulation also identifies 30 m radius boundary as impact area from all dewatering operations and any entities within the boundary should be informed 24 hours prior to the dewatering operation. Dewatering signage approved by EPA should be placed in the dewatering site during the dewatering process.

6.5.1 Applicability to the proposed project

A dewatering permit need to be applied and issued by EPA prior to any dewatering process in accordance with the regulation. The required signage will be placed in the dewatering site during dewatering operations.

6.6 Management, Use and Control of HCFC Substances Regulation (2010)

The HCFC regulation was developed under the Environmental Protection and Preservation Act (1993). The main objective of this regulation is to regulate and phase out the import, use and selling of HCFC containing substances by 2011 and completely eliminate use of HCFC substances in the Maldives by 2020 through controlling importers, registering importers, establishment of quota system, control mechanism for selling, maintenance of statistics of the import, selling, purchase and service providers.

6.6.1 Applicability to the proposed project

Since this is an obligation for the Maldives which needs to be fulfilled under the Montreal Protocol which Maldives has ratified this regulation will be adhered to during the construction and the operational phase of the project. HCFC free equipment will be utilized for air-conditioning and cooling purpose of the building.

6.7 Environmental Guidelines for Concrete Batch Plants (2014)

The aim objective for formulation of this guideline by EPA was to guide operations of concrete batch plants in an environmentally friendly manner and to mitigate and nullify the adverse impacts of operating a concrete batch plant.

Some key environmental considerations outlined in the regulation include the following:

- The Concrete batch plant should be located in an area where contaminated storm water and process wastewater can be retained on-site;
- Consideration should be given to the location of the plant to minimize spread of dust by natural means such as prevailing winds and artificial means fences and landforms;
- A 100 metre buffer zone should be left between the plant and sensitive land uses;
- Minimize wastewater and measures should be taken to re-use wastewater so that impacts on the groundwater due to potential contamination.

6.7.1 Applicability to the proposed project

Since the project will utilize a concrete batch machine during the construction phase it will conform the guidelines prescribed by the EPA.

6.8 Maldives Land Act (2002)

This legislation deals with the following aspects of Maldivian Land;

- The allocation of Maldivian Land for different purposes and uses
- issuing of land,
- issuing of state dwelling for residential purposes;
- conduct regarding state dwelling or private dwellings constructed for residential purposes;
- sale, transfer and lease of Maldivian land.

According to the Section 3 of this legislation, land shall be allocated for the following purposed and uses;

- For the construction of households and buildings for residential purposes;
- For commercial use;
- For social use;
- For environmental protection;
- For government use

6.8.1 Applicability to the proposed project

The proposed development of 13-storey building in M. Dhimyaath will conforms the aforementioned legislation as the plot has been designated for construion of building for residential and commercial purposes.

6.9 Land Use Plan and Implementation Regulation

This regulation is under the Maldivian Land Act of 2002. According to this regulation, all lands in the islands of the Maldives requires a land use plan to be developed and approved from Ministry of Housing and Infrastructure prior to use of the land. Furthermore, the regulation outlines key aspects that need to be considered during the preparation of land use plans as well as describes guidelines on developing and allocating lands for various purposed. In this regard, various categories of lands are identified under which a government agency shall implement the land use plan.

6.9.1 Applicability to the proposed project

There is no direct relevance of the regulation for the proposed 13-storey building in M. Dhimyaath as the plot in which the building is construction has already been allocated as a plot for residential or commercial purpose.

6.10 Male' Planning Regulation (2015)

This regulation was first developed in 2008 and realigned to the Maldives Land Act (2002) in 2015. This regulation is implemented by Ministry of Housing and Infrastructure.

The regulation includes the following aspects;

- The construction permit shall be displayed at the project site;
- A foundation protection method shall be approved and all foundation work shall be undertaken in accordance to the approved foundation protection plan.
- Any demolition work of existing buildings shall be carried out after consulting with utility service providers namely water and sanitation and electricity.
- All construction activities shall be only carried out by taking appropriate measure to protect the 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;
- Extending the building to the roadside (for sun shading, balcony, etc) is only allowed from 9ft above to a limit of 1.49ft.
- 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.
- 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.

6.10.1 Applicability to the proposed project

Foundation protection plan and the design of the building has been already approved by the Ministry of Housing and Infrastructure as they are compliant to the requirements of this regulation.

6.11 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 depending on the evolution of the construction industry in the Maldives. The main advantage of a performance based Building code is the flexibility. It contains no rigid prescriptive requirements requiring certain products or designs much be used. This flexibility enables developments and innovation in the building design, technology and systems. The main purpose is to create the enabling environment to achieve a safe and cost-effective building design rather than aiming for the best building design.

The main aspects of the Maldives National Building Code (2008) include the following;

- **Stability**
    - **Structure:** Buildings, building elements and sitework shall withstand the combination of loads that they are likely to withstand during construction or alteration and through the lifetime of the building.
    - **Durability:** Building materials, components and construction methods shall be sufficiently durable so 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 from fire:** The resdients of the building should be given adequate time to reach a safe place without being overcome by the effects of fire and give fire rescue teams adequate time to undertake rescue operation.
    - **Containment of the fire:** Buildings shall be provided with safeguards against fire most importantly means of protecting adjacent buildings.
    - **Structural stability during fire:** Buildings shall be constructed to maintain structural integrity during fire to allow residents adequate time to evacuate safely, provide fire and rescue personnel adequate time to undertake rescue and firefighting operations and avoid collapse and consequential damage to adjacent house plots and other properties.
    - **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.
  - **Signage:** 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.

6.11.1 Applicability to the project

The recommendations prescribed in the Maldives National Building Code 2008 will be met and during the construction and operational phase of the proposed project.

6.12 Regulation on Fuel Storage, Handling and Usage

The Regulation on Fuel Storage, Handling and Usage (2015/R-160) came into force on 12th August 2015. The implementer of this regulation is Ministry of Defense and National Security. The following are the man clauses of the regulation

Clause 4: Deals with installation, registration and inspection of fuel storage facilities. The sub-clauses under the Clause 4 includes the following;

- Fuel storage facilities shall be established according to the Regulations and shall have appropriate fire safety and protection systems;
- All fuel storage facilities shall be registered with the Ministry of Defense and National Security as per the Regulations;
- The Ministry reserves the right to inspect the facilities prior to registration and every six months thereafter in the presence of the Developer or Developer's designate.

Clause 6: considers the requirements of petrol storage facilities.

Clause 11: states the design requirements for fuel/petrol storage tanks/containers. The maximum capacity allowed for underground tanks is given as 40,000litres. The containers/tanks should be separate from other buildings such as convenience stores. Requirements for overhead tanks are also provided.

Clause 12: discusses about the requirements for petrol dispensers and filling points and Clause 13 prohibits keeping wet cells, acids and pressurized containers in petrol sheds or petrol storage areas.

Clause 14 to Clause 17: states the requirements for the installation of diesel and kerosene storage and handling facilities. These are similar to those for petrol sheds and handling facilities.

Clause 18: discusses the requirements for fuel delivery line. Fuel delivery lines are required to be kept underground and the pipes are required to conform to BS EN10025 and BS EN10296 or similar international standards. The delivery line is required to be buried at safe depth from ground within a trench that can contain the entire volume of the pipeline in case of breakage.

Clause 19: provides definitions and clause 20 penalties. The penalties vary from fines of MVR5000 to MVR25000 and withdrawal or cancellation of permits depending on the severity of the offense.

6.13 Relevant Policies

6.13.1 Waste Management Policy

Ministry of Environment and Energy has developed a framework for a national waste management policy. The main components of this policy include safe disposal of solid waste, ensuring safe disposal of chemical industrial and hazardous waste.

Waste management of the proposed 13-storey building in M. Dhimyaath project will be in line with the waste management policy.

6.13.2 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;

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

The proposed project of 13-storey building in M. Dhimyaath is in-line with the aforementioned policy.

6.14 Relevant Authorities

6.14.1 Ministry of Environment and Energy (MEE)

The Ministry of Environment and Energy is the main implementer of the Environmental Protection and preservation and the regulations under the legislation. MEE is mandated with formulation of policies, strategies, laws and regulations concerning environmental management, protection, conservation, sustainable development and climate change. The Minister of Environment and Energy or a designate gives the environmental approval or clearance to EIA conducted for development and infrastructure projects excluding the tourism sector projects. This environmental approval or clearance is in the form of an Environmental Decision Statement. In addition, MEE is responsible for formulating relevant laws and regulations, policies and strategies concerning energy, water and sanitation as well as waste management in the Maldives.

6.14.2 Environment Protection Agency (EPA)

EPA is the main regulatory body for environment sector in the Maldives. EPA is an autonomous entity formed under the umbrella of MEE. It is mandated with the following tasks;

- implementation of the EIA process in the Maldives,
- implementation of the Environmental Protection and Preservation Act in the Maldives and subsequent regulations under the aforementioned act on behalf of MEE;
- regulating water and sanitation, biodiversity conservation, waste management and coastal zone management sectors in the Maldives;
- Development of the Environmental guidelines and standards in the Maldives.

6.14.3 Ministry of Housing and Infrastructure (MHI)

MHI has an extensive mandate for planning, developing, implementing as well as regulating housing and infrastructure development in the Maldives. In this regard, land use plans for each inhabited island and various development areas are approved by the MHI. Moreover, MHI is responsible for development of Building Code in which standards and controls for various development in the country including guidelines for construction and safety measures that need to be implemented are prescribed. Furthermore, MHI approves all engineering and detailed designs of buildings developed in the Maldives for housing, residential and commercial purposes.

6.14.4 Maldives Land Survey Authority (MLSA)

Maldives Land Survey Authority (MLSA) was established in order to realize the need for a separate institution to conduct surveys and collect and maintain information on the most beneficial use of lands, lagoons and reefs of the Maldives. MLSA approves all the land surveys undertaken in the islands of the Maldives for various development projects. The authority fall under the umbrella of Ministry of Housing and Infrastructure (MHI).

6.14.5 Ministry of Defense and National Security (MDNS)

Certain aspects of construction and operation of buildings are highly relevant to the works of the Ministry of Defense and National Security. They include implementation of the fuel storage, handling and usage regulation (2015) and ensuring implementation of the fire safety measures in the resorts and in building as per the requirement of Building code.

6.14.6 Maldives Energy Authority (MEA)

The MEA is a regulatory agency under the Ministry of Environment and Energy. The prime task of MEA is to regulate the standards for energy in the Maldives. The electricity wiring and networking shall be undertaken by licensed electricians registered in the MEA.

6.14.7 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.

6.14.8 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.

6.14.9 Maldives Road Development Corporation (MRDC)

The MRDC carryout installation of dewatering pipelines for major building development projects undertaken in Male' City. MRDC also connects dewatering equipment to these pipelines for dewatering purposes. The main purpose of this is to reduce stress and load on the MWSC sewerage network as many construction projects take place in Male' simultaneously.

6.15 Permits required and obtained

The following permits are required as per the above discussed regulations. These permits are required to be obtained prior to the initiation of the construction phase of the project.

6.15.1 Project Development Concept

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

6.15.2 EIA Approval

The most important environmental permit to initiate the proposed 13-storey building project in M. Dhimyaath would be a decision regarding this EIA from the EPA. The EIA Decision Statement 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.

6.15.3 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.

6.15.4 Dewatering Permit

A dewatering permit shall be obtained from EPA prior to undertaking any dewatering activity within the plot. Dewatering permit will be issued by EPA upon issuance of Environmental Decision Statement for this EIA.

7 Survey Methods

This EIA is based on both quantitative and qualitative data collected from proposed project site. Furthermore, the report addresses major information required as per the Terms of Reference (TOR) for this EIA study. The following are the key environmental and socioeconomic paramters and the method used to collect relevant data for the project.

7.1 Climatology

The climatology data were collected from secondary sources, mainly from published reports and information from Maldives Meteorological Service (MMS) which is used in the general description of the climate in Male' where the project site is located.

7.2 Physical and Biological Environment

In order to obtain the physical and biological environment required by the TOR for this EIA study the following methods were used;

Noise Level: recorded using a digital sound meter in the vicinity of the project site.

Traffic Flow and direction: Traffic flow was measured by visual observation of traffic within a predetermined area at the project location within a specified period of time using a stop-watch. The no. of heavy duty vehicles, cars, motor-cycles, bicycles, and pedestrians at the area in a 30-minute period were noted down by visual inspection.

Tree within the project site: visual assessment within the premises of the project area.

Water Quality: The quality of the ground water in the proposed development site was assessed by testing water samples. The samples were tested at the MWSC laboratory. The parameter that was tested are salinity and pH.

Air Quality: Air quality data were obtained from secondary data sources such as published literature.

7.3 Structural and Built Environment

Structural and built environment information was obtained from general observations and photographic analysis of nearby buildings, surrounding roads and existing structures and uses of the proposed sites as well as aerial images and google maps.

7.4 Socio-economic Environment

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

7.5 Uncertainties in the data collection methods

Since the structural and built environment is assessed using only visual assessment and using photographs the degree of structural complexity that exists within these buildings will be difficult to understand. Furthermore, some quantitative assessments such as traffic survey are time bound and can vary from time to time and day to day. Hence, there is some degree of uncertainty in the data collected for this EIA.

8 Existing Environment

8.1 Climatology

The Indian Ocean Monsoons governs the climatology of the Maldives hence monsoonal reversal plays a significant role in weather patterns. Two very distinct monsoons are observed: the Northeast (Iruvai) and the Southwest (Hulhangu) monsoon. Monsoons can be best characterized by direction of wind and the amount of rainfall. The southwest (SW) monsoon is the rainy season which lasts from May to September and the northeast (NE) monsoon is the dry season that occurs from December to February. The transition period of SW monsoon occurs from March and April while that of NE monsoon occurs from October to November. The results are summarized in **Error! Reference source not found.**.

Table 4: Summary of the seasons in the Maldives

Season	NE-Monsoon	Transition Period 1	SW-Monsoon	Transition Period 2
Month	Dec, Jan, Feb	Mar, Apr	May, Jun, Jul, Aug, Sep	Oct, Nov

Since there were no site-specific wind data, wind regime around the island was assumed to be that similar to the closest meteorological stations. The closest station is the meteorological station at the Velana international airport from 2002 to 2006. **Error! Reference source not found.** below represents mean daily wind speeds and direction. t was determined that the winds from WSW to WNW is the dominant wind direction in the Southwest Monsoon, where wind from ENE and E was dominant during the North-East Monsoon. Wind determines the direction of the sediment movement and have an influence on the alongshore current patterns.

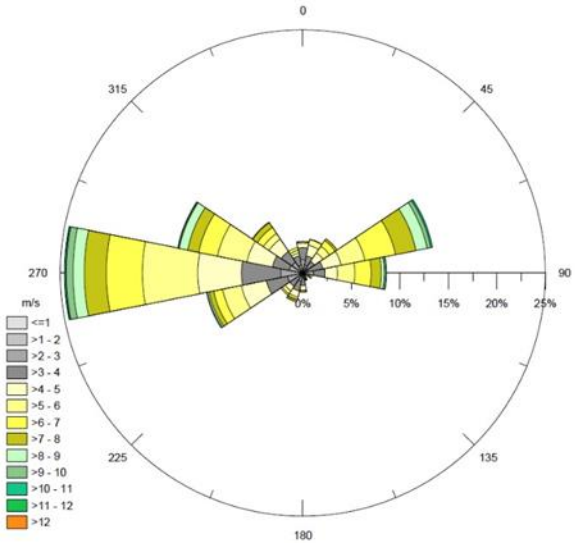

Figure 12: Wind speed and direction at Male' international airport (adapted from EIA Lamer 2008)

8.1.1 Temperature

The daily average temperature varies between 25 ^{0}C and 32 ^{0}C. The temperature rarely drops below 25 ^{0}C and rarely go above 32 ^{0}C. The warm period of the year is between March to May with an average daily temperature above 31^{0}C. The hottest day of the year during April, with an average high of 32^{0}C and low of 28^{0}C.

The cool periods last from either October or November to January with an average daily high temperature below 30 ^{0}C. The coldest day of the year is around mid-December, with an average low of 26 ^{0}C and high of 30 ^{0}C. The sea surface temperature in the Indian Ocean in July 2014 was recorded to be around 29 – 30 ^{0}C.

8.1.2 Rainfall

K. Male' is located in a medium rainfall zone of the country. Rainfall data from the three main meteorological stations, HDh Hanimaadhoo, K. Hulhule and S. Gan shows an increasing average rainfall from the northern regions to the southern regions of the country. The southern atolls receive, on average 2,277 mm of rainfall annually, while the relatively drier northern atolls receive 1,786 mm. The nearest meteorological station to V. Fulidhoo is at Velana International airport in Hulhule Island. Rainfall data for the period 1994 – 2012 from Hulhule has been used to determine rainfall pattern for V. Fulidhoo Island.

The mean annual rainfall for Hulhule is 1959.72 mm and the mean monthly rainfall is 138.67 mm. Mean rainfall varies throughout the year with mean highest rainfall during September, October and December and lowest between January and February (Figure 13)

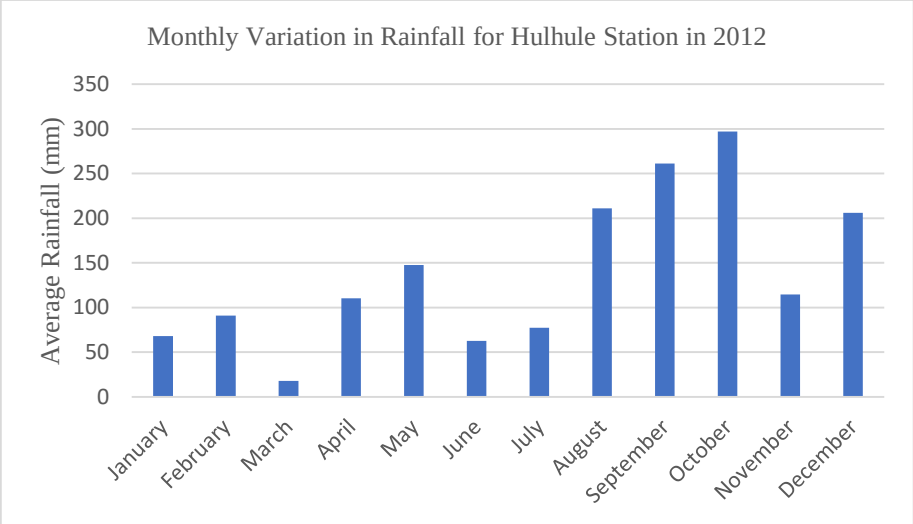

Figure 13: Monthly variation of average rainfall at Hulhule Island

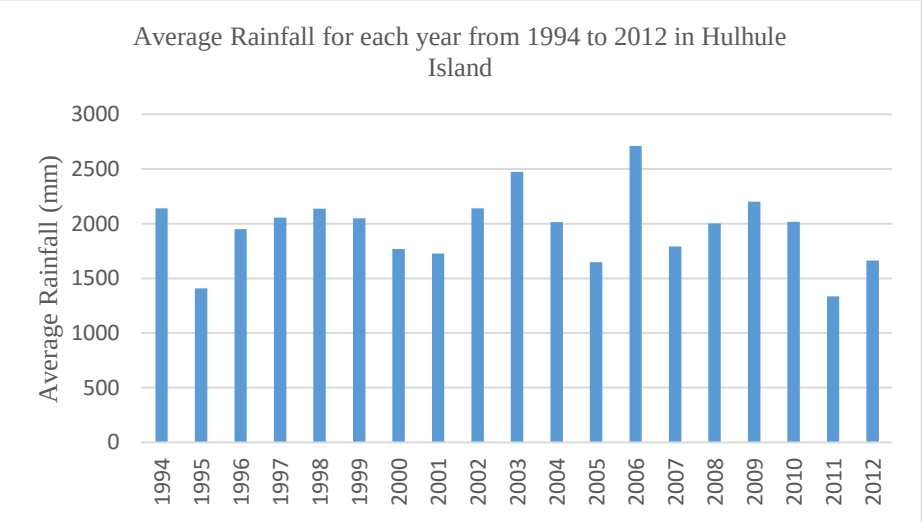

Figure 14: Annual variation of rainfall at Hulhule Island from the year 1994 to 2012

8.2 Risk of Hurricanes, Storm surges and Hazard Vulnerability

An islands inherent vulnerability to environmental and climatic conditions lies in its geographic and geomorphic characteristics. Factors such as location of the island with in the atoll, its shape, formation and orientation, the degree of protection offered to the island by surrounding reefs and other islands, presence of mangroves and wetlands at the coast, its natural and manmade coastal protection structures, are all contributors to the resiliency of the island to withstand natural hazards.

Natural hazards that may occur at the project location can be broadly classified into geological and meteorological hazards. Based on the different types of hazards identified in Detailed Island Risk Assessment for the Maldives (DIRAM) (UNDP 2008), the following hazards have been predicted to be particularly relevant to the project site in relation to the project components:

- Windstorm
- Flooding due to heavy rainfall/storms
- Gravity waves (Swell waves and udha); and
- Tsunami

UNDP's Detailed Risk Assessment (DIRAM – Thulusdhoo) carried out for Thulusdhoo Island which 26 km North east of K. Male' has been applied to predict natural hazards of K. Male' where the project site is located. According to the DIRAM that the major natural hazards in the Maldives are strictly controlled by the geophysical and climatic settings and show quite different patterns in their distribution as shown in Figure 15.

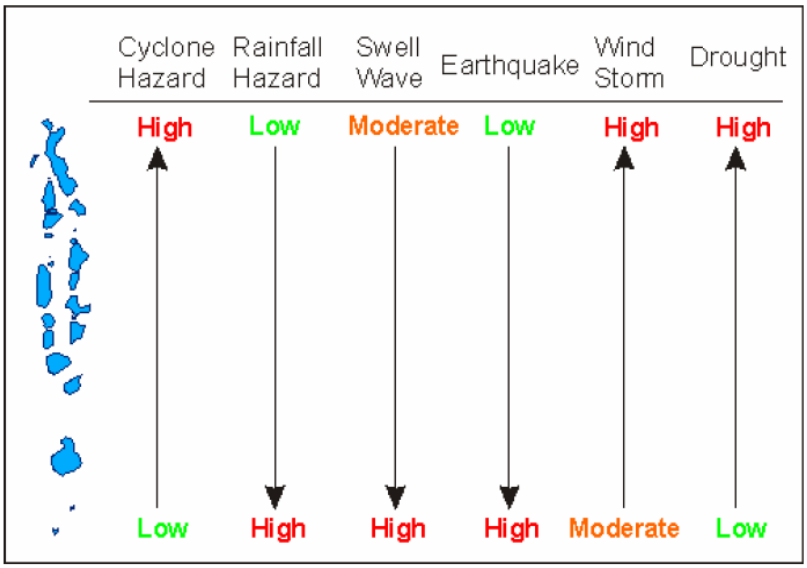

Figure 15: Major natural hazards distribution patterns in the Maldives including Latitudinal variation of major natural hazards (Adopted from UNDP 2008)

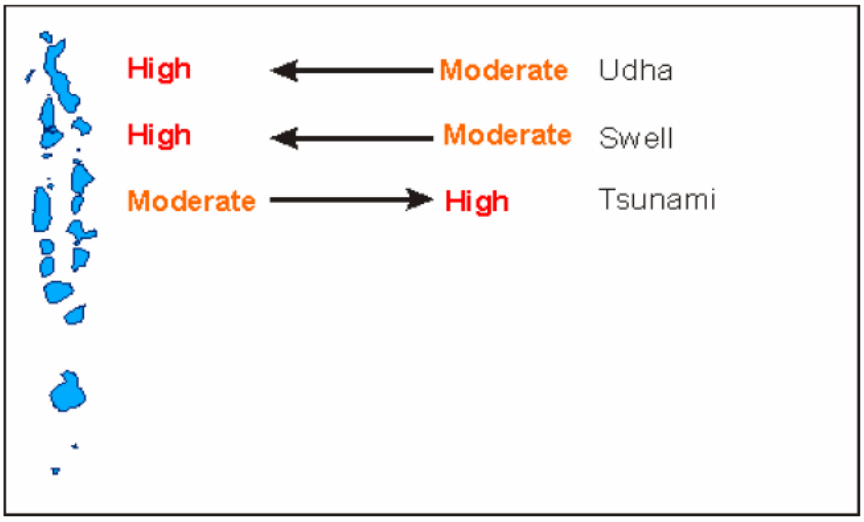

Figure 16: Longitudinal variation of major natural hazards across the Maldives (Adopted from UNDP 2008)

As can be seen in Figure 15, the tropical cyclones and correspondingly storm surges predominantly prevail in the north of the Maldives. In contrast, swell waves and heavy rainfalls are prominent in the southern and western islands of the Maldives. The southern islands of the Maldives are threatened by earthquakes from the seismic zone of Carlsberg Ridge. Considering the longitudinal variations in hazard distribution the eastern rim islands are subjected 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. Islands in the south are more exposed to southwest monsoon related surges and long-distance swells originating from the southern Indian Ocean. Islands in the north are more exposed to storm events and their impacts including storm surges and strong wind (UNDP 2008). Hazard severity and frequency of major natural hazards are shown in Figure 17.

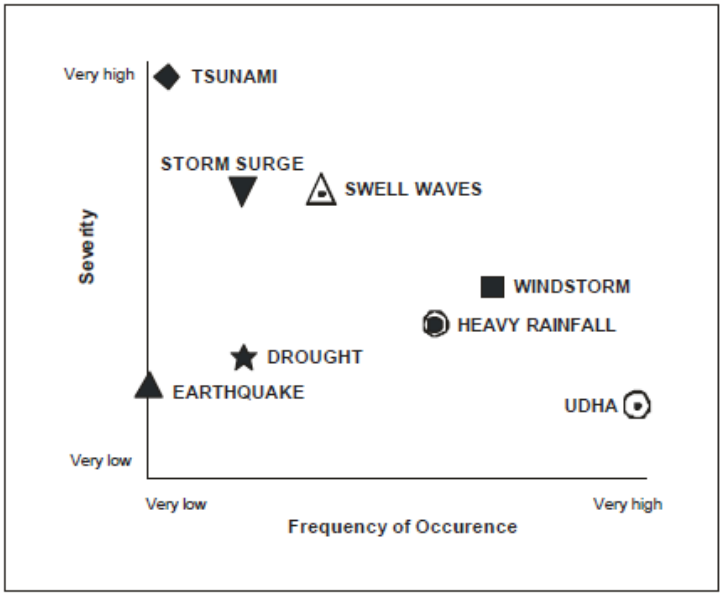

Figure 17: Relationship between hazard intensity and frequency of major natural hazards in the Maldives (Adopted from UNDP 2008)

Hazards, frequencies and damage potential for the Maldives is summarized in Table 5 (UNDP 2008)

Table 5: Hazards, frequencies and damage potential for various natural hazards in Maldives

Hazard	**Tsunami**	**Swell waves or Storm Surges**	**Rainfall flooding**	**Strong winds**
Frequency	Once in 200 years	Once in 10 years	Once in 1 year	Several times a year
Potential Damage	Very high	High	Moderate	Low

8.3 Physical and Biological Environment

8.3.1 Ambient Noise Levels

Average noise levels were recorded using a digital sound meter on four different locations in the vicinity of the proposed site, mainly around the Block. Noise level readings were taken in the late afternoon at 13:00 – 13:15 hrs on 23 September 2017. Only average noise levels recorded were taken as baseline.

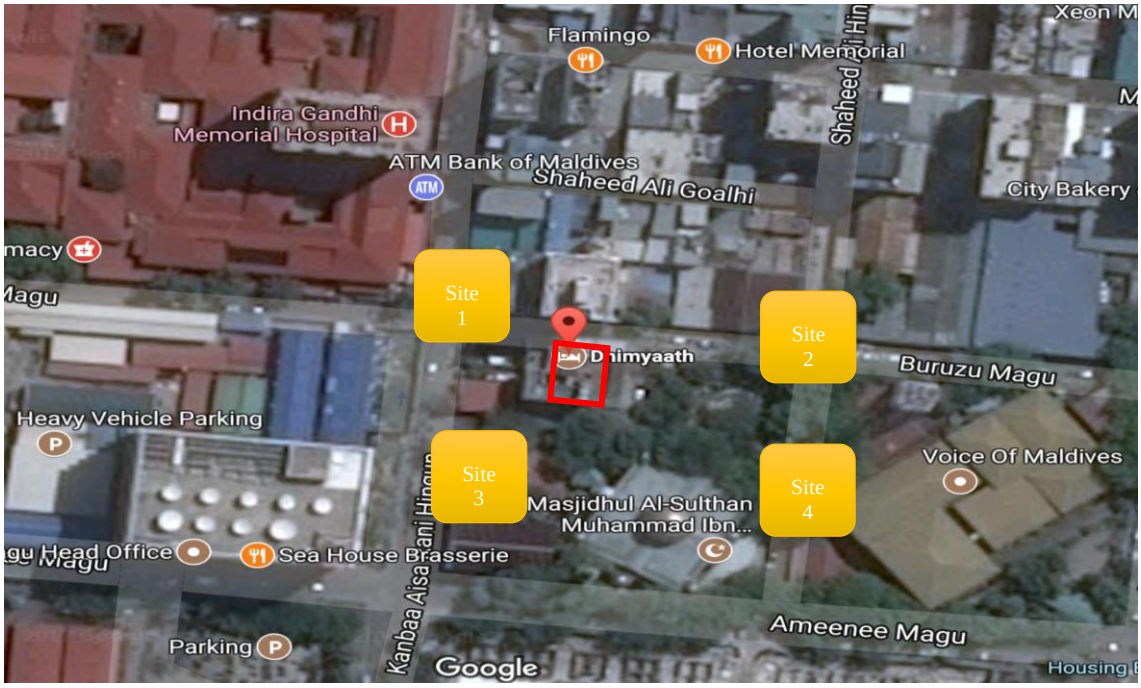

Figure 18: Sites where the noise levels where recorded around the project location

The table XX tabulates the noise level recorded at different sites and their GPS locations.

Table 6: Ambient noise levels at different sites close to the project location

Site	Noise Level	Location
Site 1	79.8	Corner of IGMH
Site 2	78.3	Intersection at Buruzumagu
Site 3	80.1	At the intersection
Site 4	82.1	Infront of mosque

Description of noise level at different sites

Noise sensitive locations found within the proximity of the project location includes Indra Ghandi Memorial Hospital (IGMH) which is 50 meters north westt of M. Dhimyaath plot. Furthermore, there is Masjidhul Al-Sulthan Muhammad Ibn Abdullah which is just 120 m south east of the project location.

8.3.2 Traffic Flow and Volume

A half hour traffic volume and flow was observed (13:00 to 13: 30 pm on 23rd September 2017) around the project site in order to understand the general traffic flow and pattern.

The following Figure 19 illustrates the general traffic flow around the project site.

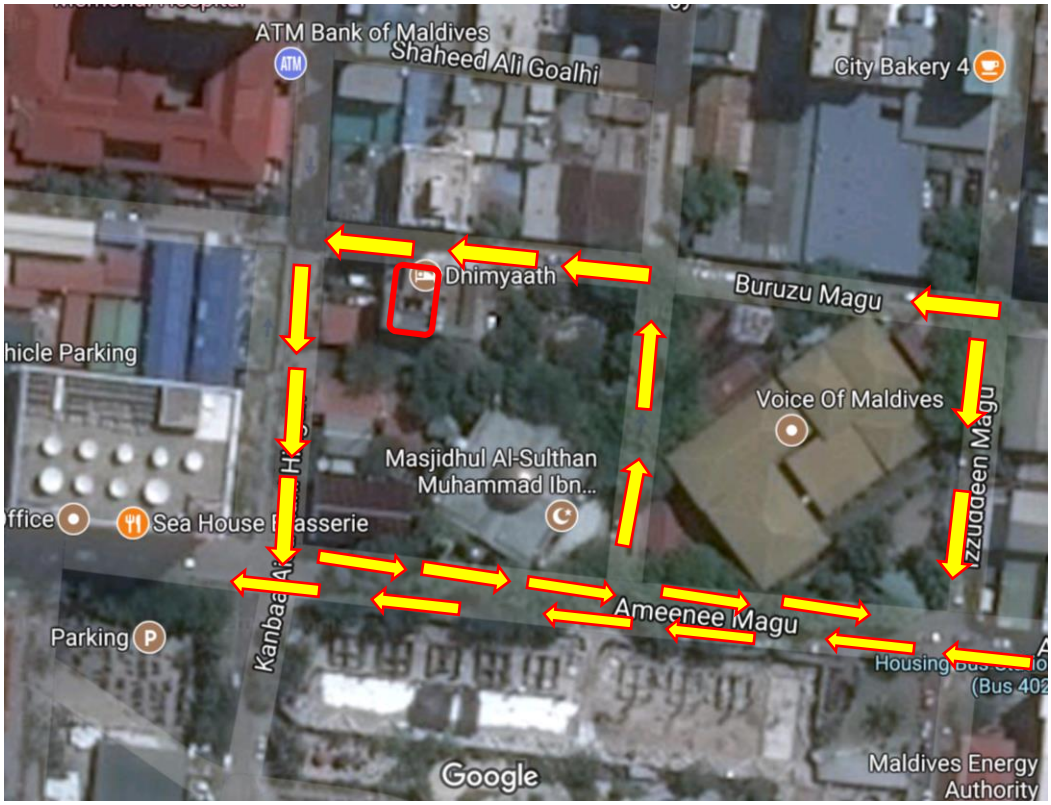

Figure 19: Traffic directions near project site

The site of the project is located in Buruzu Magu which is one of the busiest road in Male' since there are many shops and other commercials buildings located. Also Buruzu and Ameenee Magu are one of the few roads which runs from western end to the eastern end of Male'.Ameenee Magu which is the parallel road to the Buruzu Magu is also another busy road in Male' due to location of government and private offices, shops and commercial buildings and also residential buildings.

There is a heavy traffic flow in Amenee Magu as road is a two-way driving road. The traffic movement is highest during the peak hours which are believed to be 12 pm to 3pm. Buruzu Magu also experience similar pattern of traffic during the peak hours.

Due to the presence of the IGMH near the project site, there is a heavy traffic movement in Kanbaa Aisarani Hingun from north to south direction. The traffic flow in the Kanbaa Aisarani Hingun is less compared to the Buruzu Magu & Ameenee Magu.

Apart from Ameenee Magu, parking areas are located in Buruzu Magu & Kanbaa Aisarani Hingun. During the construction period the traffic movement on the Buruzu Magu & Kanbaa Aisarani Hingun will be affected the most.

The following Table 7 shows observation of the traffic in Buruzu Magu and Kanbaa Aisarani Hingun which will be affected most during the project construction phase. Also the traffic flow in Ameenee Magu which is the busiest road near the project site was also assessed using the visual observation.

Table 7: General traffic volume around the project site per hour

Type	Buruzu Magu	Kanbaa Aisarani Hingun	Ameenee Magu
Motorcycle	132	252	384
Car	48	96	168
Pickup and Lorry	24	48	72
Bicycle	12	36	24

The traffic volume observed in the vicinity of the project site is believed to be high as the time of the traffic survey coincides the peak hour of traffic in Male'.

8.3.3 Groundwater Quality

The groundwater samples were collected from the building and tested for parameters such as salinity and pH in-situ.

The Table 8 is the results of the parameter tested in the field. The result shows that the groundwater of the proposed project site is slightly saline. This may be due to over extraction of the groundwater in the past and is common for samples of groundwater collected from various areas in the Male'. The groundwater from the project site is normal with no distinct condition for the parameters test. Fecal coliform was not tested as this would be positive for groundwater in Male'.

Table 8: Results from the testing of groundwater quality

Parameter	Results of the test
pH	7.3
Total Dissolved Solids (mg/L)	1,891
Electrical Conductivity (µs/cm)	1,623
Turbidity	4
Phosphorous (mg/L)	800
Dissolved Oxygen (µg/L)	7.3

8.3.4 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 (SO2), 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.

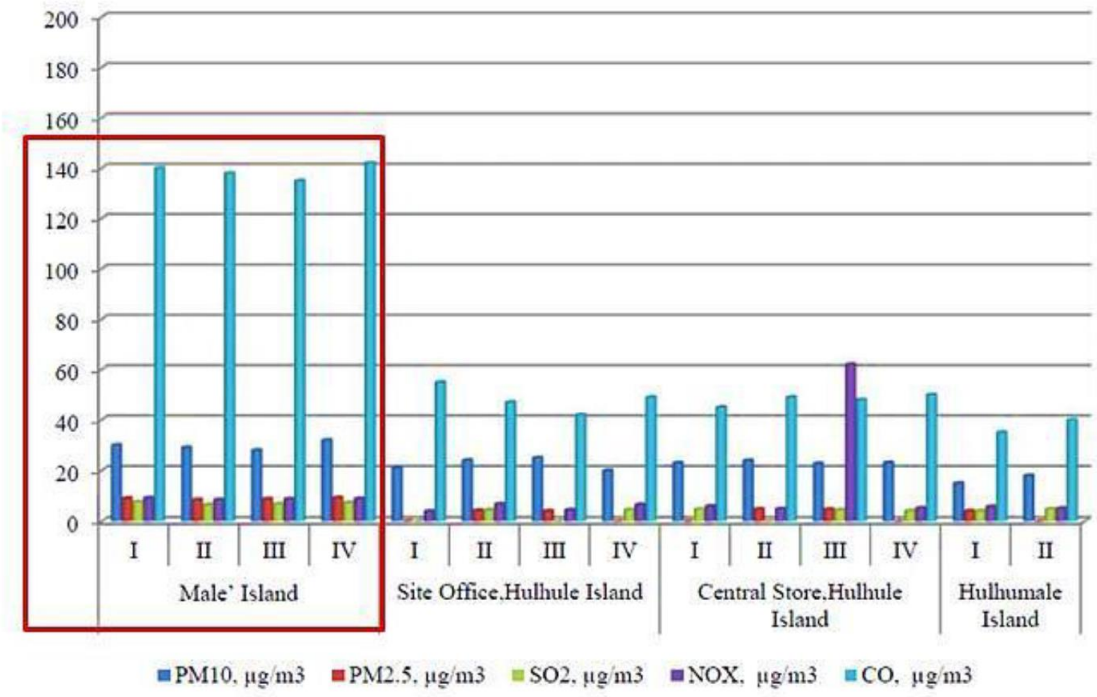

Figure 20: The ambient air quality for Male' (inside red box) taken from EIA for INIA Reclamation and Expansion

The levels of the particulate matters and NO_x and SO_2 are found to be generally low however the levels of CO is observed to be highest in Male' when compared with other areas within the Greater Male' Region. This high level of CO in Male' is belived to be due to presence of greater number of vehicles in the Male' confided to a small area.

It is extremely difficult to establish a baseline for air quality specific to the project site. This is because there are extensive number of on-going construction project in close vicinity to the project site.

8.3.5 Ecology and Vegetation Condition

There are no major vegetation or mature tree within the premises of the project site. However, there are some mature trees in vicinity of the project site including coconut palm. Even though these trees are within the block at which the project site is located no tree will be removed during the construction and operation of the project.

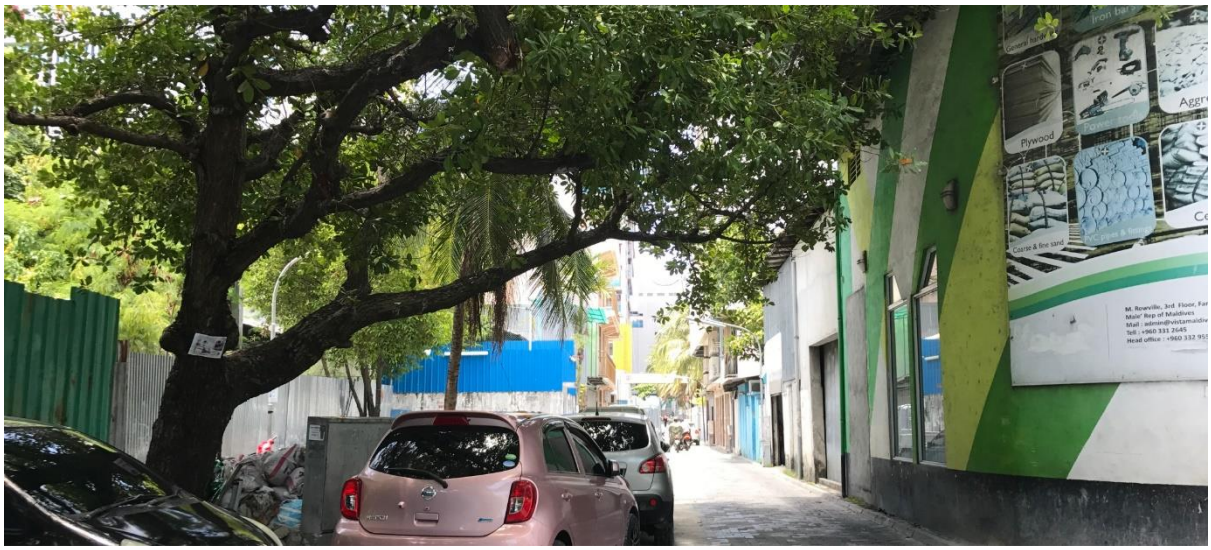

Figure 21: Photos of the vegetation near the project site

8.4 Structural Environment

8.4.1 Conditions and Uses of Nearby Buildings

The adjacent buildings include Dhon Manik Restaurant and Sewerage pump station operated and maintained by MWSC. Significant buildings close to the project site include Masjidhul Al-Sulthan Muhammad Ibn Abdullah, Fuel Supply Maldives petrol filling station, IGMH, 25-storey Dharumavantha building (IGMH new building) and multi-storied residential buildings. No major physical damages are seen in the buildings in the vicinity of the project site.

Figure 22: status of the neighboring buildings

8.4.2 Conditions of the Near-by roads

The condition of the roads surrounding the Block was observed to be in good condition. No cracks or physical damages were observed. However, due to excavation work for maintenance of the sewerage system by MWSC has resulted in pot holes in the Buzuru Magu and Kanbaa Aisarani Hingun close to the project site.

Figure 23: Conditions of the roads around the project site.

8.4.3 Existing Uses of the site

The project site is currently used for commercial purpose and a guest house is operated in the project site.

8.5 Socio-economic Environment

8.5.1 Population of Male'

According to the census conducted by National Bureau of Statistics on 2014, the population of the 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' (NBS 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.

8.5.2 Populations of the Adjacent Buildings

Since the adjacent buildings to M. Dhimyaath are used for commercial purpose there are no residents living in these buildings. However, these buildings are operational and workers will be accessing the buildings during both construction and operational phase of the project.

8.5.3 Education in Male'

There are 36 school operatonal in Male' which consist of 13 government schools and 4 community schools and 19 private schools (Ministry of Education 2013). The student population as of 2013 was 27,204 which is highest anywhere in the Maldives. The total number of teachers as of 2013 was 1,878 which give rise to a student teacher ratio of 14.48 students per teacher in Male' (Ministry of Education 2013).

8.5.4 Health

There are four major hospitals in Male' namely Indhira Gandhi Memorial Hospital (IGMH), Sena Hiya Hospital ADK Hospital and Medica Hospital. IGMH and Sena Hiya Hospital are government owned hospitals. IGMH is the biggest hospital in the Maldives. ADK and Medica Hospital are private hospitals. These hospitals provide medical health services for the residents of Male' and those who travel to Male' for medical services. In addition to the aforementioned hospitals there are specialist clinics which provide specialist health care service to the residents of Male'. Also, Dhamana Veshi (Male' Health Centre) provides health monitoring, vaccination and family planning services.

8.5.5 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'.

8.5.6 Transport

There are no existing public transport system for land transport in Male'. However, there are existing ferry system which connects between Velana International Airport and Male'. Regular ferries operate between other residential islands close to Male' including Hulhumale' and Villingili which are considered as districts of Male' city.

The most common mode of land transport are motorcycles and cars. 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 (NBS 2014). This large number of vehicle in a small island such as Male' has given rise to many congestion issues and road safety issues in the Male'.

8.5.7 Waste Management

Over 211,579 tonnes of solid waste including industrial and domestic waste from Male' were transported to Thilafushi Island in 2013 (NBS 2014). Waste Management Corporation (WAMCO) has is the state-owned enterprise responsible for waste management in Male'. They became operational from 2017 and provide waste collection services for residential as well as commercial premises in Male'.

1.1.1. Economic Activities

Male' is the main economic and commercial centre of the Maldives, hence a number of economic activities are undertaken in Male' which contributes to the local economy. The construction industry in Male' is belived to be the largest economic activity. Real estate development and management also plays a key role in the economy. Public sector and private sector employment is a essential economic activity for the residents of Male' as most of the government agencies and institutions are based in Male'. In addition, local tourism activities such as operation of travel agencies, guesthouses, souvenir shops are undertaken in Male'. Furthermore, operation of supermarkets, departmental stores, garment shops, pharmacies and restaurants and cafes are common economic activity in the Male'.

8.5.8 Economic Activities in the Surrounding Area to the project site

Being located in one of the most significant road in Male' there are many economic activities undertaken in the vicinity of the project site. Two adjacent buildings are dedicated to economic activities. The plot on the east of M. Dhimyaath is used as restaurant which is one of the most famous restaurant in Male' namely Dhon Manik Restaurant. The plot on the west of M. Dhimyaath is owned by MWSC and a crucial pumping station is located in the premises. Furthermore, there are Sonee Hardware shop and pharmacies in the vicinity of the project site. Pharmacies are the most common type of shops as the area is very close to IGMH Hospital.

9 Environmental Impacts

9.1 Introduction

This section of the report provides a detail description of the methodology used to identify, predict and assess the environmental impacts due to construction phase and the operation phase of the proposed 13-storey building in M. Dhimyaath. First, the potential impact will be identified and then the identified impact will be evaluated to determine its level of significance. This section consists of the method used for impact assessment, the limitation and uncertainties, the justification for the method used for impact prediction and description of impacts during both construction and operation phase of the project.

9.2 Method Used for Impact Prediction

The impacts on the natural and social environment that may be caused due the project interventions are predicted and is distinguished from construction and operation phases of the project. A simple descriptive matrix has been utilized to predict the aforementioned impacts. The impact prediction was done using expert judgment and professional opinions of the EIA consultant and also the based on the information provided in the reviewed EIAs mentioned earlier in this report. Once the impacts have been predicted, a detailed description has been given for the purpose of understanding the nature and type of the impact.

An impact is any change to a resource or receptor brought about by the presence of a project component or by the execution of a project related activity. The evaluation of baseline data provides crucial information for the process of evaluating and describing how the project could affect the biophysical and socio-economic environment.

Impacts are described as a number of types as summarized in Table 10. Impacts are also described as associated, those that will occur, and potential, those that may occur;

Table 9: Types of Impacts (adapted from ERM 2008).

Nature or Type	Definition
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect	Impacts that result from other activities that are encouraged to happen as a consequence of the project (e.g. in-migration for employment placing a demand on resources).
Cumulative	Impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the project.

9.3 Analysis for Significance of the predicted impacts

The analysis of environmental impacts is done in terms of their level of significance. According to Environmental Resource Management 2008, Significance is a function of the magnitude of the impact and the likelihood of the impact occurring. Impact magnitude (sometimes termed severity) is a function of the extent, duration and intensity of the impact. The criteria used to determine significance are summarized in Table 10. Once an assessment is made of the magnitude and likelihood, the impact significance is rated through a matrix process as shown in Table 11. For ease of review, the significance rating is colour-coded in the text according to Table 12. Outlined in Table 13 are the various definitions for the significance of an impact.

Significance of an impact is qualified through a statement of the degree of confidence. Confidence in the prediction is a function of uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence is expressed as low, medium or high.

Table 10: Criteria used to assign level of significance

Magnitude – the degree of change brought about in the environment	
Extent	**On-site:** impacts that are limited to the Site Area only. **Local:** impacts that affect an area in a radius of 20 km around the development area.

	Regional: impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystems. **National:** impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences. **Transboundary/International –** impacts that affect internationally important resources such as areas protected by international conventions.
Duration	**Temporary:** impacts are predicted to be of short duration and intermittent/occasional. **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 ceases when the project stops operating. **Permanent:** impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the project lifetime.
Intensity	***BIOPHYSICAL ENVIRONMENT***: Intensity can be considered in terms of the sensitivity of the biodiversity receptor (E.g.: habitats, species or communities). **Negligible:** the impact on the environment is not detectable. **Low:** the impact affects the environment in such a way that natural functions and processes are not affected. **Medium**: where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High:** where natural functions or processes are altered to the extent that it will temporarily or permanently cease.
	SOCIO-ECONOMIC ENVIRONMENT: Intensity can be considered in terms of the ability of project affected people/communities to adapt to changes brought about by the project. **Negligible:** There is no perceptible change to people's way of life. **Low:** People/communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium:** Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High:** Those affected will not be able to adapt to changes and continue to maintain pre-impact livelihoods.
Likelihood - the likelihood that an impact will occur	
Unlikely	The impact is unlikely to occur.
Likely	The impact is likely to occur under most conditions.
Definite	The impact will occur.

Table 11: Significance Rating Matrix

Significance				
		Likelihood		
		Unlikely	Likely	Definite
Magnitude	Negligible	Negligible	Negligible	Minor
	Low	Negligible	Minor	Minor
	Medium	Minor	Moderate	Moderate
	High	Moderate	Major	Major

Table 12: Significance Color Scale

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

Table 13: The definition of difference level of significance

Significance definitions	
Negligible significance	An impact of negligible significance is where a resource or receptor will not be affected in any way by a particular activity, or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background levels.
Minor significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that "moderate" impacts have to be reduced to "minor" impacts, but that medium impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the EIA process is to get to a position where the project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors, such as employment, in coming to a decision on the project.

9.4 Limitations and the uncertainties of the impact assessment methodology

The following aspects are considered as limitation and the uncertainties which may be involved in the impact assessment process;

- All the potential environmental aspects have been predicted and assumed for the proposed project development hence they may differ in the natural context such as site conditions and uncertainties in scales and magnitude.
- The baseline data for the existing environmental conditions were taken in a very short period of time hence may affect the accuracy in prediction of the environmental impacts.
- The aforementioned baseline data for the existing environmental condition were collected for one monsoonal season (*Iruvai* season) and inferred based on that seasonal data hence the predicted environmental impacts may vary on the other (*Hulhangu*) season.
- Expert judgment and professional opinion of the EIA consultant were enhanced using the existing EIA reports of similar nature, however due to the unique nature of coastal processes, lagoons and reef system in the Maldives each island is unique. Hence the predicted environmental impacts may vary from island to island.

9.5 Justification for the Methodology used

There are many various methodologies used for impact assessment in environmental context. One of the most commonly used methodologies include check lists and matrices such as Leopold Matrix (Lohani et al., 1997) The Leopold matrix was conceived by geologist Luna B. Leopold and his colleagues in 1971, as a response to the US Environmental Policy Act of 1969, which didn't give clear instructions to the Federal Government agencies for preparing an impact report or for examining the environmental effects of the projects that an agency plans. The Leopold matrix addressed this challenge by 'providing a system for the analysis and numerical weighting of probable impacts' (Josimovic et al., 2014).

According to the Leopold matrix method, EIA should consist of three basic elements:

1. a listing of the effects on the environment that the proposed development may induce, including the estimate of the magnitude of each of the effects;
2. an evaluation of the importance of each of listed effects (e.g., regional vs. local); and
3. a summary evaluation, which is a combination of magnitude and importance estimates.

The impact assessment method used in this report is a matrix which is derived from the Leopold Matrix however this method uses a colour code to assign the significance level of each predicted impact. This method has been adapted from the Environmental Resource Management (2008).

Leopold Matrix is an effective impact assessment methodology which has been extensively used by EIA practitioners across the world. The colour coding enhance Leopold Matrix further. Since EIA is a technical report which are read by both technical experts of different field as well as the general public, the colour coding of the significance level will enhance the report in a manner which would be easily comprehended by general public and people with no technical expertise in this field.

9.6 Impact Prediction

The environmental impacts of the proposed 13-storey building in M. Dhimyaath project are predicted in this section of the report 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 are impacts during construction period or during post-construction and operations period.

The following Table 14 predicts the nature and types of environmental impacts based on the existing environmental condition of the islands and the surrounding environment;

Table 14: Impact Analysis Matrix for proposed 13-storey building in M. Dhimyaath

Project Activity	Bio-physical Environment		Socio-economic Environment	
	Soil & Groundwater	Air & Noise	Services & Infrastructure	Health & Safety
Construction Phase				
Demolition	No significant impact	• Unsettling of dust and other particulate matter will decline the air quality in the vicinity of the project site. • Noise pollution and disturbance for nearby residents of the project site.	• Potential threat to nearby buildings and roads. • Damage may occur to electricity or telephone cables which are close to the project site.	• Potential fall of debris and other accidents may occur • Dust and particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site.
Excavation	Potential impacts on the soil environment	Unsettling of dust and other particulate matter will decline the air quality in the vicinity of the project site.	• Damage may occur to electricity or telephone cables or water and sanitation pipes which are close to the project site. • Potential threat to nearby buildings and roads. • Road blockage	• Without proper signage, there may be potential accidents of falling into the trenches excavated. • Dust and particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site.
Construction Activities	Groundwater may be affected due to disposal of wastewater at the construction site.	• Short-term exposure to dust due to usage of cement on the construction site. • Noise pollution and disturbance for nearby residents of the project site.	• Exposure to noise levels for residents close to the project site. • Road blockage and traffic re-routing.	• Potential fall of objects and other accidents may occur • Dust and particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site. • Exposure dust from cement and offensive smell from paints and other chemicals.
Dewatering	Short-term loss of groundwater from the project boundary and vicinity of the project site.	No significant impact	• Short term decline in groundwater quality for the close by plots • Road blockage due to installation of dewatering pipes.	• Potential breeding site for mosquitos.

Operation of construction machineries & vehicles	Potential contamination of groundwater from oil-spill from machineries	Noise disturbances due to operation of heavy machineries	• Damage to roads due to transport of heavy machineries • Road blockage during transport of heavy machineries	• Potential accidents during the operation of the heavy machineries and vehicles.
Construction waste	• Potential to pollute the groundwater • Land degradation	No significant impacts	Additional burden to existing commercial waste management system in Male'	Potential public health impacts and nuisance.
Operational Phase				
Solid Waste Management and Disposal	Aesthetic impacts and potential groundwater pollution	No significant impacts	Additional burden to existing residential waste management system in Male'	Potential public health impacts and nuisance.
Increased Traffic	No significant impact	Exposure to air pollutants such as carbon monoxide	Additional burden on roads and contribute to congestion of Male'	CO & particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site.

The above table illustrates project activities both during the construction and operational phase. The impacts of these project activities are predicted both for the biophysical and the socioeconomic environment of proposed project area in M. Dhimyaath is also shown the Table 16. The following Table 17 is a summary of project activities which has the greatest impact on both natural and social environment respectively.

Table 15: Summary of project activities with the most significant impact on both natural and social environment of Proposed project site at M. Dhimyaath

Phase of the project	Natural Environment	Social Environment
Construction Phase	Demolition (Negative Impacts) Excavation (Negative Impacts) Construction Activities (Negative Impacts) Dewatering (Negative Impacts) Operation of construction machineries & vehicles (Negative Impacts) Construction Waste (Negative Impacts)	Demolition (Negative Impacts) Excavation (Negative Impacts) Construction Activities (Negative Impacts) Dewatering (Negative Impacts) Operation of construction machineries & vehicles (Negative Impacts) Management of construction waste (Negative Impacts)
Operational Phase	Solid waste management and disposal (Negative Impacts) Increase Traffic (Negative Impacts)	Solid waste management and disposal (Negative Impacts) Increase Traffic (Negative Impacts)

9.7 Description of Impacts

9.7.1 Construction Phase Impacts

9.7.1.1 Demolition

There is an existing 3 storey-building in the plot of M. Dhimyaath which will be demolished for site clearance prior to commencement of the construction of the proposed 13-storey building. Hence, the impacts on the bio-physical environment and the socio-economic environment is considered to be highly significant. The demolition will be carried out by the contractor using heavy duty machineries used for demolition of concrete buildings in Male'.

The main impacts on the bio-physical environment include the following;

- Unsettling of dust and other particulate matter will decline the air quality in the vicinity of the project site for a short period of time;
- Noise pollution and disturbance for nearby residents of the project site.

A critical task such as demolition of a 3-storey building will cause some significant impacts on the socio-economic environment of the residents living in close vicinity to the project site. These impacts were identified as the following;

- Potential threat to nearby buildings and roads in terms of cracking and physical damages;
- Damage may occur to electricity or telephone cables which are close to the project site;
- Potential fall of debris and other accidents may occur;
- Dust and particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site.

9.7.1.2 Excavation

It is estimated that approximately 430 m^3 of sand form the plot will be excavated for laying the raft foundation and development of basement of the 13-storey building. Sand from the proposed building boundaries will be excavated by using an excavator. Although there are no major environmental impacts from sand excavation due to absence of any significant habitats and the highly urbanized nature of the Male', very low-level impacts on the soil environment is believed to take place. This includes displacement of some soil organisms.

There will be no impacts on terrestrial flora or fauna due to absence of any terrestrial flora or fauna within the plot of M. Dhimyaath. Also structural impacts to the nearby buildings and roads are highly unlikely, however the following impacts have been identified as potential impacts on the bio-physical environment due to the proposed development;

- Potential impacts on the soil environment;
- Unsettling of dust and other particulate matter will decline the air quality in the vicinity of the project site.

Furthermore, the following are some socio-economic impacts which may rise due to excavations during the construction phase of the proposed 13-storey building at M. Dhimyaath.

- Damage may occur to electricity or telephone cables or water and sanitation pipes which are close to the project site.
- Potential threat to nearby buildings and roads.
- Road blockage
- Without proper signage, there may be potential accidents of falling into the trenches excavated.
- Dust and particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site.

9.7.1.3 Construction Activities

Due the relatively large size of the building that will be constructed in the M. Dhimyaath plot, a number of construction activities will occur including cladding, concrete mixing, safety framework development, site preparation, transport of construction material, welding and woodworks etc. There construction activities are believed to generate impacts on both bio-physical and socio-economic environment.

The following are impacts on the bio-physical environment which are predicted;

- Groundwater may be affected due to disposal of wastewater at the construction site;
- Short-term exposure to dust due to usage of cement on the construction site.
- Noise pollution and disturbance for nearby residents of the project site.

The mains socio-economic impacts which may arise due to the construction activities during the construction phase include the following;

- Exposure to noise levels for residents close to the project site;
- Road blockage and traffic re-routing;
- Potential fall of objects and other accidents may occur;
- Dust and particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site;
- Exposure dust from cement and offensive smell from paints and other chemicals.

9.7.1.4 Dewatering

It is estimated that around 432 m^3 of groundwater will be required to be dewatered from the proposed project area. The environmental impacts associated with dewatering is expected to be short-term in nature. These include the following impacts on the bio-physical environment;

- Short-term loss of groundwater from the project boundary and vicinity of the project site.
- Decline in groundwater quality including increase in turbidity and dissolved solids.

The following impacts on the socio-economic environment are anticipated as a result of dewatering during the construction phase of the project;

- Short term decline in groundwater quality for the close by plots;
- Road blockage due to installation of dewatering pipes;
- Potential breeding site for mosquitos.

9.7.1.5 Operation of Construction machineries and vehicles

As part of the proposed project, construction machinery such as concrete batching plant, trucks and other vehicles such as excavators will be used in the operations. The following impacts are expected to affect the bio-physical environment dur to operation of construction machineries and vehicles;

- Potential contamination of groundwater from oil-spill from machineries;
- Noise disturbances due to operation of heavy machineries

The following are the socio-economic impacts anticipated due to operation of construction machineries and vehicles;

- Damage to roads due to transport of heavy machineries;

- Road blockage during transport of heavy machineries;
- Potential accidents during the operation of the heavy machineries and vehicles.

9.7.1.6 Construction Waste

Any project that involves construction generates large amount of solid waste. Construction was 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. The following are some of the impacts on the bio-physical environment due to the construction waste;

- Potential to pollute the groundwater
- Land degradation

The construction waste will have some adverse impacts on the socio-economic environment during the construction phase of the proposed project. They include the following;

- Additional burden to existing commercial waste management system in Male'
- Potential public health impacts and nuisance.

9.7.2 Operational phase Impacts

9.7.2.1 Solid waste management and disposal

Any residential building or commercial building will generate large quantity of solid waste during the operational phase. These may differ based on the type of economic activities which are carried out in the building. The largest environmental impact will be from generation of household waste from the building as it will be primarily used for residential purpose. 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. Solid waste need to be properly managed and disposed daily in order to prevent public health issues and foul odour. The following are some of the adverse impacts of solid waste accumulation as more number of resdients will be residing in the proposed 13-storey building in M. Dhimyaath.

The most significant impacts on the bio-physical environment include the following;

- Aesthetic impacts and potential groundwater pollution

The most important socio-economic impacts include the following;

- Additional burden to existing residential waste management system in Male'
- Potential public health impacts and nuisance.

9.7.2.2 Increased Traffic

As a greater number of families will be residing in a 13-storey building such as the proposed building in M. Dhimyaath there may be some issues arising as the traffic in the project area will increase as more number of people reside in the building. It is expected to provide housing for at least 27 families once the building is completed. Some traffic is believed to be diverted to the area mostly for use of the residents, hence the traffic is deemed to be slightly increased as result of the proposed development. This may give rise to some impacts on both bio-physical and socio-economic environment.

These impacts include:

- Exposure to air pollutants such as carbon monoxide
- Additional burden on roads and contribute to congestion of Male'
- CO & particulate matter may trigger upper respiratory tract infection and affect asthma patients living in close vicinity to the project site.

9.7.3 Cumulative Impacts

At present, there is an ongoing construction project in the Block and an empty plot planned for a similar development and as a result of these developments, similar environmental impacts such as increased dust and emissions, increased traffic, generation of construction waste around the area is believed to happen simultaneously. Hence, in general the magnitude of these environmental impacts such as dust, noise and traffic increase may be higher on a collective basis.

9.7.4 Positive Impacts

A building with 13-stories will bring enormous social and economic benefits. At the full occupancy it is expected to accommodate 100-150 people. Hence, this will contribute towards alleviation of the housing needs in Male'.

In addition, the proposed building will have commercial areas, which can be economic opportunities as well as indirect opportunities for employment once the businesses are operational.

Male' has heavy traffic and limited parking space. This proposed building with car and motorcycle parking area in the basement will contribute towards elimination of traffic and parking stress in the project area.

In general, the proposed project for 13-storey building in M. Dhimyaath will bring numerous social and economic benefits.

9.8 Impact Analysis and Evaluation

This section is aimed to analyze and evaluate the environmental impacts due to the proposed 13-storey building in M. Dhimyaath. The previously described impacts will be analyzed for their level of significance.

Table 16: Impact Analysis Matrix for proposed 13-storey building in M. Dhimyaath

Project Activity/ Impact	Extent	Duration	Intensity	Likelihood	Significance	Color Scale
Construction Phase						
Demolition	Local	Short-term	Medium	Likely	Moderate	
Excavation	Onsite	Short-term	Medium	Likely	Moderate	
Construction activities	Onsite	Short-term	Low	Unlikely	Minor	
Dewatering	Local	Short-term	Medium	Likely	Moderate	
Operation of construction machineries and vehicles	Local	Short-term	Low	Likely	Minor	
Construction Waste	Local	Short-term	Low	Unlikely	Negligible	
Operational Phase						
Solid waste management and disposal	Local	Long-term	Low	Unlikely	Negligible	
Increased Traffic	Local	Long-term	Medium	Likely	Moderate	
Both Phases						
Cumulative impacts	Local	Long-term	Medium	Likely	Moderate	
Positive Impacts	Local	Long-term	Medium	Definite	Moderate	

The Table 16 is an impact analysis. Table 16 it can be inferred that magnitude of the most of the negative impacts on the natural and social environment is moderate, minor or negligible.

The most significant impact during the construction phase of the proposed 13-storey building in M. Dhimyaath is due to demolition, excavation and dewatering.

For the operational phase of the proposed 13-storey building in M. Dhimyaath, the most significant negative impacts will be caused by increase in traffic however, the significance level of this impact is expected to be medium in nature. The cumulative impact previously described is considered to be moderate in nature and the positive impacts of the project is very much significant due to the housing needs in the Male'.

10 Mitigation Measures

10.1 Introduction

The main objective of the following section is to provide environmental management and mitigation measures that will be undertaken and monitored in order to minimize and offset previously described environmental impacts of the proposed Jetty construction project in V. Fulidhoo.

10.2 Justification for the proposed mitigation measures

The following factors were considered in order to evaluate the appropriateness of the proposed mitigation measures;

- Costs;
- Benefits;
- required manpower;
- equipment;
- expertise;
- timing and
- technology

The proposed mitigation measures will be the most cost-effective, have the maximum benefits and requires minimum utilization of manpower and equipment. Furthermore, the practicality of the proposed mitigation measures will be given a high priority. The technical aspects of the different project components were considered when evaluating the proposed mitigation measures.

10.3 Limitations of the proposed mitigation measures

The main limitation of the proposed mitigation measures is that these mitigation measures are proposed for an impact which is predicted. Since the impact has been predicted, there is an uncertainty regarding how the impact will affect the natural environment when the actual project is implemented. The nature of impacts even from similar project activities undertaken in a different location in the country could generate in a totally different manner

10.4 Mitigation measures for construction phase impacts

10.4.1 Mitigation Measures for Excavation Impacts

Excavation of the area is required to lay foundation of the building and develop the basement; hence it is an important aspect of the proposed 13-storey building in M. Dhimyaath project. Excavation has the potential to impact the groundwater and structural environment in the project vicinity. The following measures will be taken to reduce the impact of excavation.

- Only the required area will be excavated and the work will be completed as soon as possible.
- 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 for foundation protection.
- The excavated material will be immediately transported out of the project boundary to an approved area.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	**Shoring of entire boundary with corrugated sheet supported by iron beams**
Cost	Approximately 20,000 USD
Benefits	Protection of adjacent buildings
Expertise	Structural Engineering
Required Manpower	2 - 5
Responsibility	Contractor
Equipment and Technology	Corrugated sheets and iron beams
Timing	Prior to construction works

10.4.2 Mitigation Measures for Demolition Impacts

There is an existing 3-storey building in the M. Dhimyaath plot which will be demolished before the construction of the 13-storey building take place. The demolition activities are expected to have significant impact on the air quality and the structural environment near the project site.

The following are the mitigation measures which will be taken in order to minimize the impacts of demolition;

- Demolition will be done by experienced contractors who will take all the precautionary measures to avoid damage to adjacent buildings due to vibrations.
- Site is to be demarcated and boundary walls of approximately 6ft high are to be put in place straight after demolition
- Ensure no material gets deposited outside project boundary
- Safety nets will be deployed in order to avoid falling of debris on the pedestrians and users of adjacent road.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	**Installation of Safety nets used to prevent falling of debris**
Cost	Approximately 5000 USD
Benefits	Protection of pedestrians and workers
Expertise	Structural Engineering
Required Manpower	2 - 5
Responsibility	Contractor
Equipment and Technology	Safety nets and iron beams
Timing	Prior to demolition works

10.4.3 Mitigation Measures for Dewatering Impacts

Dewatering impacts can be short-term in most of the cases, however it occurs very rapidly. The following mitigation measures will be taken in order to reduce the impacts from dewatering;

- The dewatering activities will be commenced only after obtaining the required dewatering permit from the EPA and will be conducted according to the prescribed schedule;
- A signage indicating that dewatering is in progress will be placed in order to inform the general public about dewatering activities.
- The dewatering operations will be undertaken quickly in order to reduce the prolonged environmental impacts on the areas close to the project site.
- 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.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	**Monitoring and management of the dewatering pipelines**
Cost	Approximately 7000 USD
Benefits	Avoid potential flooding of the roads
Expertise	Environmental protection & plumbing
Required Manpower	2 - 5
Responsibility	Contractor
Equipment and Technology	Pipelines, machineries, management
Timing	Prior to construction

10.4.4 Mitigation Measures for Construction Activities Impacts

The main impacts from the construction activities have been outlined in the previous section of this report (see Table 15). The following are mitigation measures which will be taken in order to reduce the impacts of construction activities.

- Construction work sign boards and fencing will be placed prior to construction phase;
- Placement of safety and dust protection nets all around the building plot;
- Enforcement of the mandatory use of safety equipment and gear at all times during the construction phase;
- Excessive noise at night time will be avoided as all the construction activities are time bound.

- All the construction activities will be conducted within the project boundary hence nuisance related to construction activities will be reduced to the residents living close by.
- All road blocking will be released at shortest possible time upon completion of the work;
- All construction activities will be halted for prayer times in order to avoid noise disturbance to the close by mosque;
- First Aid kits will be maintained at the site at all times.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	Use of safety equipment and gear
Cost	Approximately 16,000 USD
Benefits	Avoid accident and increase safety of the workers
Expertise	Procurement and Project management
Required Manpower	2 - 5
Responsibility	Contractor
Equipment and Technology	Safety equipment
Timing	During construction phase

10.4.5 Mitigation Measures for impacts from construction machineries & vehicles

Machineries and vehicles used for construction purpose such as batching plant, excavators and truck will be widely used during the construction phase of the proposed project. These machineries and vehicles are expected to have the impacts as described in the impact description section (see Table 16). The following mitigation measures will be taken in order to reduce the aforementioned impacts;

- EPA guidelines will be followed during the operation of the concrete batch plant;
- The transport of materials using the vehicles will be done during the off-peak traffic hours;
- The materials will be transport in bulk in order to reduce the need of frequent transportation of the materials and reducing the impacts of noise and dust/
- The vehicles will be operated only within the project plot and areas designated by the Ministry of Housing and Infrastructure in order to avoid frequent road blockage.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	Employment of an experienced site supervisor
Cost	Site supervisor salary
Benefits	Reduce dust and emission
Expertise	Project management
Required Manpower	1
Responsibility	Contractor
Equipment and Technology	Site supervisor
Timing	During construction phase

10.4.6 Mitigation Measures for impacts from Construction Waste

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, the following measures will be undertaken;

- All the construction waste will be piled and segregated in an allocated location within the project site;
- Re-use construction waste where ever possible in order to reduce waste required for disposal;
- Regularly transport unusable construction waste to the waste collection site in Male' with assistance from WAMCO.
- Avoid transport of construction waste during rainy weather conditions;
- Arrange transportation of construction waste such that peak traffic hours will be avoided.
- Outsourcing will be done to WAMCO or any other licensed party for waste handling and comply with the waste management regulation all the times;
- Waste disposal on-site and within the boundary of the project area will be avoided at all times.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	Transport waste regularly to the designated construction waste collection site
Cost	WAMCO charges
Benefits	Reduce waste accumulated in the project site
Expertise	Logistic and transport
Required Manpower	1
Responsibility	Contractor
Equipment and Technology	Dump trucks, lorries and pick-ups
Timing	During construction phase

10.5 Mitigation measures for operational phase impacts

10.5.1 Solid waste management disposal

It is highly important to manage household waste during the operational phase of the project. The following measure will be implemented in order to mitigate the impacts from household waste accumulation in the building;

- Piling of solid waste in the floors and by the building will not be allowed;
- The building and adjacent areas will be kept clean at all times and free from waste;
- WAMCO will be outsourced for waste management and handling.
- Waste disposal will be avoided at the project site at all the time.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	Subscription to the WAMCO waste collection service
Cost	WAMCO charges (MRV 100 per apartment)
Benefits	Reduce waste accumulated in the project site
Expertise	Logistic and transport
Required Manpower	1
Responsibility	Contractor
Equipment and Technology	Dump trucks, lorries and pick-ups
Timing	During operational phase

10.5.2 Mitigation measures for increased traffic

As a result of the newly constructed building large amounts of traffic will be diverted to the project area during the operation phase of the project. The following mitigation measures will be undertaken in order to avoid impacts due to increased traffic;

- Prohibition of parking of vehicles by the building;
- Residents will be encouraged to park in the parking space available within the building and basement area.

The following are key consideration which need to be taken for the most significant mitigation measures listed above;

Mitigation Measure	Prohibition of parking of vehicles by the building
Cost	0
Benefits	Good traffic flow
Expertise	Traffic Management
Required Manpower	Nil
Responsibility	Building owner & Transport authority
Equipment and Technology	Signage
Timing	During operational phase

10.6 Commitment by the proponent

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 human health impacts. The commitment letter from the proponent is attached in the Annex.

11 Alternatives

This section of the report contains the alternative means for the project in terms of no development option, alternative project design, alternative power generation and alternative foundation.

11.1 No project option

Initially the no project option is discussed in order to hypothesize whether the project should be taking place first of all. Sometimes, projects are proposed without much thought given to the socio-economic motivation of such development and the unnecessary impacts it may have on the environment, especially those that are long term. Therefore, carrying out this exercise is important to avoid such a scenario and to ensure that undertaking this project at this stage makes good socio-economic sense without any significant impact on the environment.

The advantages and disadvantages of not undertaking each project component is given below.

Table 17: Advantages and Disadvantages of the no project option

Advantages	Disadvantages
Will not contribute to groundwater degradation	Will be a missed opportunity for the developers to develop their land and increase the value of their land
Will not lead to health and safety concerns at project site	Will not be able to alleviate the issue of people living in small crowded places in Male'
Will not contribute to structural issues of neighboring buildings.	Will lead to residents of the existing structure to continue living in an old structure prone to accidents
Will not cause any noise and air pollution at project location	Will decrease economic opportunities for construction companies and their employees
Will not cause any traffic disruptions	
Will not have any contribution to the increasing population in Male'	

A comparison of the no project option with the project going ahead as proposed, indicate that the no-project option is practicable, and environmentally favourable but involves massive losses to the developers. The other major disadvantage of the no project option is that in such a case, there won't be further housing options for people living in crowded areas in Male'. However, on the other side, it may also discourage more people migrating to Male', thereby increasing the population of the already dense city. However, this is a very indirect effect, the scope of which is outside this project, as the developers cannot in any way influence this socio-economic behavior.

There are a few advantages of the no project option from an environmental perspective. However, local environmental impact from this project is small in nature, and the advantages stated is not significant, since most of the environmental impacts can be properly mitigated. Alternatives for components of the project are discussed further.

11.2 Project Alternatives

The Proponent initially decided that the best option not encompassing excessive costs would be adopted after evaluating different options. Therefore, the different alternatives for the project components were considered before finalizing a particular option. Alternative options; mainly based on design and methodology for the construction are given below.

11.2.1 Project Location

Alternative locations are not as important for this project, as the location cannot be changed under any circumstances. The government could provide the developers with an alternative land of similar size from a similarly lucrative location in Maldives. However, there is currently no such program and the practicality of such a shift in location is questionable. Proceeding with the construction in this exact location will be the most favorable for the developers.

11.2.2 Power generation.

Currently it is proposed to utilize the existing power system in Male'; that is to obtain power from Stelco mains. However, other alternatives such as use of solar energy is recommended especially given the large empty terrace. The proponent informed that this had been considered subject to utility, practicality and feasibility.

1.1.2. Foundation

A deep pile foundation can be constructed, which will likely provide more stability to the 11 storey structure in the long term. However, the city have had to endure some negative experiences with deep piled structures, most notably that of the Traders building (formerly Holiday Inn) at Athireege Aage. For the structure, metal load bearing piles were driven to depths of 30 to 40 metres. The deep piling, lead to several neighbours complaining of tremors and cracks in their walls. Due to the close proximity of buildings structures, use of deep pile technology may not be ideal for high rise buildings in Male'.

11.3 Justification for the preferred alternatives

The following statements justify the preferred options over the alternatives proposed that will be undertaken as a part of the proposed 13-storey building in M. Dhimyaath

- 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 developing social housing, creating jobs and contributing commercial benefits of having commercial spaces, which can be sustained for long-term periods. The proposed development will greatly contribute to the social and economic aspects of the area many years to come.
- Utilization of the existing power system is more feasible than roof-top solar PV installation as this technology will require a significant capital investment and the proponent is currently investing a significant capital for the construction of the building itself.
- With regards to the foundation method of the proposed high rise building, a raft foundation method has been considered given that there will be a significant environmental impacts such as dewatering impacts from a deep pile foundation.

12 Stakeholder Consultation

This section outlines the major findings of the consultations undertaken with regards to the proposed 13-storey building in M. Dhimyaath

12.1 List of Stakeholder

As per the approved Terms of Reference (TOR) for the EIA, the following key stakeholders have been identified; MWSC, STELCO, General public at the project area, Thaajudheen School and WAMCO

12.2 Communication channel among the stakeholders

The following section outlines mechanisms as requested in the TOR with regards to providing necessary information to key stakeholders that have been identified above. In this regard, the following mechanisms will be practiced throughout the process of the proposed 13-storey building at M. Dhimyaath.

12.3 Means of Stakeholder Consultation

There is no formal method 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; formal communication with STELCO, MWSC and WAMCO and Thajudheen School, and informal communication general public of project area. Additional stakeholders were also consulted.

12.4 Key Outcomes

12.4.1 Ministry of Housing and Infrastructure

Ministry of Housing and Infrastructure has approved the concept of the proposed development. The approval letter from the ministry is annexed to this report. The approval from the ministry is indicative that they have no major concerns over the proposed development provided that the development shall be undertaken in conformity to relevant laws and regulations. A construction permit will be given to the project proponent upon approval of the EIA.

Additionally, the Ministry of Housing and Infrastructure has approved foundation plan of the building, which is also annexed to this report.

12.4.2 MWSC

MWSC was consulted as part of the project. MWSC's requirements for the pluming has been addressed in the detail designing of the project that has been approved by the Ministry of Housing and Infrastructure. MWSC will be able to supply required freshwater during project construction phase as the site is located on a main road

Suggested to have two catch pits 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' and the pump stations for the main sewer are being upgraded to allow for more volume to be pumped out from the system. Hence there will be no capacity issue for managing sewerage and supplying freshwater to the proposed building

For dewatering purpose some other measures need to be considered given that there are some limitation for continuously dewatering from large development projects that can be used through the MWSC Sewerage network. MWSC provide booster pumps that can provide freshwater to top floors of the building without any drop of the pressure.

12.4.3 STELCO

STELCO is the main provider of electricity in Male'. STELCO was consulted on 23rd September 2017 over the phone. The building at Dhimyaath will be connected to STELCO grid when it is completed. STELCO with provide electricity to the project site during construction phase. The site on a main road, electricity can be made available easily. The design of the building to have easy access to the switchboard room, meters are located on the ground floor of the building. There is no issue of STELCO to have a standby genset for emergency use within the building. There will be no capacity issue to provide electricity to the building as there is ongoing upgrading works done at STELCO powerhouse. All meters need to be approved by STELCO as now an HV metering system is implemented in Male.

12.4.4 WAMCO

As part of the project EIA, WAMCO was consulted over the phone on 23rd September 2017. WAMCO is the main company which collects and transport waste, including construction waste to Thilafushi from Male'. WAMCO is making arrangements to obtain necessary vehicles and machinaries to collect and transport construction waste from construction sites in Male' to the waste transfer facility in Male. The waste from the waste transfer facility is transported to Thilafushi for final disposal on landing crafts. The company is currently increasing its capacity in terms of vehicles for waste transportation for all service areas. For the household waste and commercial waste, WAMCO provide building services service to collect waste. Similarly, WAMCO has a call up service to collect bulk waste from houses and commercial facilities in Male'.

12.4.5 Transport Authority Maldives

Mr. Ibrahim Yasir, Director, Maldives Transport Authority was contacted on 17th September 2017 at 10:00 am over the phone. It was indicated that MTA has no direct involvement of Transport Authority of Maldives with regards to providing any permission such as parking and road blocking for the proposed project. Under the Land Transportation Act 5/2009, a Regulation on Parking of Vehicles has been developed (2012/R-1), which states parking zones shall be determined by the City Council in Citiies and Island Councils in the islands.

12.4.6 Thaajudheen Schools

As part of the project EIA ToR, Mr. Ibrahim Saeed, Administrator (7900428) of Thaajuddeen School was consulted over the phone on 24th September 2017. Mr. Ibrahim Saeed highlighted that noise is the schools primary concern regarding construction projects going on nearby vicinity. He also noted that M. Dhimyaath is not very close to the school and they do not think impact of noise will be significant. However, school face some difficulties due to high noise level from nearby construction sites, especially during examination period. Therefore, school requests client to share the construction schedule with school.

12.4.7 General Public of the project area

Following are the summary of major findings of the stakeholders with the general public around the project area.

This is a high traffic area due to many cafes, restaurants, offices, school, hospital and a main road, the development may impact traffic movement in the area.

Currently motorcycle parking by the proposed block is undertaken mostly by Dhonmanik restaurant and IGMH visitors and if parking is not allowed, it will be difficult for the restaurant and hospital visitors, however, there are other parking areas on the other side of Ameeni Magu, which can be used.

There will be no major issues from noise and dust as activities will happen inside a closed boundary and work will not be undertaken at night.

Most problems to pedestrians and traffic as well as residents in the area are believed to occur during the initial stages of the development. A lot of multi-storey buildings have been developed near the project site and some are under development that have completed structural works, there are major issues with dust and noise from these ongoing projects. Once structural works are completed, no major problems are believed to occur as things will get normalized by then.

Summary of the stakeholders who were consulted

Name	Designation	Stakeholder	Contact
Ahmed Shafiu	Commercial Collection Services Manager	WAMCO	7698899
Aishath Bariya	Engineer	Ministry of Housing and Infrastructure	
Mohamed Niyaz	Senior Engineer	STELCO	778 7021
Mr. Ibrahim Yasir,	Director	Maldives Transport Authority	7944443
Mr. Ibrahim Saeed	Administrator	Thaajuddeen School	7900428
Ibrahim Naeem	Director General	EPA	3335949
Mohamed Naif	Customer Service Officer	MWSC	96 3547
Hashim Nabeel	Asst. Oceanographic Observer	EPA	3335949
Ahmed Waheed		Resident	7758896
Aslam		Resident	9895017
Hawwa Ismail		Resident	7873502

13 Monitoring Program

13.1 Introduction

Environmental monitoring is the systematic measurement of key environmental indicators over time within a particular geographic area (Joseph et al 2015). It is an integral part of any EIA. It shows how the project has or is impacting the baseline environmental conditions that have been assessed as the part of the EIA. It identifies the degree 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.

13.2 Aim and Objectives of the Monitoring Program

The aim of the proposed environmental monitoring program is to provide information which would enable effective impact management. Furthermore, the monitoring program is aimed to better understand how the predicted impacts have actually impacted the baseline environmental condition hence the impact prediction and effectiveness of mitigation measures can be better understood.

The objective of the proposed monitoring program is to measure the following environmental indicators

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

The proposed monitoring will ensure that these measured parameters are kept within the baseline limits and predicted impacts are accurate and mitigation measures has been taken effectively.

13.3 Monitoring Report

13.3.1 Reporting Format

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

format;

i) Introduction
ii) Aims and Objectives
iii) Environmental Conditions
  - Ambient Noise level
  - Traffic volume and flow
  - Groundwater quality
  - Solid waste

iv) Comparison of data from the monitoring survey and the baseline
v) Conclusion and Recommendations

13.4 Frequency of Reporting

It is critical that monitoring of the environmental parameter mentioned in the report format will be initiated during construction periods, and continued throughout the operational phase of the project.

- During Construction Phase (Three monitoring reports)
- During Operational Phase (Annual monitoring report for two years)

13.5 Monitoring Plan and Cost

The following monitoring plan will be utilized during the construction phase and the operational phase of the proposed 13-storey building in M. Dhimyaath.

Table 18: Environmental Monitoring Plan

Monitoring Requirement	Environmental Indicator	Baseline Data	Technique	Frequency	Cost (USD)
Noise Levels	Decrease or Increase	Baseline Data of EIA	Digital Sound Meter	Every 4 months	200
Traffic Flow and Volume	Increase or decrease	Baseline Data of EIA	Visual assessment	Every 4 months	200
Groundwater quality	pH & salinity	Baseline Data of EIA	Laboratory assessment	Every 4 months	150
Solid waste (both construction and operational phase)	Type and quantity	Waste audit at the beginning of construction phase	Waste audits	Every 4 months	500
Vibration	Seismic parameters		Vibration meter	During construction of foundation	400
Total Cost					1450

13.6 Commitment from the proponent

A commitment letter from the project proponent (Dr. Mohammed Muizzu) has been attached in the annex of this report which clearly states the commitment of the proponent to undertake the monitoring program outline in this report.

14 Summary and Conclusion

Following are the summary and conclusions with regards to the proposed 13-storey building in M. Dhimyaath;

- The project has been proposed by Dr. Mohammed Muizzu to construct and operate a 13-storey building in M. Dhimyaath.
- The proposed project involves construction of construction of a 13-storey building and basement in M. Dhimyaath Plot.
- Currently, there is a 3-storey building in the M. Dhimyaath plot which will be demolished prior to the construction phase of this project.
- As a result of the proposed project during the construction phase it is expected to some minor impacts on the groundwater of the project area due to dewatering and exposure noise and dust due to construction activities. Some minor impacts are anticipated due to operation of construction machineries and vehicles which may lead to road blockade.
- During the operational phase of the proposed project the main impacts predicted include impacts due to household solid waste management and increased traffic as traffic will be routed to the project area as new residents move to the newly constructed building.
- The proposed mitigation measures include shoring of entire boundary with corrugated sheet supported by iron beams, installation of safety nets used to prevent falling of debris and monitoring and management of the dewatering pipelines.
- Alternative has been proposed for the power generation and type of the foundation have been proposed. Based on evaluation, it was found that the proposed type of power generation and foundation is the preferred option.
- Environmental monitoring during both construction and operation stages has be given serious consideration in order to assess the degree and magnitude of environmental changes in the biophysical environment, through a follow-up monitoring of established baseline data.
- During construction, monitoring of construction will be undertaken three times and during operation monitoring once yearly for two years will be undertaken.
- Although there are some environmental impacts from the proposed project, most of these impacts can be reduced and mitigated by use of appropriate methodology and timing.
- The effectiveness of these methodologies can be documented by implementing a comprehensive monitoring programme. Also, with the need of the project to contribute to housing needs in Male', it is concluded that the project as proposed.

Annex 2: Approved TOR

بسم الله الرحمن الرحيم

No: 203-EIARES/INDIV/2017/162

Terms of Reference for Environmental Impact Assessment for proposed Construction of 13 Storey Building in Male' Maldives

The following is the Terms of Reference (ToR) following the scoping meeting held on ***30th August 2017*** for undertaking the EIA of the proposed construction of 13 storey building at Dhimyaath in Male'. The proponent of the project is Dr. Mohamed Muizzu (ID; A042056)

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

    a. Name and contact details of the Proponent
    b. Rationale and background to the project
    c. 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 boundary of the study area for the environmental impact assessment highlighting the proposed development locations and size of the proposed facilities.

3. **Scope of work** – Identify and number tasks of the project including site 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.

Task 2.Description of the proposed project – Provide a description and justification of relevant parts of the project, using maps at appropriate scales where necessary. Legal status of the plot allocated for development should be identified.

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

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ތިމާވެއްޓާ ދެކުންހުރި ތަރައްޤީ ކުރިޔަށްގެންދާ ބޭނުންވެރިކަން
ފ. ހަނ. ބ. 3 ވަނަ ފަންގިފިލާ، ހަނ. ބ. ހަނ. ދ. ދ.
ދ.ގ.، ދިވެހިރާއްޖެ، 20392

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
e) Details of backup generator (if any)

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.

Provide a description of the relevant parts of the project, using maps at appropriate scales where necessary. This is to include: manpower, equipment and technology used; duration and scheduling of the proposed activities; location plan; scaled site plan showing all aspects of proposed project; architectural drawings; sources and quantities of all project inputs; types and quantities of all outputs and how they will be managed.

Task 3. Description of the environment – Assemble, evaluate and present environmental baseline study/data regarding the study area and timing of the project. Identify baseline data gaps and identify studies and the level of detail to be carried out by consultant. Consideration of likely monitoring requirements should be borne in mind during survey planning, so that data collected is suitable for use as a baseline. As such all baseline data must be presented in such a way that they will be usefully applied to future monitoring. The report should outline 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 including physical appearance, Salinity, pH
- 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.
- Possible social impact arising from construction activities.

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.

- An assessment on the quality of the ground water shall be undertaken with focus on areas that are likely to be impacted by the project component

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:

- Approval from Ministry of Housing and Infrastructure;
- 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 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 the *"no action option"* should be presented. Determine the best practical environmental options. Alternatives examined for the proposed project that would achieve the same objective including the "no action alternative". This should include alternative site for the project. The report should highlight how the location was determined. Alternatives must be compared according to commonly accepted standards as much as possible.

Task 7. Stakeholder Consultation – The EIA report should include a list of people/groups consulted, their contact details and summary of the major outcomes. The following parties should be consulted;

a) STELCO
b) MWSC
c) General public by the project area (Adjacent Buildings)
d) Nearby Schools
e) WAMCO

Task 7. Development of a Monitoring Plan – Identify the critical issues that require monitoring and develop a monitoring plan for the construction and operational phase giving considerable preference to any potential significant impacts identified. 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.

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, 2015

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.

7th September 2017

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ގްރީން ބިލްޑިންގ، 3 ވަނަ ފަންގިފިލާ، ހުޅުވަރީ ހިންގުން
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Annex 2: Design approval from Ministry of Housing and Infrastructure

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

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<u>އިމާރާތުގެ ކުރެހުން ފާސްކުރިކަމުގެ ލިޔުން</u>

- ގޯތި ނުވަތަ ބިމުގެ ނަން: މ. ދިލްޝާދު
- ފެންވިލާގެ އަދަދު: 13 (ތޭރަ) ފެންވިލާ
- ސްޓްރަކްޗަރގެ ބާވަތް: ކޮންކްރީޓް
- އިމާރާތުގެ އުސްމިން: 37.98 ފޫޓު
- ފެންވިލާގެ ބާވަތް: ކޮންކްރީޓް
- މި ލިޔުމުގެ މުއްދަތު: 6 (ހައެއް) އަހަރު
- މުއްދަތު ހަމަވާ ތާރީޚު: 03 މެއި 2023
- ބޭނުންތައް: މުޅިއެއްކޮށް ދިރިއުޅުން.

1. މި ލިޔުން، (އިމާރާތުގެ ކުރެހުން ފާސްކުރިކަމުގެ ލިޔުން) ހުށަހެޅުމުގެ، މި ލިޔުން ދޫކުރާ ތާރީޚުން 6 (ހައެއް) އަހަރުދުވަހުގެ ތެރޭގައި، "އިމާރާތްކުރުމުގެ ހުއްދަ" ނެގުމަށްފަހު ނޫނީ، މި ލިޔުން ބާތިލްވާނެއެވެ. މި ލިޔުން ބާތިލްވުމާއި، މި ލިޔުން ދޫކުރާ 6 (ހައެއް) އަހަރުދުވަހުގެ ތެރޭގައި، "މާލޭ ޑިވެލޮޕްމަންޓް ޕްލޭން" އާއި އިމާރާތް ކުރުމާބެހޭ އުސޫލުން ޕްލޭނިންގ ކަންކަމާ ބެހޭގޮތުން ހުށަހެޅޭ މައްސަލަ ތަކެއް ހިނގާ ޕްލޭނިންގ އެއްޗެހި ބަދަލުވުމުން، ކުރެހުންތަކަށް ގެނެސްދޭ ބަދަލުތައް ހިމެނޭނެއެވެ.

2. "އިމާރާތްކުރުމުގެ ހުއްދަ" ހުށަހެޅުމަށް، އެ ހުއްދަ ދޫކުރާ ތާރީޚުން 6 (ހައެއް) އަހަރު ދުވަހުގެ ތެރޭގައި، އިމާރާތްކުރަން ނުފެށިއްޖެ ނަމަ، އެ ހުއްދަ (އިމާރާތްކުރުމުގެ ހުއްދަ) ބާތިލުވާނެއެވެ. އެ ހުއްދަ ބާތިލުވެއްޖެނަމަ ބަންދަށްވުރެ އިމާރާތްކުރުމުގެ މަސައްކަތް ކުރުމަށް، އެ ހުއްދަ އާކުރަން ޖެހޭނެއެވެ. އެ ހުއްދަ އާކުރުމަށް، "އިމާރާތުގެ ކުރެހުން ފާސްކުރިކަމުގެ ލިޔުން" ދޫކުރާ ތާރީޚުން 6 (ހައެއް) އަހަރު ދުވަސް ހަމަވުމުގެ ކުރިން ނަގާނެއެވެ.

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އާދަމް ނަސީމް
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އިސްމާޢީލް ޙަމީދު
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އަމީނީމަގު، މާފަންނު، މާލެ، 20392، ދިވެހިރާއްޖެ.
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بسم الله الرحمن الرحيم

މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ
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• ނަންބަރު: LBD-BS/IK/2017/158

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• އަތޮޅާއި ރަށުގެ ނަން: މ. ދިއްގާރު
• މަގުގެ ނަމާއި، ގޭގެ ނަންބަރު: ބުރުޒުމަގު، 342
• އިމާރާތުގެ މަޤްޞަދު ބޭނުން: ފިހާރަ، ރެސްޓޯރަންޓް، ދިރިއުޅުން، ގުދަން.
• އިމާރާތުގެ އުސްމިން: 37.98 މީޓަރު
• ފަންގިފިލާގެ އަދަދު: 13 (ތޭރަ) ފަންގިފިލާ.
• އިމާރާތުގެ ސްޓްރަކްޗަރގެ ބާވަތް: ކޮންކްރީޓް
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• އާކިޓެކްޓް: ފާތިމަތު ޝަފާރިން • ހުއްދަ ނަންބަރު: BDR2016174A
• ސިވިލް އިންޖިނިއަރ: ޝަފީޤް ޢަލީ • ހުއްދަ ނަންބަރު: BDR2017027E
• ވެރިފަރާތް ނުވަތަ ވެރިފަރާތްތައް: މުޙައްމަދު މުޢިއްޒު.
• ހުއްދަ ދިނުން ގޮތް: މި ހުއްދައިގެ ދަށުން އިމާރާތްކުރުމުގެ މަސައްކަތް ކުރައްވަންވާނީ، މާލެ ޕްލޭނިންގ ގަވާއިދާއި، ބިލްޑިންގ ކޯޑް ފަންނީގޮތުން ބޭނުންކުރުމުގެ ގަވާއިދާއި، މިނިސްޓްރީ އޮފް ހައުސިންގ އެންޑް އިންފްރާސްޓްރަކްޗަރ ބިލްޑިންގ ކޯޑުގެ ނަންބަރު A-97/40 އިޢުލާނާއި، ދިވެހިރާއްޖޭގެ ބިމުގެ ސަރަޙައްދުތަކުގެ ގަވާއިދުތަކާއި، ގާނޫނުގެ ދަށުން ހަރަކާތް ގަވާއިދުތަކާއި އެއް މިންގަނޑަށް އިމާރާތްކުރުމުގެ ޝަރުޠުތަކާއި ގަވާއިދުތަކާ އެއްގޮތްވާ ގޮތުގެ މަތިން.
• ހުއްދައިގެ މުއްދަތު ހަމަވާ ތާރީޚް: 03 މޭ 2023

މަތީގައި ބަޔާންކުރެވުނު އިމާރާތް، މަތީގައި ބަޔާންކުރެވުނު ގޮތުގެ މަތިން އިމާރާތްކުރުމުގެ ހުއްދަ ދެވިއްޖެ.

08 ޝަޢުބާން 1438
04 މޭ 2017

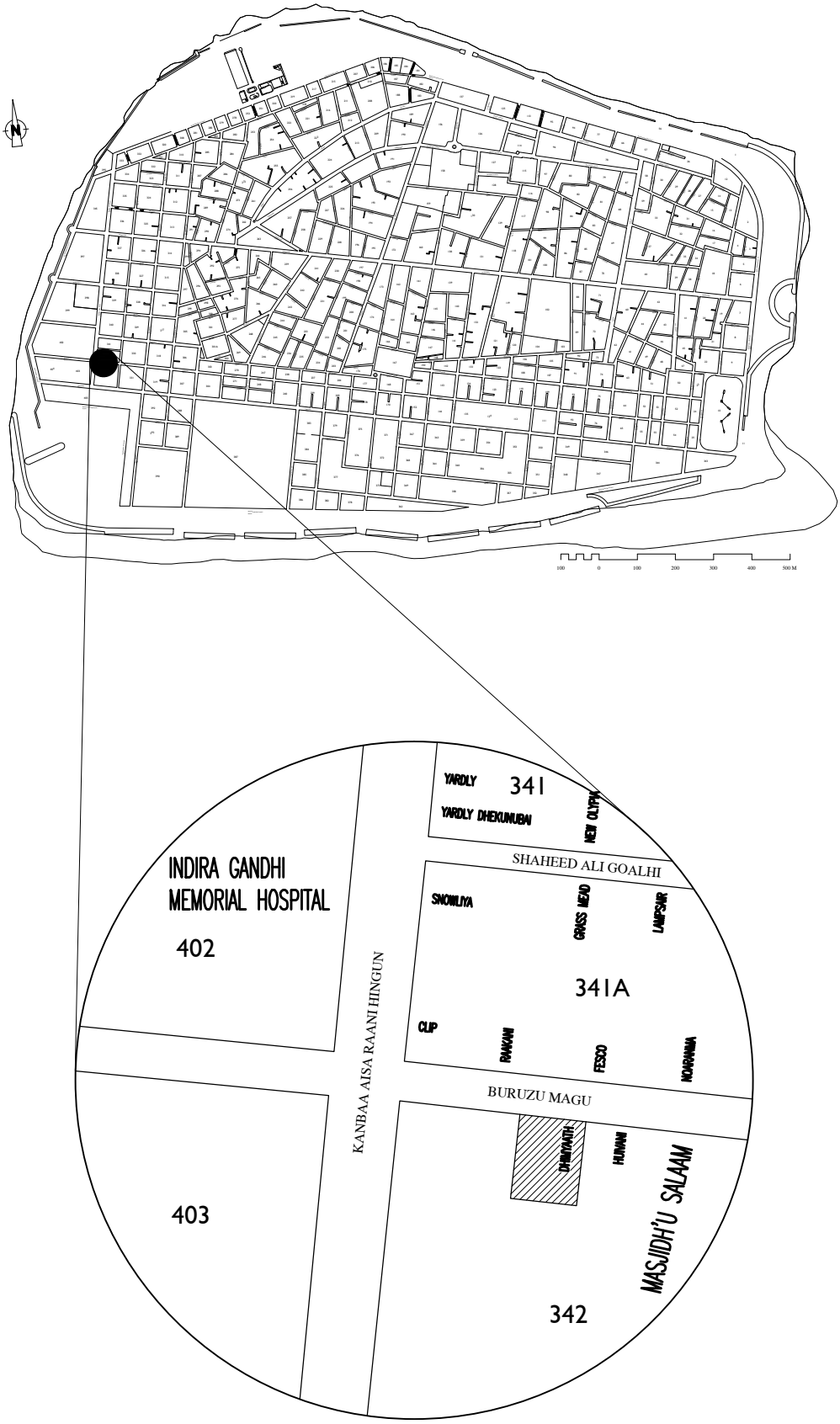
އާދަމް ނާސިރު
ޑިރެކްޓަރ

އިސްމާޢީލް ...
ސީނިއަރ ސްޓްރަކްޗަރަލް

ނޯޓް:

• މި ހުއްދައާއި އެއްވެސް ބައިވެރިއެއް ގެނައުމެއް ނުކުރާނެ، މި ހުއްދަ ބާޠިލުވާނެއެވެ.
• މާލެ ޕްލޭނިންގ ގަވާއިދުގެ 1.16 ވަނަ މާއްދާގައި ވާގޮތުން، އިމާރާތް ނުވަތަ އިމާރާތުގެ ބައެއް ބިނާކުރުމަށް ދޫކުރާ "އިމާރާތް ބިނާކުރުމުގެ ހުއްދަ" ހޯދުމަށްފަހު، އެ ހުއްދައިގެ މުއްދަތުގައި "އިމާރާތް ބިނާކުރުމުގެ ހުއްދަ" ހޯދަންވާނެއެވެ. މީގެ އިމާރާތް ނުވަތަ އިމާރާތުގެ ބައެއް ދިރިއުޅުމަށް ހުޅުވާ ނިމުމުން، ކަރަންޓާއި ފެނުގެ ހިދުމަތަށް އެދުމުގެ ކުރިން އިމާރާތް ބިނާކުރުމުގެ ހުއްދަ ނަގާފައިވާންވާނެއެވެ.

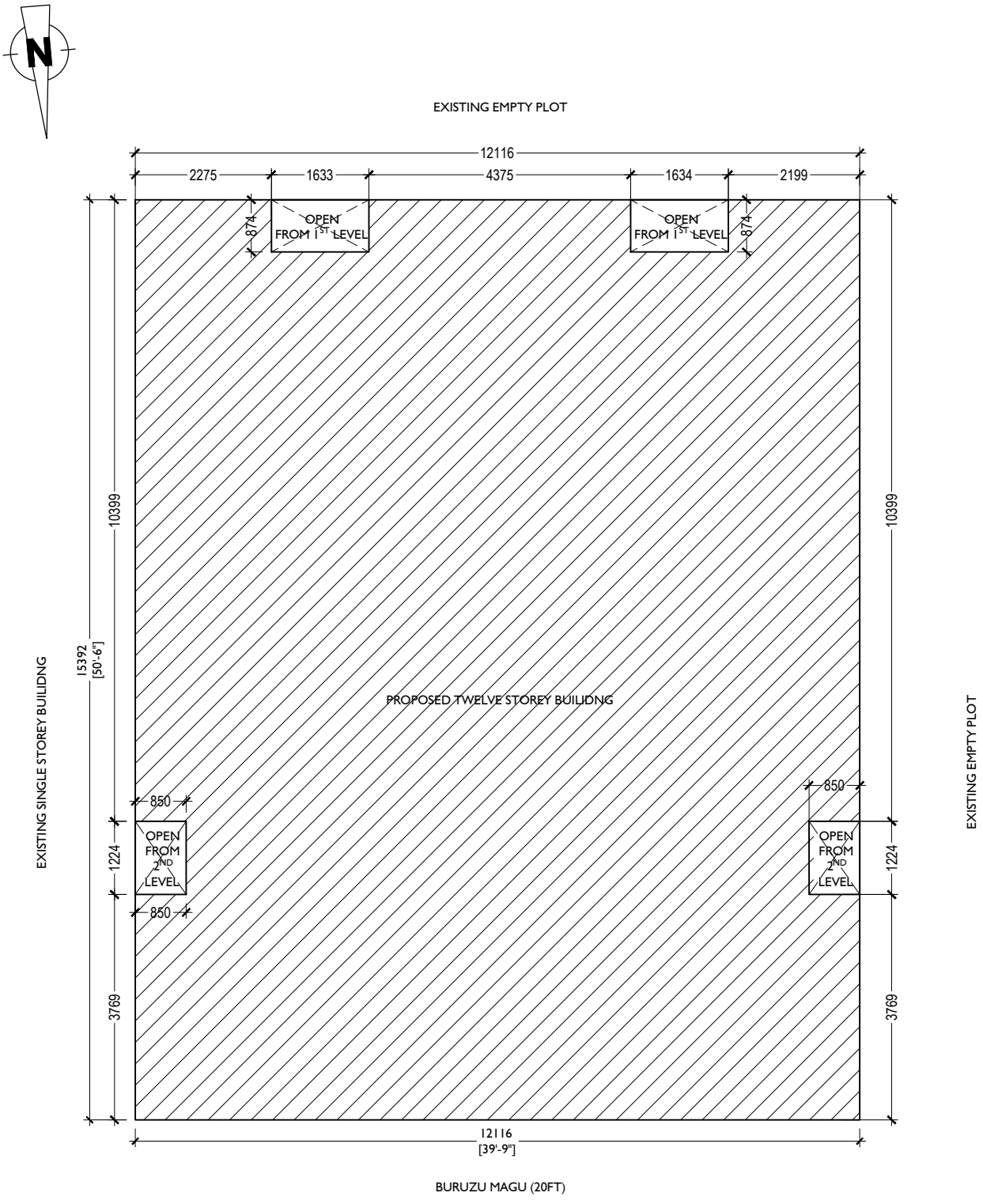
Annex 2: Site Layout



LOCATION PLAN NTS

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

CONTRACTORS MUST CHECK ALL DIMENSIONS ON SITE.
CONTRACTORS SHALL WORK FROM FIGURED DIMENSIONS ONLY.



PLOT AREA = 186.45 m²
PROPOSED BUILDING AREA = 186.45m²
REQUIRED PARKING AREA = 37.29m²
REQUIRED GARBAGE AREA = 2.796 m²
OPEN AREA = 4.936 m²

SITE PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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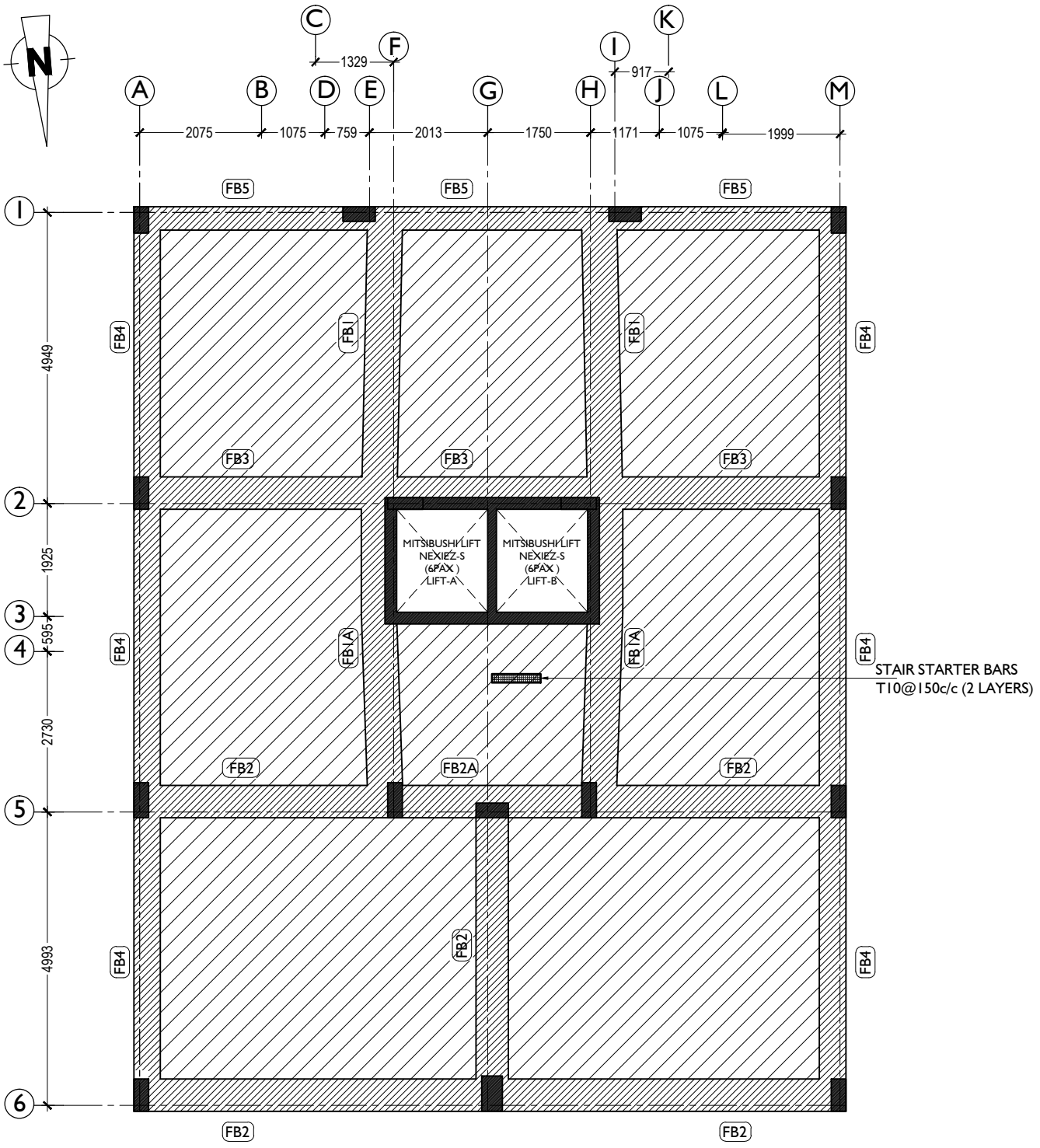
Annex 2: Tentative Schedule

ID	Task Name	Duration	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1	Mobilisation																						
2	Preconstruction																						
3	Obtaining of all permits and Approval																						
4	**Structural**																						
5	Below ground Foundation	45days																					
6	Basement	25 days																					
7	Ground Floor	25 days																					
8	1st Floor	25 days																					
9	2nd Floor	25 days																					
10	3rd Floor	25 days																					
11	4th Floor	25 days																					
12	5th Floor	25 days																					
13	6th Floor	25 days																					
14	7th Floor	25 days																					
15	8th Floor	25 days																					
16	9th Floor	25 days																					
17	10th Floor	25 days																					
18	11th Floor	25 days																					
19	Terrace floor	25 days																					
20																							
21	**Archtectural work**																						
22	Below ground Foundation	75 days																					
23	Basement	60 days																					
24	Ground Floor	50 days																					
25	1st Floor	45 days																					
26	2nd Floor	45 days																					
27	3rd Floor	45 days																					
28	4th Floor	45 days																					
29	5th Floor	45 days																					
30	6th Floor	45 days																					
31	7th Floor	45 days																					
32	8th Floor	45 days																					
33	9th Floor	45 days																					
34	10th Floor	45 days																					
35	11th Floor	45 days																					
36	Terrace floor	45 days																					

Annex 6 – Foundation design and section drawings



NOTE:
> FOUNDATION DEPTH = 2000mm

FOUNDATION PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
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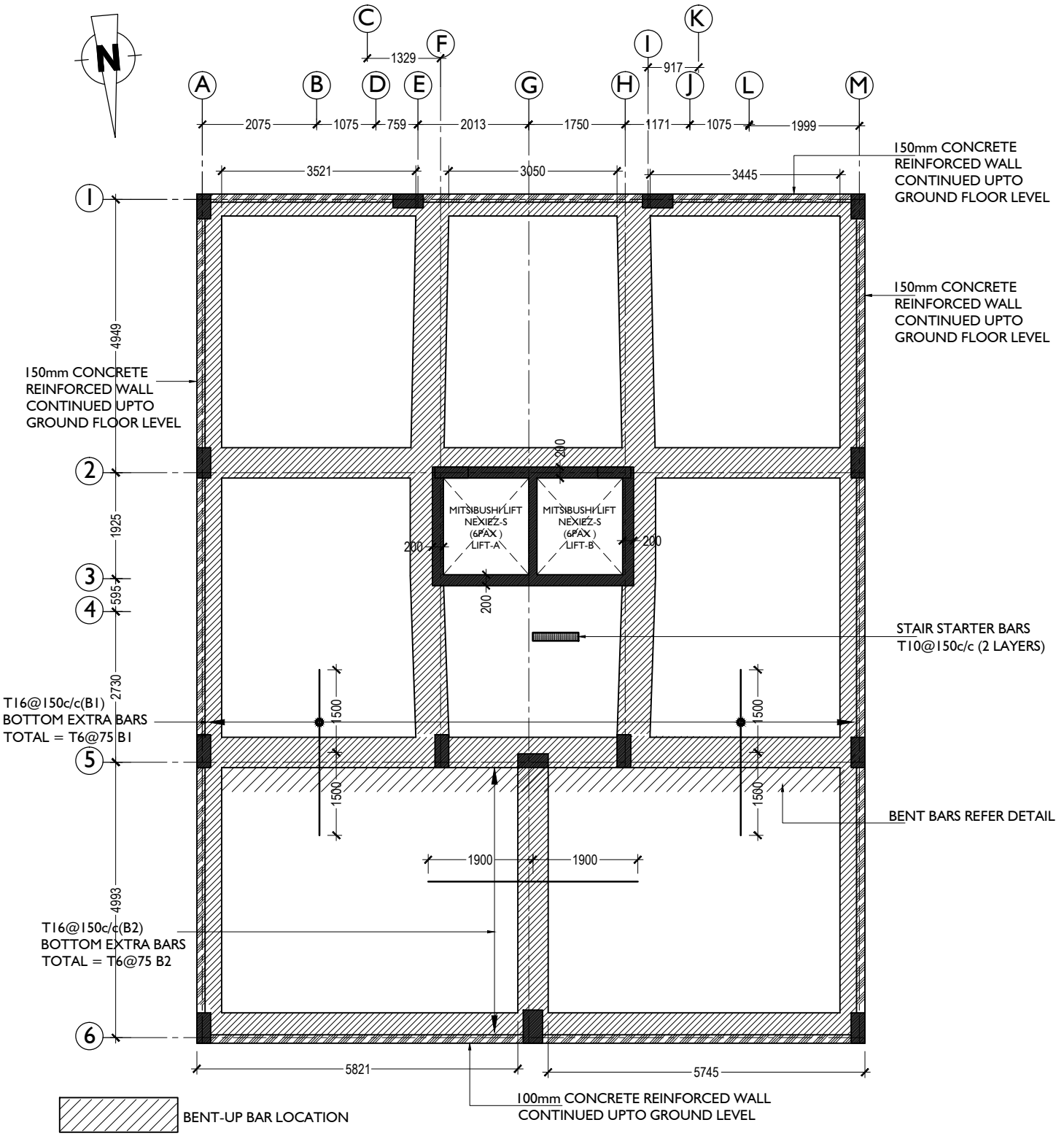

FOUNDATION REINFORCEMENT PLAN 1:100

NOTE:

> RAFT THICKNESS = 600mm
> FOUNDATION DEPTH = 2000mm
> RAFT BOTTOM COVER = 50mm
> COVER TO BEAMS = 50mm

- RAFT REINFORCEMENT
  >TOP- T16@150 B/W (NOT SHOWN)
  >BOTTOM- T16@150 B/W (NOT SHOWN)

PROVIDE EXTRA BOTTOM BARS AS SHOWN

PROVIDE BENT-UP BAR AT LOCATION SHOWN

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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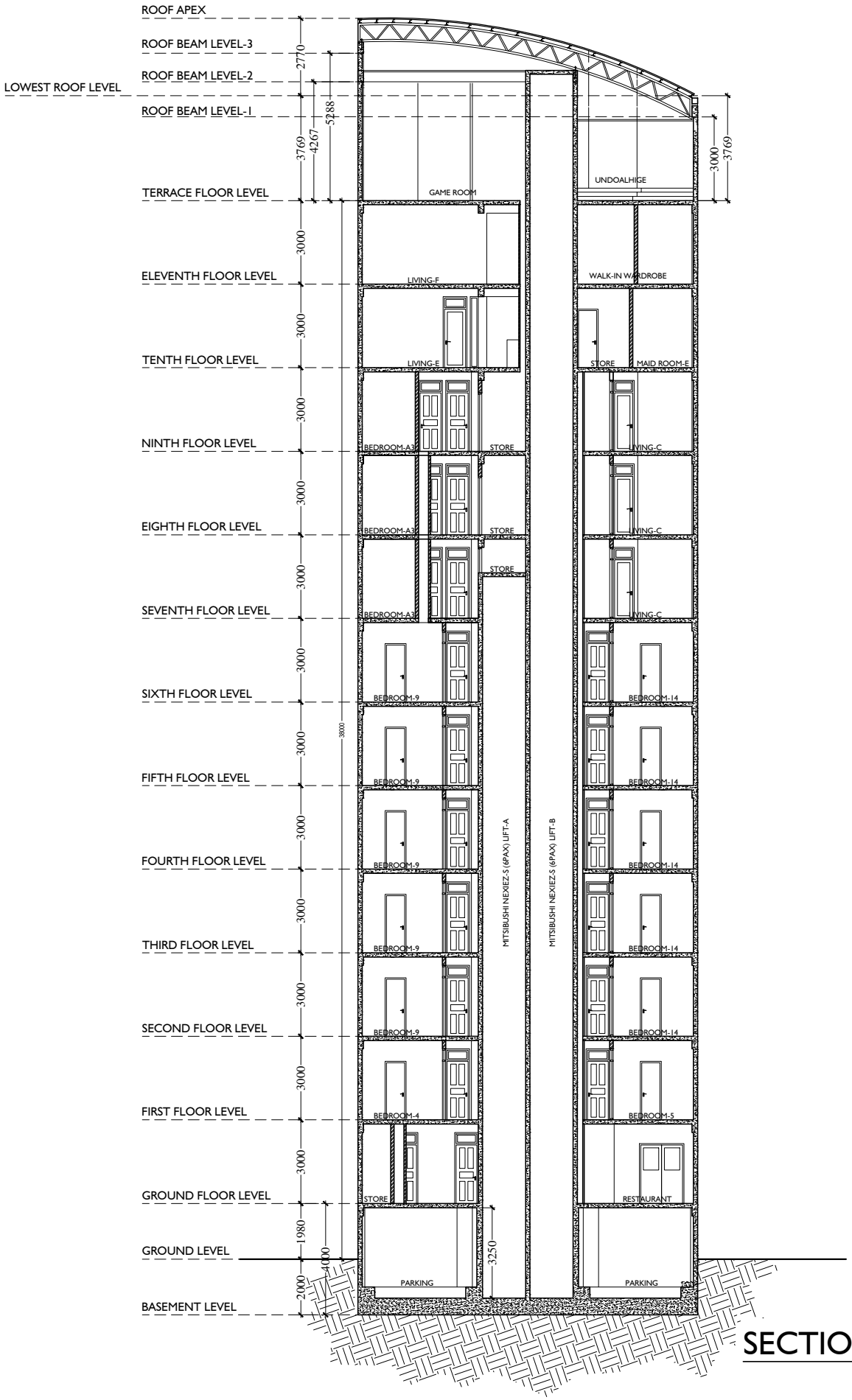

SECTION X-X 1:200

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)		DRAFTED BY:	MARIYAM NEELEE
		ENGINEER:	SHIFAZ ALI (ENZO)
		ARCHITECT:	FATHIMATH SHAHEEN
		ENGINEER CHECKER:	IBRAHIM THOAM
		ARCH CHECKER:	HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU		DATE: APRIL 2017	

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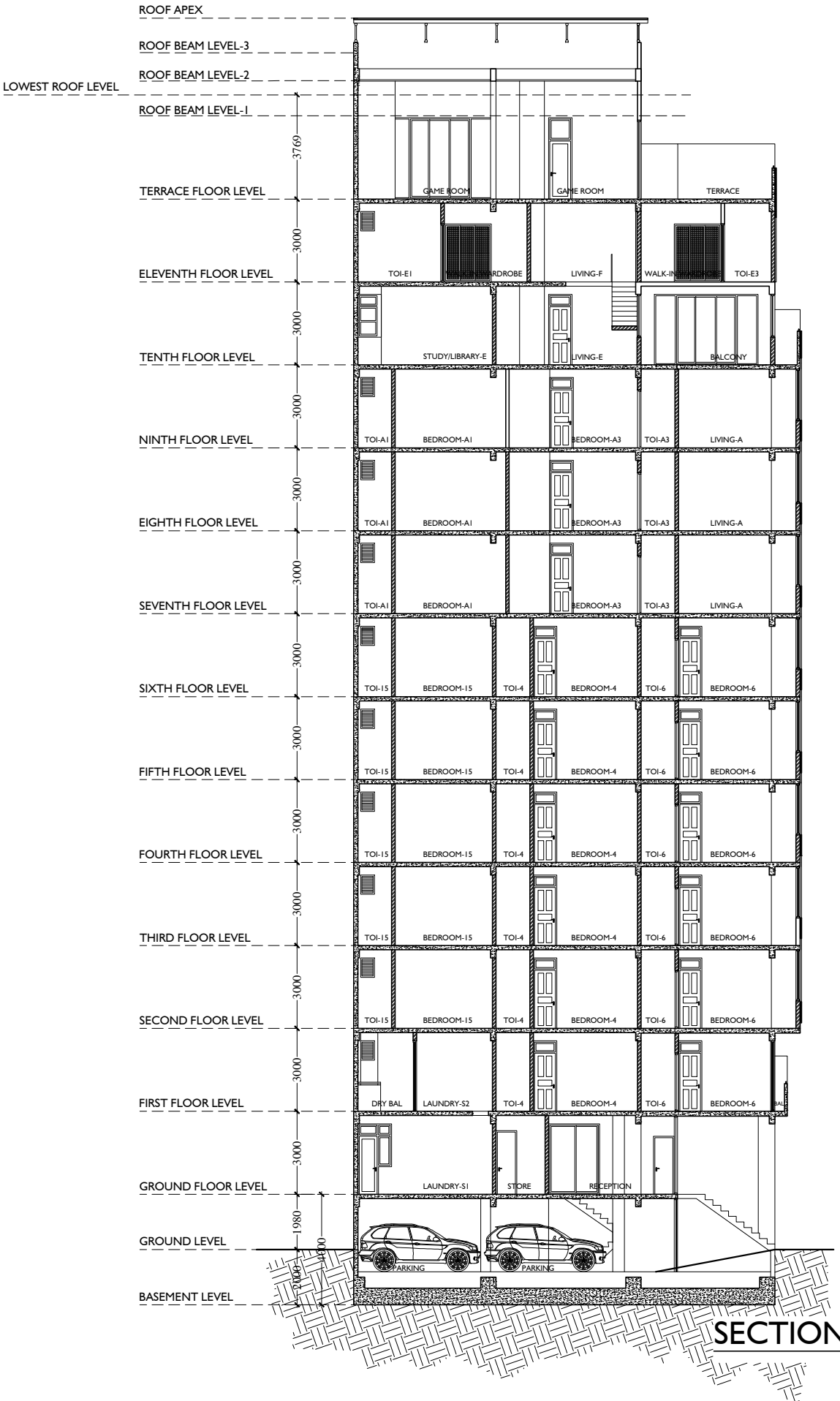

SECTION Y-Y 1:200

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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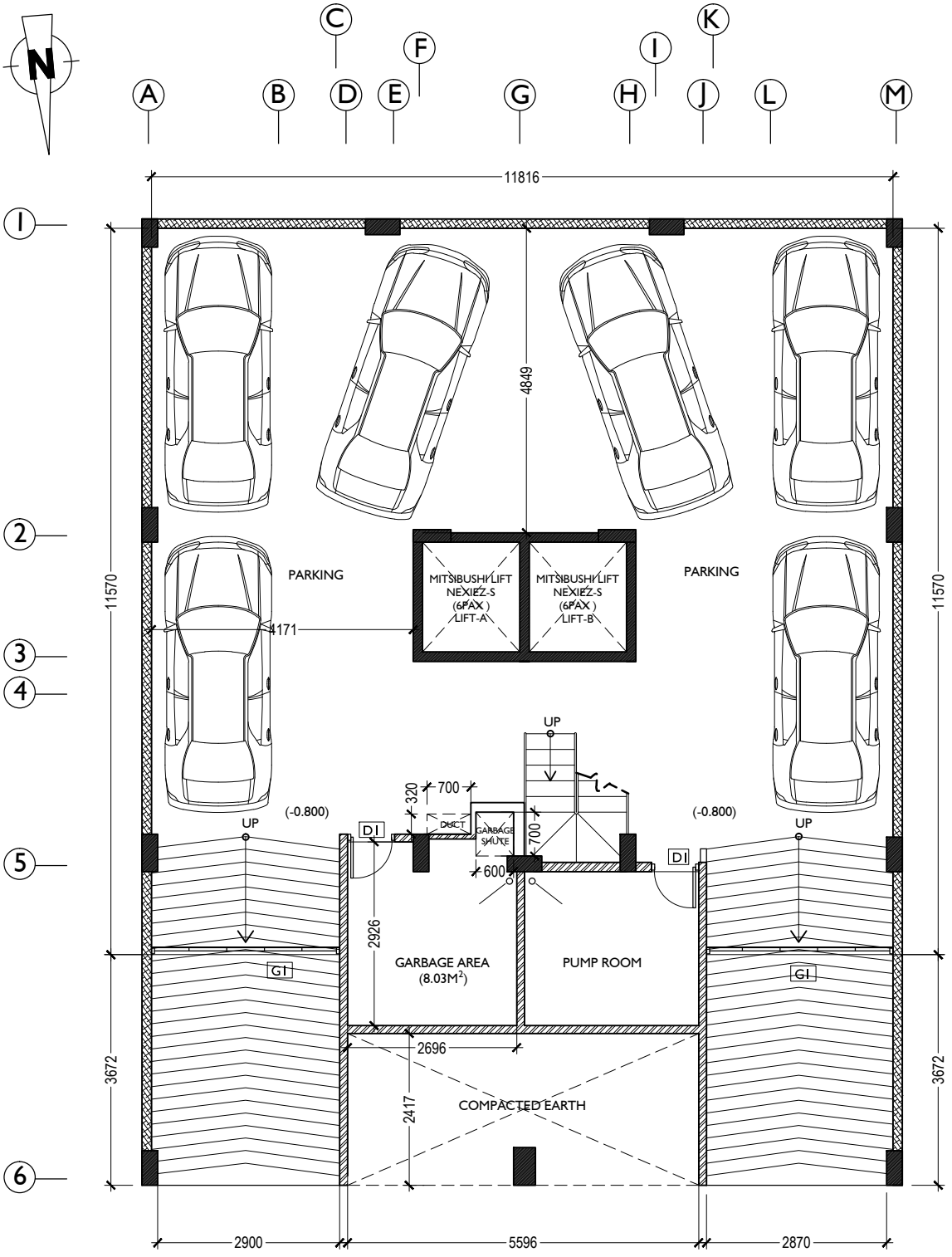

150mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

BASEMENT PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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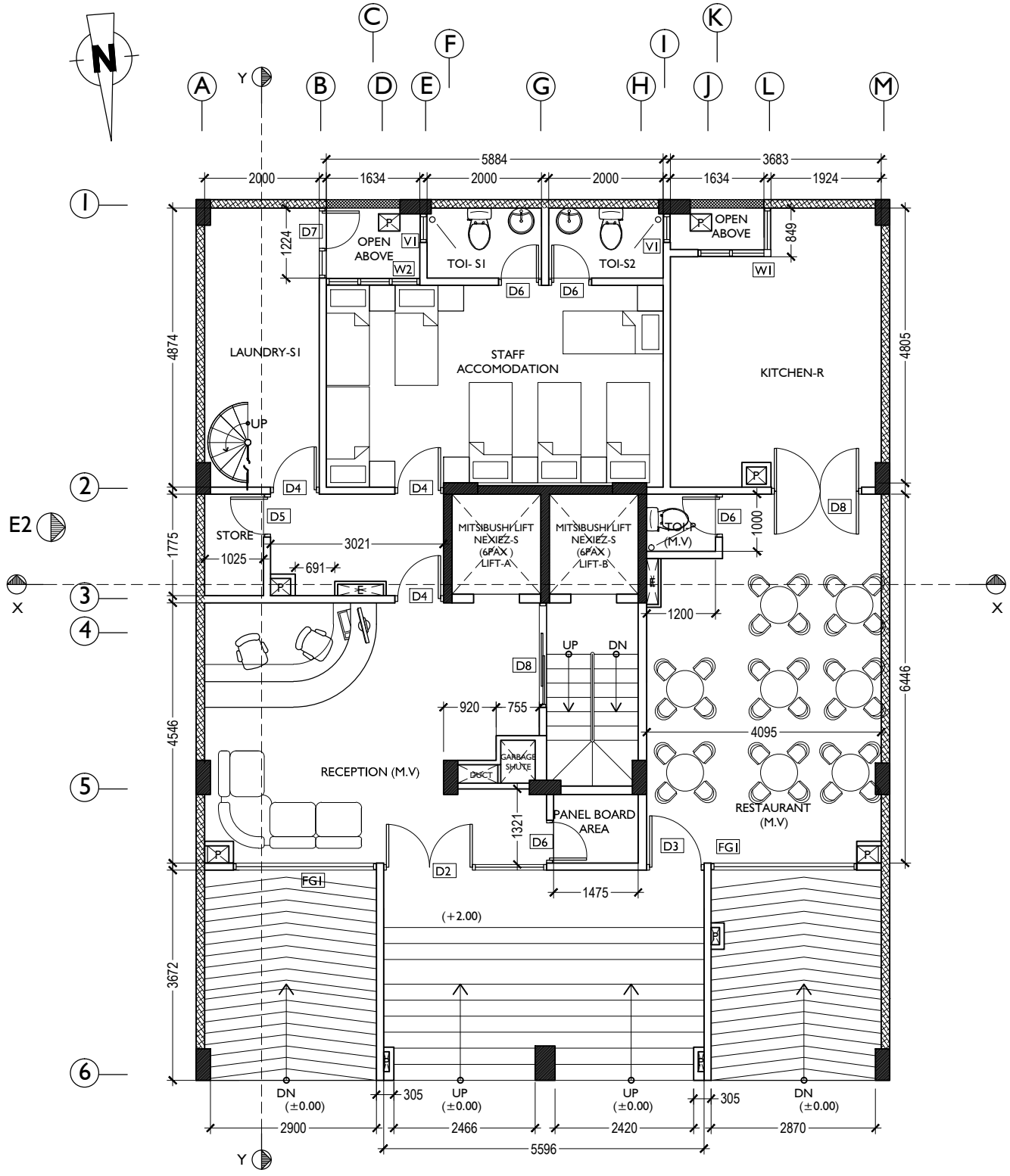

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

GROUND FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
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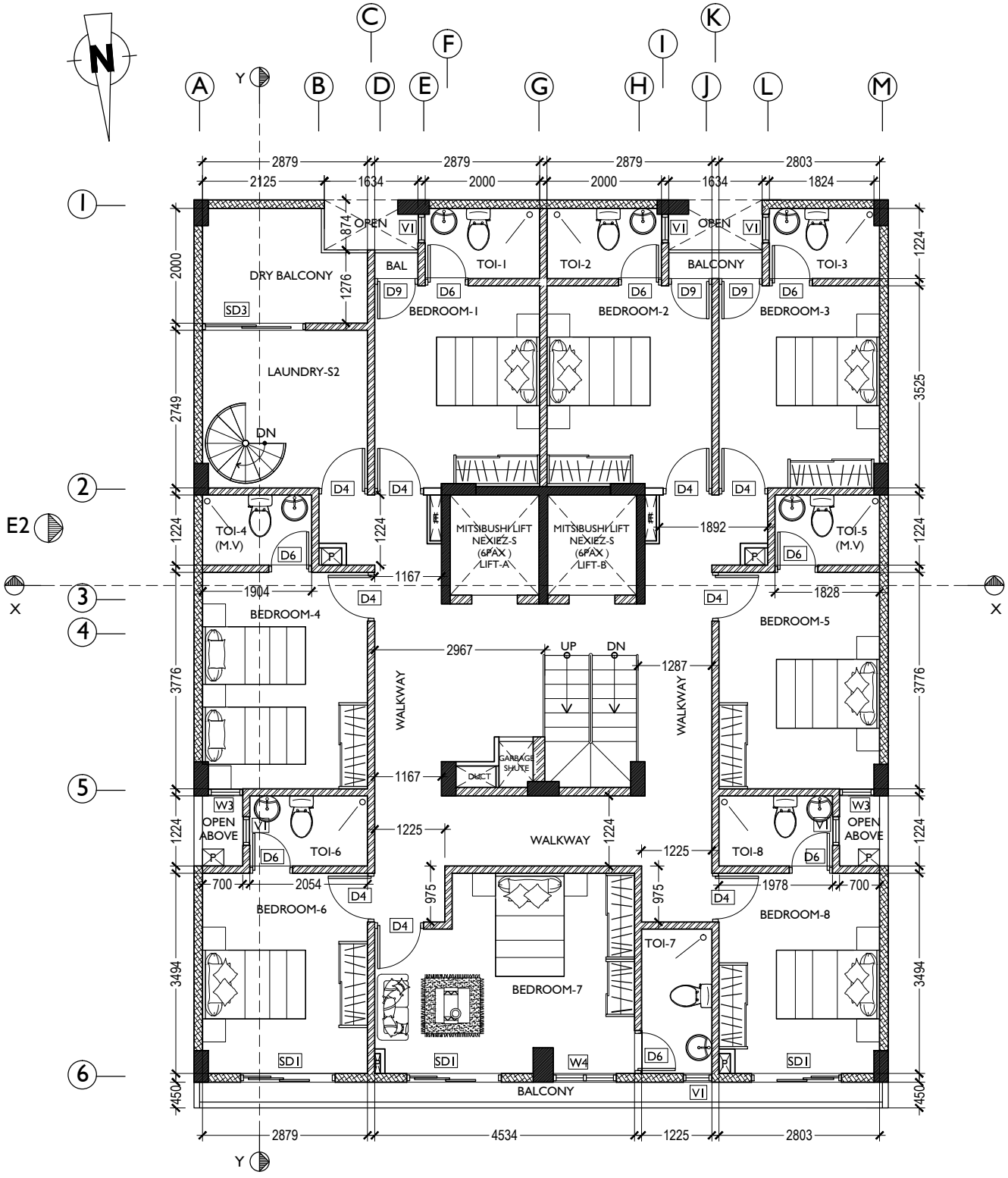

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

FIRST FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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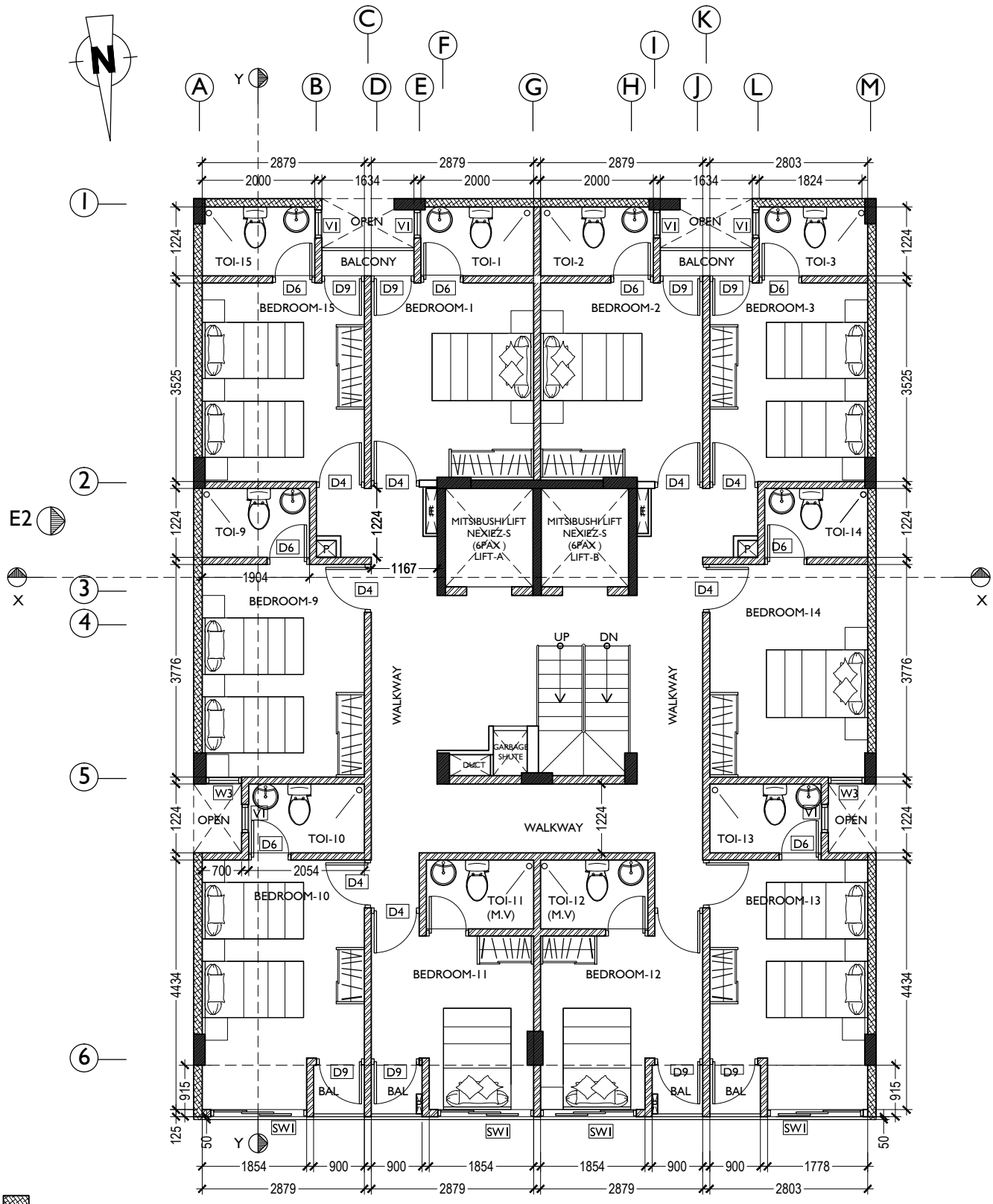

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

SECOND & THIRD FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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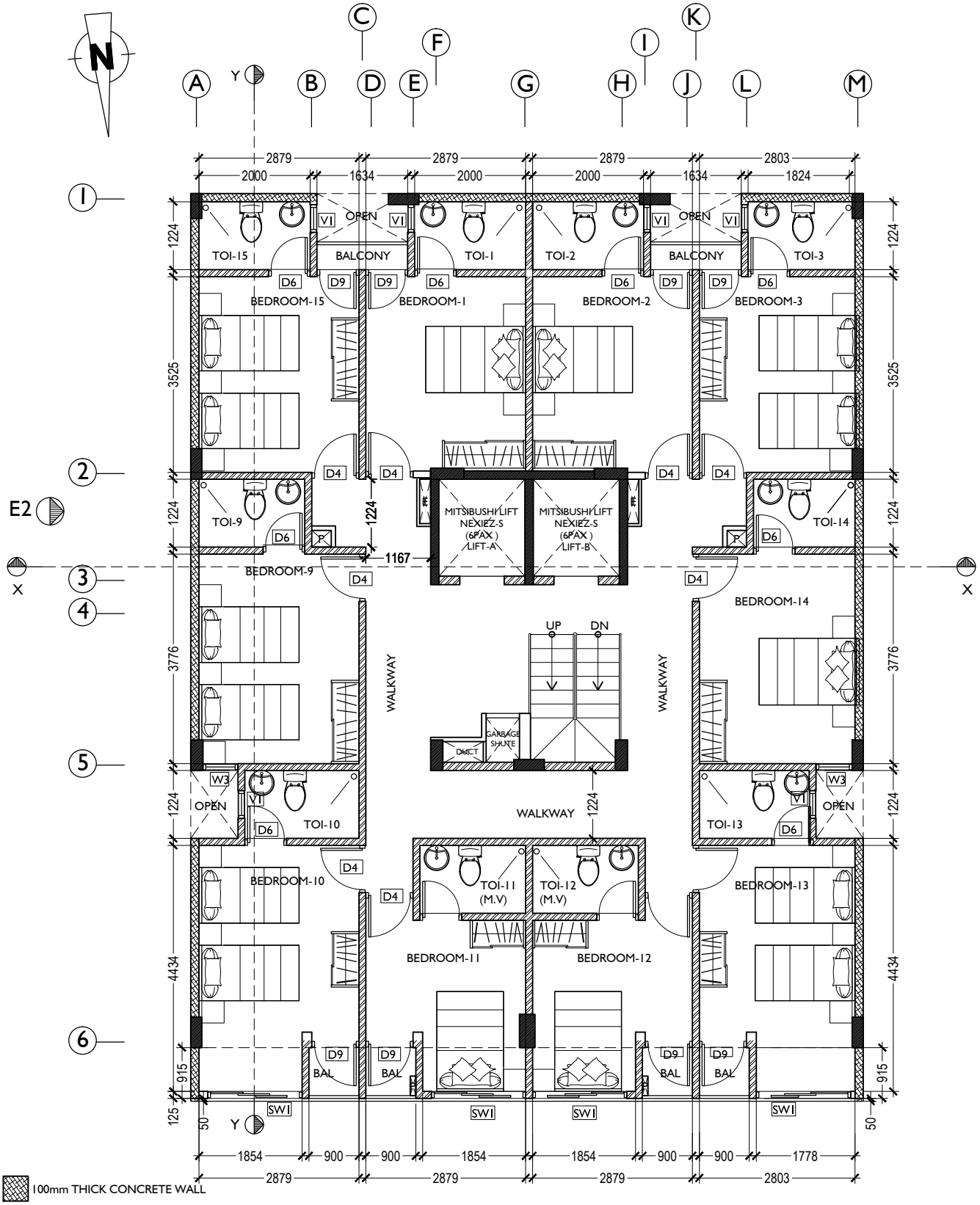

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

FOURTH & FIFTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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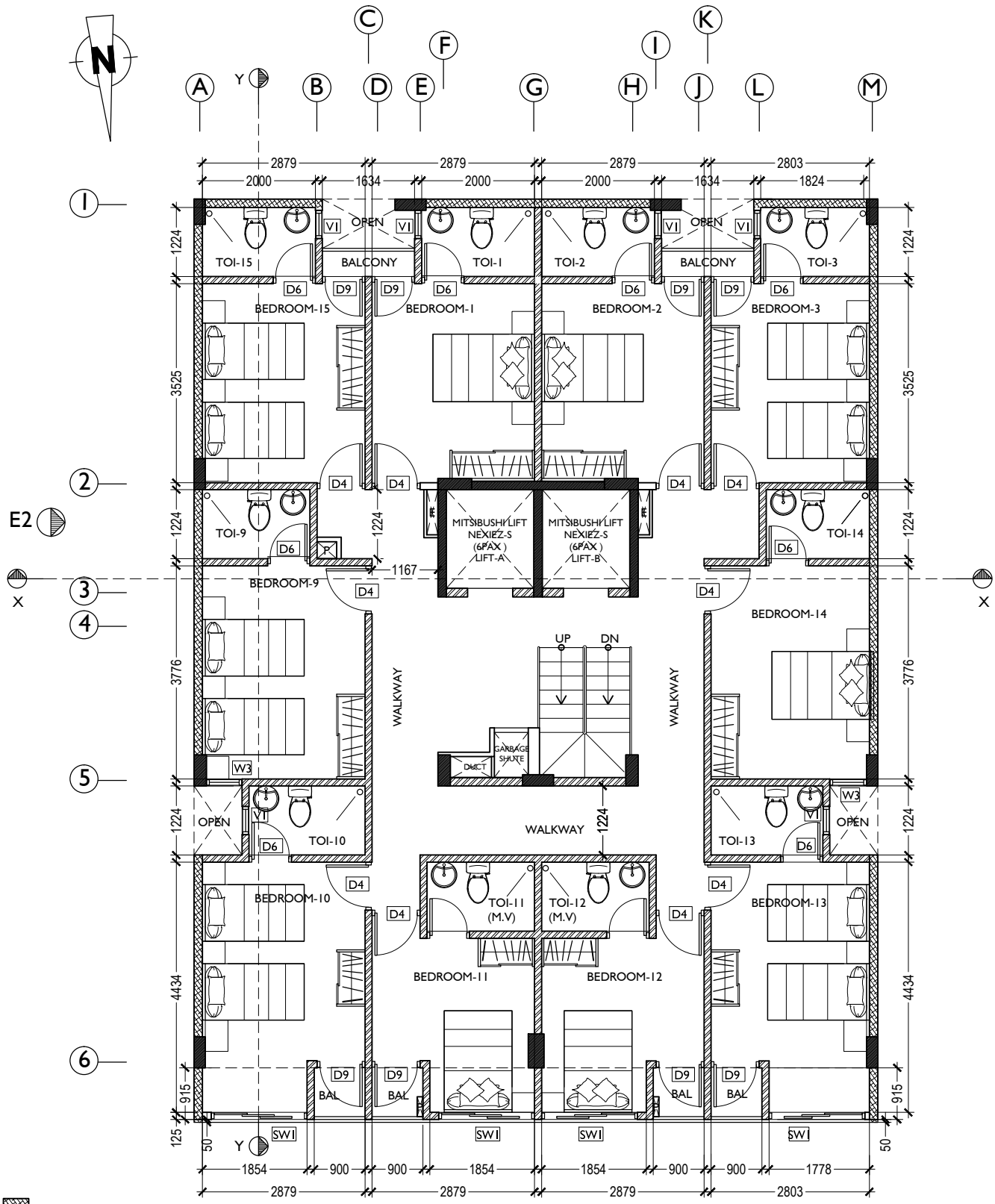

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

SIXTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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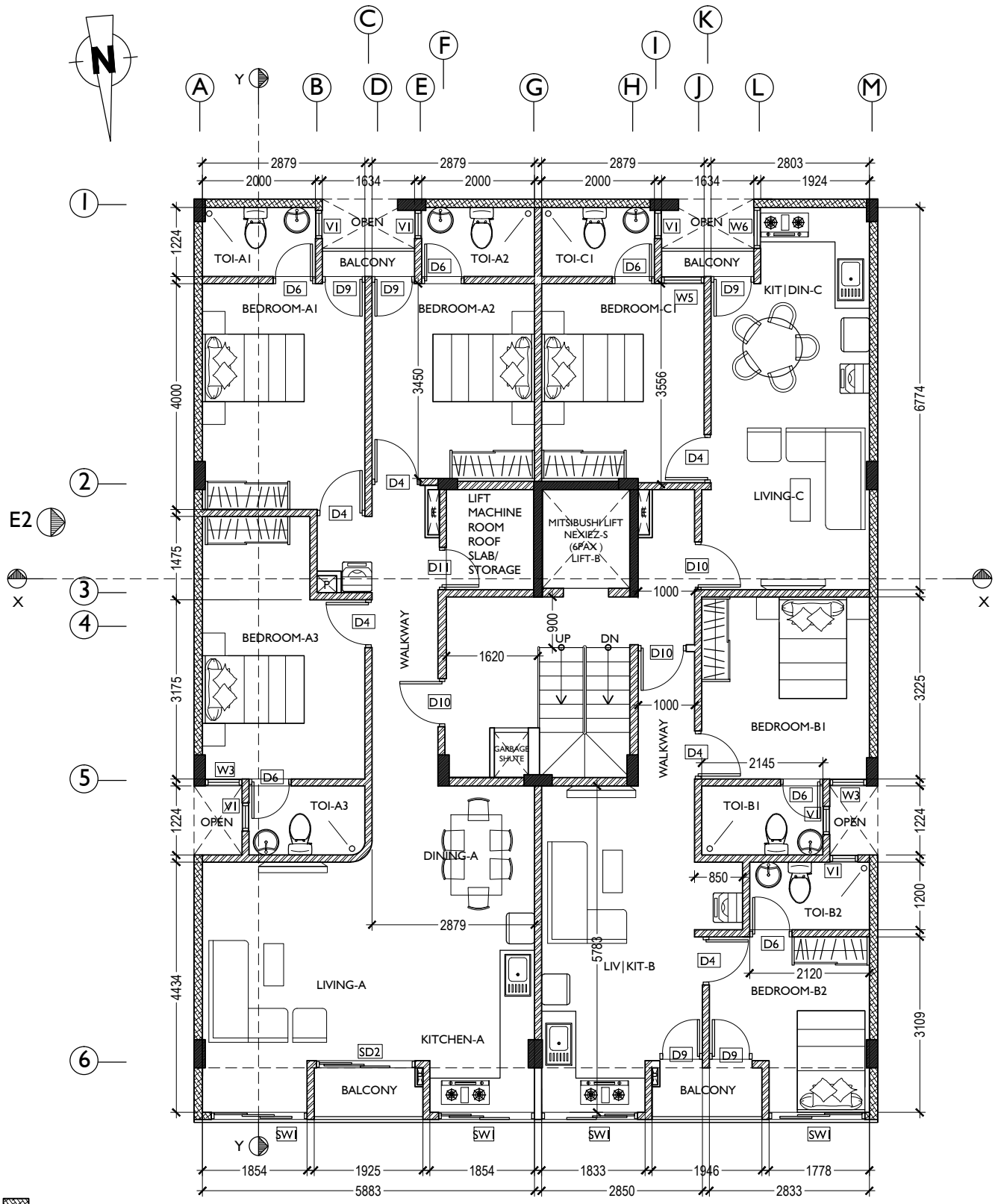

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

SEVENTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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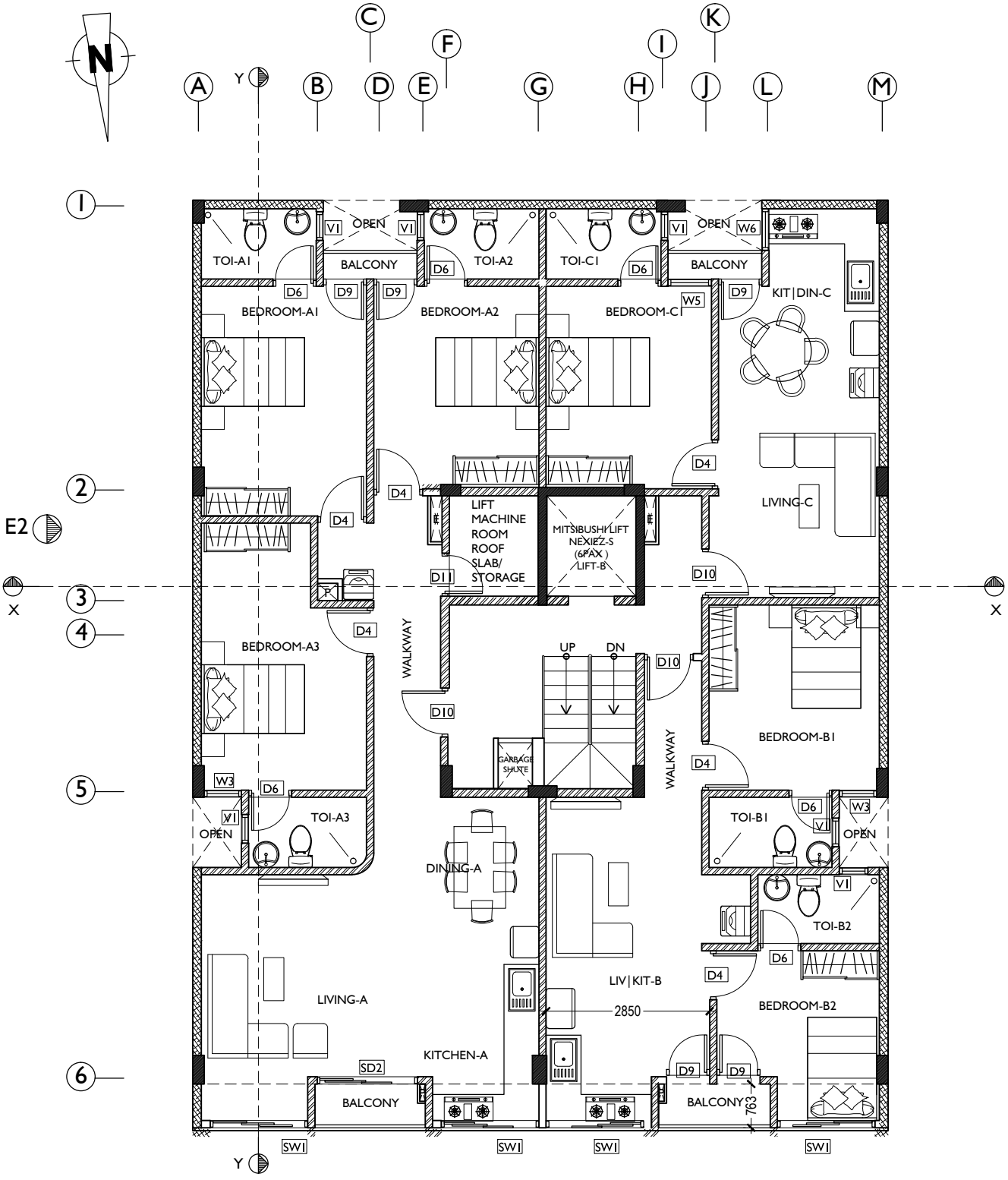

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

EIGHTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
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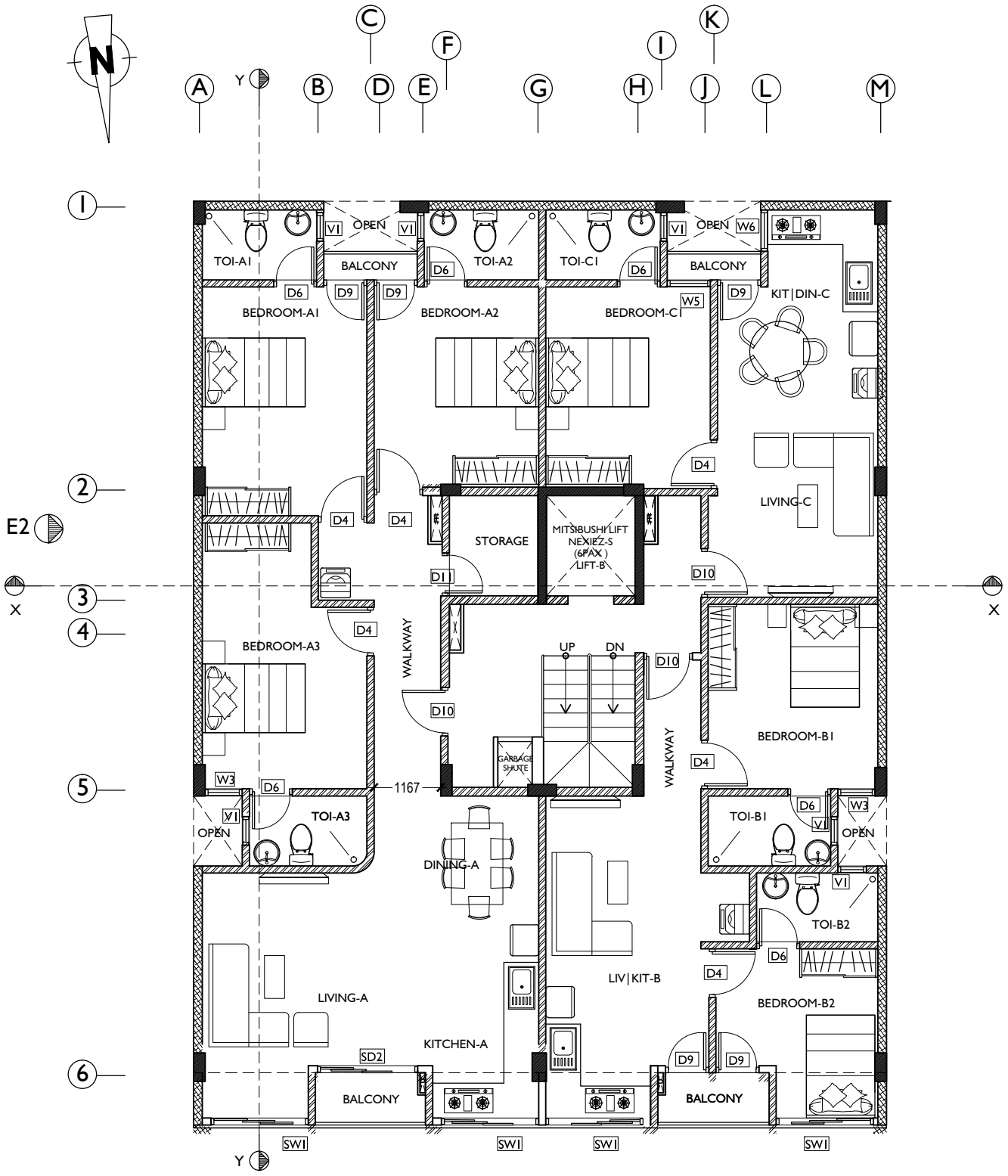

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

NINTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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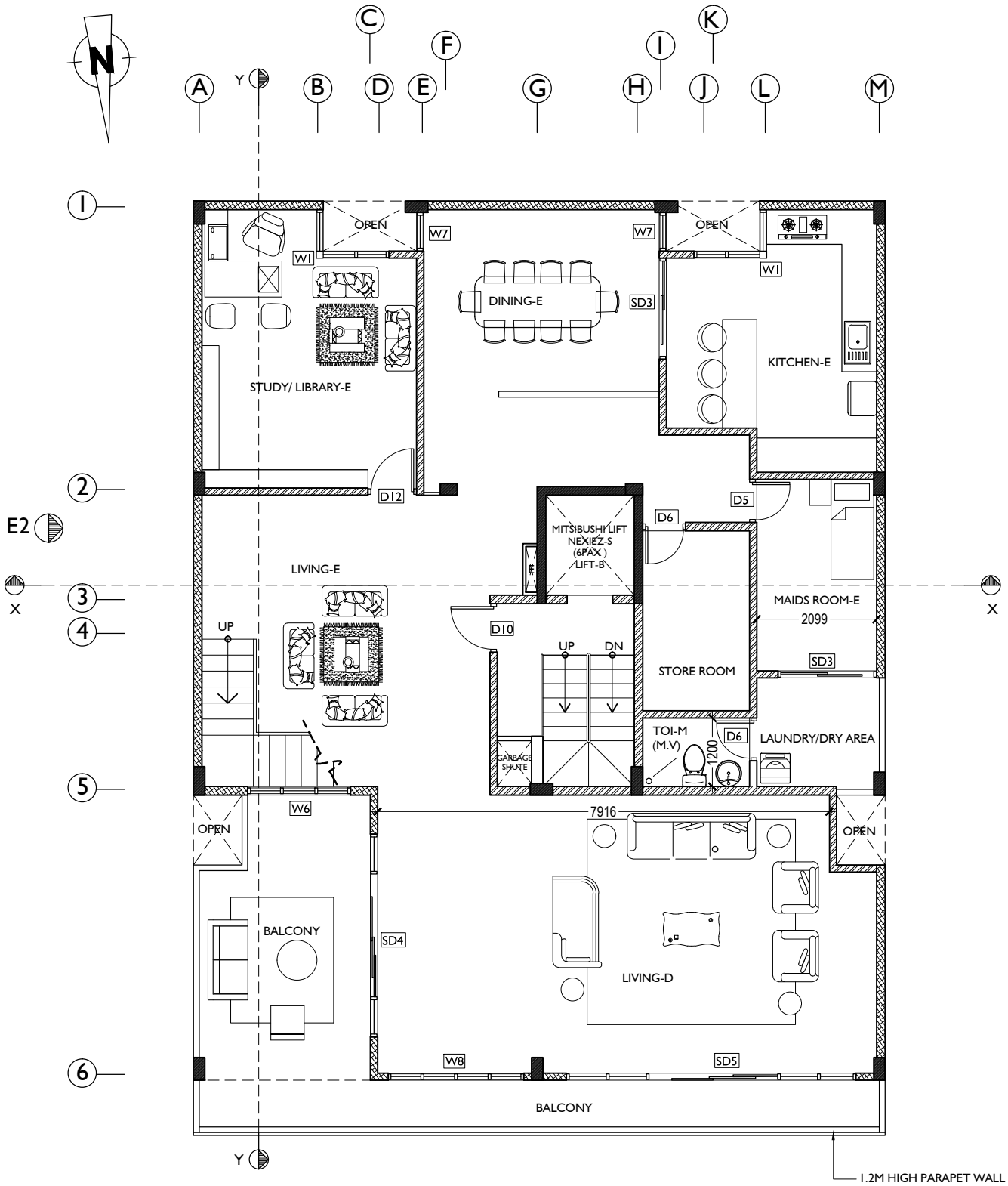

100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

TENTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

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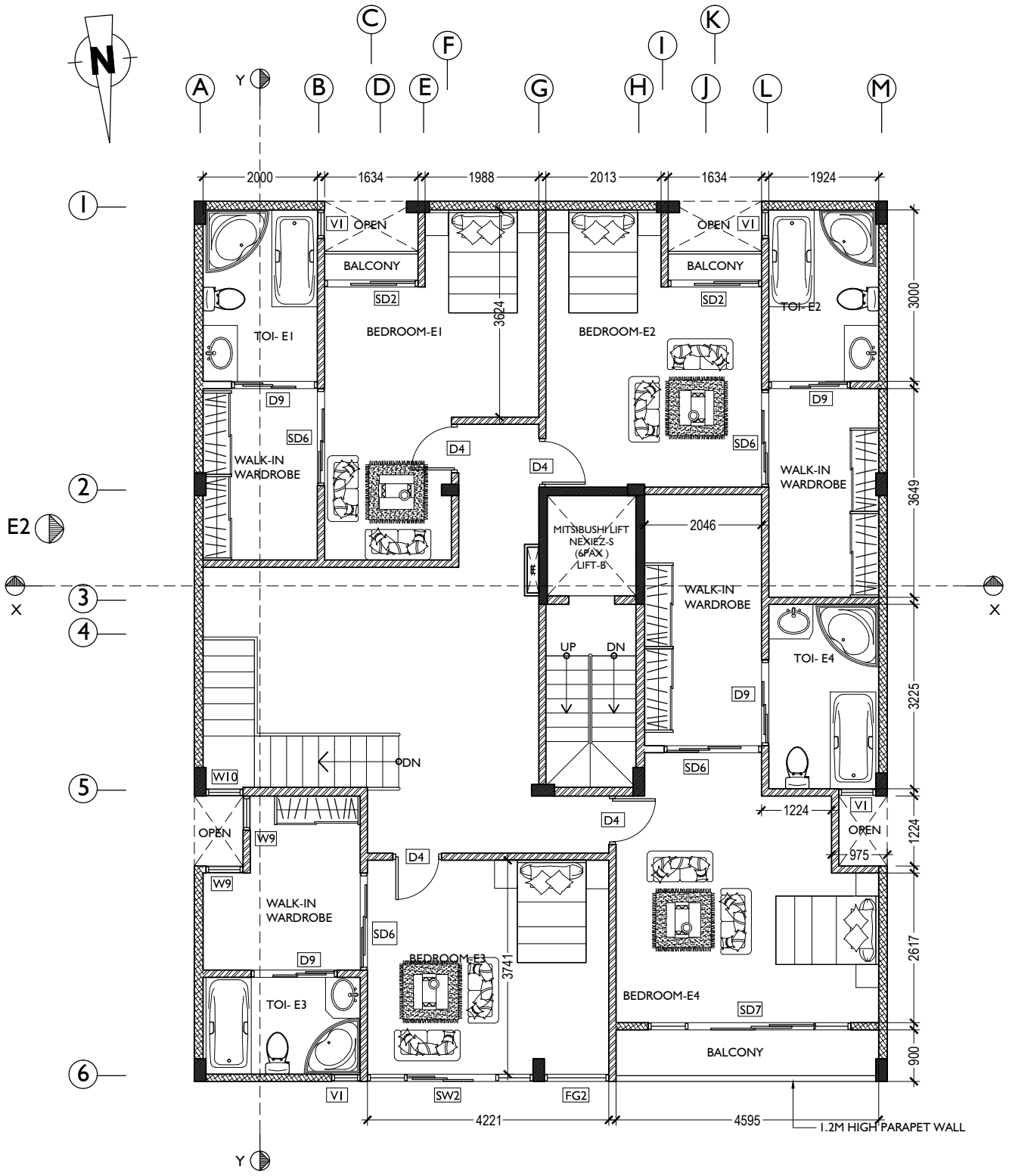


100mm THICK CONCRETE WALL

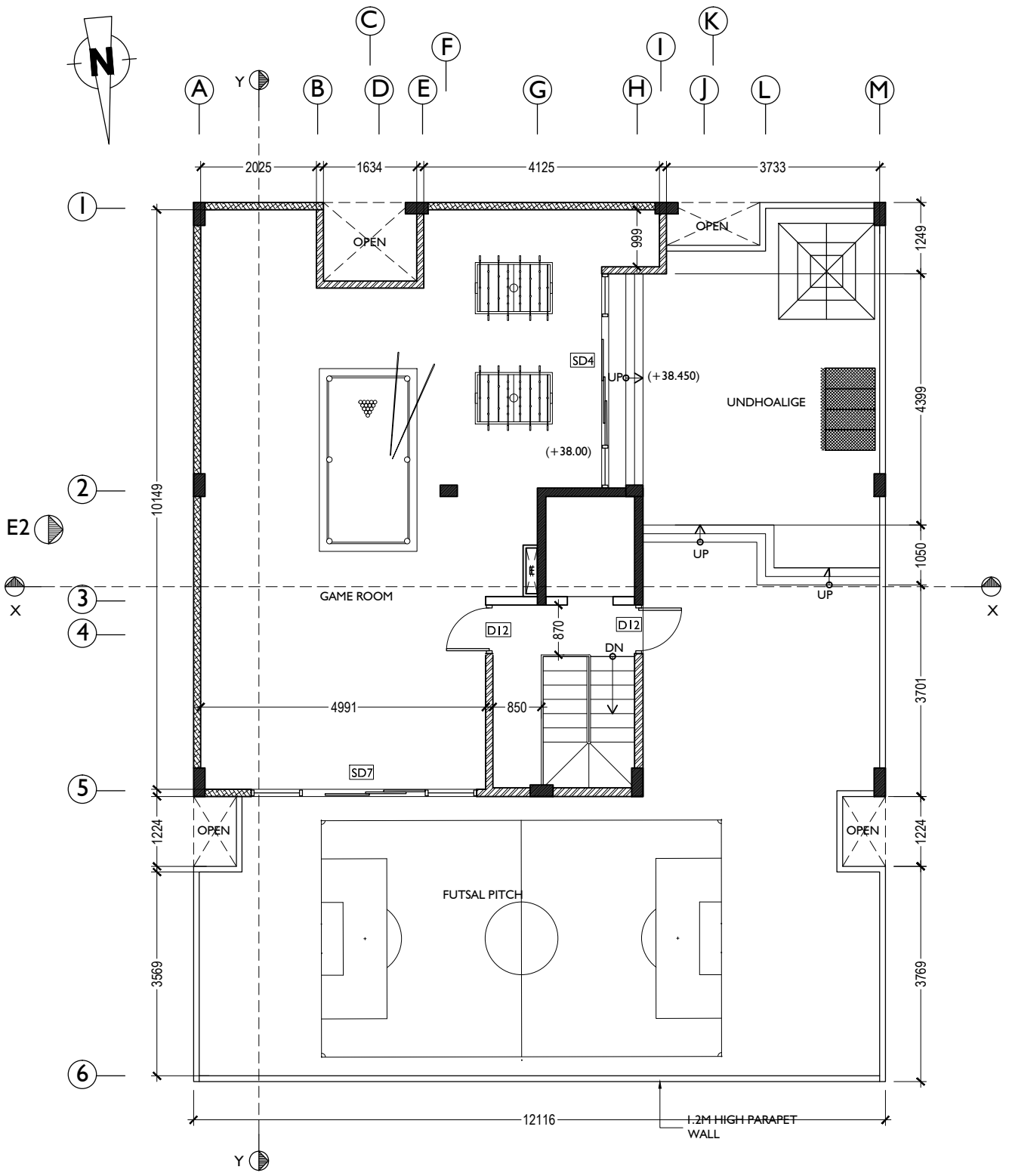
150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

ELEVENTH FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

CONTRACTORS MUST CHECK ALL DIMENSIONS ON SITE.
CONTRACTORS SHALL WORK FROM FIGURED DIMENSIONS ONLY.



100mm THICK CONCRETE WALL

150mm THICK MASONRY WALL

2m HIGH PARAPET WALL

TERRACE FLOOR PLAN 1:100

PROJECT: M. DHIMYAATH MALE' (13 STOREY BUILDING)	DRAFTED BY: MARIYAM NEELEE ENGINEER: SHIFAZ ALI (ENZO) ARCHITECT: FATHIMATH SHAHEEN ENGINEER CHECKER: IBRAHIM THOAM ARCH CHECKER: HUSSEIN IBRAHIM
CLIENT: DR. MOHAMED MUIZZU	DATE: APRIL 2017

CONTRACTORS MUST CHECK ALL DIMENSIONS ON SITE.
CONTRACTORS SHALL WORK FROM FIGURED DIMENSIONS ONLY.

Annex 7 – Proponents Commitment for Monitoring and Mitigation

بسم الله الرحمن الرحيم

M. Dhimyaath
Buruzumagu,
Male', Maldives

Date: 26 September 2017

Mr. Ibrahim Naeem,

Director General,

Environmental Protection Agency,

Male', Maldives

Dear Mr. Ibrahim Naeem,

Re: Declaration and Commitment to undertake mitigation measures and environmental monitoring proposed in the EIA for the proposed construction of 13 Storey Building at M. Dhimyaath, Male'

As the proponent I confirm that I have read the report and to the best of our knowledge, all non-technical information provided in the report are complete and accurate.

I would like to confirm my commitment to the proposed mitigation measures and the monitoring programme that has been highlighted in the EIA report that has been specifically prepared for the above referred project.

Sincerely

Dr. Mohamed Muizzu

بسم الله الرحمن الرحيم

Water Solutions Pvt. Ltd. Reg No: C-344/2005
Ma. Fas Eri, Ameenee Magu, Male', Maldives

ނަންބަރު: WS/LTR/2017/109

މާލެ ސިޓީ ކައުންސިލްގެ ރައީސް އަށް.
ފުރުން ސަލާމަށްފަހު ދަންނަވަމެވެ.

(އީ.އައި.އޭ) ރިޕޯޓުބޭއި ބާރ

މ. ދިއްގަރުގައި 13 ބެޑުގެ އިމާރާތެއް ހެދުމާއިބެހޭ އެންވަޔަރަމަންޓް އިމްޕެކްޓް އެސެސްމަންޓް (އީ.އައި.އޭ) ރިޕޯޓު ގެ ކޮޕީއެއް މިސިޓީއާއި އެކު ތިޔަ ކައުންސިލްގެ މަޢުލޫމާތަށްޓަކައި ފޮނުވީމެވެ.

އިޙްތިރާމް ޤަބޫލް ކުރައްވުން އެދެމެވެ.
01 އޮކްޓޫބަރު 2017 މ.

ޚާދިމްކުމް
މުޙައްމަދު މުޖުތަބާ
އެޑްމިން އެގްޒެކެޓިވް

WATER SOLUTIONS PVT LTD
Reg No: C-344/2005
Rep of Maldives

މާލެ ސިޓީ ކައުންސިލް

<u>އީ.އައި.އޭ ރިޕޯޓް ލިބުނުކަމުގެ ލިޔުން.</u>

އީ.އައި.އޭ ރިޕޯޓުގެ ނަން:
މ. ދިއްގަރުގައި 13 ބެޑުގެ އިމާރާތެއް ހެދުމާއިބެހޭ އެންވަޔަރަމަންޓް އިމްޕެކްޓް އެސެސްމަންޓް (އީ.އައި.އޭ) ރިޕޯޓް

ބަލައިގަތް ފަރާތުގެ ނަން: ....

މަޤާމު: ....

އިދާރާގެ ނަން: ....

ތާރީޚް: 01/10/17 .... ގަޑި: 12:00 ....

ސޮއި: .... ސިއްކާ: ....