

# Initial Environmental Examination

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Project Number: 47913  
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## MYA: Yangon Urban Renewal and District Cooling Project

Prepared by Meeyahta International Hotel Ltd.

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## LIST OF ABBREVIATION

ADB	Asian Development Bank
CO	Carbon monoxide
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ET	Environmental Team
FMI	First Myanmar Investment Co. Ltd.
GFA	Gross Floor Area
GIIP	Good International Industry Practice
IEE	Initial Environmental Examination
IEC	Independent Environmental Consultant
ISCST	Industrial Source Comple Short Term
MIC	Myanmar Investment Commission
MIHL	Meeyahta International Hotel Ltd.
MRB	Myanmar Railway Building
MOECAF	Ministry of Environmental Conservation and Forrestry
NIF	Noise Insulation Fabric
NO <sub>2</sub>	Nitrogen dioxide
NSR	Nearest Sensitive Receiver
PM <sub>10</sub>	Particulate Matter less than 10 micron
PE	Project Engineer
PP	Project Proponent
SO <sub>2</sub>	Sulphur dioxide
SPA	Serge Pun and Associates (Myanmar) Limited
TSP	Total Suspended Particulate
VOC	Volatile Organic Compounds
YCDC	Yangon City Development Committee
YSH	Yoma Strategic Holdings

# EXECUTIVE SUMMARY

## 1 INTRODUCTION

This IEE has been prepared with information from the Environmental and Social Impact Assessment (ESIA) that has been prepared for the proposed premium mixed use development comprising residential, commercial, retail and hospitality components known as the Landmark Project (hereafter referred as the “Project”). The site occupies an existing 3.9-hectare (9.64-acres) plot in the city centre of Yangon, Myanmar. The regional location of the project site is shown in Figure 1 (the “Project Site”).

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## 2 STATEMENT OF NEED

As a result of rapid urbanization, economic prospects and a positive growth outlook predicted by the Asian Development Bank (ADB), Myanmar's construction sector is on the rise. This is evident in the planning and implementation of a large number of infrastructures projects within and around the main cities. The country needs the development of urban structures to support the current growth and to achieve its long term development goals. New infrastructure is key in attracting capital investments from Japan, Korea, Europe, the US and ASEAN neighbors. There is also a keen interest by private developers and the government in preserving existing colonial era architecture and other cultural heritage buildings as part of the urbanization process as it is envisaged that this approach will contribute towards long-term financial gains.

In aiming to meet the development demands described above, joint ventures and strategic business partnerships between foreign and local companies are embarking on the development of new hotels, residential, commercial buildings, as well as to restore existing heritage buildings which were vacated when the government relocated to Naypyidaw. Specifically, Yangon is set to undergo a major transformation aligned with the strategic urban development theme "Yangon 2040, A City of Green and Gold". This urban development includes efforts to conserve and restore Myanmar's unique heritage buildings.

## 3 LEGAL REQUIREMENT

The National Environmental Conservation Law, under Section 42 (n) gives the responsibility to the Ministry of Environmental Conservation and Forestry (MOECAF) to issue necessary rules to implement the law. Under this provision, the Ministry has issued the recently approved EIA Rules and Regulations (2013).

The Rules define the EIA as the process of assessing the significant impacts of a proposed project on the physical, biological and socio-economic environment and includes an Environmental Management Plan (EMP) and a social impact assessment report. The submission of this Environmental and Social Impact Assessment (ESIA) to MOECAF for approval prior to project commencement is a legal requirement.

## 5 PROJECT DESCRIPTION

### Project Location

The proposed Project involves the establishment of a premium mixed use development comprising residential, commercial, retail and hospitality components on an existing 3.9-hectare (9.64-acres) plot located at 372 and 380 Bogyoke Aung San Road, Pabedan Township, Yangon, Myanmar. Upon completion of the Project, the total Gross Floor Area (GFA) will be approximately 200,000 m<sup>2</sup> (2.15 million ft<sup>2</sup>). The site location map is presented in **Figure 4.2**.

### Existing Layout

The site is a built environment comprising the following main buildings:

- i. Former Myanmar Railway Headquarters Building (MRB): a 130 years old three-storey brick building, listed under the Yangon Heritage Trust which has been vacant/abandoned since 1994;
- ii. The First Myanmar Investment Co. Ltd (FMI) Centre: an approximately 17 years old 11-storey building serving as an office and commercial building;
- iii. The Grand Mee Ya Hta Executive Residence: a 18-year-old, 10-storey concrete building which has been vacant since October 2013;
- iv. Zawgyi House: A former two-storey residential brick building which is currently being used as a restaurant;
- v. Two residential scale two-storey brick buildings aged approximately 50 years old which currently serves as temporary accommodation and storage, and
- vi. A variety of smaller supporting structures associated with the existing land use.

### **Proposed Layout**

The proposed Project will comprise several main components, namely:

- Peninsula Hotel, converted from the existing MRB. The Net Lettable Area (NLA) of 14,000 m<sup>2</sup> will be divided over three-storeys, a mezzanine and a basement level;
- Peninsula Residence Tower consisting of 25 storeys with a total of 84 residences and two basement levels;
- Business Hotel, covering a total NLA of 41,500 m<sup>2</sup>. The hotel has 250 hotel rooms and 89 apartments divided over 25 storeys. It will include a restaurant, bar and pool;
- Two Office Towers of 21 storeys each with a total built-up area of 68,000 m<sup>2</sup> for 32 offices;
- Retail Podium with a total built-up area of approximately 37,000 m<sup>2</sup> will accommodate a supermarket and other retail, and
- A basement car parking with approximately 1,200 parking bays.

## **6 PROJECT DEVELOPMENT ACTIVITIES**

The Project will be developed in phases and the estimated development timelines of which are as described below:

- Restoration of MRB (Luxury Hotel) – 41 months;
- Demolition of Grand Mee Ya Hta Executive Residence - 7 months;
- Site formation at footprint other than MRB – 28 months;
- Demolition of FMI Centre – 3 months ;
- Superstructure works other than MRB site – 12 months;
- Roadworks and landscaping works – 35 months; and
- Application for occupation permit – 23 months.

It is anticipated that the entire Project will take 60 months.

### **Pre-Construction Phase**

Activities undertaken during this phase are focused primarily on obtaining physical data on the existing conditions at the project area. Key activities include:

- Hazardous Materials Assessment (carried out in February 2013);

- Heritage Survey (started/completed);
- Site Topographical Survey (carried out in September 2012);
- Soil Investigation work (first one carried out in 2012 and additional one in 2013), and
- Utilities Survey (completed).

As part of the Heritage Survey, a Conservation Technical Specification (CTS) has been prepared to describe the requirements pertaining to the documentation, dismantling and storage of heritage elements identified for eventual conservation and reuse within the MRB, prior to the commencement of construction works. The dismantled elements shall be restored at a later stage, or to be reinstalled and reused in the Project.

### Construction Phase

The principal activities envisaged during the construction phase are as follows:

- Setting up and management of temporary facilities;
- Transportation of materials and machinery;
- Demolition and site clearing;
- Conservation work;
- Infrastructure and utility development;
- Construction of building structures;
- Off-site improvements per the Traffic Impact Assessment (TIA), and
- Landscape and revegetation.

### Operational Phase

During operations of the Project, air emissions, wastewater generation and waste generation have a potential impact on the environment. The likelihood and severity of impacts and their proposed management and mitigation measures are described in Chapter 8.

The anticipated utilities that will be required for the development are water supply and electricity. In addition, there will be diesel for the generators and Liquefied Petroleum Gas (LPG) for kitchen use stored on site.

An increase in traffic near the site is envisaged. The traffic assessment and recommendations for managing the increase in traffic are provided in Chapters 5 and 6.

## 7 EXISTING ENVIRONMENT

The summary of the existing environment at the Project Site is presented in **Table ES.1**.

**Table ES1: Summary of the Existing Environment**

Item	Description
<b>Physical Environment</b>	
Site Setting	The Project is located in the city of Yangon within the Yangon Region, Republic of the Union of Myanmar. Located in the heart of Lower Myanmar, Yangon lies at the convergence of the Yangon and Bago Rivers on the eastern margin of Ayeyarwady Delta and approximately 30 km away from the coastline bordering the Gulf of Martaban.

Item	Description
	<p>The Yangon Region is bordered by the Bago Region in the north and east, the Gulf of Martaban in the south and Ayeyarwady Region in the west.</p> <p>The Project is located at 372 and 380 Bogyoke Aung San Road, Pabedan Township, Yangon, Myanmar. The site is an irregularly-shaped land parcel (16°46' 50.84" N/96° 09'31.58" E (northeast corner) and 16° 46'46.58" N/96°09'23.38" E (southwest corner)) with an area of approximately 38,000 m<sup>2</sup> (3.9 hectares). The site is a built-up area comprising a number of existing buildings, namely, the MRB, FMI Centre, Grand Mee Ya Hta Executive Residence, Zawgyi House, two residential brick buildings, parking areas and a variety of smaller structures associated with the existing site.</p>
Topography	Based on the data obtained from the topography survey, the site is relatively flat, with a gentle downward slope from the northeast boundary (RL+10.97 m) to the southwest (RL+7.75 m).
Geology	<p>Yangon is underlain by alluvial deposits (Pliocene to Recent), the non-marine fluvialite sediments of Irrawady formation (Pliocene), and hard, massive sandstone of Pegu series (early-late Miocene). Alluvial deposits are composed of gravel, clay, silts, sands and laterite which lie upon the eroded surface of the Irrawaddy formation at 3-4.6 m above mean sea level (MSL). The rock type in Yangon is mainly soft rocks, which it consist of sandstone, shale, limestones and conglomerate.</p> <p>Tectonically, Yangon is situated in the southern part of the Central Lowland, which is one of the three major tectonic provinces of Myanmar. The Taungnio Range of the Gyophyu catchments area of Taikkyi District, north of Yangon, through the Thanlyin Ridge, south of Yangon forming a series of isolated hills probably resulted from the progressive deformation of the Upper Miocene rocks as the eastern continuation of the subduction or stretching and compression along the southern part of the Central Basin and regional uplifting of the Pegu Yoma (Aung Lwin 2012).</p>
Soil	<p>The underlying soil type at the Project Site and its surroundings is characterized as Meadow and Meadow Alluvial Soil. Meadow Soil is soil which occurs near the river plains with occasional tidal floods, non-carbonate and usually contains large amounts of salt. Meadow Alluvial Soils are being found in the flood plain. Both materials mainly comprise silty clay loam and neutral soil where they are rich in available plant nutrient.</p> <p>Site-specific soil characteristics of the Project Site were obtained from a soil investigation study which was conducted in October-November 2012 (Geolab (M) Sdn. Bhd). In general, the upper layers (approximately 0 to 7 m) of the soil at the Project Site comprise largely of cohesive layers with traces of sand and gravel, followed by the sand layers with low silt content and trace gravel from 7 to 35 m. The lower layers comprise denser silt layer with traces of sand and gravel from approximately 57 to 70 m. Standard Penetration Test (SPT) results indicated that the soil strength generally increases with depth.</p>
Hydrogeology	Yangon is rich in groundwater resources conserved by unconsolidated Tertiary-Quaternary deposits. In Yangon, groundwater is mostly extracted from Valley filled deposits and Ayeyarwady sandstones. High potential areas are underlain by Pliocene Series and recent Formations. High potential area covers approximately 85 percent of the Yangon city, including Pabedan where the Project Site is located.
Hydrology	The Project site lies along the catchment of the Pazundaung River which flows east of the site in a southerly direction to converge into the Yangon River.
Climate and Meteorology	Yangon has a tropical monsoon climate under the Koppen climate classification system. The city typically experiences a distinct rainy season from the month of May through to October when a substantial amount of precipitation occurs; and dry season which commences from November and ends in April. During the course of a year, average temperatures show some variance with average highs ranging from 26°C to 36°C and average lows occurring between 18°C and 25°C.

Item	Description
Natural Hazards	<p>Myanmar is exposed to multiple natural hazards including cyclones, earthquakes and floods:</p> <p><b>A. Earthquakes</b></p> <p>Yangon District is in the vicinity of the southern section of the Sagaing Fault, which has not been active in the past 50 to 75 years indicating that the faults may be under accumulating stress suggesting the potential for an earthquake is increasing. Yangon straddles the boundary between Zone II (Moderate Zone) and Zone III (Strong Zone), with the old and new satellite towns in the eastern part in Zone III and the original city in Zone II.</p> <p><b>B. Cyclones and Strom Surges</b></p> <p>Myanmar is exposed to a thread of cyclones and associated storm surges from the Bay of Bengal. Previous frequency of cyclones that made landfall at Myanmar’s coast was once in about three years. However, since the year 2000, cyclones have crossed Myanmar’s coast every year. Annually, there are approximately 10 tropical storms in the Bay of Bengal from April to December. Severe cyclones occur during the pre-monsoon period of April to May and post-monsoon period of October to December.</p> <p><b>C. Flood</b></p> <p>The monsoonal/rainy season in Myanmar is mostly from May to October and flooding and landslides are common in the country. The threat of flooding usually occurs in three waves each year: June, August and late September to October. The most vulnerability for monsoon rains to peak occurs in August.</p>
<b>Land Use within the ZOI</b>	Existing land use pattern within the Zone of Impact (ZOI) of 2 km is predominantly a mixture of commercial and residential purposes.
<b>Landscape Character &amp; Visual Amenity</b>	The existing landscape character and visual amenity are characterized by the colonial-style MRB, although in debilitating condition, FMI Centre, Grand Mee Ya Hta Executive Residence, the two old double-storey buildings, Zawagi House and landscaped green areas. The proposed design will retain the heritage character of the MRB. The visual and physical permeability of the site are keys to the design of the proposed Project. Visual access to the site and to the MRB is also very important as it contributes to the urban character of the local area thereby enhancing the history of Yangon city. In ascertaining the flora existing within the Project Site, a preliminary survey was carried out. Based on the survey data, 111 trees were identified and no protected species or species of conservation value were identified.
<b>Air and Noise Quality</b>	Secondary data obtained from a monitoring station located around the Traders Hotel in December 2008, monitored over an averaging period of 24 hours including Total Suspended Particulate (TSP), PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>2</sub> , showed that most parameters were well below the UESPA standards. Both air quality and noise environment were dominated by vehicular traffic and occasionally by construction works. Noise was not regularly monitored as it is largely location specific.
<b>Soil and Groundwater</b>	<p>An intrusive soil and groundwater investigation was performed at the Project Site where baseline analytical results were generally compared against the Dutch Standards 2009 (Rev 2012).</p> <p>DTV exceedances in soil were reported for all metals and metalloids tested for except total chromium and molybdenum, selected sum PAHs and mineral oil. Among samples</p>

Item	Description
	<p>tested, TP11 has reported an exceedance of the DIV limit for copper (190 mg/kg) with a reading of 600 mg/kg. A comparison with alternative standards for combined exposure pathways (dermal contact and incidental ingestion) in commercial/industrial soil indicates that the general population (including excavation workers) is not at risk at the current copper concentrations. Total coliform was also detected in the soil samples, where most coliforms are harmless in soil with no human health risk.</p> <p>Detected constituent in groundwater is compared to DTV, DIV and Myanmar Effluent or Water Quality Standards. Barium in all four monitoring wells was found to exceed the DTV. The groundwater quality at the Project Site is in generally in compliance with the prescribed limits. Total coliform was present in groundwater samples MW3 and MW4, recording at 30,000 CFU/100 ml and 500 CFU/100 ml respectively. Based on the Guidelines on Canadian Drinking Water Quality, the CFUs in MW3 and MW4 exceed the limit of 10 CFU/100 ml. In the event groundwater from the site is proposed for consumption, the supply will be subjected to treatment to ensure safe consumption of the water.</p>
<b>Biological Environment</b>	
	<p>The Project Site is a built-environment and the species of flora surveyed at the site are native species not uncommon to the Yangon area. There were no protected species or species of conservation value identified.</p>
<b>Socio-Economic Environment</b>	
Population Density, Population Growth and Distribution in Yangon City	<p>The Yangon Division is the smallest but the most densely populated area in Myanmar with population density of 635 persons per km<sup>2</sup> in 2005. In 2005, the total population of Yangon City was estimated to be about 4.35 million, with an average growth rate of 2.5 percent during 1983-2005 periods. The 2005 data indicates 30 percent the population were under 15 years old, 65 percent between 15 and 64 years old and 6 percent were over 64 years old. Pabedan township has an urban population of 29,900. The projected population for Pabedan township for 2015 is 62,402 people and for 2020 is 67,575 people with a growth of 1.4 percent from 2010-2015 and 1.6 percent from 2015-2020 (Myanmar Information Management Unit of the United Nations Development Programme, July 2013).</p>
Employment by Sector	<p>The industrial structure in Yangon Region consists of the processing and manufacturing sector (37 percent); trade sector (25 percent) and services sector (24 percent). In 2001, the key employment sector is the tertiary sector which a share of more than 70 percent of total employment. About one fifth of the total population employed was in the secondary sector and about 5 percent in the primary sector, particularly agriculture.</p>
Labour Supply and Demand	<p>The number of people of working age is projected to rise from about 3.1 million in 2005 to 5.4 million in 2020 which correspond to the increase in overall population during the period. The labour force participation rate is expected to increase by a rate of 0.5 percent per annum from 59.2 percent in 2005 to 63.8 percent in 2020. The tertiary sector is expected to remain dominant and its share to the total employment is expected to increase from 75.4 percent in 2005 to 78 percent in 2020 while the primary and secondary sectors are expected to decline in their share to the total employment.</p>
<b>Traffic and Transportation</b>	
Existing Access	<p>Existing access to the Project Site is from Bogyoke Aung San Road with one entry and exit to serve FMI Center and one entry and exit to serve Grand Mee Ya Hta Executive Residence. There are other kerb cuts and access points that are no longer in operation and were historically used to access the MRB.</p>
Existing Road Characteristics	<p><b>Bogyoke Aung San Road</b> is a primary road with one-way traffic direction with 4 lanes. There is a raised median and barrier along the centre of the road that starts approximately 100 m from the west junction and 100 m from the east. The road runs in a west-east direction and connects Shwedagon Pagoda Road in the west to Lower Pasunduang Road in the east.</p> <p><b>Alan Pya Pagoda Street / Zoological Garden Road</b> is another major road with two way traffic in a north-south direction.</p>

Item	Description
	<b>Sule Pagoda Road</b> is a three-lane two-way road with raised median. The road runs in a north-south direction and connects Bogyoke Aung San road to the north and Strand Road to the south. There are service roads alongside the northbound (north part) and southbound (south part) of the road.
	<b>Shwedagon Pagoda Road</b> is a four-lane two-way road with stripe median. The road runs in a north-south direction and connects U Htuang Bo Road in the north and Strand Road in the south.
Existing Traffic Volume	A video traffic survey was conducted for the weekday peak periods 08:30-09:30 and 16:30-17:30 on Monday 3rd and Tuesday 4th June, 2013.
Pedestrian Movements	There are existing footways surrounding the site on Bogyoke Aung San Road and Alan Pya Pagoda Street and to the west of the existing Grand Mee Ya Hta Executive Residence access. This is an uncontrolled pedestrian crossing with striping. The latter is regularly used and the Project will make improvements to this as currently people are required to step out in front of a lot of traffic.
Public Transport Accessibility	In Yangon 80% of trips are undertaken by bus and 3% by rail.
Background Traffic in Yangon	The estimated number of registered cars in Yangon in 2011 is 167,440. This equates to 28 cars per 1,000 people in Yangon (estimate of 5 cars per 1,000 people in whole of Myanmar). Yangon currently prohibits motorcycles in the city centre and bus travel accounts for over 80% of daily trips. Plans to improve the Yangon Circular Railway and implement Bus Rapid Transit or other mass rapid transit systems are still in the early stages and implementation is unlikely to happen within the next 5 years before the Project opens.
<b>Heritage Assessment</b>	
Current Conservation Regulatory Context	Current conservation policies mainly comprise the Protection and Preservation of Cultural Heritage Regions Law (1998), and the Yangon City Development Committee (YCDC) Heritage List (1996).

## 8 ASSESSMENT OF IMPACTS AND PROPOSED MITIGATION

The assessment of potential impacts anticipated from the implementation of the Project is summarized below.

### 8.1 Air Quality

#### 8.1.1 Construction Phase

Potential sources of air quality impact during the construction phase include fugitive dust arising from the activities such as site clearance, excavation, demolition of buildings on-site, and the operation of the batching plant. Fugitive dust is represented by Total Suspended Particles (TSP) and a small fraction of Particulate Matter (i.e. PM<sub>10</sub>). It is noted that due to the high groundwater table at the Project Site, excavation activities are not expected to generate significant amount fugitive dust.

The exhaust emissions emitted from vehicles and machinery engine exhaust emissions will contain NO<sub>x</sub>, SO<sub>x</sub>, CO, volatile organic compounds (VOC), particulates and smoke.

#### 8.1.2 Operation Phase

During the operational phase of the Project, there will be no sources of significant air emissions. Air pollution will be a minor issue during the operational phase of the Project.

## 8.2 Noise and Vibration

### 8.2.1 Construction Phase

#### *Noise*

Construction noise impact is considered a key issue and hence has been addressed quantitatively in detail while noise during the operational phase has been assessed qualitatively.

The noisiest tasks are identified to be associated with piling and demolition works.

To establish the existing baseline noise levels, noise levels were measured at representative noise sensitive receivers (NSR) near the northern and southern boundaries of the Project Site. The noise assessment area is defined as the areas within a 300 m radius of the Project Site boundary.

Based on the predicted levels, there will be noise exceedance at one NSR location (N2-Church) by a maximum of 4 dB(A) for 13 construction months. By implementing the proposed mitigation measures, it is expected that the noise exceedance at N2 can be reduced by 1 dB(A) with the months of noise exceedance shortened by 3 months.

#### *Vibration*

Construction vibration will be dominated by demolition activities associated with Grand Mee Ya Hta Executive Residence and FMI Centre. All demolition activities will be staggered to avoid cumulative vibration impacts.

The use of backhoe mounted hydraulic breakers was the focus of the vibration assessment. A number of vibration sensitive receivers ("VSRs") were identified based on their proximity to the Project Site, nature of uses and the number of people that might be affected.

The vibration impacts have been calculated based on a specific methodology from both the structural damage and annoyance perspective. The results demonstrate that there will be no unacceptable vibration impacts predicted at the VSRs.

### 8.2.2 Operation Phase

Noise impacts are not expected to be significant during the operational phase of the Project. The main sources of noise generation are mobile and intermitted. In addition, the surrounding area is highly urbanised and already exposed to traffic noise. Therefore it is predicted that the impacts from the Project will not be significant.

## 8.3 Water Quality

### 8.3.1 Construction Phase

Sources of water quality impacts predicted during the construction phase include:

- Soil erosion from construction activities;
- Potentially contaminated surface runoff arising from the site; and

- Sewage from temporary on-site sanitary facilities.

a) In preventing or minimizing the impacts arising from soil erosion, the appointed Contractor must ensure that the phased approach is maintained. The impacts arising from the earthwork activities can be minimized with the implementation of appropriate mitigation measures and carried out by the appointed Contractor in accordance with the construction methodology proposed by the engineering team.

With the proposed measures in place, the site preparatory works are not expected to result in adverse erosion rates. The impacts arising are transient in nature, occurring only during the site preparation stage of the construction phase, and with the effective implementation of these measures, this risk will be further reduced.

b) Water quality impacts from site drainage will become significant in the event the runoff is uncontrolled and permitted to discharge directly into the canal without any form of pre-treatment. Temporary and/or permanent drainage conveyance systems will be installed immediately following the site preparation works. Provided the construction runoff and drainage are effectively managed and controlled with the implementation of the recommended mitigation measures, the potential impacts to the receiving canal is not predicted to be significant.

c) To eliminate the source pollution, portable toilets will be provided for use at the proposed site to prevent any release of untreated sewage into city main drain which transects the Project Site.

### **8.3.2 Operation Phase**

During the operational phase of the Project, the main source of water quality impact will be domestic wastewater which comprises sewage and sullage. Stormwater from the Project Site will be conveyed via a network of permanent drains which will discharge via the northern boundary of the site into the existing canal. To treat the sewage effluent from the sanitary facilities on-site and the sullage, a sewage treatment plant (STP) will be constructed on-site. The treated effluent will be reused onsite as cooling water and any excess will be pumped into the city's stormwater drainage system.

## **8.4 Soil and Groundwater**

### **8.4.1 Construction Phase**

The potential impacts on soil and groundwater resources during the construction phase are likely to be attributed to improper management and handling of hazardous materials stored at the site. Soil and groundwater impacts arising from accidental spillage and leakage of hazardous chemicals and wastes during the construction phase are assessed to be not significant due to the limited quantities of chemicals used at any one time on-site during construction.

The risks of soil and groundwater contamination during the construction phase will be appropriately managed and controlled by implementing the proposed mitigation measures.

### **8.4.2 Operation Phase**

Accidental release of hazardous materials/chemicals have the potential to result in adverse impacts on soil and groundwater resources during the operational phase of the development. Both organic and inorganic contaminants in soil and groundwater have the potential to pose short term and long term threats to human health, safety and sensitive environmental receptors.

Impacts to soil and groundwater resources associated with implementation of the Project can be minimised or prevented by implementing appropriate mitigation measures. The diesel and chemical storage facilities will be designed and operated to ensure that as far as practicable, leakage and accidental release of chemicals into the underlying soil and groundwater do not occur. Prevention and control measures will be further put in place.

## **8.5 Waste**

### **8.5.1 Construction Phase**

The types of solid wastes generated during the construction phase can be broadly categorised based on their nature and ultimate disposal method into the following:

- Non-hazardous solid wastes: e.g. demolition debris, excavated soil, construction spoil from the construction works, general waste; and
- Hazardous wastes: demolition waste of old structures potentially contains hazardous materials such as Asbestos Containing Material, lead-based paints and mold.

Overall, the impacts arising from the management of non-hazardous and hazardous wastes at the Project Site during the construction phase are predicted to be short-term and localized, and can be effectively mitigated with the implementation of appropriate construction management practices.

### **8.5.2 Operation Phase**

Non-hazardous wastes arising from the occupancy of the residential tower blocks and the hotels include domestic wastes such as kitchen, garden and office wastes. Small quantities of hazardous wastes, such as spent oil and used fluorescent bulbs will be generated from the operation of the hotel largely from periodic maintenance activities. The primary concern with regards to hazardous and municipal wastes management is improper disposal at unauthorised sites.

Waste collection areas will be provided within the Project during the occupancy/operational stage. A waste separation system may be implemented within the Project Site and options for waste recycling may be considered to minimise the volume of wastes to be disposed to the landfill.

## **8.6 Socio-Economic Aspects**

### **8.6.1 Construction Phase**

The magnitude and duration of the Project is likely to positively impact the overall socio-economic status of the city of Yangon. The Project will provide significant employment opportunities for the local skilled and unskilled work force and will be a driver for economic

growth. This socio-economic assessment did not identify any significant adverse social impacts arising from the Project.

### 8.6.2 Operation Phase

Only significant long-term positive socio-economic impacts are predicted as a result of the Project. No negative socioeconomic impacts are envisaged. The key benefits accrued by the Yangon Division and the neighbouring regions include the inflow of foreign direct investment, transfer of technology/training, growth of supporting businesses, employment opportunities, economic benefits and business for local suppliers.

## 8.7 Cultural Heritage

### *Impact on Myanmar Railways Building*

Direct moderate to high impacts are associated with:

- **new usage and design** brief, compliance with present-day building codes, compatibility of additions and alteration work with the building's heritage significance and character;
- **interior remodeling** of the MRB with regards to partial demolition and structural strengthening works;
- **foundation underpinning and basement construction** works;

Direct moderate impacts are associated with:

- **facade strengthening** and restoration works
- **visual impact** on the immediate setting of the MRB associated with new podium, high-rise towers and courtyard atrium.

### *Impact on Adjacent Heritage Structures*

Indirect physical impact associated with construction works in proximity, e.g. basement excavation, demolition of FMI Centre, is moderate. The proposed mitigation will entail conducting a structural dilapidation survey on the adjacent buildings, use of a low impact method and sequence for basement construction and application of active protection, instrumentation and monitoring of the adjacent buildings.

The visual impact on the immediate vicinity and adjacent buildings such as the St Gabriel's Church is considered to be moderate, whilst the visual impact on the wider setting – Bogyoke Aung San Market – is low. The proposed mitigation is limited due to the intimate scale of streets and lanes, height of market blocks etc. Little or no mitigation measures required.

## 8.8 Landscape and Visual Impacts

### 8.8.1 Construction Phase

The development of the Project will result in temporary adverse landscape and visual impacts during the demolition and construction phase. A decorative hoarding will be erected around

the periphery of the Project Site to screen the temporary construction works from the local low level receivers, mainly pedestrians.

The construction of Project will inevitably impact the existing trees within the Project Site. Wherever possible the existing trees which contribute most to the landscape of the Project Site will be retained. It is anticipated that the 10 trees and 41 palms identified for transplantation can be relocated to a nursery area. In cases where transplantation is not considered viable then compensatory planting is proposed.

### **8.8.2 Operation Phase**

A qualified landscape architect is involved in the design, construction, supervision and monitoring and maintenance period to oversee the implementation of the recommended landscape and visual mitigation measures including the tree preservation and landscape works on site. Measures put in place to protect the landscape components and to create an aesthetic/visual impact are proposed.

## **8.9 Ecology**

Presently, the existing vegetation within and around the MRB, which has been deserted and is in a dilapidated condition, comprises largely of sparsely distributed secondary vegetation including common species of grass, shrubs and isolated trees. The existing vegetation around FMI Centre and Grand Mee Ya Hta Executive Residence comprise fruits trees, ornamental trees and common species of shrubs used for landscaping purposes. The areas along the northern and eastern boundaries of the site are overgrown with dense undergrowth, shrubs and scattered stands of fruits trees such as mango, jackfruit and coconut trees.

Overall, the impacts arising from the Project on the existing terrestrial flora and fauna; and avifauna are not significant.

## **8.10 Traffic and Transportation**

Currently, existing access to the site is from Bogyoke Aung San Road with one entry and exit to serve FMI Centre and one entry and exit to serve Grand Mee Ya Hta Executive Residence. There are other kerb cuts and access points that are no longer in operation and were historically used to access the MRB.

### **8.10.1 Construction Phase**

The existing access to Grand Mee Ya Hta Executive Residence on Bogyoke Aung San Road will be used during construction. During the construction of Phase 2, FMI Centre access will be used. During the construction of Phase 1, FMI Centre access will operate as existing.

The construction is expected to take approximately 5 years with the majority of vehicles entering and exiting the site during the basement excavation at the start of the construction period.

Construction traffic will avoid the peak traffic hours and adhere to Yangon City Development Council (YCDC) limitations on vehicle size during specified hours of the day. Traffic management during the improvements and access design connecting to the public road will

be prepared by the Contractor at a later date and agreed with the YCDC Roads and Bridges Department.

### **8.10.2 Operation Phase**

#### ***Future Base Year Analysis***

According to the Project's current development plan, the Project will be open in 2018 which is 5 years from 2013 (start of early works). In the absence of any formal advice on traffic growth % for future years, the traffic volume for 2018 has been calculated by applying an estimated annual growth factor for two scenarios: a 5% annual growth (based on controlled car ownership/imports and improved public transport) and a 10% annual growth based on existing trends.

The existing junction would be able to operate satisfactorily with a 5% increase per year in traffic but will begin to experience more significant delay and queuing if traffic increases at 10% per annum. The junction can operate better in the AM peak than the PM peak.

#### ***Future Year with Development***

Analysis of the Traders Junction has been undertaken for 2018 with the Project. The development traffic distribution is based on the existing percentage distribution at the junction. To mitigate the increase in traffic as a result of the Project, as well as altering the signal timings, the Developer proposes to improve the pedestrian facilities and flow of traffic along the site frontage.

The Project will include some improvements to the pedestrian and traffic in the vicinity of the site, which are described in Chapter 6.

### **8.11 Health and Safety**

The IFC PS 4 recognizes that project activities, equipment and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project proponent's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.

The management of potential impacts and the mitigation measures have been developed to achieve the objectives of IFC PS 4, as applicable to the environmental and social setting of the Project.

MIHL and its enlarged group of companies (the "Group") has recently issued Guidelines on Minimum Health & Safety Standards for Major Works and its compliance during the implementation of the Project is mandatory. An important preventive measure that the guideline covers is that all workers and supervisors working at the Project Site must have received health and safety training.

#### **8.11.1 Construction Phase**

The Project Site will be organized in conformity with the civil-engineering and working designs. The site will be fenced, with signs and marking of detour for transport vehicles and passageways for pedestrians along the main Bogyoke Aung San Road.

Knowledge on the health and safety rules of these workers will also be checked periodically to ascertain their understanding. Prior to starting construction works, the more dangerous zones where hazardous factors exist within the Project Site will be identified.

It is important and critical to protect the community and workers from physical, chemical and other hazards associated with the Project Site during construction phase.

Increased incidences of communicable diseases represent a potentially health threat to project personnel including the Contractor, the workforce and residents of local communities. Prevention of the transmission of disease is also a key consideration.

A significant increase in the movement of heavy vehicles for the transport of construction materials and equipment will impact the risk of traffic-related accidents and injuries to workers and the local community.

The above mentioned impacts can all be managed by implementing proper mitigation measures. Reference is made to Chapter 6.

### **8.11.2 Operation Phase**

During the operational phase, health and safety impacts will be significantly reduced and limited to maintenance activities and the handling of hazardous materials, paints, oils, etc. In ensuring the safe handling of these materials, Material Safety Data Sheets (MSDS) for each of the chemicals will be obtained and the corresponding storage and handling measures will be implemented, including the provision of appropriate personal protective equipment.

## **9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN**

The Environmental and Social Management Plan (ESMP) establishes the strategy for how environmental and social impacts will be managed throughout the stages of the Project, i.e. the construction and operational phases of the Project, and provides a framework upon which the Developer will set environmental and social management requirements for the Project via its contractual documents with the relevant parties, e.g. the main Contractor appointed for the construction phase of the Project and the managing entities appointed to operate the various development components within the Project Site.

Within the ESMP, roles and responsibilities for all relevant parties that will be involved in the implementation of the plan are explained. Another important component of an ESMP is training and awareness.

The final ESMP will be developed upon completion of the ESIA process, the public notification and stakeholder engagement process, receipt of feedback from the regulatory agencies, any ESIA approval conditions and completion of the detailed construction methodology and design.

A copy of the final EMSP will be required to be maintained at the construction site with easy access by Project staff and the public. The EMSP will be regularly reviewed in relation to conditions encountered and updated as appropriate.

## 1 Introduction

1. Meeyahta International Hotel Ltd. (MIHL) intends to redevelop the group's existing 3.9-hectare (9.64-acres) plot in the Yangon city centre area into a premium mixed use development scheme comprising residential, commercial, retail and hospitality components known as the Landmark Project (hereafter referred as the "Project"). MIHL is currently owned by Serge Pun and Associates (Myanmar) Limited, a Myanmar-based company that is majority owned and controlled by Mr. Serge Pun .

2. The Project Site which is located at the northwest corner of Bogyoke Aung San and Sule Pagoda Road within the Pabedan Township in Yangon is a built environment accommodating the historic Myanmar Railways Building (MRB) (former headquarters for the railway company), FMI Centre, Grand Mee Ya Hta Executive Residence, Zawgyi House, two residential brick buildings (abandoned) and a variety of smaller supporting structures associated with the main buildings on site.

3. As part of this Project, most of the buildings and related structures at the Project Site will be demolished except for the MRB which will be refurbished and restored. The redeveloped site will comprise the Peninsula Hotel, the Peninsula Residence (luxury condominium), a business hotel and serviced apartments, two office towers, a retail podium, a two-level parking basement structure and associated ancillary structures. The unique element of this Project is the restoration and conversion of the MRB into a heritage building by maintaining the building's distinctive and elegant colonial architecture. This refurbished building will house the luxury Peninsula Hotel.

4. The Asian Development Bank (ADB) has requested that an Initial Environmental Examination (IEE) be prepared for the Project which according to the ADB Safeguards Policy Statement (June 2009) corresponds to a Category B project. Category B projects are defined as projects where the potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed readily. The Project is also subject to an Environmental Impact Assessment (EIA)/Environmental and Social Impact Assessment (ESIA) in accordance with the requirements of the Myanmar environmental regulatory agencies and the Myanmar Investment Commission (MIC) approval conditions.

5. This IEE has been prepared by MIHL to comply with the lending and financing consideration processes of the ADB.

## 2 Policy, Legal and Administrative Framework

### 2.1 National Policy and Legal Requirements

6. In promoting environmentally sustainable development, the Government of Myanmar has put in place the necessary legal and institutional requirements to ensure that environmental and socio-economic factors are deliberated during the early stages of project planning.

7. The recently promulgated Foreign Investment Rules and MIC Notification (2013) clarified Myanmar's new foreign investment framework which requires the submission of an ESIA for most of the projects presented to the MIC for approval. The draft ESIA will be submitted as part of the Project's MIC application package. Currently the **Ministry of Environmental Conservation and Forestry (MOECAF)** is one of the members that will participate at the MIC meetings and review ESIA reports as part of the MIC approval process. Members of MIC including MOECAF will review the project documentation presented as part of the application package, will present comments if any and will give their clearance. With the MIC clearance the Developer can start project implementation.

8. The National Environmental Conservation Law which was promulgated in 2012 emphasizes the need to reduce air pollution, water pollution and land pollution, and requires public engagement to increase their awareness with respect to environmental pollution and social issues and encourages public participation. The responsibility to enforce these requirements has been given to MOECAF. Chapter IV, section 7(m) of the Law requires the conduct of an ESIA for development projects and stipulates environmental quality standards on water quality, underground water quality, atmospheric quality, emissions, effluents, solid wastes and other environmental quality standards.

9. Under Section 42 (n) of the National Environmental Conservation Law, MOECAF has been empowered to enforce requirements of the necessary rules to implement the Law. Under the provision of this Law, MOECAF has prepared the draft Environmental Impact Assessment Rules and Regulations (draft was submitted to the Cabinet/Parliament in 2013 and at the time of reporting was still under review), that requires any project likely to have a significant impact or change on the environment to undertake an EIA and obtain approval for implementation of the project. The Rules define the EIA as the process of assessing the significant impacts of a proposed project on the physical, biological and socioeconomic environment and includes an Environmental Management Plan (EMP) and a social impact assessment report. The submission of this report to MOECAF is a legal requirement under the Myanmar Foreign Investment Law and the MIC and will be submitted as part of the MIC application package.

## **2.2 Applicable ADB and IFC Safeguard Requirements**

10. IFC has given a Category B to the Project according to IFC's Policy on Environmental and Social ("E&S") Sustainability because a limited number of specific and reversible environmental and social impacts may result, which can be avoided or mitigated by adhering to generally recognized performance standards, guidelines or design criteria.

### **Identified Applicable IFC Performance Standards**

PS 1: Assessment and Management of Environmental and Social Risks and Impacts  
PS 2: Labor and Working Conditions  
PS 3: Resource Efficiency and Pollution Prevention  
PS 4: Community Health, Safety and Security  
PS 8: Cultural Heritage

11. MIHL has prepared an IEE report for its Landmark Project to comply with the lending and financing consideration processes of Asian Development Bank (ADB). The IEE needs to conform to ADB policies and guidelines.

**Identified Applicable ADB Safeguards and Strategies:**

12. ADB's policies and standards to manage social and environmental risks and impacts are considered:

- (i) ADB Safeguard Policy Statement (2009);
- (ii) Policy on Gender and Development (1998)
- (iii) Social Protection Strategy (2001); and
- (iv) Public Communication Policy (2011).

The ADB Safeguard Policy Statement 2009 sets out the policy objectives scope and trigger and principles for the following three key safeguard areas:

- (i) Environmental safeguards;
- (ii) Involuntary resettlement safeguards; and
- (iii) Indigenous peoples safeguards.

13. The objective and scope of above three key areas are briefly described below.

14. **Environment.** This policy element ensures the environmental soundness and sustainability of projects and supports the integration of environmental considerations into the project decision-making process. Environmental safeguards are triggered if a project is likely to have potential environmental risks and impacts.

15. During the design, construction, and operation of a project the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines.

16. **Involuntary Resettlement.** This policy guideline encourages avoiding involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced person in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups

17. The involuntary resettlement safeguards covers physical displacement (relocation, loss of residential land or loss of shelter) and economic displacement (loss of land assets, access to assets, income sources or means of livelihoods) as a result of (i) involuntary restrictions on land use or (ii) access to legally designated parks and protected areas. It covers displaced persons whether such losses and involuntary restrictions are full or partial, permanent or temporary.

18. **Indigenous Peoples.** This guides the project proponent to design and implement projects in a way that fosters full respect for indigenous peoples' identity, dignity, human rights, livelihood systems and cultural uniqueness as defined by the indigenous peoples themselves so that they (i) receive culturally appropriate social and economic benefits, (ii) do not suffer

adverse impacts as a result of projects, and (iii) can participate actively in projects that affect them.

19. The indigenous peoples safeguards are triggered if a project directly or indirectly affects the dignity, human rights, livelihood systems or culture of indigenous peoples or affects the territories or natural or cultural resources that indigenous peoples own, use, occupy or claim as an ancestral domain or asset. The term indigenous peoples are used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees: (i) self-identification as members of a distinct indigenous cultural group and recognition of the identity by others; (ii) collective attachment to geographically distinct habits or ancestral territories in the project area and to the natural resources in these habits and territories; (iii) customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and (iv) a distinct language, often a different form of the official language of the country or region. In considering these characteristics, national legislation, customary law and any international conventions to which the country is a party will be taken into account. A group that has lost collective attachment to geographically distinct habits or ancestral territories in the project area because of forced severance remains eligible for coverage under this policy.

#### **Policy on Gender and Development (1998)**

20. The Asian Development Bank (ADB) first adopted a Policy on the Role of Women in Development (WID) in 1985 and over the passage of time has progressed from a WID to a gender and development (GAD) approach that allows gender to be seen as a crosscutting issue influencing all social and economic processes. ADB's policy on GAD will adopt mainstreaming as a key strategy in promoting gender equity. The key elements of ADB's policy will include the following.

21. Gender sensitivity: to observe how ADB operations affect women and men and to take into account women's needs and perspectives in planning its operations

22. Gender analysis: to assess systematically the impact of a project on men and women and on the economic and social relationship between them

23. Gender planning: to formulate specific strategies that aim to bring about equal opportunities for men and women

24. Mainstreaming: to consider gender issues in all aspects of ADB operations, accompanied by efforts to encourage women's participation in the decision-making process in development activities

25. Agenda setting: to assist developing member country (DMC) governments in formulating strategies to reduce gender disparities and in developing plans and targets for women's and girls' education, health, legal rights, employment and income-earning opportunities

26. ADB will aim to operationalize its policy on GAD primarily by mainstreaming gender considerations in its macroeconomic and sector work, including policy dialogue, lending and technical assistance (TA) operations. Increased attention will be given to addressing directly gender disparities by designing a larger number of projects with GAD either as a primary or secondary objective in health, education, agriculture, natural resource management and financial services, especially microcredit, while also ensuring that gender concerns are addressed in other ADB projects, including those in the infrastructure sector.

### **2001 Social Protection Strategy**

27. ADB's Social Protection Strategy 2001 requires a borrower/client to comply with applicable labor laws in relation to the project and take the following measures to comply with the core labor standards<sup>1</sup> for the ADB financed portion of the project;

- (a) carry out its activities consistent with the intent of ensuring legally permissible equal opportunity, fair treatment and non-discrimination in relation to recruitment and hiring, compensation, working conditions and terms of employment for its workers (including prohibiting any form of discrimination against women during the hiring process and providing equal work for equal pay for men and women engaged by the borrower/client);
- (b) not restrict its workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment;
- (c) engage contractors and other providers of goods and services:
  - (i) who do not employ child labor<sup>2</sup> or forced labor;<sup>3</sup>
  - (ii) who have appropriate management systems that will allow them to operate in a manner which is consistent with the intent of (A) ensuring legally permissible equal opportunity and fair treatment and non-discrimination for their workers, and (B) not restricting their workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment; and
  - (iii) whose subcontracts contain provisions which are consistent with paragraphs (i) and (ii) above.

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<sup>1</sup> the core labor standards are the elimination of all forms of forced or compulsory labor; the abolition of child labor; elimination of discrimination in respect of employment and occupation; and freedom of association and the effective recognition of the right to collective bargaining, as per the relevant conventions of the International Labor Organization;

<sup>2</sup> child labor means the employment of children whose age is below the statutory minimum age of employment in the relevant country, or employment of children in contravention of International Labor Organization Convention No. 138 'Minimum Age Convention' ([www.ilo.org](http://www.ilo.org))

<sup>3</sup> forced labor means all work or services not voluntarily performed, that is, extracted from individuals under threat of force or penalty

28. The above measures should be incorporated in the environmental (and/or social) management plan (EMP).

29. The monitoring and reporting requirements in the EMP should also state that the borrower/client will provide ADB with an annual report on its compliance with the measures identified above (which may be included in any report (e.g. Environmental and Social Monitoring Report) required to be provided by the borrower/client to ADB).

30. For additional guidance please refer to the 2001 Social Protection Strategy (SPS) and the Core Labor Standards Handbook:

- [http://www.adb.org/Documents/Policies/Social\\_Protection/social-protection.pdf](http://www.adb.org/Documents/Policies/Social_Protection/social-protection.pdf)
- <http://www.adb.org/documents/handbooks/Core-Labor-Standards/CLS-Handbook.pdf>

31. ADB adopted a commitment to core labor standards (CLS) as part of its Social Protection Strategy in 2001. Since then, ADB ensures that CLS are duly considered in the design and implementation of its investment projects. In this regards, a handbook for CLS has been developed by ADB with the cooperation of the International Labor Organization (ILO). The objective is to convince decision makers that the introduction of CLS and labor standards in general will not impede development. CLS are a set of four internationally recognized basic rights and principles at work:

- (i) Freedom of association and the effective recognition of the right to collective bargaining;
- (ii) Elimination of all forms of forced or compulsory labor;
- (iii) Effective abolition of child labor; and
- (iv) Elimination of discrimination in respect of employment and occupation.

### **2011 Public Communications Policy**

32. The Public Communications Policy of ADB guides the institutional efforts to be transparent and accountable to the people it serves. The Policy recognizes that transparency and accountability are essential to development effectiveness. The objective of the Policy is to enhance stakeholders' trust in and ability to engage with ADB. The Policy recognizes the right of people to seek, receive, and impart information about ADB operations. It supports knowledge sharing and enables participatory development or two-way communications with affected people. The Policy is based on a presumption in favor of disclosure unless there is a compelling reason for nondisclosure. It commits ADB to disclose institutional, financial and project-related information proactively on its website, following strictly time limits and provides mechanisms to handle responses and complaints.

## **3 Project Description**

### **3.1 Project Sponsor**



33. The Project involves multiple strategic business alliances including MIHL's partnership with Hong Kong-based Hongkong & Shanghai Hotels for the redevelopment of the MRB as a heritage building and a luxury hotel, and the expected partnership with Mitsubishi Corporation and Mitsubishi Estate for the business hotel and serviced apartments, the luxury condominium, the office towers and the retail podium.

### 3.2 Project Location

34. The Project Site is situated at the northwest corner of the Bogyoke Aung San Road and Sule Pagoda Street and located east of the Bogyoke Aung San Market (Scott's Market). The Yangon Central Railway station is located 400 m to the northeast of the site with the Traders Hotel and Central Hotel located across Bogyoke Aung San Road to the south. The main railway line runs outside the northern boundary of the site.

35. A regional location of the Project Site and an aerial view of the site and the surrounding areas within a 300 m radius are presented in **Figure 1** and **Figure 2**.

36. The two leases for the 9.64 acre Project Site were secured in two separate transactions: (i) The Grand Mee Ya Hta Site (including the Old Lady) leased in 1993 directly from Myanmar Railways of the Ministry of Rail Transportation and, (ii) the land lease for the FMI Center parcel of land transferred in 1995 from an independent developer which had previously leased it from Ministry of Rail Transportation, Myanmar Railways.

### 3.3 Site Description

#### 3.3.1. The Project Site and Existing Features

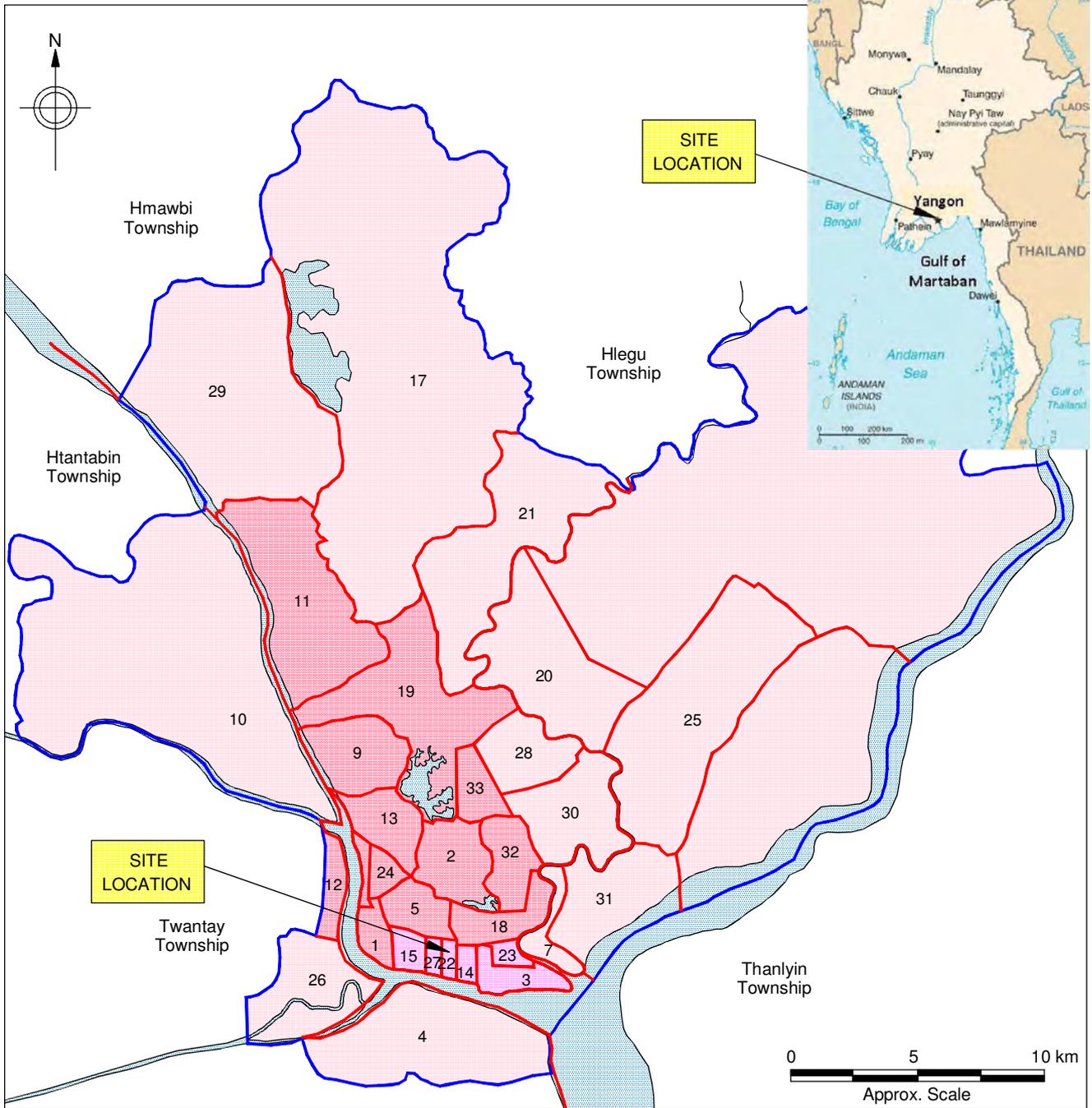
37. The earmarked Project Site is a rectangular plot (16°46' 50.84" N/96° 09'31.58" E (northeast corner) and 16° 46'46.58" N/96°09'23.38" E (southwest corner)) covering an area of approximately 39,000 m<sup>2</sup> (9.64 acres). Upon completion of the Project, the total Gross Floor Area (GFA) will be approximately 200,000 m<sup>2</sup> (2.150 million ft<sup>2</sup>).

38. The Project Site in its current state is a built environment comprising the following main buildings:

- i. Former Myanmar Railway Headquarters Building (MRB): a 130 years old three-storey brick building, listed under the Yangon Heritage Trust which has been vacant/abandoned since 1994;
- ii. FMI Centre: an approximately 17 years old 11-storey building serving as an office and commercial building;
- iii. Grand Mee Ya Hta Executive Residence: a 18-year-old, 10-storey concrete building which has been vacant since October 2013;
- iv. Zawgyi House: A former two-storey residential brick building which is currently being used as a restaurant;
- v. Two residential scale two-storey brick buildings aged approximately 50 years old (one building was previously used as a staff house for the Myanmar Railways and the other belonged to the Church) which currently serves as temporary accommodation and storage; and
- vi. A variety of smaller supporting structures (such as generator sets and wastewater storage) associated with the existing land use.

Legend:

- City Boundary
- Township Boundary
- River
- Downtown Area
- Suburban Area
- Outer Suburban and New Towns



Legend:

- |                  |                         |                      |
|------------------|-------------------------|----------------------|
| 1 Ahlone         | 12 Kyeemyindine         | 23 Pazundaung        |
| 2 Bahan          | 13 Kamayut              | 24 Sanchaung         |
| 3 Botataung      | 14 Kyauktada            | 25 South Dagon       |
| 4 Dala           | 15 Latha                | 26 Seikkyi Kanaungto |
| 5 Dagon          | 16 Lanmadaw             | 27 Seikkan           |
| 6 Dagon Seikkan  | 17 Mingalardon          | 28 South Okkalapa    |
| 7 Dawbon         | 18 Mangalar Taung Nyunt | 29 Schwepyithar      |
| 8 East Dagon     | 19 Mayangone            | 30 Thingangyun       |
| 9 Hlaing         | 20 North Dagon          | 31 Thaketa           |
| 10 Hlaingtharyar | 21 North Okkalapa       | 32 Thamwe            |
| 11 Insein        | 22 Pabedan              | 33 Yankin            |

Source: Myanmar Survey Map

Figure 1 Regional Location of Project Site (Townships)



Figure 2 Aerial View of Site and the Surrounding Areas within a 300 m Radius.

39. There are no residential dwellings within the Project Site.

40. For ease of description, the layout of the current Project Site has been divided into nine areas (**Figure 3**) and the corresponding detailed description for each area is presented in **Table 1**.

**Table 1: Existing Site Features and Project Components**

Area	Features	Current use	Proposed development	Actions required prior to initiation of construction
1	Two (2) two-storey residential-scale structures which are approximately 50 years old  Vacant, generally unpaved area to the east, west and south of the structures	Old staff house and old church building	Not part of the current project.	Consultation with Church leaders about the potential impacts of the Project and the mitigation measures.
2	Three-storey MRB building which is approximately 130 years old.  Vacant, generally unpaved area to the east, south with the centre of the MRB overgrown with shrubs and grass.	Unoccupied/vacant	To be restored and converted into the Peninsula luxury hotel	Heritage Dilapidation Survey Implementation of Dilapidation Survey Removal of Hazardous Waste General Cleaning Protective Construction Fences to be installed where necessary
3	Façade of the Grand Mee Ya Hta Executive Residence and paved driveway	Unoccupied/vacant	To be demolished	Utility shut off. Protective Construction Fences to be installed where necessary
4	Concrete block-paved parking area for approximately 100 cars  Former residential two-storey brick structure presently used as a restaurant (Zawgyi House)  Temporary container van offices currently used by the Project's consultants	To be demolished		Notices to the existing tenant/leaseholder to be served. Demolition to be initiated.
5	Utilities and parking area for FMI Centre	Currently in use		
6	Grand Mee Ya Hta Executive Residence utilities area including the wastewater treatment plant, two chillers, generator shed and oil drums shed	Currently unused		Utility shut off. Relocation of Existing Utilities Protective Construction Fences to be installed where necessary



Figure 3 Area Location Map

Area	Features	Current use	Proposed development	Actions required prior to initiation of construction
7	Parking area for approximately 50 cars	Currently in use		Protective Construction Fences to be installed where necessary
8	10-storey Grand Mee Ya Hta Executive Residence (each floor is made up of 10 residential units)	Currently unused	To be demolished	Utility shut off. Relocation of Existing Electrical Protective Construction Fences to be installed where necessary
9	11-storey FMI Centre which is approximately 17 years old (currently used as an office/commercial block)	Office space and commercial establishments in the lower floors.	To be demolished for development	Utility shut off. Relocation of Existing Utilities Protective Construction Fences to be installed where necessary

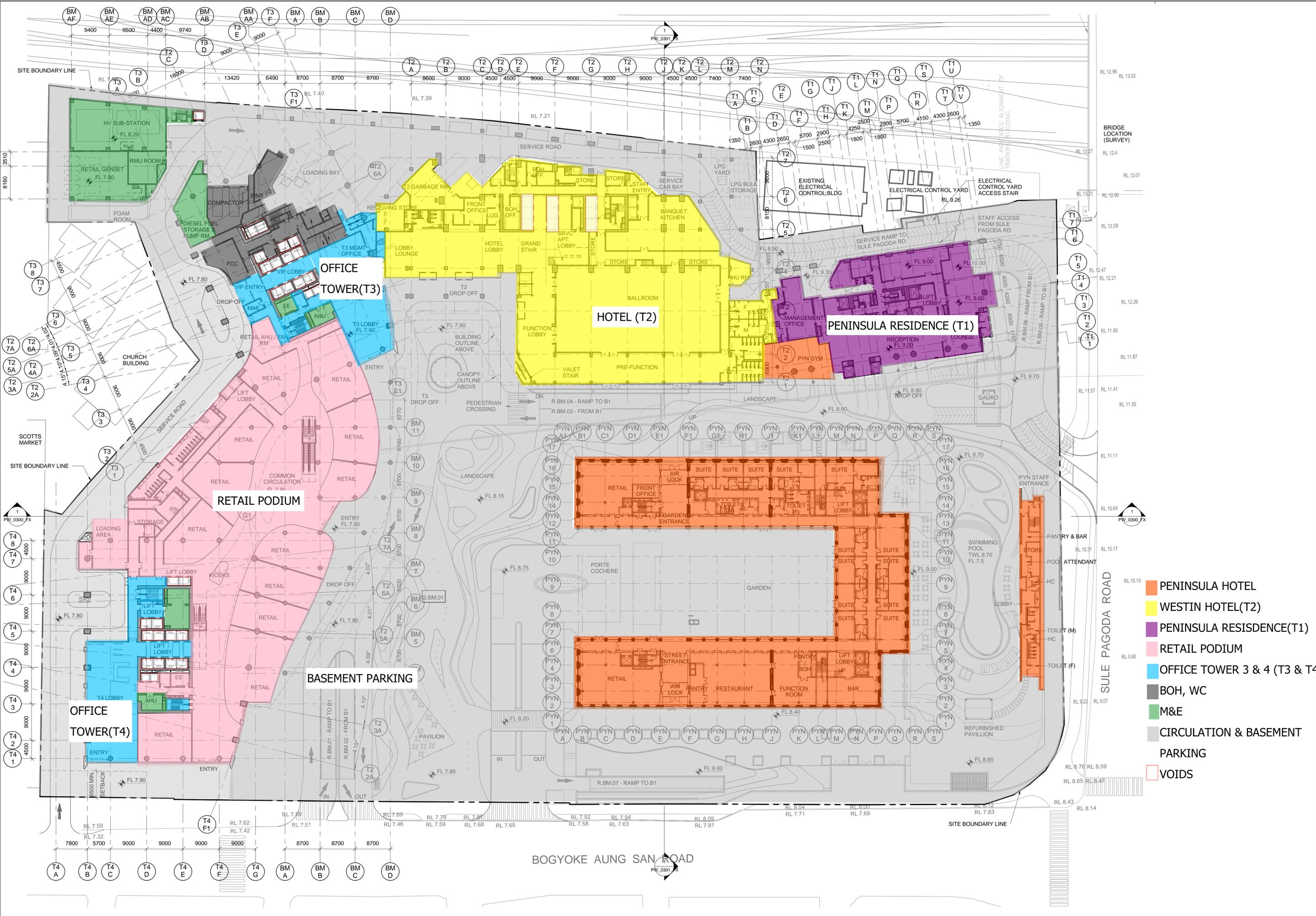
### 3.3.2. Project Components

41. The Project will involve the demolition of all the structures on site except for the MRB which will only be conserved, restored and converted into an approximately 90 keys luxury hotel (Peninsula Hotel). It will be a controlled demolition and the contractor's demolition work will be supervised by a third party management team. While the MRB will be restored, improved structurally and will be redeveloped into a luxury hotel with careful consideration to its cultural and historical significance the project includes construction of the following main building components:

- **Peninsula Residence:** A luxury condominium will be constructed on the northeastern corner of the Project Site. The tower comprises a total of 25 storeys with a total of approximately 90 units of luxury residence (approximate area of 36,500 m<sup>2</sup>).
- **Business Hotel and Serviced Apartments:** The business hotel will be constructed centrally along the northern boundary of the Project Site sandwiched between the Peninsula Residence and Office Tower 3. The hotel will be a 25-storey building (20 storeys above the retail podium) comprising 250 hotel rooms and 89 serviced apartments. The approximate floor area is 41,500 m<sup>2</sup>. This building also supports the roof facilities which include a fine dining restaurant with outdoor terrace, a function room/kids club, an exclusive rooftop bar, pool deck with large outdoor pool bar and an infinity edge pool.

- **Two Office Towers:** The two 21-storey office towers (16-storey above retail podium) will be constructed along the west boundary of the Project Site. Constructed on top of the retail podium, each tower comprises a total built-up area of 34,500 m<sup>2</sup>;
- **Retail Podium:** A five storey Retail Podium will be located below the Office Towers and Business Hotel with a net floor area of approximately 37,100 m<sup>2</sup>.
- **Two Parking Levels:** *mostly* two basement parking levels that will provide for 1,187 parking spaces except for the MRB where only one basement parking level will be built.
- Support Infrastructure facilities such as the wastewater treatment and district cooling.
  - Membrane Bioreactor System (MBR)
    - MBR with a design capacity of 1,100m<sup>3</sup>/day has been proposed as the preferred **STP** for the Project. This wastewater treatment plant will be located at the northwestern corner of the project site. The treated effluent will be used as the cooling tower makeup water (almost 100%) but if there is any excess, the effluent will be discharged into the stormwater drainage system.
  - District Cooling
    - All areas except the Peninsula Residence units and the MRB (Peninsula Hotel) will be supplied from a central chilled water system. The Peninsula Residence will be supplied by DX type VRF system units with an air cooled condenser unit for individual ownership, operation and control. The MRB will be supplied by its own dedicated water cooled chiller plant.
    - Water cooled electric chillers will be provided for the Project. The central chiller plant will comprise 4 sets of 1,400 TR chillers (3 duty, 1 standby) plus 1 nos. 1,000 TR chillers (for the Business Hotel and Serviced Apartment), primary and secondary chilled water pumps, condenser water pumps and a water treatment system. Chillers and pumps will be located at the podium level 3. The MRB will be provided with 3 sets of 180 TR chillers (2 duty, 1 standby) and will be co-located with the central plant. The chiller configuration has been selected based on the load profiles and to maximize system efficiencies.
    - Primary chilled and condenser water pumps will be constant speed type. Secondary chilled water pumps will be variable speed. There will be a total of 5 tertiary chilled water zones as follows:
      - Business Hotel and Serviced Apartment
      - Office Tower 1
      - Office Tower 2
      - Retail Podium
    - The MRB will be supplied by dedicated secondary chilled water pumps without tertiary pumping.

42. The site layout plan indicating the proposed development components of the Project is presented in **Figure 4.1 and Figure 4.2.**



- PENINSULA HOTEL
- WESTIN HOTEL(T2)
- PENINSULA RESIDENCE(T1)
- RETAIL PODIUM
- OFFICE TOWER 3 & 4 (T3 & T4)
- BOH, WC
- M&E
- CIRCULATION & BASEMENT PARKING
- PARKING
- VOIDS

BOGYOKE AUNG SAN ROAD

SULE PAGODA ROAD

BRIDGE LOCATION (SURVEY)

Architectural site plan showing building footprints, parking areas, and infrastructure. Key buildings include Office Tower (T3), Office Tower (T4), Retail Podium, Westin Hotel (T2), Peninsula Residence (T1), and Peninsula Hotel. The plan also shows a basement parking area, various service roads, and utility structures like an HV sub-station and electrical control yards. Grid lines and elevations are marked throughout the site.



OFFICE TOWER 3  
(T3)

HOTEL (T2)

PENINSULA RESIDENCE  
(T1)

RETAIL PODIUM

OFFICE TOWER 4  
(T4)

PENINSULA  
HOTEL

BASEMENT  
PARKING

43. A sectional view of the development components is presented in **Figures 4.3 and 4.4**.

### 3.4 Implementation schedule

44. It is anticipated that the completion of the entire Project will take up to 60 months including demolition.

## 4 Description of the Environment

45. The purpose of this IEE is to predict how environmental and socio-economic conditions will be impacted as a result of the implementation of the proposed Project. This requires a sound understanding of the baseline conditions at the Project Site which was established through desk-based research, site surveys, primary data collection and empirical studies and projections. Together, these describe the current and future characteristics of the Project Site and the value and vulnerability of key environmental and socio-economic resources and receptors. The section below provides a description of the environmental and socio-economic aspects of the Project.

### 4.1 Physical Environment

46. Site Setting: The Project is located in the city of Yangon within the Yangon Region in Myanmar. The city lies at the convergence of the Yangon and Bago Rivers on the eastern margin of Ayeyarwady Delta and is located approximately 30 km away from the coastline bordering the Gulf of Martaban. The Yangon Region is bordered by the Bago Region in the north and east, the Gulf of Martaban in the south and Ayeyarwady Region in the west.

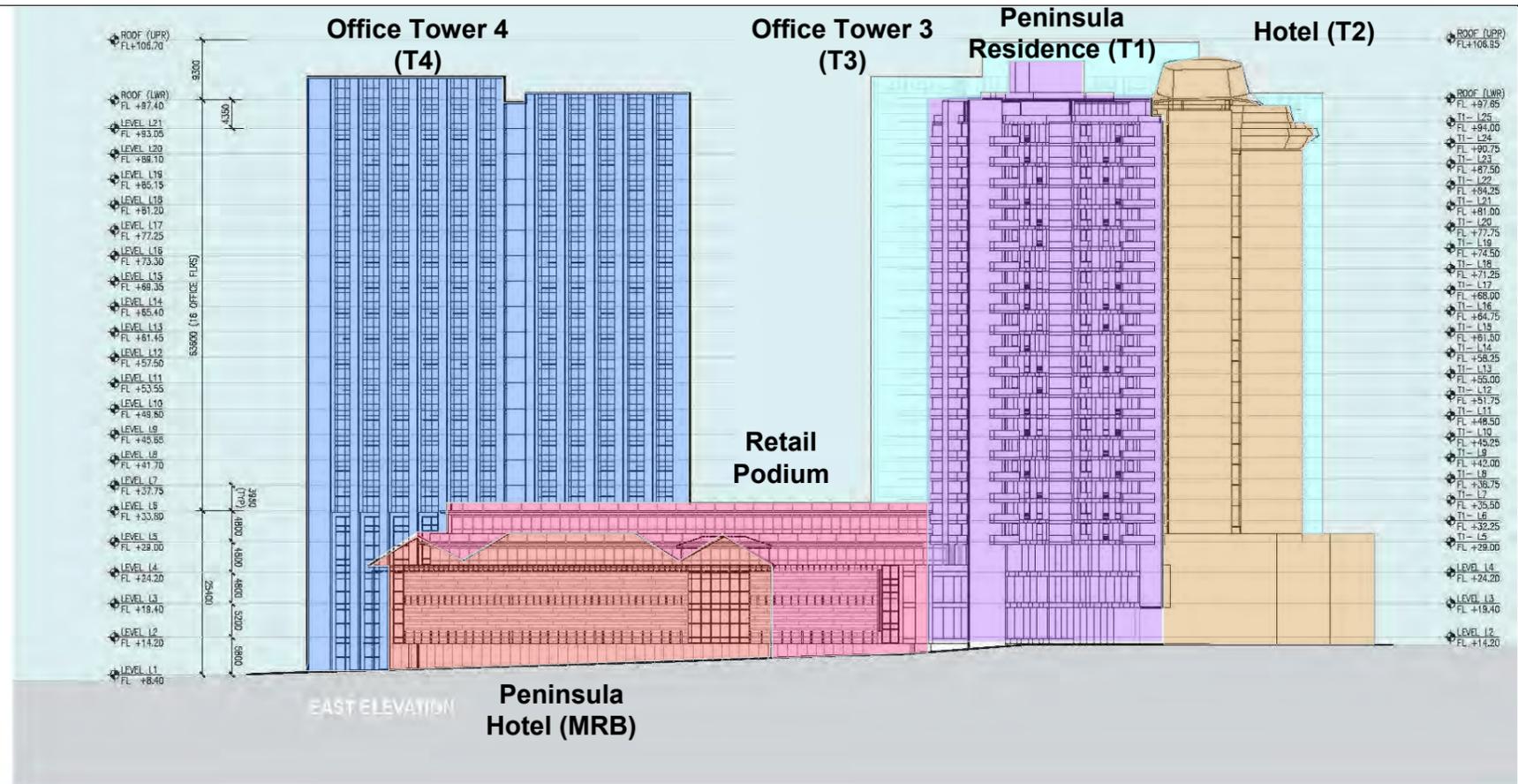
47. Topography: Based on the data obtained from the topography survey, the site is relatively flat, with a gentle downward slope from the northeast boundary (RL+10.97 m) to the southwest (RL+7.75 m).

48. Geology: The Yangon area is underlain by alluvial deposits (Pliocene to Recent), the non-marine fluvial sediments of Irrawaddy formation (Pliocene), and hard, massive sandstone of Pegu series (early-late Miocene). Alluvial deposits are composed of gravel, clay, silts, sands and laterite which lie upon the eroded surface of the Irrawaddy formation at 3-4.6 m above mean sea level (MSL). The rock type in Yangon is mainly soft rocks, which consist of sandstone, shale, limestones and conglomerate.

49. Tectonics: Yangon is situated in the southern part of the Central Lowland which is one of the three major tectonic provinces of Myanmar. The Taungnio Range of the Gyophyu catchments area of Taikkyi District, north of Yangon, through the Thanlyin Ridge, south of Yangon forming a series of isolated hills probably resulted from the progressive deformation of the Upper Miocene rocks as the eastern continuation of the subduction or stretching and compression along the southern part of the Central Basin and regional uplifting of the Pegu Yoma (Aung Lwin 2012).

50. Soil: The underlying soil type at the Project Site and its surroundings is characterized as the Meadow and Meadow Alluvial Soil. Meadow Soil is soil which occurs near the river plains exposed to occasional tidal floods, is non-carbonate and usually contains a large amount of salt. Both materials mainly comprise silty clay loam and neutral soil rich in plant nutrient. The upper layers (approximately 0 to 7 m) of the soil at the Project Site comprise largely of cohesive

East Elevation



South Elevation

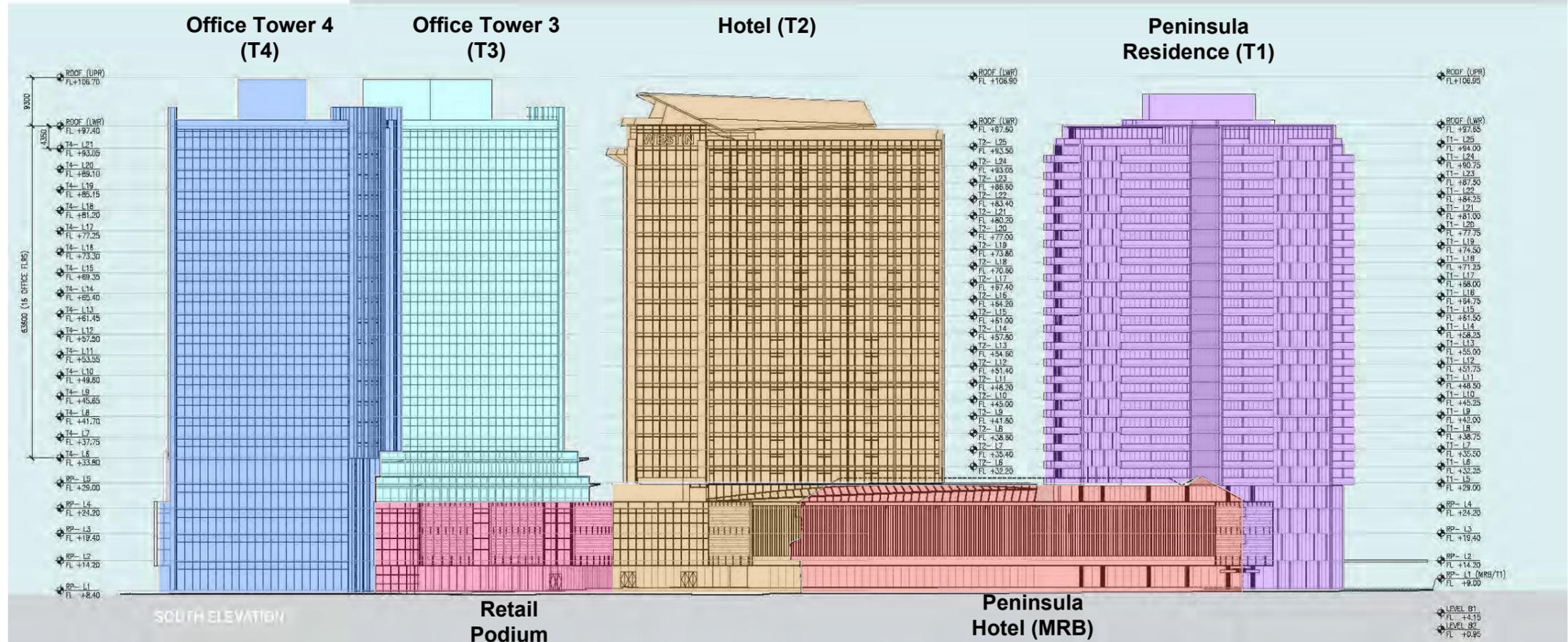


Figure 4.3 Sectional Elevation View of Proposed Project (East and South)

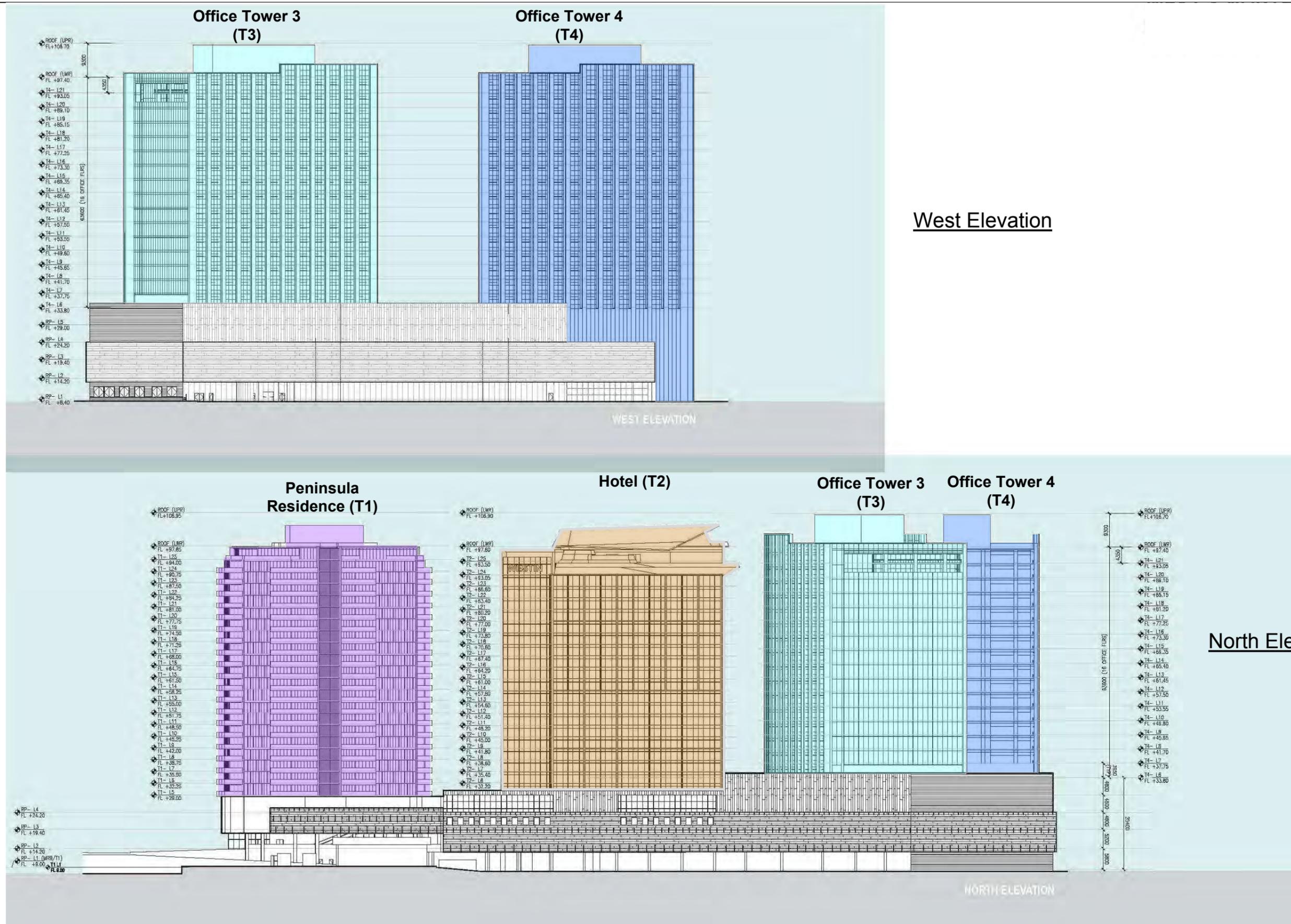


Figure 4.4 Sectional Elevation View of Proposed Project (West and North)

layers with traces of sand and gravel, followed by sand layers with low silt content and trace gravel from 7 to 35 m. The lower layers comprise denser silt layer with traces of sand and gravel from approximately 57 to 70 m. Standard Penetration Test (SPT) results obtained from testing at the Project Site indicate that the soil strength generally increases with depth. The STP results showed that the current soil quality can accommodate the construction of the Project.

51. Hydrogeology: Yangon is rich in groundwater resources conserved by unconsolidated Tertiary-Quaternary deposits. In Yangon, groundwater is mostly extracted from Valley filled deposits and Ayeyarwady sandstones.

52. Groundwater: Groundwater availability is generally based on the distribution of permeable and relatively impermeable rocks. The nature of openings in the rocks determines permeability of rocks. Based on local geological considerations, potential groundwater source of Yangon can be roughly divided into two sub regions, namely the low potential area and high potential area. Low potential areas are areas with those rock units of Hlawga Shale, Thadugan Sandstones and Basepet Alternation of upper Pegu Group (Miocene epoch) and Danyingon Clays of Irrawaddy rocks. These rocks and formations are a dense, massive and consolidated nature and have impervious characteristic. High potential areas are underlain by Pliocene Series and recent Formations. High potential area covers approximately 85 percent of the Yangon city including Pabedan where the Project Site is located. At the Project Site, stand pipe piezometers were installed at a depth of up to 30 m from the existing ground level while a pumping well was installed upon completion of the soil investigation works. Based on the results recorded up to the 8th of December 2012, stabilized groundwater level was observed to range between 0.49 m MSL to -1.81 m MSL<sup>4</sup>.

53. Water Supply: The Yangon City Development Committee (YCDC) has an overall responsibility for the management and distribution of water for Yangon City. Presently, YCDC's water supply is obtained from two main sources: (1) reservoir (Hlawga, Gyobu, Pugyi and Ngameoyeik reservoirs) and, (2) groundwater from YCDC's tube wells. Water from these sources is utilized to varying degrees. Areas not supplied with water from the YCDC rely on shallow surface wells and private boreholes. Water supply for the Project Site will be obtained from onsite borewells for both construction and operations due to the poor reliability of municipal supply. Permitting is part of the Planning Consent Application currently underway. The boreholes will be provided and operated by the Developer.

54. Hydrology: The Project Site lies along the catchment of the Pazundaung River which flows east of the site in a southerly direction to converge into the Yangon River. The Yangon River (also known as the Rangoon River or Hlaing River) is formed by the confluence of the Pegu and Myitmaka rivers and flows into the Gulf of Martaban which is part of the larger Andaman Sea. The river flows along a 40 km stretch flowing from southern Myanmar as an outlet of the Ayeyarwady River into the Ayeyarwady delta. A small portion of the Bago River (the estuary) lies within the Yangon Division. The Pazundaung Creek and Bago River joins the Yangon River and from there, flow towards the southwestern direction into Andaman Sea.

55. Climate and Meteorology: Yangon has a tropical monsoon climate under the Koppen climate classification system. The city typically experiences a distinct rainy season from the month of May through to October when a substantial amount of precipitation occurs; and dry

<sup>4</sup> Geolab (M) Sdn. Bhd. (2012). Ground Investigation, Headquarter Project at 372, Bogyoke Aung San Road, Pabedan Township, Yangon, December 2012

season which commences from November and ends in April. During the course of a year, average temperatures show some variance with average highs ranging from 26°C to 36°C and average lows occurring between 18°C and 25°C.

56. Temperature. The hottest period is between February and May, with little or no rain. At the end of this season, generally from March to April, the average monthly temperature reaches the upper 30°C. The average temperatures in Yangon range from 24°C to 36°C in April during the hot season and it ranges from 18°C to 32°C in January during the cooler season.

57. Rainfall and Relative Humidity: The climate of Myanmar follows a typical monsoon pattern. Historically, the average annual mean rainfall for Yangon is 2,681 mm with the annual average rainy days of 129.3 days. During the course of 2013, the Department of Meteorology and Hydrology (Myanmar) reported an annual precipitation of approximately 2700 mm. The month with the most precipitation was in July. The relative humidity was generally higher from May to October 2013. The dry season occurs from November to April. Based on the historical weather for the last twelve months in Yangon, no precipitation was observed in December 2012, February 2013 and March 2013. The least humid month of the last 12 months was February 2013 with an average daily low humidity of 34%, and the most humid month was September with an average daily high humidity of 80%.

58. Wind Speed and Direction. Based on 2013 data, it was reported that the month with the highest wind speed was April 2013 with an average wind speed of 3 m/s while the least windy month was December 2012 with an average wind speed of 1m/s. The highest sustained wind speed was 54 m/s, occurring on September 19, 2013 and the highest daily mean wind speed was 4 m/s, occurred on May 14, 2013.

59. Natural Hazards: Myanmar is exposed to multiple natural hazards including cyclones, earthquakes, floods and fire. It has been periodically exposed by natural disasters. The Yangon District is in the vicinity of the southern section of the Sagaing Fault which has not been active in the past 50 to 75 years indicating that the faults may be under accumulating stress increasing the potential for an earthquake to occur. The Sagaing Fault is the most prominent active fault in Myanmar trending roughly north to south. It has been the originator of a large proportion of destructive earthquakes in Myanmar. The Project Site is also located in an earthquake zone and therefore the building construction design needs to cater for this hazard with adequate planning on emergency response procedures. Myanmar is exposed to cyclones and associated storm surges from the Bay of Bengal. Annually, there are approximately 10 tropical storms in the Bay of Bengal from April to December. Severe cyclones occur during the pre-monsoon period of April to May and post-monsoon period of October to December. The threat of flooding usually occurs in three waves each year: June, August and late September to October.

## 4.2 Baseline Environmental Quality and Biological Environment

60. The baseline environmental quality at the Project Site and its immediate surroundings was established by collecting soil, groundwater and ambient air quality samples; as well as noise measurements at immediate surrounding areas. The data is presented below.

### (a) Soil and Groundwater

61. An intrusive soil and groundwater investigation was performed at the Project Site to ascertain the baseline data conditions at the site regarding the environmental quality of the on-site soil and groundwater.

62. The location of the soil and groundwater sampling stations is presented in **Figure 5**.

63. The investigation was performed based on the American Standard for Testing Methodology (ASTM) Standard Practice for Environmental Site Assessments (ESA) E 1527-05 (Phase I ESA) and ASTM E 1903-11 (Phase II ESA), as applicable outside of the United States.

64. A total of fifteen soil and seven groundwater samples were subjected to chemical analysis which was based on the United States Environmental Protection Agency (USEPA) and American Public Health Association (APHA). The samples were analyzed for recommended parameters in the Singapore Jurong Town Corporation (JTC) Environmental Baseline Study (EBS) Guidelines and the data compared against the Dutch Standards 2009 (Rev 2012)<sup>5</sup>. The parameters analysed include:

- Metals and metalloids;
- Volatile Organic Compounds (VOCs);
- Semi-Volatile Organic Compounds (SVOCs);
- Total Petroleum Hydrocarbons (TPH);
- Inorganic compounds;
- Conventional Analytes;
- Organic matter and moisture;
- General groundwater quality;
- Total Coliform; and
- Asbestos Containing Materials (ACM).

65. As there are currently no compound-specific reference standards for assessing the presence of soil and groundwater impact in Myanmar, the baseline analytical results were compared against the Dutch Standards 2009 (Rev 2012).

66. The Dutch Standards, which are more stringent standards than the IFC EHS Guidelines, specifies two sets of limits for heavy metals, inorganic compounds, aromatic compounds, hydrocarbons, pesticides and other pollutants for soil and groundwater.

67. If the parameter is not listed in the Dutch Standards, alternative screening criteria were used. Any exceedances to the DIVs were compared to alternative standards for the purposes of evaluating risk to human health and the environment. The Myanmar water quality standards are used where available.

68. The summary of the detected constituents in the **soil** and a comparison of soil analytical results to DTV and DIV are shown in **Table 2a**. Exceedances of the Dutch Target Values (DTV) in the soil were reported for all metals and metalloids tested for except total chromium and molybdenum, selected sum PAHs and mineral oil. Among samples tested, one sample reported an exceedance of the DIV limit for copper (190 mg/kg) with a reading of 600 mg/kg.

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<sup>5</sup> Golder Associates (2013). Landmark Project – Hazardous Materials Assessment, July 2013

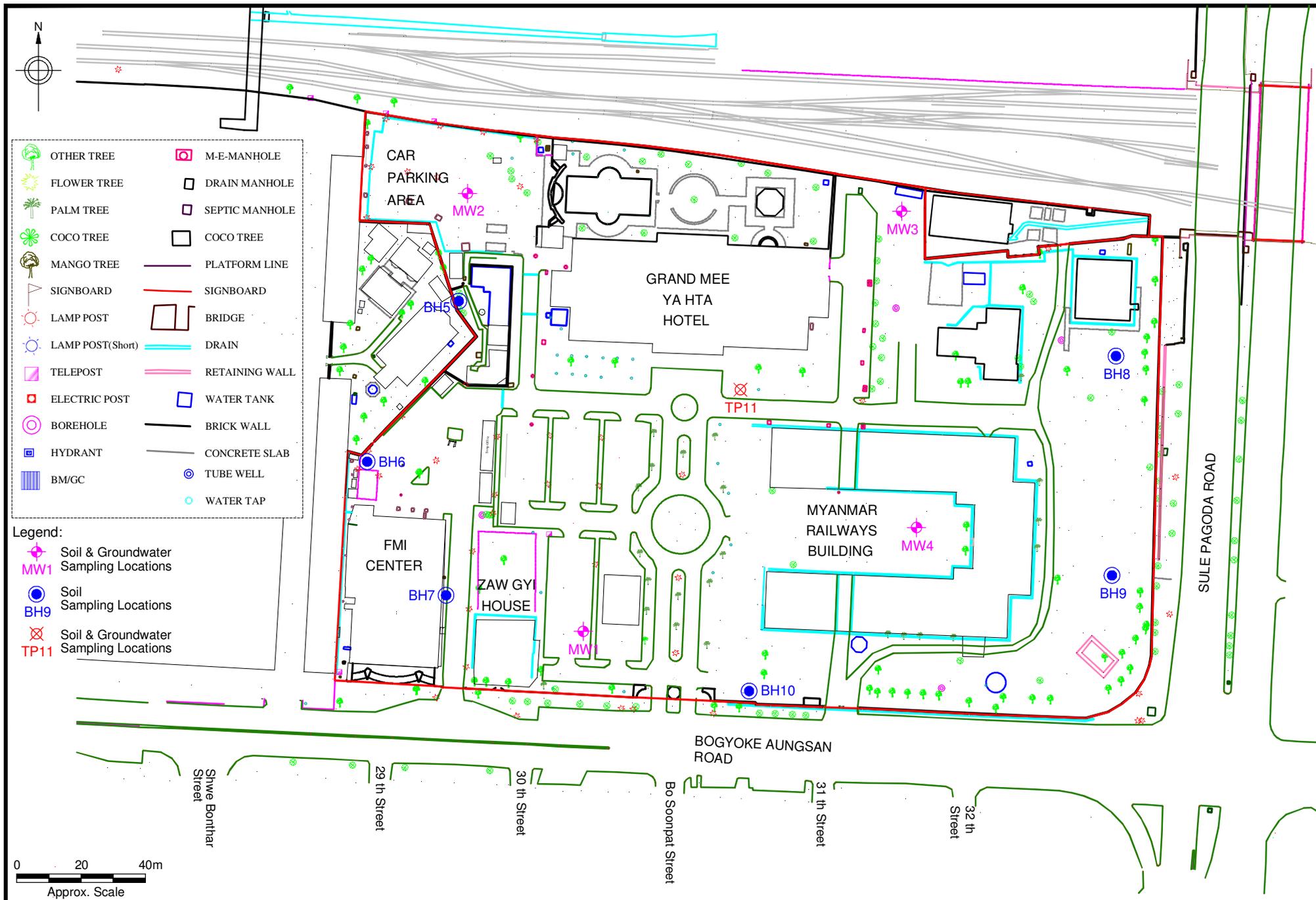


Figure 5 Soil and Groundwater Sampling Stations

Table 2a: Summary of Soil Laboratory Results

Test Parameter	Dutch Standard (Rev 2012)		LO R <sup>c</sup>	MW1	MW2	MW3			MW4		BH5	BH6	BH7	BH8	BH9	BH10	TP11
	DTV S <sup>a</sup>	DIV S <sup>b</sup>		204001/2 002 <sup>d</sup>	207002/2 002	201003/2 001	201003/2 003	201003/2 006	202004/2 001	202004/2 008	206005/2 001	209006/2 003	209007/2 001	201008/2 002	202009/2 001	203010/2 002	206011/2 001
				1.5 m <sup>e</sup>	1.0 m	0.5 m	3.0 m	9.0 m	0.5 m	13.0 m	0.5 m	4.0 m	0.6 m	2.0 m	0.5 m	2.0 m	1.1 m
<b>Metals and Metalloids</b>																	
Arsenic	29	76	0.5	3.98	5.40	3.18	4.33	0.55	7.68	1.86	4.61	3.02	4.96	6.21	21.6	6.00	65.4
Barium	160	- <sup>f</sup>	0.5	132	129	26.7	118	20.5	197	35.8	80.4	30.7	49.7	109.0	191	122	484
Cadmium	0.8	13	0.5	<0.5	0.77	<0.5	<0.5	<0.5	0.51	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.96
Chromium Total	100	-	0.5	26.9	51.4	24.4	26.5	10.7	43.7	24.6	35.2	32.8	29.5	47.9	60.2	41.2	39.6
Cobalt	9	190	0.5	9.35	10.4	7.89	12.6	2.86	13.6	7.69	9.49	5.20	10.1	37.3	8.41	12.0	21.9
Copper	36	190	0.5	39.8	102	6.75	40.9	4.11	125	2.99	61.6	9.72	18.0	15.8	75.6	50.4	600
Total Mercury	0.3	-	0.02	0.65	0.21	0.04	0.20	0.02	0.82	<0.02	0.30	0.22	0.39	0.07	0.40	0.65	0.17
Lead	85	530	0.5	76.7	195	13.9	44.2	6.25	13.6	7.65	73.5	15.1	40.9	38.0	7.28	89.1	154
Molybdenum	3.0	190	0.5	<0.5	0.73	<0.5	1.03	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	35	100	0.5	19.6	23.5	36.9	18.2	18.5	22.8	33.0	23.1	11.0	21.3	19.9	22.3	23.7	12.0
Zinc	140	720	0.5	79.4	174	39.2	153	16.7	17.4	25.1	18.0	15.7	53.8	32.1	16.6	174	648
Antimony	3	22	0.5	1.20	4.00	0.65	1.26	<0.5	3.39	0.56	1.86	1.08	1.01	1.74	2.33	1.40	1.57
<b>Inorganic Compounds</b>																	
Total cyanide	1	20	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.4	<0.10	<0.10
<b>PAHs</b>																	
Anthracene	-	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	<0.1	<0.1	<0.1	<0.1
Phenanthrene	-	-	0.1	<0.1	0.58	<0.1	0.22	<0.1	<0.1	<0.1	<0.1	<0.1	1.19	<0.1	0.10	<0.1	<0.1
Fluoranthrene	-	-	0.1	0.24	0.36	<0.1	0.55	<0.1	<0.1	0.16	<0.1	<0.1	2.38	<0.1	0.26	0.51	<0.1
Benzo(a)anthracene	-	-	0.1	0.19	0.33	<0.1	0.40	<0.1	<0.1	0.12	<0.1	<0.1	1.47	<0.1	0.18	0.45	<0.1
Chrysene	-	-	0.1	0.22	0.44	<0.1	0.32	<0.1	<0.1	0.12	<0.1	<0.1	1.10	<0.1	0.18	0.34	<0.1
Benzo(a)pyrene	-	-	0.2	<0.2	<0.2	<0.2	0.20	<0.2	<0.2	<0.2	<0.2	<0.2	0.58	<0.2	<0.2	0.32	<0.2
Benzo(k)fluoranthrene	-	-	0.2	0.29	0.24	<0.2	0.35	<0.2	<0.2	0.21	<0.2	<0.2	0.93	<0.2	0.26	0.49	<0.2
Sum PAH (soil with OM up to 10%)	1	40	0.2	0.94	1.95	<0.2	2.04	<0.2	<0.2	0.61	<0.2	<0.2	7.83	<0.2	0.98	2.11	<0.2
<b>Other Pollutants</b>																	
Mineral Oil	50	5000	50	55	83	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
<b>Conventional Analytes</b>																	
Fluoranthrene	-	-	0.1	0.24	0.36	<0.1	0.55	<0.1	<0.1	0.16	<0.1	<0.1	2.38	<0.1	0.26	0.51	<0.1
Benzo(a)anthracene	-	-	0.1	0.19	0.33	<0.1	0.40	<0.1	<0.1	0.12	<0.1	<0.1	1.47	<0.1	0.18	0.45	<0.1
Chrysene	-	-	0.1	0.22	0.44	<0.1	0.32	<0.1	<0.1	0.12	<0.1	<0.1	1.10	<0.1	0.18	0.34	<0.1
Benzo(a)pyrene	-	-	0.2	<0.2	<0.2	<0.2	0.20	<0.2	<0.2	<0.2	<0.2	<0.2	0.58	<0.2	<0.2	0.32	<0.2
Benzo(k)fluoranthrene	-	-	0.2	0.29	0.24	<0.2	0.35	<0.2	<0.2	0.21	<0.2	<0.2	0.93	<0.2	0.26	0.49	<0.2

Test Parameter	Dutch Standard (Rev 2012)		LO R <sup>c</sup>	MW1	MW2	MW3			MW4		BH5	BH6	BH7	BH8	BH9	BH10	TP11
	DTV S <sup>a</sup>	DIV S <sup>b</sup>		204001/2 002 <sup>d</sup>	207002/2 002	201003/2 001	201003/2 003	201003/2 006	202004/2 001	202004/2 008	206005/2 001	209006/2 003	209007/2 001	201008/2 002	202009/2 001	203010/2 002	206011/2 001
				1.5 m <sup>e</sup>	1.0 m	0.5 m	3.0 m	9.0 m	0.5 m	13.0 m	0.5 m	4.0 m	0.6 m	2.0 m	0.5 m	2.0 m	1.1 m
Sum PAH (soil with OM up to 10%)	1	40	0.2	0.94	1.95	<0.2	2.04	<0.2	<0.2	0.61	<0.2	<0.2	7.83	<0.2	0.98	2.11	<0.2
<b>Other Pollutants</b>																	
Mineral Oil	50	5000	50	55	83	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
<b>Conventional Analytes</b>																	
Fluoranthrene	-	-	0.1	0.24	0.36	<0.1	0.55	<0.1	<0.1	0.16	<0.1	<0.1	2.38	<0.1	0.26	0.51	<0.1
Benzo(a)anthracene	-	-	0.1	0.19	0.33	<0.1	0.40	<0.1	<0.1	0.12	<0.1	<0.1	1.47	<0.1	0.18	0.45	<0.1
Chrysene	-	-	0.1	0.22	0.44	<0.1	0.32	<0.1	<0.1	0.12	<0.1	<0.1	1.10	<0.1	0.18	0.34	<0.1
Benzo(a)pyrene	-	-	0.2	<0.2	<0.2	<0.2	0.20	<0.2	<0.2	<0.2	<0.2	<0.2	0.58	<0.2	<0.2	0.32	<0.2
Benzo(k)fluoranthrene	-	-	0.2	0.29	0.24	<0.2	0.35	<0.2	<0.2	0.21	<0.2	<0.2	0.93	<0.2	0.26	0.49	<0.2
Sum PAH (soil with OM up to 10%)	1	40	0.2	0.94	1.95	<0.2	2.04	<0.2	<0.2	0.61	<0.2	<0.2	7.83	<0.2	0.98	2.11	<0.2
<b>Other Pollutants</b>																	
Organic matter, %	-	-	0.1	2.9	10.5	0.5	6.8	<0.1	3.1	<0.1	3.1	0.3	0.8	0.4	5.6	1.2	12.4
Moisture, %	-	-	0.1	18.4	20.8	17.3	18.4	16.3	10.1	16.1	13.5	21.7	17.2	14.7	8.95	19.9	50.1
<b>Other Analytes</b>																	
TPH C15-C28	-	-	10	21	60	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C29-C36	-	-	10	34	23	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Coliform Count, MPN/g sample	-	-	*	NA	NA	>1,100	>1,100	NA	>1,100	NA	>1,100	>1,100	NA	NA	>1,100	>1,100	>1,100
Pyrene	-	-	0.2	0.23	0.39	<0.2	0.52	<0.2	<0.2	<0.2	<0.2	<0.2	2.08	<0.2	0.23	0.53	<0.2

**Notes:**

a – NOBO 2008 for DTV as referenced in Dutch Standard 2009 (rev 2012)

b – Dutch Intervention Values 2009 (Rev 2012)

c – Limits of reporting

d – Row refers to sample identification marks

e – Row refers to depth the sample was taken

f – No Dutch standard

\*No laboratory limit or reporting

NA – Not Analyzed

Units are in mg/kg, unless otherwise indicated

Detected concentrations are in bold font; DTV exceedances are highlighted in yellow; DIV exceedances are highlighted in red.

Barium and total chromium were detected in the equipment wash blank at 87 µg/L respectively. As per EPA, if the blank concentration is greater than or equal to the limit of reporting or greater than a fifth the sample concentration, whoever is greater, the results may not be reported. In the case of barium and total chromium, the detected concentration in the equipment wash blank are less than the limit or reporting for the soil samples, as such, results are valid.

This maximum copper concentration was then compared against alternative standards. A comparison with three alternative standards<sup>6</sup> for combined exposure pathways (dermal contact and incidental ingestion) in commercial / industrial soil indicates that the general population (including excavation workers) is not at risk at the current copper concentrations.

69. Further, total coliform was detected in the soil samples. This group includes faecal coliform (e.g., *Escherichia coli* (E .coli)), as well as other forms of naturally occurring coliform found in soil. Most coliforms are harmless in soil with no human health risk. To prevent any potential risks, the incidental ingestion of soil at the site should be prevented by the enforcement of appropriate personal protective equipment (PPE) and good hygiene practices, e.g. frequent washing of hands.

70. A summary of the detected constituents in the **groundwater** and a comparison of groundwater analytical results to DTV, DIV and the Myanmar Effluent or Water Quality Standards are shown in **Table 2b**.

**Table 2b: Summary of Groundwater Laboratory Results**

Test Parameter	Dutch Standard (Rev 2012)		LOR <sup>c</sup>	MW1	MW2	MW3	MW4
	DTV <sup>a</sup>	DIV <sup>b</sup>					
<b>Metals and Metalloids</b>							
Barium	50	625	<20	<b>87</b>	<b>109</b>	<b>166</b>	<b>80</b>
Nickel	15	75	<10	<10	<b>14</b>	<b>11</b>	<b>14</b>
Zinc	65	800	<10	<10	<b>12</b>	<10	<10
Total coliform Count (cfu/100 ml)	<400 <sup>e</sup>		*	NA	NA	30,000	500
<b>Conventional Analytes</b>							
pH @ 25°C (pH Unit)	6.5 to 9.2 <sup>f</sup>		0.1	7	6.4	7.1	5.5
BOD @ 20°C (mg/L)	50 <sup>e</sup>		2	5	4	5	4
COD (mg/L)	250 <sup>e</sup>		1	12	16	26	8
Total Organic Carbon (mg/L)	-		0.10	1.17	<0.10	0.63	0.67
Fluoride as F (mg/L)	20 <sup>e</sup>		0.10	0.26	<0.10	0.29	<0.10
Chloride as Cl (mg/L)	600 <sup>f</sup>		0.10	32.1	30	42.5	<0.10

<sup>6</sup> a Hong Kong Risk-Based Remediation Goals (RBRGs) for Contaminated Land Industrial Land use

b Florida Department of Environment Soil Clean-up target Levels (CTLs) for Direct Exposure in Commercial/Industrial Land

c New Zealand Ministry for Environment Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health

Sulphate as SO <sub>4</sub> (mg/L)	400 <sup>f</sup>	0.10	37.2	90.4	14.6	26.8
Ammonia as N (mg/L)	10 <sup>e</sup>	0.01	0.64	2.1	14.1	2.50
Conductivity (µS/cm)	-	1.0	445	577	596	234

**Notes:**

a – Dutch Target Values 2009 (rev 2012)

b – Dutch Intervention Values 2009 (Rev 2012)

c – Limits of reporting

d – Row refers to sample identification marks

e – Myanmar Effluent Quality Standard

f – Myanmar Effluent Quality Standard

- No available standard

\*No laboratory limit or reporting

NA – Not Analyzed

Units in µg/L, unless otherwise indicated

Detected concentrations are in bold font; DTV exceedances are highlighted in yellow;

71. Groundwater levels were measured at 10.1 m bgl (MW1), 6.73 m bgl (MW2), 7.71 m bgl (MW3) and 11.3 mbgl (MW4) during sampling and/or purging. Barium in all four monitoring wells was found to exceed the DTV. The groundwater quality at the Project Site is in generally in compliance with the prescribed limits.

72. Total coliform was present in groundwater samples MW3 and MW4, recording at 30,000 CFU/100 ml and 500 CFU/100 ml respectively. There are presently no limits for this parameter in surface water or groundwater quality. Only the Myanmar effluent standards stipulate limits for total coliform at <400 MPN/100ml of coliform bacteria. The detected CFUs in MW3 and MW4 are above this limit and as such groundwater pumped from the site cannot be discharged into the public sewer system without prior treatment.

73. Based on the Guidelines on Canadian Drinking Water Quality, the CFUs in MW3 and MW4 exceed the limit of 10 CFU/100 ml. In the event groundwater from the site is proposed for consumption, the supply will be subjected to treatment to ensure safe consumption of the water.

## (b) Air Quality

74. The key air quality concern for the Project is Total Suspended Particulate (TSP) or dust during the construction phase of the Project. TSP was measured to obtain the baseline data. There are no other sources that emit PM<sub>10</sub>, SO<sub>x</sub>, NO<sub>x</sub>. The Project will not have air emission sources during its operation (nor chimneys) and will use clean gaseous fuel.

75. There are no air quality standards established in Myanmar at present. Therefore, in deciding on a suitable air quality standard to be used for the Project, a review of a number of air quality standards was carried out.

76. Whilst many official publications compare air quality with the US NAAQS<sup>7</sup> and WHO AQG<sup>8</sup>, the suitability of the chosen air quality standard to be adopted for this IEE was based on relevance in geographical location, pace of development, stakeholder requirements as well as

<sup>7</sup> US National Ambient Air Quality Standard

<sup>8</sup> World Health Organization's Air Quality Guidelines

availability of the standards of concern. There is no single air quality standard relevant to the short-term TSP down to 1-h averaging periods, which is the relevant concern to the construction activities in focus.

77. The only statutory limit for TSP (1-h) is provided in Annex 4 of Hong Kong EIAO- TM. As such Annex 4 of Hong Kong EIAO-TM is adopted for the purposes of this IEE. It specifies a limit of 500  $\mu\text{g}/\text{m}^3$ .

78. As the year round hourly meteorological data are not available for a complete assessment to predict the impacts in different average periods, only the worst-case hourly impacts are predicted under a directly downwind situation.

79. The Ministry of Health's Occupational Health Department began measuring air pollution at three locations in 2009 and new readings were undertaken in January at Hlaing Tharyar Industrial Zone, the department's office in Ahlone township and a residential area in Bahan township. The air quality compares favorably with the US NAAQS and WHO AQG and the annual mean of PM., PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> for the three monitoring sites (commercial, industrial and residential) are summarized in **Table 3**.

**Table 3: Air Quality Measured at Three Monitoring Sites (Oct 2008-Sep 2009)**

Pollution Parameters	Commercial	Industrial	Residential	Area Average
	Annual mean ( $\mu\text{g}/\text{m}^3$ )			
PM	58	65	91	71
PM <sub>10</sub>	38	43	62	48
SO <sub>2</sub>	1	3	1	2
NO <sub>2</sub>	14	13	18	15

Source: Air Quality Assessment in Yangon City, Toe Aung, Air Pollution Management 2009 Advanced International Training Programme, Head of Office, Yangon City Development Committee, Union of Myanmar.

80. Desktop research was carried out to secure secondary data which is presented in **Table 4**. The data was obtained from a monitoring station located around the Traders Hotel in December 2008. The Traders Hotel is located across Bogyoke Aung San Road from the Project Site. The ambient air quality parameters were monitored over an averaging period of 24 hours included Total Suspended Particulate (TSP), PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub>.

**Table 4: Ambient Air Monitoring Results**

Parameters	Results ( $\mu\text{g}/\text{m}^3$ ), 24 hours averaging time		
	Commercial Area	WHO (2005) <sup>9</sup>	USEPA <sup>10</sup>
TSP	143.21	-	-
PM <sub>10</sub>	71.75	50	150
SO <sub>2</sub>	0.88	20	75 ppb <sup>A</sup>
NO <sub>2</sub>	22.23	200 <sup>A</sup>	100 ppb <sup>A</sup>

Note:

A – 1 hour mean

<sup>9</sup> WHO Air Quality Guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide, Global Update 2005, Summary of Risk Assessment.

<sup>10</sup> National Ambient Air Quality Standards (NAAQS) (40CFR part 50), USEPA.

Source: *Air Impact Assessment in Myanmar Development Projects: Sharing of Experiences and Needs to be Improved During the Air-EIA*, Dr. Ohnmar May Tin Hlaing, Environmental Consultant.

81. Similar to air quality, the noise environment is dominated by vehicular traffic and occasionally by construction works. Noise is not regularly monitored, as it is largely location specific.

82. Baseline air quality was measured on the 22<sup>nd</sup> – 23<sup>rd</sup> October 2013 at potential air sensitive receivers that may be affected by the Project which include residential buildings to the north and south of the Project Site. The location of these monitoring stations is presented in **Figure 4.5** and the measured concentrations of TSP are shown in **Table 5** below.

**Table 5: Ambient Air Quality Levels**

Parameter	Location A	Location B	Location C
Nature of Use	Residential building north of Site	Residential building south of Site	Shopping Mall west of Site
Time of Measurement ending	18:38	19:02	19:32
Duration (minutes)	15	15	15
Likely sources of TSP	Mainly residential activities	Traffic emissions and commercial activities	Commercial activities
Measured TSP Levels ( $\mu\text{g}/\text{m}^3$ )	59	82	65

83. Since the key air quality concern for the Project is TSP or dust during the construction of the Project, TSP was measured to obtain the baseline data.

### (c) Noise Levels

84. Construction noise impact is considered a key issue and hence has been addressed quantitatively in detail while noise during the operational phase has been assessed qualitatively.

85. There is no provision of noise standards in Myanmar nor reference to other established standards adopted elsewhere. Therefore, in deciding on a suitable noise standard to be used for the Project, a review of regulations used internationally as well as in neighbouring countries was carried out.

86. The suitability of the chosen noise standard to be adopted for this IEE was based on relevance in geographical location, pace of development, stakeholder requirements as well as availability of the standards. In view of the measured, pre-construction high ambient noise levels, the urban noisy environment dominated by vehicular traffic and the short-term impact due to construction activities, the Hong Kong – EIAO-TM, Annex 5, Table 1B - Noise Standards for Daytime Construction Activities were adopted for the purposes of this IEE.

### **Hong Kong Noise Standards**

87. Noise impacts arising from general construction activities other than percussive piling during the daytime period (07:00-19:00 hours of any day not being a Sunday or general holiday) are to be assessed against the noise standards reproduced in **Table 6**. This has been



Figure 4.5: Ambient Air Quality and Noise Measurement Locations Near The Landmark Site

successfully used in Hong Kong in many projects in the urban and rural areas and is suitable for short-term impacts in 30 minutes interval.

**Table 6: Hong Kong Noise Standards for Daytime Construction Activities**

Noise Sensitive Uses	0700 to 1900 hours on any day not being a Sunday or general holiday, $L_{eq}$ (30 min), dB(A)
All domestic premises including temporary housing accommodation	75
Hotels and hostels	
Educational institutions including kindergarten, nurseries and all Others where unaided voice communication is required	70 65 during examination

**Source:** EIAO-TM, Annex 5, Table 1B - Noise Standards for Daytime construction Activities

(<http://www.epd.gov.hk/eia/english/legis/memorandum/annex5.html>)

**Notes:**

1. The above noise standards apply to uses, which rely on opened windows for ventilation
2. The above standards shall be viewed as the maximum permissible noise levels assessed at 1m from the external façade
3. IFC EHS Guidelines are largely intended for long-term impact in contrast to temporary construction noise. IFC EHS Guidelines are therefore not recommended for use in this IEE.

88. To establish the existing baseline noise levels, noise levels were measured at representative noise sensitive receivers near the northern and southern boundaries of the Project Site (refer **Figure 4.5**). The measurements were conducted on 22 Oct 2013 during 16:30 to 17:30 to coincide with the rush hour in the area. The noise data recorded in presented in **Table 8** below.

**Table 8: Measured Ambient Noise Levels**

Parameter	Location A	Location B
Nature of Use	Residential building north of Site	Residential building south of Site
Time of Measurement ending	18:38	19:02
Duration (minutes)	15	15
Measured Ambient Noise Level (free field) (dBA)	59	68

**(d) Biological Environment**

89. The Project Site is a built-environment and the species of flora and fauna surveyed at the site are native species not uncommon to the Yangon area. There were no protected species or species of conservation value identified.

90. In ascertaining the flora existing within the Project Site, a preliminary survey was carried out. Based on the survey data, 112 trees were identified. It is noted that these species comprise common species which are native and largely distributed in Myanmar. The survey indicates that the majority of the trees (75%) are small with diameters less than 2 feet. Only 11 trees were recorded to have a diameter of 8 feet and this constituted 10% of the total

number of trees. To comply with compensatory planting required by YCDC, the Developer has paid a fee to YCDC, to cut the trees that won't be used in the new development landscape and to replant two trees for each one cut.

**Table 9: Species of Flora Identified at the Project Site**

Tree Name	Total
Sein Pan	5
Coco Tree	15
Tha Phan	3
Vandar Tree	6
Mango Tree	5
Wild Palm	8
Ngu War	4
Jack Fruit tree	1
Other tree	4
Gant Gaw	18
Yetamar	12
Bayan Tree	11
Rain tree	2
Palm	16
Padauk	1
Khayae	1
<b>Total</b>	<b>112</b>

### 4.3 Socioeconomic Environment

91. *Demographic Profile.* The current population of Yangon is 5.14 million making it the largest city in Myanmar followed by Mandalay. The population of Yangon represents 12 percent of the national population and approximately 22 percent of the country's gross domestic product (GDP). Yangon was the capital of Myanmar until 2005. The region has a higher growth rate than the rest of the country. Between 1998 and 2011, the rate was recorded at 2.58 percent per annum versus the national growth rate of 2.0 percent per annum for the 2000-2005 period. This population growth is not homogeneous across the city of Yangon. The suburbs have high population growth rates of 6-7 percent as opposed to an almost zero or negative average population growth rates in the central business district and center area. Around 10 percent of the population of Yangon is believed to live in slums. In 2005, the total population of Yangon was estimated to be about 4.35 million with an average growth rate of 2.5 percent during 1983-2005 period. During the 1990's and early 2000's the rate of population growth was due to the increase in migration from rural areas and from other states. It increased from 2.11 percent during the 1983-1993 period to 2.87 percent during 1993-2005 period. The projected

population for the Pabedan township (within which the Project site is located) for 2015 and 2020 are 62,402 and 67,575 respectively based on a growth projection of 1.4 percent from 2010-15 and 1.6 percent between 2015-20.

92. *Economic Profile.* The industrial structure in Yangon Region consists of the processing and manufacturing sector (37 percent); trade sector (25 percent) and services sector (24 percent). Information obtained in 2011 shows that the ratio of the labour population to the total population in Yangon City was 50.8 percent (2.61 million) with nearly 70 percent of the working population (1.78 million) typically involved in tertiary industries. Data from the Myanmar Central Statistical Organisation shows that the total average monthly expenditure per household increased by 27% between 1989 and 2006, reaching MMK 97,700. The discrepancy between rural and urban households did not increase over the years. Rural expenditure grew at 26% versus urban at 27% from 1989-2006. The 2006 rural household expenditure represents only about 80% of urban number. The repartition of monthly expenditures did not progress between 1989 and 2006 and remained focused on meeting basic needs. Food represents 71% (with rice more than 25%).

93. *Poverty.* In the UNDP's 2010 Human Development Index Report (HDI), Myanmar was ranked 132 out of 169 countries. According to the Integrated Household Living Conditions Survey, that was conducted by UNDP in collaboration with the Myanmar Ministry of National Planning and Economic Development in 2010, the national poverty rate is estimated to be 25%. Poverty incidence is higher in rural than urban areas with rates of 29% and 15% respectively.

94. *Access to infrastructure.* The Japan International Cooperation Agency (JICA) recently conducted a household interview survey to collect information from 10,000 households which comprise 1.0% of the total households in Greater Yangon. Based on the survey, only 40 percent of households were reported to have water supply and there is no central sewage collection or treatment system. The service coverage of the existing sewerage system is less than 10%. Electricity supply is inadequate and blackouts are common. Solid waste collection services are only available to 72% of the households surveyed. For the Project, the existing transformer for the Grand Mee Ya Hta Executive Residence (to be demolished as part of project enabling works) is being relocated and will be used to supply electricity from the grid for construction (with back-up generators as required).

95. *Profile of women* According to the ADB Country Strategy for Myanmar, the female participation in the national labor market is of 63.1%, which is significantly below that of men at 85.1%. Except for the agriculture sector, the share of women in paid employment gradually increased from 41.3% in 2005 to 44.7% in 2010 (with variations across states and regions). In the industry and services sectors, data reflects women's limited access to labor markets. A wide gap remains between men and women in the higher ranks of paid employment, with women concentrated in lower ranks and less-skilled jobs. Despite laws requiring equal pay for men and women, disparities in wages remain. A study conducted by UNDP in 2009, *Human Development Report 2009. Overcoming Barriers: Human Mobility and Development*, for similar formal sector jobs, men earned an estimated \$1,043 in 2007, while women earned only \$640.48.

*Current and proposed development activities around the site.*

96. Currently, JICA is preparing the Yangon master plan which is not available to the public yet. Once approved, JICA will issue the Final Report. In what has been presented at the workshops conducted on the future master plan, there are a number of schemes around the Project, specifically (i) a Central Business District Bus Rapid Transit (it is likely that a separated bus lane will either be in the middle or on one side of Bogyoke Aung San Road and the location of stops can potentially be influenced to benefit the Project); and (ii) upgrade of the Rail Circle Line with developments at the Yangon Central Railway station on the south side.

97. With regard to other future developments in the area, there is the mixed use development being constructed on the south east corner of the junction with Bogyoke Aung San Road and Shwedagon Pagoda Road. There is also the Traders Square development next to the Traders Hotel.

98. There are no official guidelines regarding the study of traffic in Myanmar. The scope of a Traffic Impact Assessment for the Project has been established based on guidelines available in other countries such as Singapore, UK and Thailand. The TIA report analyses (i) the existing traffic, pedestrian and public transport situation of the Project, (ii) highlights the key proposals for access, circulation and parking, (iii) calculates daily and hourly traffic demand and parking accumulation; (iv) the capacity of the road network and proposed improvement to the traffic, pedestrian and public transport network; and (v) the proposed routes and timings of construction vehicles.

### **Existing Access**

99. Existing access to the site is from Bogyoke Aung San Road with one entry and exit to serve FMI Centre and one entry and exit to serve Grand Mee Ya Hta Executive Residence. There are other kerb cuts and access points that are no longer in operation and were historically used to access the MRB.

100. Bogyoke Aung San Road is one way eastbound meaning that there is a cross-over between traffic entering and exiting FMI Centre or Grand Mee Ya Hta Executive Residence. Access to the proposed Project will aim to remove this conflict by proposing left in / left out access at Bogyoke Aung San Road.

### **Existing Road Characteristics**

101. Bogyoke Aung San Road is a primary road with one-way traffic direction with 4 lanes. There is a raised median and barrier along the centre of the road that starts approximately 100m from the west junction and 100m from the east. The road runs in a west-east direction and connects Shwedagon Pagoda Road in the west to Lower Pasunduang Road in the east. Adjacent to the site there is existing parking within lay-by's used mainly by taxis.

102. Alan Pya Pagoda Street / Zoological Garden Road is another major road with two way traffic in a north-south direction. The carriageway is four lanes in each direction and connects to Kan Yiek Thar Road to the north and Bogyoke Aung san road to the south. Adjacent to the site there is no street parking.

103. Sule Pagoda Road is a three-lane two-way road with raised median. The road runs in north-south direction connects Bogyoke Aung San Road to the north and Strand Road to the

south. There are service roads alongside the northbound (north part) and southbound (south part) of the road.

104. Existing traffic volume. The Project Site is immediately adjacent to the “Traders Junction” and all traffic whether entering or exiting the Project junction will need to pass through this junction. To establish the existing traffic conditions for the TIA a video traffic survey was conducted for the weekday peak periods 08:30-09:30 and 16:30-17:30 on Monday 3<sup>rd</sup> and Tuesday 4<sup>th</sup> June, 2013. The traffic volume and surveyed junction is shown in **Figure 7 Traffic Volume at “Traders Junction”**.

105. For pedestrians, there are existing footways surrounding the site on Bogyoke Aung San Road and Alan Pya Pagoda Street. The footway along the boundary of the MRB is narrower than other footways surrounding it. There is also an uncontrolled pedestrian crossing to the west existing Grand Mee Ya Hta Executive Residence access. All of the access will be improved to ease pedestrian movement. The existing public transport network is conveniently located within the walking distance from the Project.

#### **Public Transport Accessibility**

106. In Yangon, 80% of trips are undertaken by bus and 3% by rail. Although this is undoubtedly reducing as a result of higher car ownership, there are still many people using the public transport network. The Project is conveniently located within walking distance of the public transport network. The Yok Lan bus stop and Yangon Central Railway Station are located on Alan Pya Pagoda Street approximately 220 m and 380 m from the site respectively. There are also Bogyoke Zay bus stop on Bogyoke Aung San Road and Sule bus stop on Sule Pagoda Road approximately 300 m and 210 m from the site, respectively.

107. In the future there is expected to be many changes to the public transport network such as improved bus fleet and safer services, renovated rail service, a metro system (expected by 2035) and bus priority measures, all to maintain the popularity of public transport and reduce the impacts of rapid traffic growth.

108. *Indigenous groups in the project area.* There are no permanent residences and indigenous groups located within the Project Site.

#### **4.4 Historical and Cultural Value**

109. Current conservation policies mainly comprise the Protection and Preservation of Cultural Heritage Regions Law (1998), and the Yangon City Development Committee (YCDC) Heritage List (1996). According to the Yangon Heritage Trust (YHT)<sup>11</sup> statement on the 1998 law, as published on the NGO’s website:

110. “This law provides statutory protection and preservation of designated cultural heritage regions (or zones) administrated by the Ministry of Culture. The law covers ancient heritage sites, which includes structures that predate 1886 or buildings that are declared as cultural heritage, namely, shrines, stupas, temples, monasteries, palaces, residential buildings, and

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<sup>11</sup> A Yangon-based Non-Governmental Organization focused on promoting the preservation of historical buildings in Yangon

Figure 7: Traffic volume at 'Traders Junction'



other man-made or natural heritage sites. In 2009, an amendment permitted the law to cover all buildings over 100 years-old, but at the moment, it remains unclear if and how this law applies to urban areas.” In 1996, the YCDC declared an official List of Heritage Buildings intended to safeguard Yangon’s built heritage. To date it totals 189 heritage buildings, and includes only state-owned and religious structures. Other privately owned buildings are not protected by the list. YHT observes that the list “remains incomplete in its current form... [m]any impressive structures remain without any official protection”.

111. Conservation policies in Yangon are rapidly evolving in response to the gathering pace of urban transformation. An urban conservation law proposed by the YHT in July 2013 is currently under government review. There is as yet no national regulatory framework for HIA in Myanmar. Nonetheless, in the context of these policy developments and growing interest and awareness in Yangon’s urban heritage, the Developer undertook a Heritage Impact Assessment report<sup>12</sup> requested by YHT as due diligence to better understand, monitor, manage, and mitigate any adverse heritage impact of the Project.

112. An architectural research and restoration firm from Singapore (a UNESCO/ICOMOS member) was commissioned to undertake detailed research and site survey works of the entire site, comprising the MRB and its historic neighbourhood. The HIA documented the historical and unique architectural features of the MRB, based on which restoration and conservation related recommendations have been made. The HIA and the conservation related recommendations have been developed in liaison with the YHT and in collaboration with the cultural heritage regulatory agencies within the Government of Myanmar. The ESMP (Chapter xx) presents the proposed mitigation measures to address the key heritage impacts identified in the HIA.

#### **4.5 HR policies and employee information of the company**

113. The Group is working to continually improve work force protection measures. As part of its E&S management system and SOP development process, the Group will update its HR policy documents and employee manual, to ensure that its labor practices and that of its contractors and sub-contractors comply with work force protection related requirements. The Group currently employs approximately 5,000 people. All employment policies and targets are currently being review and prepared.

#### **4.6 CSR and community development activities of the company**

114. The Group, as a Myanmar conglomerate, is committed to local development and has supported community initiatives in past years. For instance, the Group supported disaster relief efforts in 2008 in the aftermath of Cyclone Nargis by providing monetary support and by sending staff to disaster struck areas. During construction and operation, this Project will generate a large number of local jobs directly or through supply chains and procurement activities.

### **5 Anticipated Impacts and Mitigation Measures**

115. Potential environmental impacts from the construction and operational phases of the Project include impacts on ambient air quality, noise and vibration, water quality, soil and

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<sup>12</sup> Though the area of study does not currently fall under a UNESCO World Heritage Site, the ICOMOS Guidance on Heritage Impact Assessment for Cultural World Heritage Properties (Jan 2011) is broadly used to guide the process, methodology and content structure of the Heritage Impact Assessment report.

groundwater, waste, landscape and visual, traffic and health and safety. In mitigating these impacts suitable measures are recommended.

## **A Design Phase**

116. The MRB, a building of significant architectural heritage, is part of the project. While the MRB is being conserved and redeveloped with careful consideration to its historic value, these principles have been addressed in the design of the project components, so that the designs are not obtrusive and will be an integral part of the overall ambience so as to avoid visual impacts on the aesthetics of the site.

## **B. Pre-construction phase**

### **Land acquisition and resettlement**

117. There is no land acquisition or resettlement requirement for the Project. There are no households or communities residing within the Project Site. In addition, the project area and surroundings have no record of settlements of ethnic groups or indigenous peoples. With respect to involuntary resettlement and indigenous peoples, it is considered that the project is classified as Category C under the ADB Safeguards Policy Statement. Though land acquisition is not envisaged, relocation of existing business establishments and offices shall be required. For the currently occupied structures (FMI Centre and Zawgyi House), appropriate notice will be provided to vacate the premises.

**118. Retrenchment.** GMER closed down in October 2013 in preparation for its demolition. The Group arranged two job fairs during which each business within the Group interviewed GMER staff for potential re-employment. Some of the 134 GMER staff have taken up offers with various Group entities while the rest decided to pursue other opportunities. For those who chose not to stay with the Group, a severance package equal to six months of pay (1 month notice and 5 months of severance) was provided in line with national labor regulations.

## **C. Construction Phase**

### **Air Quality**

119. Potential sources of air quality impacts during the construction phase include fugitive dust and exhaust emissions. Sources of fugitive dust include the following activities:

- Site preparation works such as excavation, levelling, compaction and trenching;
- Movement of heavy construction vehicles and machinery within the site and during transportation operations;
- Material handling (delivery, unloading and use of construction aggregates and structural fill);
- Demolition of existing buildings on-site;
- Operation of a batching plant; and
- Material/soil tracked out of the site and deposited on local roads.

120. The batching plant will be located to the east of the MRB. The specifications are the following:

- Plant Concrete Output	: 60 m <sup>3</sup> /h
- Model of Mixer	: DNA 1.5
- Type of Mixer	: Helical Twin Shaft
- Mixer Capacity	: 2250/1500 Liter
- Mixer Concrete Output	: 1.5 m <sup>3</sup> /cycle
- Number of Aggregate Bins	: 4 Nos
- Aggregate Storage Capacity	: 45 m <sup>3</sup>
- Cement Silo	: 1 Nos
- Aggregate Weighting System	: By Skip Bucket
- Cement & Water Dosing	: By Weight
- Aggregate Loading System	: Ramps
- Dimension for Transport (L x W x H, m)	: 14.3 x 2.5 x 3.3 m (l) x (w) x (h)

121. The exhaust emissions emitted from vehicle and machinery engine exhaust emissions will contain NO<sub>x</sub>, SO<sub>x</sub>, CO, volatile organic compounds (VOC), particulates and smoke. The main air quality parameter of concern is fugitive dust, represented by TSP and a small fraction of PM<sub>10</sub>. Major activities that will contribute to fugitive dust impact include site clearance, demolition of buildings, excavation and operation of the batching plant.

122. In assessing the air quality impacts, numerical modelling using the Industrial Source Complex Short Term (ISCST3) (an USEPA accepted software developed based on Gaussian dispersion) was carried out to quantify the impacts at the nearest sensitive receivers (NSRs) which include residential buildings to the north and south of the site, a Mosque and a Church, all of which are located within 50 m of the Project Site. These NSRs are indicated in **Figure 6**. The predicted maximum hourly average concentrations at the representative NSRs were derived assuming dust-generating activities are conducted in parallel, and the value superimposed with the background TSP level obtained from the baseline monitoring program. This value was then compared with the hourly TSP limit of 500µg/m<sup>3</sup> adopted for the Project Site to evaluate acceptability. In selecting the TSP limit and in the absence of suitable local regulatory standards, a number of standards<sup>13</sup> were compared. The only statutory limit specified for TSP (1 hour) was in the Hong Kong Environmental Impact Assessment Ordinance and therefore the Ordinance's prescribed limit of 500µg/m<sup>3</sup> was adopted for the Project. The findings indicate that except for a 12% exceedance of the hourly TSP limit predicted at the Church located to the west of the Project site, no other exceedances were observed at the remaining NSRs. Representatives of the Developer met with the Church and discussed a range of issues of mutual interest/concern. TSP and noise exceedances were amongst them. TSP and noise mitigation measures that are included in the ESMP in Section 10 of this report specifically to address noise level issues at the Church were discussed and agreed. The Developer will be ensuring that the appointed contractor adheres to the requirements of the ESMP, and has also independently commenced processes to undertake a dilapidation survey of the Church and other surrounding buildings.

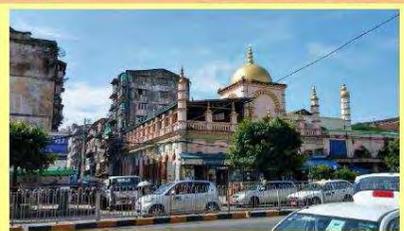
<sup>13</sup> Air Quality Standards by Ministry of Natural Resources and Environment, Thailand; WHO AQG adopted by IFC in EHS Guidelines (Air Emission & Ambient Air Quality); US NAAQS – National Ambient Air Quality Standards HKAQO - Hong Kong Air quality Objectives (with effect from 1 Jan 2014); Hong Kong EIAO-TM, Annex 4 – Criteria for Evaluating Air Quality Impact and Hazard to Life (short-term construction dust, TSP limit)



N2-Church



N1-Northern Residential Building



N3-Mosque



N4-Southern Residential Building

Figure 6: Representative NSRs

123. Overall, the air quality impacts predicted from the Project Site are expected to be short-term, localized and, with the implementation of dust control measures, management of construction activities and proper maintenance of vehicles and machinery as recommended in the Environmental and Social Management Plan (ESMP) outlined in Section 10, the impacts can be minimized. Further, an environmental monitoring and audit (EM&A) program will be implemented to verify the actual impacts and to modify the construction activities/program to alleviate the impacts arising.

## Noise

124. In identifying the noise generating activities, the detailed Project construction programme which describes the various construction activities and the associated equipment/machinery was reviewed. The highest noise generating activities are those associated with piling and demolition works. An assessment of the noise impacts was carried out quantitatively by preparing a construction equipment inventory with the Sound Power Level (SPL) of each equipment using the database provided in the BS 5228-1-2009<sup>14</sup> and calculating the Predicted Noise Level (“PNL”) at the NSRs (similar to the NSRs for the air quality impacts). The PNL was adjusted for various corrections including distance attenuation and facade reflection to obtain the Corrected Noise Level (“CNL”) at all the NSRs. The CNL obtained indicate that noise exceedance by a maximum of 4 dB(A) was predicted at the Church over 13 months during the construction period. Management of noise impacts during the construction can be achieved by considering alternative construction methodologies, use of silencers and enclosures, use of movable noise barrier and good international industry practice (GIIP) as described in the ESMP included in section 10. With the implementation of these measures, the noise impacts are predicted to be short-term, localized and reversible.

## Vibration

125. Vibration impacts are most likely anticipated during the demolition activities. A review of the list of construction machinery and equipment indicate that the backhoe-mounted hydraulic breaker will be the dominant source of vibration during the demolition of the Grand Mee Ya Hta Executive Residence and FMI Centre buildings. In assessing vibration impacts, a damage assessment and annoyance assessment were carried out per the Transportation- and Construction-Induced Vibration Guidance Manual<sup>15</sup>. Based on these assessments, it has been demonstrated that no unacceptable vibration impacts are predicted at the sensitive receivers which were identified as the Church and the MRB due to their close proximity to the Grand Mee Ya Hta Executive Residence and FMI Centre buildings.

## Water Quality

126. Sources of water quality impacts predicted during the construction phase include:

- a) Soil erosion from the following key construction activities:
  - I. Demolition and site clearing;
  - II. Site preparation and site formation/earthworks;
  - III. Superstructure works; and

<sup>14</sup> BS 5228-1:2009 – “Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise”.

<sup>15</sup> Transportation- and Construction-Induced Vibration Guidance Manual, pp 24, published by California Department of Transportation

- IV. Infrastructure development including road works, utilities and landscaping activities;
- b) Potentially contaminated surface runoff arising from the site especially from material stockpile areas and hazardous materials (e.g. diesel, paints, lube oils) storage area; and
- c) Sewage from the sanitary facilities provided at the on-site temporary offices and worker cabins.

**127. (a) Soil erosion.** Soil erosion is predicted as a result of demolition of existing structures, site clearing (including the removal of undergrowth and secondary vegetation which exist mainly along the north-eastern and eastern boundaries of the site), earthworks, grading, excavation of drainage system, electrical cables and backfilling activities. It is anticipated that up to 400,000 m<sup>3</sup> of soil/subsurface materials will be removed to allow for the foundation works and the basements for the buildings to be constructed onsite.

**128. (b) Construction runoff and drainage.** Surface runoff and drainage from material stockpiles areas, excavated areas and temporary drainage channels contain increased sediments and other water quality contaminants. Potential contaminations include:

- Grouting and other 'wet' building materials;
- Various types of lube oil, spent/waste oil and residues from construction equipment, vehicles and diesel generators;
- Residues and waste of industrial paints, pigments, lacquers, curing compounds, etc.;
- Debris and rubbish such as packaging material, plastics, reject construction materials and discarded containers;
- Excavated materials stockpile; and
- Spillages of fuel oil (diesel), liquid chemicals, paints and other liquid waste residues.

**129. (c) Sewage Effluent and Domestic Wastewaters.** During the construction phase, temporary site offices and cabins for use by the workers will be established at the Project Site. Wastewaters generated will be in the form of sewage effluent and domestic wastewater (e.g. kitchen washwaters from temporary canteens which may be established at the Project Site).

130. Improper management of the sources described above will result in adverse impacts to the receiving waterbody which is a canal which flows along the northern boundary of the Project Site. A Wastewater Treatment Plant will be installed so that all discharges from the site will pass through the WWTP before finally discharging the flow offsite into the canal via a box culvert. The canal flows some 2.5 km in a southeasterly direction into the Pazundaung Creek. The creek meanders in a southerly direction to converge with the Yangon River some 3 km away.

131. In preventing or minimizing the impacts above, a phased construction approach will be adopted. The impacts arising from the earthwork activities can be minimized with the implementation of appropriate mitigation measures (as described in the ESMP) by the appointed contractor in accordance with the construction methodology proposed by the engineering team. Upon the onset of physical works, it is important that the nominated earthworks contractor be guided in the planning of site clearance and earthworks. Earthwork plans and phasing details complete with the relevant mitigating measures will be submitted to the YCDC for approval before the commencement of works. An Erosion and Sedimentation

Control Plan (ESCP) will be integrated into the earthworks plan and the contractor will be required to comply with the details of the plan.

132. The potential impacts on soil and groundwater resources are likely to be attributed to improper management and handling of hazardous materials stored at the site. Potential sources of impacts anticipated during the construction activities of the Project include:

- Accidental spillage and leakage arising from the handling and storage of hazardous materials/chemicals in diesel skid tanks, chemical/fuel dispensers and storage drums, jerry cans or carboys that contain lube oil, hydraulic oil, paints and organic solvents and other chemicals used during the construction phase;
- Leakage arising from vehicle engine oil change, equipment and machinery, as well as refueling activities;
- Spills as a result of inappropriate hazardous waste storage and disposal practices;
- Improper discharge of untreated sewage; and
- Groundwater dewatering activity.

133. Soil and groundwater impacts arising from accidental spillage and leakage of hazardous chemicals and wastes during the construction phase are predicted to be not significant due to the limited quantities of chemicals stored and used at any one time on-site during construction. Further, the extent of soil and groundwater contamination is likely to be localized and surficial. These impacts can be readily addressed by implementing appropriate mitigation measures discussed in the proceeding section.

134. The risks of soil and groundwater contamination during the construction phase will be appropriately managed and controlled by implementing the measures described in the ESMP.

### **Non-hazardous and Hazardous Waste**

135. Waste generated during the construction phase includes both non-hazardous solid wastes and hazardous wastes.

#### **(a) Non-hazardous waste**

136. Sources of non-hazardous waste include:

- **Demolition debris:** The development of the Project will involve the staged demolition of the buildings which currently occupy the site as described above. The non-hazardous demolition spoil is expected to comprise amongst others brick, concrete materials, iron, electrical wiring, wood based materials;
- **Excavated unsuitable soil:** During the site formation works, approximately 400,000 cubic metres of material will be excavated and taken off-site and disposed of at YCDC-approved dumping grounds. The soil investigations showed soil to be generally suitable for reuse. Excavated soils will become property of the main contractor and will likely be

reused on other sites as fill material. If found to be unsuitable however, they will be disposed of at approved dumping grounds (not yet identified).

- **Construction spoil originating from the construction works.** These include materials such as crushed stones and gravel, rejected metal based materials, bricks, concrete slabs, steel frames, PVC pipes, cement/grouting mixes, etc;
- **General waste** which includes non-inert and non-toxic waste such as plastics, packaging, paper, glass, metals, planks, putrescible food and other wastes generated from site office and temporary workers' canteen at the site; and
- **Vehicle/equipment parts** such as tyres, metal components, etc.

## (b) Hazardous waste

137. Sources of hazardous waste include:

- Hazardous demolition wastes: Wastes from the demolition of old structures will potentially contain hazardous materials which require appropriate management and disposal. Older buildings are often painted with lead paint and paints containing mercury-based biocides, use leaded pipes, have asbestos insulation, use mercury-containing fluorescent lamps and PCB ballasts and contain other hazardous materials. An assessment on the presence, condition and extent of hazardous materials was carried out for the Project Site in July 2013<sup>16</sup> and the findings and recommendations are indicated below:
  - Asbestos containing material (ACM) across all buildings onsite<sup>17</sup>, inclusive of Synthetic Mineral Fibre (SMF) at Grand Mee Ya Hta Executive Residence, FMI Centre and Zawgyi House. Confirmed SMF materials should be maintained in good condition and removed under controlled conditions prior to any demolition works;
  - Lead-based paints across all buildings onsite and the paint were observed to be peeling and weathered. It is recommended to remove the paint through techniques such as wire brushing or wet hand scraping with liquid paint removers or replacement of gas pipes should the pipe not be required in the future;
  - Ozone depleting substances at Grand Mee Ya Hta Executive Residence, FMI Centre and Zawgyi House. During demolition all equipment containing refrigerants on site should be dismantled, handled with care and returned to the supplier for disposal or recycling where possible;
  - Radioactive smoke detectors at FMI Centre and Grand Mee Ya Hta Executive Residence were of the FDS series and contain small amounts of Americium 241; a radioisotope. These smoke detectors should be separated from pre-demolition

<sup>16</sup> Golder Associates (2013). Landmark Project – Hazardous Materials Assessment, July 2013

<sup>17</sup> This component of the assessment was carried out in accordance with HSG264 Asbestos: The Survey Guide and Golder Associates technical procedures on ACM bulk sampling methods. Bulk samples of suspected asbestos containing material was collected during the survey and placed in plastic sealed bags. These samples were later analysed by Analytical Environmental Services Inc. (AES) in Atlanta who are certified by AIHA to analyse Industrial Hygiene Samples by Polarised Light Microscopy. Groundwater samples were assessed for ACM content by Transmission Electron Microscopy (TEM) –EPA Method 100.2.

- and either returned to the supplier or recycled. These smoke detectors should not be thrown in general waste as far as possible;
- Mercury containing materials e.g. fluorescent lights at the MRB and Grand Mee Ya Hta Executive Residence. At various locations, LG, GE and Osram brands of incandescent and fluorescent lighting were used. No mercury is released when compact fluorescent lights (CFL) bulbs or fluorescent tubes are intact (not broken) or in use. However, when fluorescent lamps are no longer usable, they should be disposed of safely or recycled if possible;
  - Hazardous chemicals/wastes at FMI Centre and Grand Mee Ya Hta Executive Residence. In general, it is suggested to ensure that hazard warnings and appropriate labeling are put in place for chemicals required and stored on site;
  - Mold at the MRB and Grand Mee Ya Hta Executive Residence. All sources of moisture should be cut off prior to cleaning. Area should be dried and workers renovating the area should wear N95 masks and clean the mold growth with bleach if necessary. All other vents should be checked thoroughly for signs of mold growth prior to demolition to prevent any exposure to airborne diseases through mold spore exposure.; and
  - Biological hazards (pigeon dropping and rat droppings) at the MRB, FMI Centre and Grand Mee Ya Hta Executive Residence. This waste should be removed prior to demolition so as to prevent disease transmission during demolition activities.
- Spent filter cartridges, mineral oils/engine cleaning fluids from the construction machinery/equipment;
  - Small quantities/residues of waste of industrial paints from the painting activities; and
  - Various types of spent/waste oil and soil/rags contaminated with oily residues from construction equipment, vehicles and diesel generators

138. The potential impacts arising from the improper management of both non-hazardous and hazardous waste categories described above include the following:

- Improperly managed wastes may enter public drainage system potentially obstructing the drainage flow;
- Grouting materials, oil and grease, paints, etc. may potentially contaminate the surface runoff arising from Project Site;
- Improper disposal of putrescible municipal wastes onsite would attract disease carrying rodents and insects which are possible health risks to the employees within the Project Site as well as create an odor nuisance within the site;
- Indiscriminate dumping of construction wastes (hazardous) at open areas within the Project Site may potentially contribute to soil and groundwater contamination;
- Ineffective management of waste onsite including large stockpiles of excavated materials will also create aesthetic impacts as the Project Site is located along one of the main streets within the city of Yangon; and
- Improperly managed construction wastes are also potential fire hazards within the site.

139. Overall, the impacts arising from the management of non-hazardous and hazardous wastes at the project site during the construction phase are predicted to be short-term and localized, and can be effectively mitigated with the implementation of appropriate construction management practices. An Exposure Control Plan has been developed for removal of ACM and SMF, as far as necessary, to facilitate a safe work area for demolition workers. YCDC entrusts the Pollution Control and Cleansing Department to collect and haul industrial wastes into designated dumping sites. This form of disposal will need to be carried out for the ACM and other hazardous waste derived from the Project. Appendix A and Appendix B present the detailed Exposure Control Plan for ACM and SMF Removal.

140. In mitigating the impacts, good housekeeping practices are essential within the site. Open burning of any form of construction waste material within the Project Site is strictly prohibited as apart from polluting the atmosphere and reducing the ambient air quality at the site, the activity poses a risk of fire spreading to the hazardous materials storage areas. General construction spoil will be recycled on site as much as possible. Domestic waste generated from the site offices and workers' temporary cabins will be stored in suitable covered receptacles or stored within enclosed areas and collected regularly. Unsalvageable construction spoil will be stockpiled at a designated site and sold to salvage yard operators or other contractors interested in recycling the material.

### **Landscape and Visual**

141. The development of the Project will result in temporary adverse landscape and visual impacts during the demolition and construction phases. Mitigation measures to be implemented to reduce these impacts include the erection of a decorative hoarding around the periphery of the site to screen the temporary construction works from the local low level receivers, mainly the pedestrians. The proposed hoarding is expected to provide a unified edge treatment and interface between the construction site and its landscape context. The construction activities of the Project will inevitably impact the existing trees within the site. Wherever possible the existing trees which contribute most to the landscape of the site will be retained *in-situ*. The nominated Landscape Consultant for the project, in consultation with YCDC, has confirmed that a total of ten trees and 41 palms from the original survey of existing trees included in table 5.4.2 Species of Flora Identified at the Project Site will be preserved. During the construction phase, these trees will be replanted at a nursery area and relocated back onto the site within the new development scheme. These flora comprise common species frequently planted in gardens, parks and urban setting within Yangon, and in the wider South East Asia region.

142. In the event transplantation is not successful or considered not viable, compensatory planting will be adopted. According to guidelines developed by the YCDC, every tree that is removed from the Project Site will be compensated with two trees to that will be replanted in Yangon area. The nominated contractor will ensure compliance to these guidelines.

### **Socio-economics**

143. *Employment Opportunities.* Overall, the socio-economic impacts are predicted to be positive. It is expected that some 2,500 new jobs for locals will be created for the Project. The construction workforce comprising both skilled and unskilled labour will be sourced primarily from the local population, and foreign workers would mostly be hired if a post cannot be filled

by a local. This is according to the Group's internal HR policy and to maximize the benefits of the Project to the local community and the nation as a whole. It is likely that the majority of workers will be employed from Yangon region, and the logistic services that have importance in the realization of the Project such as fuel purchases, accommodation of the workers and necessities, construction material necessities among others will be procured from the Yangon region. It is estimated that the Project will directly employ the following at the start of operations:

Estimated total direct employment	856
Estimated direct female employment	480

144. *Compliance to labor laws and standards.* The appointed main contractor for the construction phase of the Project will ensure compliance to the national labor law and measures to comply with relevant ILO labor standard conventions, including the following international practices with respect to the construction workforce:

- promote the fair treatment, non-discrimination and equal opportunity of workers;
- establish, maintain and improve the worker-management relationship;
- ensure total compliance with national labor and employment laws and the ILO labor standard conventions;
- establish guidelines to avoid involvement of child labor, by contractors, sub-contractors, and the supply chain;
- protect the workforce, including workers engaged by third parties, and workers in the project proponent's supply chain;
- promote safe and healthy working conditions and workforce health and well-being; and
- prohibit any use of forced labor.

## Health and Safety

145. Serge Pun & Associates (Myanmar) Limited ("SPA") as the parent company of MIHL has recently issued the Guidelines on Minimum Health & Safety Standards for Major Works and will implement these guidelines during the construction phase. The guideline is applicable to all contractors working at the Project Site and in the event of non-compliance a penalty system has been put in place to deter any non-compliance and to encourage the management of workers' health and safety. The penalty, in terms of monetary fines, will be strictly imposed. Contractors working on the Project are required to prepare a Safety and Health Management Plan that needs to be submitted to SPA for approval before any commencement of works can start. This Safety and Health Management Plan must contain at a minimum the following:

- Safety policy;
- Safe work practices;
- Safety training (including local subcontractors);
- Group meetings;
- Incident investigation and analysis;
- In-house safety rules and regulations;
- Safety promotion;
- Evaluation, selection and control of sub-contractors;

- Safety inspections;
- Maintenance regime for machinery and equipment;
- Hazard analysis;
- Control of movement and use of hazardous substances;
- Emergency preparedness; and
- Occupational health programs.

146. It is expected that construction work will be performed by shifts; the working schedule and rest breaks will be organized with due consideration of natural and climatic conditions and the level of difficulty of a specific working process. As the workers will be sourced locally, there will be no temporary accommodations/worker camps provided at the Project Site.

147. The general amenities in the construction yards will comprise potable water supply (bottled water will be provided in the event such supply does not exist), temporary sanitary facilities, changing/locker rooms and rest areas. To cater for minor cuts and bruises and medical condition, adequate medical first-aid kits will be provided.

148. The appointed contractor and subcontractors will be responsible for the health and safety of their personnel. Health and safety instructions will be developed based on the Health and Safety Code of Singapore (2007) for issuance to workers and, for the more dangerous work, specific hazard-related training and briefing on the use of construction machinery, tools, appliances and personal protection equipment. Knowledge on the health and safety rules of these workers will also be checked periodically to ascertain their understanding.

149. Prior to starting construction works, the more dangerous zones where hazardous factors exist within the Project Site will be identified. These include the following areas:

- Areas in proximity to buildings/structures during demolition activities;
- Hazardous wastes storage/handling areas (removed from the buildings to be demolished) stockpile areas;
- Hazardous materials storage area (diesel, lube oil, paints, thinner, grouting chemicals);
- Areas where installation (or dismantling) of structural elements or heavy equipment is carried out;
- Displacement zones, where machinery, equipment or parts thereof are used;
- Areas above which loads are handled by hoisting cranes; and
- Areas where concentrations of harmful substances in the ambient air in working zones exceed the regulatory maximum permissible levels) will be identified.

150. In the process of executing work at these areas, the workers will be impacted by the following:

- Increased dust in the ambient air in working zones;
- Increased temperature of equipment surfaces;
- Increased vibration levels;
- Moving machinery or its moving parts; and
- Common injuries likely to be encountered include over-exertion, dehydration especially during the hot season, minor cuts and bruises, ergonomic injuries and illnesses are among the most common causes of injuries in construction and decommissioning sites.

151. Management of workers' health and safety will be carried out by implementing the following:

- Protective fencing or tape will be provided at the boundaries of these zones and the appropriate warning signs, markings and safety signs;
- Areas where workers will stay temporarily (example, rest areas) will be located outside of any hazardous or dangerous zones;
- A work permit will be issued for any work to be carried out within these zones. The work permit will indicate the area where the work is to be carried out, a description of work in a hazardous/dangerous zone, conditions for safe execution of work, the time of beginning and completion of the work, the list of team members and person responsible for safety in the process of the work;
- The persons entitled to issue work permits will determine the need for such work and a possibility for its safe execution; they will be responsible for the implementation of the precaution measures mentioned in the work permit. A job description will be developed for each type of work; and
- Workers will be protected from over-exertion and ergonomic injuries and illnesses, slips and falls, and work in heights. Measures to be put in place include:
  - Training workers in lifting and materials handling techniques and setting weight limits;
  - Planning the layout of the work site to minimize the need for manual transfer of heavy loads;
  - Selecting tools that reduce force requirements and holding times;
  - Sorting and placing loose construction materials or demolition debris in established areas away from foot paths;
  - Cleaning up excessive waste debris and liquid spills regularly;
  - Training and use of temporary fall prevention devices as rails, and barriers;
  - Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support heavy loads.

152. It is important to protect the community and workers from physical, chemical and other hazards associated with the Project Site during construction phase. Risks can arise from trespassing including potential contact with hazardous materials, buildings that are vacant or under construction or excavations and structures which may pose fall and entrapment hazards. Restricting access to the Project Site with the use of appropriate hoarding and posting 24-hour security personnel to monitor the boundaries will reduce such risks.

153. Increased incidences of communicable diseases represent a potentially health threat to project personnel including the contractor, the workforce and residents of local communities. Prevention of the transmission of disease is also a key consideration. Workers will be trained to adopt basic requirements for personal hygiene, food preparation and handling, and recognition of the symptoms of communicable diseases. It is important as well to provide workers and the local community guidance on specific emergency actions to take in the event of a suspected disease outbreak. It will be noted that the baseline soil and groundwater investigation report prepared in 2013 indicates the presence *E. coli* and total coliform

exceeding international limits<sup>18</sup>. It will be important to ensure the workers use proper personal protective equipment and practice good hygiene whilst working on site.

154. Risks may arise from handling or being exposed to hazardous materials that will be used at the construction areas within the Project Site, and these include:

- Diesel for the onsite generators, pumps, small engines; and
- Grouting chemicals, paints, solvents.

155. The following measures are planned to prevent the release or the spills of hazardous substances:

- To prevent accidental spills of petroleum products in the process of the filling of vehicles or machinery, secondary containment measures will be provide, i.e. trays will be placed beneath the machinery and vehicle filling will be carried out at designated areas provided with hardstanding and catch drains;
- Maintenance of construction machinery will be carried out only at designated areas where there is adequate protection to prevent the migration of spilled fuel or lubricants to the soil and groundwater (it is noted that the site has a high water table);
- Durable waste receptacles will be installed at construction sites for the collection of oil contaminated waste materials and soil; all wastes will be disposed of separately as hazardous waste at a local approved by the YCDC; and
- Use of third party expert assisted by the trained personnel to identify and remove hazardous materials for example asbestos, PCB's, electrical components containing mercury per the Hazardous Materials Management Plan prepared in the Hazardous Materials Assessment report.

156. A significant increase in the movement of heavy vehicles for the transport of construction materials and equipment will impact the risk of traffic-related accidents and injuries to workers and the local community. The incidence of road accidents involving project vehicles during construction will be minimized through a combination of education and awareness-raising.

157. In managing these impacts, the following measures will be taken:

- Traffic safety awareness will be promoted;
- Safe transport practices will be adopted with an emphasis on safety aspects among drivers;
- The number of trips for each driver to be limited as far as practicable and rosters will be drawn up for drivers avoid overtiredness;
- Dangerous routes will be avoided and transportation during night time reduced to minimize the risk of accidents; and
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize serious accidents.

## Traffic Management

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<sup>18</sup> Golder Associates (2013). Landmark Project – Hazardous Materials Assessment, July 2013

158. The exiting access to Grand Mee Ya Hta Executive Residence on Bogyoke Aung San Road will be used during construction. During the construction of Phase 2 FMI Centre access will be used. During the construction of Phase 1 FMI Centre will operate as existing. The construction is expected to take approximately 5 years with the majority of vehicles entering and exiting the Project Site during the basement excavation at the start of the construction period. Construction traffic will avoid the peak traffic hours and adhere to YCDC limitations on vehicle size during specified hours of the day. Traffic management during the improvements and access design connecting to the public road will be prepared by the contractor at a later date and agreed with YCDC Roads and Bridges Department.

## **B. Operational Phase**

### **Air Quality**

159. Air quality impacts will be minor during the operational phase. MIHL is committed to the use of clean gaseous fuel (LPG, LNG etc.) for heating or other purposes. Liquid fuel such as diesel will only be used for emergency generators.

### **Noise**

160. Noise impacts are not expected to be significant during the operational phase of the Project. The main sources of noise generation will be traffic noise from the increased vehicular movement by the employees of the office towers, the residents of the service apartments/condominiums and the guests staying at the hotels onsite. As these sources are mobile and intermittent and the surrounding area a highly urbanized environment exposed to traffic noise, it is predicted that the impacts will not be significant.

### **Water Quality**

161. During the operational phase of the Project, the main source of water quality impact is domestic wastewater which comprises sewage and sullage (wastewater sinks/wash basins, showers, and baths, but not waste liquid or excreta from toilets). Stormwater from the Project Site will be conveyed via a network of permanent drains which will discharge via the northern boundary of the site into the existing canal. Untreated or inadequately treated sewage effluent and domestic wastewaters which are high in organic content has the potential to increase the Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Ammoniacal Nitrogen (AN) concentration in the receiving waterways. These effluents will also have high counts of faecal coliform, *E. coli* and other disease carrying bacteria.

162. To treat the sewage effluent from the sanitary facilities located at the various development components of the Project and sullage from development components, a sewage treatment plant (STP) designed to comply with appropriate international standards will be constructed onsite. The STP will be designed based on the peak water demand of 1,100 m<sup>3</sup>/day as this rate is assumed to represent the wastewater generation at the site. The design influent criteria is BOD > 400 mg/l for the sanitary facilities of the residential units, BOD < 1100 mg/l for the kitchen washwaters and BOD < 150 mg/l for grey waters entering the STP. The BOD and SS limits for the treated effluent will be < 20 mg/l and < 30 mg/l respectively. A discussion will be held with the relevant department within the YCDC to confirm the adequacy of these treatment

limits as currently **there are no specified national/local regulatory limits for treated effluent discharge.**

163. The wastewater from these sources will first undergo coarse screening before entering the equalization tank (350 m<sup>3</sup>). From this tank, the wastewater will be pumped through a fine screen into an air-sparged aeration tank (80 m<sup>3</sup>). The overflow from the aeration tank will then pass through two membrane tanks (150 m<sup>3</sup> each) which will operate in parallel. Sodium hypochlorite will be added into both the membrane tanks for disinfection purposes. The final treated effluent will be pumped into the treated water tank (100 m<sup>3</sup>). The sludge formed at the bottom of the equalization tank and the aeration tank will be pumped into the slurry tank (30 m<sup>3</sup>) for temporary storage before being pumped to a tanker for offsite discharge/disposal at a location approved by the YCDC. To ensure optimal efficiency of the STP, the system will be subject to periodic preventive maintenance.

164. The treated effluent will be reused onsite as cooling water and any excess will be pumped into the city's stormwater drainage system.

### Soil and Groundwater

165. The main source of soil and groundwater contamination during the operational phase of the Project is spillage of hazardous materials from the following areas:

- Diesel Storage Room covering a footprint of 135 m<sup>2</sup> which houses 3 metal skid tanks (each with a storage capacity of 20,000 litres) and 2 tanks (with a storage capacity of 10,000 m<sup>3</sup>)
- Chemical Store for the storage of chemical related to maintenance activities, the STP and the cooling towers (anti-fouling agents, corrosion inhibitors, biocides);
- The emergency firewater pumphouse (diesel storage for the firewater pump) ;
- Standby generators (including their diesel day tanks); and
- Hazardous Wastes Storage.

166. In mitigation, the diesel and chemical storage facilities will be designed and operated to ensure that as far as practicable, leakage and accidental release of chemicals into the underlying soil and groundwater do not occur. Prevention and control measures include the following:

- The five diesel storage tanks within the Diesel Storage Room will be located within concrete-bunded enclosures capable of containing 110% of the contents of the largest tank within each enclosure. The floor of the bunded enclosures will be concrete-lined with an impermeable liner to prevent contaminant from permeating into the ground;
- Operational control which includes regular/routine surveys, inspection and maintenance of the diesel fuel tanks and their ancillary facilities (pumps, valves and pipes) will be integrated into the Project's environmental management practices so as to identify and rectify any significant product losses or ongoing spills/leakages which may be occurring;
- Areas where regular or periodic handling and dispensing of liquid hazardous material are undertaken, such as the diesel storage area and the building maintenance store

will be concrete-paved with appropriate secondary containment (drip trays and bunded areas) provided.

- Any accidental spills will be assessed on a case by case basis and remedied, including excavation and disposal of any contaminated soil (classified as hazardous wastes) at a secure disposal facility approved by the YCDC.
- Procedures and work instructions on the proper handling of diesel and maintenance chemicals as well as the disposal procedures for hazardous wastes will be developed and effectively communicated to all operations and maintenance personnel;
- Material Safety Data Sheets (MSDS) to be provided for the diesel and any other chemicals (e.g. chemicals used for the maintenance activities, used at the STP and for the cooling towers) stored within the Project Site;
- Corrosion protection for steel tanks and their ancillary facilities (pumps, valves and pipes) will be provided to prevent leaks.

167. As part of continuous monitoring, the groundwater quality at the Project Site will be monitored on a regular basis during the lifetime of the development as groundwater is a valuable and sensitive resource in Yangon. Groundwater monitoring wells will be installed at locations up-gradient and down-gradient of the site. The location of the groundwater sampling stations is presented in **Figure 5**.

168. If contaminants are present at concentrations above the groundwater quality screening levels such as the Dutch Intervention Values (DIVs) which are more stringent than IFC EHS, further assessments will be necessary to determine the nature and extent of the contamination, as well as to remove the potential source(s) of contamination. A Human Health Risk Assessment (and/or an Ecological Risk Assessment, where appropriate) may be required to determine if the concentrations detected in the impacted media pose an unacceptable risk to human health and the environment.

### **Non-hazardous Waste and Hazardous Waste**

169. Non-hazardous or municipal wastes arising from the occupancy of the buildings proposed for the Project include kitchen wastes, office wastes from the administration offices of the hotel, wastes generated by the hotel guests, garden wastes and miscellaneous wastes which may include waste paper, plastic, cardboards etc.

170. Small quantities of hazardous wastes will be generated from the operation of the hotel largely from the periodic maintenance activities. These include:

- Used fluorescent bulbs;
- Spent oils and solvents from the hotel maintenance department.
- Discarded or off-specification chemicals (paints, thinners, chemicals used for the disinfection of the swimming pool);
- Containers, bags or equipment contaminated with chemicals or mineral oil; and
- Rags, plastics, papers or filters contaminated with chemicals or oils.

171. The primary concern with respect to hazardous and municipal wastes management is improper disposal at unauthorized sites. This will lead to potential surface water, ground water and soil contamination as well as contribute to unhealthy and unattractive surroundings. Proper handling, storage and disposal of wastes is crucial to managing these impacts. Waste collection areas will be provided at strategic locations within the Project Site and the hazardous and non-hazardous wastes will be hauled offsite by contractors licensed under one of the six waste collection companies appointed by the YCCD. A waste separation system will be implemented within the Project Site and options for waste recycling will be considered to minimize the volume of wastes to be disposed to the landfill.

### Landscape and Visual

172. Only positive impacts are envisaged during the operational phase when the buildings are fully constructed and the Project Site appropriately landscaped.

### Health and Safety

173. During the operational phase of the Project, potential health and safety impacts will be significantly reduced and limited to maintenance activities and handling of hazardous materials (diesel, chemicals used for the STP, chemicals used for the treatment of groundwater and the treatment of the water used in the swimming pools at the hotels, chemicals used for the cooling towers (anti-fouling agents, corrosion inhibitors, biocides, etc.), paints, lube oils, grease and thinner. In ensuring safe handling of these materials, Material Safety Data Sheets (MSDS) for each of the chemicals will be obtained and the corresponding storage and handling measures will be implemented, including provision of appropriate personal protective equipment.

### Socio-economics

174. Only significant long-term positive socio-economic impacts are predicted as a result of the Project. No negative socioeconomic impacts are envisaged. The key benefits accrued by the Yangon Division and the neighbouring regions include the following:

- **Inflow of Foreign Direct Investment:** The implementation of the Project will entail a significant investment which will have a multiplier effect on the country's economy. This is in line with the Government of Myanmar's efforts to encourage foreign investments to Myanmar to support the rapid growth and expansion of the economy;
- **Transfer of Technology/Training:** The Project will provide opportunities for training and professional development of the Myanmar employees to be hired to be part of the Project, mainly in the hospitality and commercial sectors. At this time, there is no information available on the estimated number of people to be trained. The transfer of technology will take place at the point when employees are sent for training overseas in neighbouring countries and also by way of regular visits by foreign specialists whose services may be engaged to provide onsite job training to the local staff;
- **Growth of Other Supporting Businesses:** The Project, which will be located in the Yangon city centre, is expected to create new business opportunities for the following sectors/activities amongst others:
  - Transport/logistics;
  - Housing;

- Banking and insurance;
  - Health care;
  - Education/professional training centres;
  - Chemicals; and
  - Retail and service providers e.g. telecommunication and waste disposal.
- **Increased Employment Opportunities:** The entire Project is expected to provide job opportunities for up to 2,500 locals. Of which around 875 jobs will be created during operation and over 1,600 during construction of the project. Where a post cannot be filled with a local, the company will hire a foreigner employee. The foreigner employees will train locals until such time the locals attain sufficient skills and technical knowledge to subsequently take over the responsibilities from the foreigners. Additionally, further job opportunities will become available for the local population as a result of the growth in the other supporting sectors identified above;
  - **Economic Benefits:** The proposed Project is expected to bring about positive multiplier effects to the Myanmar economy. The total direct and indirect contributions to the Myanmar economy by the Project are expected to be significant. In addition, the Project is expected to generate significant tax revenue for the Myanmar Government over its lifetime.
  - **Business for Local Suppliers:** Creation of demand for local supplies for the following sections including food and beverage and textile/garment.
  - Improvement of pedestrian and traffic movement by providing sufficient parking at the Project, provision for signalization and relocation of the pedestrian crossing at Bogyoke Aung San Road will benefit the local area and will ease traffic and pedestrian movement.

## Cultural Heritage

175. The MBR which was first built in 1877 will be restored and converted into the Peninsula Hotel which is a luxury hotel. MIHL has engaged an architectural research and restoration firm from Singapore (a UNESCO/ICOMOS member) to undertake a detailed research to document the historical and unique architectural features of the MBR based on which the restoration and conservation related recommendations have been made. The firm has also undertake a detailed research of the entire site and the significant neighboring buildings. The firm is in liaison with YHT, a Yangon-based Non-Governmental Organization focused on promoting the preservation of historical buildings in Yangon, and which has been in active contact with the cultural heritage departments within the Government of Myanmar. MIHL has emphasized that the Project will ensure careful restoration and redevelopment of the MRB given its historical significance.

## 6 Analysis of Alternatives

176. Options considered in the planning stages of the Project include design alternatives; the No-Built as well as Built-Out alternatives which are based on assessments of beneficial and adverse environmental and socio-economic impacts arising from the Project. The alternatives considered are as follows:

- (a) **Design alternatives:** The overall design concept of the Project takes into consideration environmentally sustainable features with the adoption of the Singaporean Green Mark guidelines. This includes energy conservation measures including energy saving lighting, features which employ and maximize sunlight/skylight, water recycling (including wastewater recycling), landscaping the Project Site with trees and shrubs to preserve the natural resources as well as protect the local microclimate and minimizing ozone depletion by using CFC and HCFC-free refrigerant in the chillers and air-conditioning units.
- (b) **No-Build Alternative:** During both the construction and operational phases of the Project, significant socio-economic benefits are envisaged. These are described under the previous section (Section 5). It is expected that the local as well as the regional economy will benefit significantly from the Project directly and indirectly. In the event the Project is not implemented, the benefits described in Paragraph 92 will fail to materialize. However, from an environmental perspective, the potential environmental concerns described in Section 5 will cease to exist and there will be no change to the prevailing environment condition.
- (c) **Built-Out Alternative:** With the implementation of the Project, environmental impacts are envisaged. However, these impacts are predicted to be localized, short-term and reversible with the implementation of appropriate mitigation measures and by undertaking regular compliance audits as well as environmental monitoring programs. No adverse irreversible environmental or social impacts are anticipated. On the contrary, significant positive socio-economic impacts to the local and regional community are envisaged.
- (d) Upon careful consideration of the above alternatives, the Project Implementation alternative was selected.

## 7 Information Disclosure, Consultation and Participation

177. Consultation with relevant stakeholders has been an integral part of the project preparation. The project proponent, since the initiation of the project development in 2011, has carried out consultations with stakeholder groups including but not limited to:

- Myanmar Government agencies, such as YCDC, MOECA, Ministry of Rail and Myanmar Railways, Ministry of Tourism;
- NGOs active in Myanmar on heritage conservation and management;
- Tenants currently occupying the Project Site – in FMI Centre and Zawgyi House;
- Customers and corporate clients of the Grand Mee Ya Hta Executive Residence;
- Employees of Grand Mee Ya Hta Executive Residence;
- Communities in the vicinity of the site, including the St Gabriel's Church and Bogyoke Aung San Market;
- Tourist operators and real estate professionals in Yangon.

178. At the corporate level, MIHL will develop its corporate level ESMP, including the development of SOPs on stakeholder and community engagement (including grievance mechanisms) appropriate to the scale and complexity of the environmental and social risks/impacts associated with the Project. The ESMP will be in place by mid-2014.

179. A bilingual English and Burmese language advertisement will be placed in a major local newspaper in Yangon to inform the public about the Project and that the environmental and social assessments carried out for the Project are available for access. It will also post the English and Burmese language ESRS and ESAP at conspicuous locations outside the main entrance of the Project site and at the front entrance of FMI Centre; and the same on its corporate website or provide a web-link to IFC's disclosed ESRS and ESAP, and the ADB disclosed IEE. The final version of the ESMP in English and Burmese versions will be available at the Project office on site for access to any interested persons.

180. As part of the due diligence exercise, the International Finance Corporation (IFC) sent a team to review the Project. The review relied upon documents made available by the YSH Group, on interviews conducted by IFC with the Group, project management and contractor representatives as well as with workers and local community members at or near the project site. IFC's due diligence found no issues related to land lease acquisition and no concerns expressed by local residents near the site. The review also did not identify any adverse impacts of the Project on ethnic minority persons or biodiversity.

## 8 Grievance Redress Mechanism

181. A Grievance Redress Mechanism has been devised to provide a venue to discuss issues adequately. During project construction and operation, a community relations contact posted at the site office will be responsible in reviewing queries about the project.

182. The Group's office at FMI Centre and security station at the front entrance of the Project Site are the key local public interfaces to receive external communications including grievances from the public. At each of the Group's business or real estate sites, the main office or project management office and the front entrance security stations serve as the point of contact to receive public enquiries.

183. Management of Complaints or Query. A community member can approach or call the Group's community relations contact to complain or to ask questions. Complaints will be immediately handled and the community relations contact will target to settle the complaint within 5 working days. A Record Book will be kept with details on the following: a) date of the complaint, b) details about the complainant (name and contact information), c) description of grievance, d) actions taken, e) follow up requirements, f) implementation and mitigation measures (if required). The Record Book will include details on the measures/process undertaken to handle or mitigate these concerns.

## 9 Environmental and Social Management Plan

### 9.1. YSH Environment and Social Management Systems

184. Yoma Strategic Holdings Ltd. ("YSH") which will be a major shareholder in MIHL has developed and implemented an Enterprise Risk Manual ("ERM") framework in order to identify, assess, treat and monitor potential risks. At YSH's corporate level, the Director of Risk Management and Assurance, who reports to the Chief Executive Officer of YSH, is responsible for overall risk management and oversight as well as conducting risk based reviews across the Group (otherwise known as Risk Based Internal Auditing) to provide assurance to the board that risk management processes are managing risks effectively, in relation to the risk appetite (or identify exceptions when it is not).

185. The Director of Risk Management and Assurance reports the improvement opportunities identified during the reviews and provide recommended action plans to management members including the CEO of YSH. As part of this process, Standard Operating Procedures (“SOP”) are developed to address improvement opportunities identified in the report.

186. YSH is in the process of developing an environmental and social management system manual in accordance with relevant IFC Performance Standards which will be endorsed by the CEO and adopted at working entity level. The manual will include:

a) an E&S policy and mission statement; b) specific SOPs on but not limited to the following: E&S screening and due diligence of potential projects; labor and working conditions; key occupational health and safety risks; land acquisition, resettlement, and livelihood restoration; stakeholder engagement and community grievance mechanisms; emergency preparedness and response; E&S requirements on contractors, sub-contractors, and primary suppliers; biodiversity management; resource efficiency and waste management; c) relevant key performance indicators, training programs, and corporate monitoring and reporting programs; d) mechanisms to regularly review implementation effectiveness by internal (and external as needed) experts; e) assignment of an appropriately qualified staff member as overall E&S coordinator at Group level.

187. The Environmental and Social Management Plan (ESMP) described in this section forms an integral part of the IEE prepared for the Project. It establishes the strategy for how environmental and social impacts will be managed throughout the stages of development, i.e. the construction and operational phases of the Project and provides a framework upon which MIHL as the Developer will set environmental and social management requirements for the Project via its contractual documents with relevant parties, e.g the main contractor appointed for the construction phase of the Project and the managing entities appointed to operate the various development components within the Project Site. The ESMP has been developed in conjunction with the environmental and social management system manual described above.

188. Broadly, the objectives of the ESMP are to:

- Provide practical and achievable plans for the management of the Project specifically ensuring that environmental requirements are complied with, by providing for the monitoring and control of the predicted impacts;
- Provide MIHL and the regulatory authorities with a framework to confirm compliance with environmental policies and requirements; and
- Provide the community with evidence of the management of the Project in an environmentally and socially acceptable manner.

189. This ESMP provides the delivery mechanism to address the adverse environmental and social impacts of the proposed Project during its implementation, to enhance project benefits, and to introduce standards of good practices to be adopted during all project stages.

### **ESMP implementation structure**

190. The relevant parties that will be involved in the implementation of the Environmental and Social Management Plan include:

- MIHL as the Project Proponent (PP);
- MOECAAF – Environmental Review and Approval Authority;
- The Project Manager (PM) – to be employed by the PP;
- The Independent Environmental Consultant (IEC) – to be engaged by the PP;
- The Environmental Team (ET) – to be employed by the PP or the contractor; and
- The contractor.

191. **Project Proponent (PP):** MIHL as the Project Proponent (PP) will assume overall responsibility for the Project. The PP will ensure that an ET is employed to undertake and manage the monitoring and audit, laboratory analysis and reporting of the environmental monitoring and audit programme; and ensure an IEC is engaged to audit the results of the EM&A works undertaken by the ET.

192. **Ministry of Environmental Conservation and Forestry (MOECAAF):** The MOECAAF is the governmental enforcement body for relevant environmental protection matters in Myanmar. There are relevant departments with which this ministry will be engaged in all regulatory enforcement issues.

193. **Project Manager:** The PM will be employed by the PP and will be responsible for overseeing the construction of the Project and monitoring the works undertaken by the contractor and the ET and to ensure the works undertaken are in accordance with the specification and contractual requirements.

194. **Independent Environmental Consultant:** The IEC is engaged by the Project Proponent. The IEC will advise the PM on environmental issues related to the Project. The IEC will be empowered to carry out an independent environmental performance audit of the Project on a [yearly basis]. The IEC will have the relevant qualification and experience in environmental monitoring and audit for environmental management works subject to the approval of the PM.

195. The responsibility of the IEC includes verifying the environmental acceptability of permanent and temporary works, relevant design plans, the project logbook and submissions under the ET, as well as arranging and conducting monthly general site inspections.

196. **Environmental Team (ET):** An ET will be employed by the PP to carry out the environmental and social monitoring programme. The ET leader is the person who is responsible for and in charge of the ET to execute the environmental monitoring. The ET leader will have the relevant qualifications and experience in environmental and social monitoring.

197. The ET leader will plan, organise and manage the implementation of the monitoring programme in accordance with the requirements as stipulated in the Final ESMP. Suitably qualified professional staff will be employed in the ET, and resources for the implementation of the monitoring programme will be allocated.

198. As addressed above, during the construction and operational phases of the proposed project, environmental and social management will become a routine function as an integral part of the operations and management activities.

199. **Community relations contact:** The Group's office at FMI Centre and the security station at the front entrance of the Project Site are the key local public interfaces to receive external communications including grievances from the public. At each of the Group's business or real estate sites, the main office or project management office and the front entrance security stations serve as the point of contact to receive public enquiries. The community relations contact will analyse and respond to the complaints of the affected communities as described in the Grievance Mechanism.

#### **9.4 Environmental and social management plan measures**

200. The Project's draft ESMP is presented in **Table 10** and will be finalized upon receiving comments from the MOECAAF as part of the ESIA approval process.

**Table 10: Draft Environmental and Social Management Plan Measures**

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
<b>Air Quality (Construction Phase)</b>				
<p>Potential sources include:</p> <ul style="list-style-type: none"> <li>• Site preparation works such as excavation, levelling, compaction and trenching</li> <li>• Movement of heavy construction vehicles and machinery within the site and during transportation operations;</li> <li>• Material handling (delivery, unloading and use of construction aggregates and structural fill);</li> <li>• Demolition of existing buildings on-site;</li> <li>• Operation of the batching plant;</li> <li>• Material/soil tracked out of the site and deposited on local roads; and</li> <li>• Exhaust emissions emitted from vehicle and machinery engine exhaust emissions will contain NO<sub>x</sub>, SO<sub>x</sub>, CO and VOCs.</li> </ul>	<p>Mitigation measures involving standard dust suppression measures include:</p> <ul style="list-style-type: none"> <li>• Carry out regular surface damping or wetting on general site areas, stockpiled fill and aggregates especially during dry ambient conditions;</li> <li>• Provide site enclosure and covering of any aggregates or stockpiles;</li> <li>• Ensure that all hardstanding areas and access roads within the site are wet twice a day;</li> <li>• Provide wheel-washing facilities or trough at the ingress/egress points. These facilities will be equipped with (1) a temporary hardstanding of sufficient size to accommodate a standard sized vehicle and equipped with a sump; and (2) high pressure water jets.</li> <li>• Vehicles operating within the Project site and especially within the construction works area will adhere to speed limits not exceeding 30 km/hr.</li> </ul>	<p>Ambient air quality monitoring to be carried out monthly at two locations along the Project site boundary and one location at the Church compound.</p> <p>The monitoring will be carried out by an accredited laboratory. Parameters to be monitored include TSP, PM<sub>10</sub> (particulate matter less than 10 micron), SO<sub>2</sub> and NO<sub>2</sub>.</p>		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<ul style="list-style-type: none"> <li>• Surface damping will be carried out on a 50 m road stretch on the public road outside the site’s access point.</li> <li>• All construction vehicles transporting dusty materials will be secured with appropriate materials/sheets to prevent the escape of fugitive dust.</li> <li>• Open burning on the site premises is strictly prohibited on-site.</li> </ul> <p>The control of vehicular emissions can be achieved by observing good construction practice procedures such as:</p> <ul style="list-style-type: none"> <li>• Turning of equipment when not in use;</li> <li>• Lorries/trucks waiting for more than 10 minutes will turn off their engines; and;</li> <li>• Regular maintenance of construction vehicles/equipment.</li> </ul>			
<b>Air Quality (Operational Phase)</b>				
During the operational phase of the Project, there will be no significant sources of air emissions.	No mitigation measures required.			
<b>Vibration (Construction Phase)</b>				
<p>The main construction activities that will generate vibration include:</p> <ul style="list-style-type: none"> <li>• Demolition of buildings, mainly with the use of backhoe mounted hydraulic breakers;</li> </ul>	Mitigation measures proposed for noise to be applicable	No monitoring programme required.		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
<ul style="list-style-type: none"> <li>MRB early and main construction works;</li> <li>Main buildings early construction works;</li> <li>Piling works for the main buildings;</li> <li>Main building pile caps, basement slabs and podium; and</li> <li>Construction of the towers</li> </ul>				
<b>Vibration (Operational Phase)</b>				
Except for minor increase in traffic noise due to the occupancy of the various development components of the Project, no significant impacts are envisaged.	No mitigation measures required.	No monitoring programme required.		
<b>Noise (Construction Phase)</b>				
<p>The main construction activities that will generate noise include:</p> <ul style="list-style-type: none"> <li>MRB early &amp; main construction works;</li> <li>Main buildings early construction works;</li> <li>Piling Works for the main buildings;</li> <li>Main Building Pile Caps, Basement Slabs &amp; Podium; and</li> <li>Construction of the Towers</li> </ul>	<p>Mitigation measures which will be implemented include:</p> <ul style="list-style-type: none"> <li>Consideration for alternative construction methodologies: The use of hydraulic breakers should be avoided and hydraulic crushers should be used instead. These crushers are typically 6-12 dB(A) quieter.</li> <li>Use of mobile barriers: Movable noise barriers will be used as necessary to achieve 5 dB(A) reduction for movable construction equipment or 10 dB(A) for stationary ones.</li> </ul> <p>Implement Good International Industry Practice (GIIP) as follows:</p>	<p>Noise monitoring to be carried out monthly at two locations along the Project site boundary and one location at the Church compound.</p> <p>The monitoring will be carried out by an accredited laboratory over a 24-hour period.</p>		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<ul style="list-style-type: none"> <li>• The contractor will adopt the Code of Practice on Good Management Practice to Prevent Violation of the Noise Control Ordinance (Chapter 400) (for Construction Industry) published by EPD;</li> <li>• The contractor will observe and comply with the statutory and non-statutory requirements and guidelines;</li> <li>• The contractor will submit the method statement to the Engineer for comments on the construction methods, use of equipment and noise mitigation measures intended to be implemented on-site;</li> <li>• The contractor will devise and execute working methods to minimize the noise impact on the surrounding sensitive uses, and to provide experienced personnel with suitable training to ensure that those methods are implemented;</li> <li>• Noisy equipment and noisy activities will be located as far away from the NSRs as is practicable;</li> <li>• Unused equipment will be turned off and the parallel use of noisy equipment / machinery will be avoided;</li> </ul>			

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<ul style="list-style-type: none"> <li>Queuing of dump trucks will be avoided. Their intermittent use will be avoided between loading cycles or may be throttled down to a minimum to reduce noise;</li> <li>Regular maintenance of all plant and equipment; and</li> <li>Material stockpiles and other structures will be effectively utilised as noise barriers, where practicable.</li> </ul>			
<b>Noise (Operational Phase)</b>				
Except for minor increase in traffic noise due to the occupancy of the various development components of the Project, no significant impacts are envisaged.	No mitigation measures required.	No monitoring programme required.		
<b>Water Quality (Construction Phase)</b>				
Soil erosion	<ul style="list-style-type: none"> <li>Sediment retention structures such as silt traps or catch pits of adequate sizes will be provided at suitable locations within the active works area within the Project site to remove soil and sediment in the surface runoff prior to discharge into the receiving drainage channels. The silt traps/catch pits will be regularly maintained and desilted to provide maximum silt removal efficiencies. Oil and grease removal facilities will also be provided to ensure the overflows from the silt trap do not have traces of oil and grease.</li> </ul>	<p>Inspection of silt traps will be carried out by the contractor as required.</p> <p>Based on the inspection, as required, silt traps/catch pits will be desludged to maximise silt removal efficiencies.</p> <p>The overflow from the silt traps will be monitored on a weekly basis to ensure the</p>		Development of an Erosion and Sedimentation Control Plan (ESCP) for integration into the Earthworks and Drainage Plan which will be submitted to the YCDC and related agencies.

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<ul style="list-style-type: none"> <li>• These structures will be located, designed and constructed in a manner that will minimise the potential threat of downstream flooding.</li> <li>• Any disturbed earth caused by construction activities or fill operations will be firmly consolidated and compacted by earth moving vehicles and compactors to reduce the rate of possible erosion and release of loose soil particles.</li> <li>• Denuded stretches will be re-vegetated or sealed immediately after the construction works. Suitable re-vegetation programmes will be planted as quickly as possible on exposed areas to reduce surface runoff and sediment loss.</li> <li>• Uncovered stockpiles of excavated material or topsoil and fill material are prone to erosion and therefore will be protected. Small stockpiles can be covered with tarpaulin sheets and large stockpiles will be stabilised by erosion blankets and regularly damped.</li> <li>• Construction of a wash trough at the ingress / egress point of the Project site to remove dirt/soil from vehicles and machinery leaving the site. The wash trough will have spray jet</li> </ul>	<p>Total Suspended Solids (TSS) concentration is below 50 mg/l.</p>		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<p>facilities and all surface discharge from the wash trough will be channeled into the temporary drainage system</p> <ul style="list-style-type: none"> <li>Stockpiles of construction aggregate spoil and excavated soil will be located at areas within the project site that do not permit direct run off into water courses and are generally flat. On site storage of excessive quantities of such materials will be avoided and where not possible the use of geotextile material or tarpaulin covers will be considered to minimise erosion.</li> </ul>			
Construction runoff and drainage	Temporary and/or permanent drainage systems will be installed immediately following the site preparation works to minimise downstream flooding.	Visual monitoring of the temporary and/or permanent drainage system will be carried out on a weekly basis and immediately after a heavy rainfall event. If these channels are obstructed, measures will be taken to prevent drainage impedance.	contractor	
Sewage Effluent and Domestic Wastewaters	<ul style="list-style-type: none"> <li>Appropriate sanitary facilities will be provided and properly maintained for construction workers throughout the construction stage. Direct discharge of untreated sewage into underlying soil, groundwater or surface water is prohibited. If portable toilets are used</li> </ul>	The sanitary facilities to be cleaned twice daily. The portable chemical toilets will be maintained per the manufacturer's requirements.		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<p>at the site, they must be of sufficient numbers and meet the requirements of Yangon City Development Council.</p> <ul style="list-style-type: none"> <li>• Temporary septic systems or portable chemical toilets will be provided for use at the proposed site to prevent any release of untreated sewage into YCDC main drain.</li> <li>• These facilities will be maintained and cleaned on a daily basis.</li> </ul>	<p>If temporary septic systems are used, periodical desludging will be carried out as necessary.</p>		
<b>Water Quality (Operations Phase)</b>				
Sewage and sillage	<p>A sewage treatment plant (STP) will be constructed onsite designed based on the peak water demand of 1,100 m<sup>3</sup>/day.</p>	<p>Implementation of preventive maintenance programmes and performance monitoring programmes as stipulated under the manufacturer's specification.</p> <p>The treated effluent from the STP will be monitored once a week to ensure compliance to the design specifications and to ensure compliance with the requirements of MOECAP. The specific parameters to be monitored will be confirmed in conjunction with</p>	<p>Company appointed for the operation and maintenance of the STP.</p>	<p>Submission of monthly monitoring report of the treated effluent from the STP.</p>

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
		MOECAF as presently there are no prescribed limits for treated effluent.		
<b>Soil and Groundwater (Construction Phase)</b>				
Accidental spills and leaks from handling and storage of hazardous materials	<ul style="list-style-type: none"> <li>A secured area (enclosed with hardstanding impervious base) will be provided for the storage of any hazardous materials and hazardous wastes.</li> <li>All temporary fuel tanks and drum storage areas will be provided with drip collection devices and be sited on sealed areas (for example, concrete paved areas) with appropriate bunding for accidental spill containment. A valve will be installed at the discharge outlet of the bunded area.</li> <li>Any accidental spills of fuel, oil or other hazardous chemicals will be cleaned up immediately. The recovered media (contaminated soil, absorbent pads, rags etc) will be disposed of as hazardous waste.</li> </ul>	<p>Daily inspection of the hazardous materials storage area.</p> <p>Any spills observed, or any deterioration in the integrity of the storage containers (e.g. tanks, drums) will be addressed immediately.</p>		
Leaks from vehicle engine and refueling activities	<ul style="list-style-type: none"> <li>All activities that may result in the potential release of hazardous materials to the ground such as changing of engine oils and lubrication oils from construction vehicles,</li> </ul>	Daily inspection of the areas designated for refueling.	contractor	Submission of weekly inspection reports to the ET and the PE.

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	equipment and generators on site will be performed only on designated sealed areas or on drip trays to reduce the risk of direct spill into the underlying soil and groundwater. Spent oil must be handled and disposed of as hazardous waste.	Any spills observed will be contained and removed with the use of sand, sawdust chemical absorbents		
Improper discharge of untreated sewage	<ul style="list-style-type: none"> <li>Appropriate sanitary facilities will be provided and properly maintained for construction workers throughout the construction stage. Direct discharge of untreated sewage into underlying soil, groundwater or surface water is prohibited. If portable toilets are procured to the site, they must be of sufficient numbers and meet the requirements of Yangon City Development Council.</li> <li>Temporary septic systems or portable chemical toilets will be provided for use at the proposed site to prevent any release of untreated sewage into YCDC main drain.</li> <li>These facilities will be maintained and cleaned on a daily basis.</li> </ul>	<p>The sanitary facilities to be cleaned twice daily. The portable chemical toilets will be maintained per the manufacturer's requirements.</p> <p>If temporary septic systems are used, periodical desludging will be carried out.</p>	contractor	Provision for proper management of sewage effluent from temporary sanitary facilities to be included in the Construction Method Statement.
<b>Soil and Groundwater (Operations Phase)</b>				
Contamination of soil and groundwater as a result of hazardous materials (diesel and chemicals) spillage.	<ul style="list-style-type: none"> <li>The five diesel storage tanks to be installed within the Diesel Storage Room will be located within concrete-bunded enclosures capable of containing 110% of the contents of the</li> </ul>	Daily inspection of the Diesel Storage Room including the piping, valves and related structures by the	Company appointed to carry out maintenance activities for	Submission of weekly inspection reports to the PP.

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<p>largest tank within each enclosure. The floor of the bunded enclosures will be concrete-lined with an impermeable liner to prevent contaminant from permeating into the ground;</p> <ul style="list-style-type: none"> <li>• Appropriate instrumentation and control/trigger alarm to warn of possible overfilling and to provide an alert mechanism in the event of significant fuel/chemical loss will be provided for the storage tanks;</li> <li>• Operational control which includes regular/routine surveys, inspection and maintenance of the diesel fuel tanks and their ancillary facilities (pumps, valves and pipes) will be integrated into the Project's environmental management practices so as to identify and rectify any significant product losses or ongoing spills/leakages which may be occurring;</li> <li>• Areas where regular or periodic handling and dispensing of liquid hazardous material are undertaken, such as the diesel storage area and the building maintenance store will be concrete-paved with appropriate secondary containment (drip trays and bunded areas) provided.</li> </ul>	<p>maintenance crew appointed during the operational phase of the Project.</p> <p>During the inspection, a checklist which addresses the management measures of the ESIA will be used.</p> <p>The groundwater quality at the Project site will be monitored during the lifetime of the development. The number of monitoring wells and the specific parameters to be monitored will be decided in conjunction with MOECAP. At a minimum, three wells will be located to represent the groundwater quality up-gradient and down-gradient of the site.</p> <p>If contaminants are present at concentrations above the groundwater quality screening levels (example, the Dutch Intervention Values</p>	<p>the Project Site.</p>	<p>Submission of monthly groundwater quality monitoring report to the ET and the PP.</p>

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<ul style="list-style-type: none"> <li>Any accidental spills will be assessed on a case by case basis and remedied, including excavation and disposal of any contaminated soil (classified as hazardous wastes) at a secure disposal facility approved by the YCDC.</li> <li>Procedures and work instructions on proper handling of diesel and maintenance chemicals as well as the disposal procedures for hazardous wastes will be developed and effectively communicated to all operations and maintenance personnel;</li> <li>Material Safety Data Sheets (MSDS) to be provided for the diesel and any other chemicals (e.g. chemicals used for the maintenance activities, used at the STP and for the cooling towers) stored within the Project site;</li> <li>Corrosion protection for steel tanks and their ancillary facilities (pumps, valves and pipes) will be provided to prevent leaks.</li> </ul>	(DIVs), further assessments will be necessary to determine the nature and extent of the contamination, as well as to remove the potential source(s) of contamination.		
<b>Non - Hazardous Waste Management (Construction Phase)</b>				
Improper management of waste will potential result in the following: <ul style="list-style-type: none"> <li>Drainage impedance</li> </ul>	<ul style="list-style-type: none"> <li>Good housekeeping practices are essential within the site. Open burning of any form of construction waste material within the Project site is strictly prohibited as apart from</li> </ul>	Daily inspection on housekeeping, storage and disposal of non-hazardous waste generation from the	Contractor	Submission of monthly report on the quantity and type of waste generated and its

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
<ul style="list-style-type: none"> <li>Contamination of the surface runoff caused by the chemicals used at the Project site</li> <li>Odour impacts</li> <li>Possible health risks caused by disease vectors</li> <li>Possibility of fires at the Project site</li> </ul>	<p>polluting the atmosphere and reducing the ambient air quality at the site, the activity poses a risk of fire spreading to the hazardous materials storage areas (example, diesel storage area).</p> <ul style="list-style-type: none"> <li>General construction spoil will be recycled on site as much as possible. For example, construction aggregate materials may be considered as possible backfill material;</li> <li>Domestic waste generated from the site offices and workers' temporary cabins will be stored in suitable covered receptacles or stored within enclosed areas and collected regularly by a YCDC-licensed contractor for disposal at an approved disposal/landfill sites; and</li> <li>Unsalvageable construction spoil will be stockpiled at a designated site and sold to salvage yard operators or other contractors interested in recycling the material.</li> </ul>	Project Site will be carried out.		disposal method. Copies of the receipts used in the sale and/or of the waste materials will also be appended in the report.
<b>Hazardous Waste Management (Construction Phase)</b>				
Waste from demolition of old structures potentially containing hazardous materials such as ACM, SMF, PCB, LBP, ODS, radioactive smoke detectors, mercury containing materials, hazardous chemicals/wastes, mold and biological hazards.	<ul style="list-style-type: none"> <li>As presently there is no collection system for hazardous waste in Yangon, the YCDC entrusts PCCD to collect industrial waste, together with municipal and general waste.</li> <li>.</li> </ul>	Daily inspection on housekeeping, storage and disposal of hazardous waste generation from the Project Site will be carried out.	contractor	Submission of monthly report on the quantity and type of hazardous waste generated and its disposal method.

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
<p>Other sources also include waste generated from construction activities including spent filter cartridges, small quantities of waste of industrial paints and various type of spent soil and soil/rags contaminated with oily residue.</p>	<ul style="list-style-type: none"> <li>Project management team will meet with PCCD to discuss available options in deciding the best option in ensuring safe management and disposal of hazardous waste.</li> </ul>			<p>Copies of the receipts used in the sale and/or of the waste materials will also be appended in the report.</p>
<b>Non Hazardous and Hazardous Waste Management (Operational Phase)</b>				
<p>Non-hazardous waste arising from occupancy of residential tower and hotel include:</p> <ul style="list-style-type: none"> <li>Kitchen waste,</li> <li>Office waste from administrative offices;</li> <li>Hotel guests waste;</li> <li>Garden waste; and</li> <li>Miscellaneous waste.</li> </ul> <p>Hazardous waste will be generated in small quantities, largely from the operation of hotel's periodic maintenance activities including:</p> <ul style="list-style-type: none"> <li>Used fluorescent bulbs;</li> <li>Spent oils and solvents from hotel maintenance department;</li> <li>Discarded or off-specification chemicals;</li> <li>Containers, bags or equipment contaminated with chemicals or mineral oil; and</li> <li>Rags, plastics, papers or filters contaminated with chemical or oils.</li> </ul>	<p>Project management team will meet with PCCD to discuss available options in deciding the best option in ensuring safe management and disposal of the non-hazardous and hazardous waste.</p>	<p>Daily inspection on housekeeping, storage and disposal of hazardous waste generation from the Project Site will be carried out.</p>	<p>contractor</p>	<p>Submission of monthly report on the quantity and type of hazardous waste generated and its disposal method. Copies of the receipts used in the sale and/or of the waste materials will also be appended in the report.</p>
<b>Cultural Heritage (Construction Phase)</b>				

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
Interior remodeling with partial demolition and structural strengthening.	<ul style="list-style-type: none"> <li>Salvage, re-use and 'up-cycling' of historic interior elements from the MRB will be undertaken by the Developer.</li> <li>An Architectural Dilapidation Survey Report has been prepared to document the existing condition and inventorize the heritage elements in the MRB, to be complemented by the contractor's comprehensive site audit prior to commencement of construction works.</li> <li>Careful sequencing and appropriate controlled demolition methods for the internal elements is necessary, taking into account the MRB's phased construction through its history.</li> <li>Active protection, instrumentation and monitoring of the MRB's structural integrity during remodeling works shall be undertaken.</li> </ul>	No monitoring programme required.		
Foundation underpinning and basement construction	<ul style="list-style-type: none"> <li>Strategic retention and showcase of original plinth and footing of the MRB is recommended.</li> <li>A robust facade retention frame will be installed to enhance structural stability during the excavation and internal remodelling works.</li> <li>Low impact method and sequence for basement construction is necessary.</li> <li>Active protection, instrumentation and monitoring of the MRB's structural integrity during remodelling works shall be undertaken.</li> </ul>	No monitoring programme required.		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
Facade strengthening	<ul style="list-style-type: none"> <li>To consider factors such as low invasivity, compatibility, ease of reversibility, breatheability and other considerations that will not compromise the heritage and material characteristics of the historic fabric</li> </ul>	No monitoring programme required.		
Indirect physical impact to adjacent heritage structures.	<ul style="list-style-type: none"> <li>Structural dilapidation survey on adjacent buildings</li> <li>Low impact method and sequence for basement construction</li> <li>Active protection, instrumentation and monitoring of adjacent buildings</li> </ul>	No monitoring programme required.		
<b>Cultural Heritage (Operational Phase)</b>				
New usage and design which includes addition and alteration work with the building's heritage significance and character.	<ul style="list-style-type: none"> <li>Improve public accessibility of the MRB where the public are able to gain varying levels of access to the heritage building.</li> <li>A set of conservation principles and recommendations in the Architectural Heritage Survey Report will be incorporated into the Schematic Design by project consultants.</li> <li>New additions to the MRB will be distinguished from the historic in design expression, but will be sympathetic and complementary in character and visually unobtrusive.</li> <li>Customized solutions for structural modification, introduction of modern services, restoration and repair methods are necessary to strike a</li> </ul>	No monitoring programme required.		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	balance between preserving the heritage character of the MRB and meeting contemporary functional requirements and building regulations.			
Visual impact on immediate setting of the MRB.	<ul style="list-style-type: none"> <li>Podium height will be lower than the eaveline of the MRB, and the segmented massing complements its scale and character.</li> <li>Restrained design and sensitive use of masonry cladding and vertical greening, with glazed curtain wall will be kept to the tower blocks.</li> <li>The proposed glazed entrance lobby within the courtyard will be visually light, appropriately scaled, and detached from the MRB's masonry structure.</li> </ul>	No monitoring programme required.		
Visual impact on immediate and adjacent heritage structures	<ul style="list-style-type: none"> <li>8.1m setback of the Project's podium block from Church compound boundary for fire engine access</li> <li>Further setback of the Project's office towers from podium line</li> <li>Sympathetic podium façade treatment</li> </ul>	No monitoring programme required.		
<b>Landscape and Visual (Demolition and Construction Phase)</b>				
<p>Temporary adverse landscape and visual impacts during the demolition and construction phase.</p> <p>Construction of the Project will also impact the existing trees within the site.</p>	A decorative hoarding will be erected around the periphery of the site to screen the temporary construction works from the local low level receivers, mainly pedestrians. The proposed hoarding would provide a unified edge treatment and interface between the construction site and its landscape context.	Daily inspection of the hoarding to ensure there are no breaches or damaged areas.	contractor	Submission of monthly reports to the PP and the PE.

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<p>Mitigation measure to retain existing trees include:</p> <ul style="list-style-type: none"> <li>• Trees to be transplanted will be retained at proper nursery;</li> <li>• Phased segmental root pruning for trees;</li> <li>• Pruning of branches of existing trees;</li> <li>• Watering of existing vegetation;</li> <li>• All works affecting the trees identified for retention and transplantation will be carefully monitored; and</li> <li>• Tree transplanting and planting works will be implemented by approved landscape contractors, inspected and approved by qualified Landscape Architect.</li> <li>• Compensatory tree planting done by YCDC.</li> </ul>			
<b>Landscape and Visual (Operational Phase)</b>				
<p>Only positive impacts are envisaged.</p>	<p>A landscape management plan has been prepared for the Project Site, including tree preservation and landscape work with measures are the followings:</p> <ul style="list-style-type: none"> <li>• To create a plaza to the west of the cultural heritage building;</li> <li>• To restore the cultural heritage building;</li> <li>• To create landscaped gardens;</li> <li>• To retain trees with historic value.</li> </ul>	<p>A qualified landscape architect will be employed to manage the landscape elements of the Project site.</p>	<p>PP</p>	<p>Submission of bi-yearly reports on the landscape management at the Project site.</p>
<b>Traffic and Transportation (Construction Phase)</b>				

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
Increase in construction traffic.	<ul style="list-style-type: none"> <li>Construction traffic will avoid the peak traffic hours and adhere to YCDC limitations on vehicle size during specified hours of the day.</li> <li>The exiting access to Grand Mee Ya Tha on Bogyoke Aung San Road will be used during construction. During construction of Phase 1 the FMI center will operate as existing. During construction of Phase 2 the FMI center access will be used.</li> </ul>	No monitoring programme required.	Contractor	
<b>Traffic and Transportation (Operational Phase)</b>				
Increase in traffic and pedestrian volume around the vicinity.	<ul style="list-style-type: none"> <li>Improved footway surface along the boundary of the site</li> <li>Left in / left out access on Bogyoke Aung San Road (currently right in / right out conflicting with traffic)</li> <li>Relocation of pedestrian crossing on Bogyoke Aung San Road to align with the retail and office buildings</li> <li>Signalization of the pedestrian crossing for improved pedestrian safety (traffic and pedestrian volumes will increase in future and so will conflicts so signalization would be required even without )</li> <li>Removal of on street parking along the site boundary at Bogyoke Aung San Road to improve traffic flow and safety.</li> <li>Improve lane markings and geometry of Bogyoke Aung San Road</li> <li>Pedestrian connection / escalator in the north east corner of the site</li> </ul>	No monitoring programme required.		

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<p>providing air conditioned and traffic free route through the retail podium from Alan Pya Pagoda Road towards Bogyoke Aung San Road.</p> <ul style="list-style-type: none"> <li>Ensuring that access is designed with suitable gradients and visibility according to international standards (UK, Singapore).</li> <li>At the main access car park ramp - providing car park ticket booths on Basement 1 level to avoid queuing back onto Bogyoke Aung San Road. Other booths within the development will be a minimum of 30m from the road (standard applied in Bangkok).</li> </ul>			
<b>Compliance with Labor Standards (Construction and Operations Phase)</b>				
<ul style="list-style-type: none"> <li>Compliance of the Company and its Contractors and subcontractors with national labor laws and relevant ILO core labor standards</li> <li>Payment of mandated minimum wages</li> <li>Payment of mandated benefits of workers</li> <li>Prohibited employment of child labor and forced labor</li> <li>Nondiscrimination Etc.</li> </ul>	<p>National labor law and measures to comply with relevant ILO labor standard conventions, including the following international practices with respect to the construction workforce:</p> <ul style="list-style-type: none"> <li>promote the fair treatment, non-discrimination and equal opportunity of workers;</li> <li>establish, maintain and improve the worker-management relationship;</li> <li>promote compliance with national labor and employment laws;</li> <li>protect the workforce, including vulnerable groups such as children or workers engaged by third parties, and workers in the project proponent's supply chain;</li> </ul>		PP	

Potential Sources of Impacts	Mitigation/Management Measures	Monitoring Requirement and Frequency	Responsible Party	Monitoring and Reporting Requirements
	<ul style="list-style-type: none"> <li>• promote safe and healthy working conditions and workforce health and well-being; and prohibit any use of forced labor.</li> </ul>			
<b>Health and Safety (Construction Phase)</b>				
<p>Factors affecting the health and safety of the workers:</p> <ul style="list-style-type: none"> <li>• Hazardous working areas/dangerous zones;</li> <li>• Communicable disease and vector borne disease;</li> <li>• Exposure to hazardous materials/chemicals; and</li> <li>• Traffic safety</li> </ul>	<p>The Guidelines on Minimum Health &amp; Safety Standards for Major Works developed by MIHL will be adopted for the construction and operational phases of the Project.</p>	<p>During the construction phase, provisions will be made for the appointment of a Health and Safety Officer at the Project Site. Alternatively, one of the members of the ET can assume the role of managing the health and safety requirements at the Project Site.</p>		

### **9.5 Environmental monitoring and audit (EM&A) program**

201. The findings of the IEE indicate that the implementation of the Project will result in potential environmental and social impacts. However, overall, these impacts are expected to be short-termed (occurring mainly during the construction phase) and localized to the Project Site. With appropriate mitigation measures, these impacts will be minimized. A set of environmental and social mitigation measures to avoid or minimize adverse impacts throughout the project construction and operation phases have been recommended and are included in the ESMP. The supervision, evaluation and reporting of activities implemented as per the ESMP will be carried out in a timely manner with periodical feedback to the ADB Project management team.

## **10 Conclusion and Recommendation**

202. The nature of the Project which is essentially a redevelopment of an existing built-up site with a cultural heritage restoration in the real estate sector within an urbanized area is considered a Category B project because of the limited number of specific and reversible environmental and social impacts that may result as part of the Project. These impacts can be avoided or mitigated by adhering to the ESMP included in Table 4 and generally recognized good international industry practices and guidelines.

203. The IEE has assessed these potential impacts and has proposed a set of mitigation measures and, a monitoring plan in the form of an ESMP for its contractors and staff to strictly pursue. Consequently, it is expected that adverse impacts from the Project's construction and operation phases will be localized with low residual impacts.



Asbestos is a respiratory hazard and respiratory/gastro intestinal carcinogen. Exposure to asbestos occurs when respirable fibres are released into the air and then inhaled. Since exposure occurs when asbestos is inhaled, the best way to prevent exposure is to prevent asbestos fibres from becoming airborne.

Asbestos containing materials are therefore divided into two categories: friable and non-friable.

- Friable means that a material is able to be reduced to a powder by hand pressure. Asbestos containing materials that are friable, by their nature, have a much greater tendency to release fibres into the air.
- Non-friable asbestos containing materials, by their nature, do not want to give up their fibres into the air. This class of materials must be mechanically impacted (power tools such as sanders, drills, chippers, saws, etc.) to release fibres.

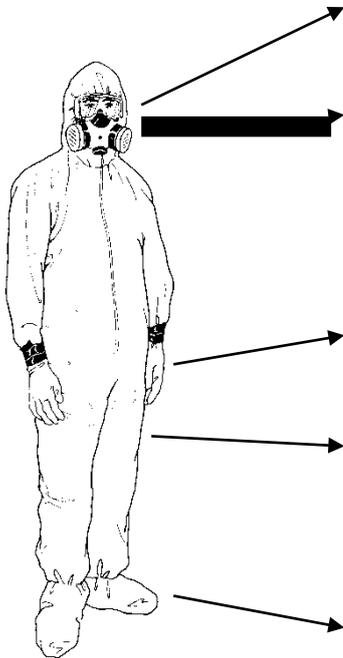
### **Protection from Asbestos Exposure during Non - Friable Removal Exercises:**

There are several levels of protection to help prevent asbestos fibre release during asbestos removal projects.

- 1) The **first level** of protection comes from the material itself. As non-friable material, the products do not want to readily release their fibres. The cohesive matrix of the materials (tar, pitch, asphalt) binds the fibres together with other materials. A great deal of energy is required to separate the asbestos fibres and release it in a respirable form.
- 2) The **second level** of protection is in the methods of removal. The contractor is required to use non-abrasive removal techniques. In simple terms, they can only use hand tools (shovels, chisels, hammers, etc.) to strip the non-friable material from the building.
- 3) The **third level** of protection is whenever asbestos containing materials are disturbed in any manner, the material must be wet. Materials that are wet do not release respirable particles into the air. A wetting agent should be added to reduce the surface tension of water and increase the ability for it to penetrate materials. For “amended water” – add ordinary dishwashing detergent; 1 cup detergent to every 20 litres water.
- 4) The **fourth level** of protection is how the materials are handled during and after removal. Once materials are removed, they must be double wrapped in layers of 6 mm thick plastic and then sealed with duct tape. The materials also must be segregated into a dumpster/ container used only for asbestos waste and labelled. No removed asbestos containing materials should be permitted to accumulate on the roofs or the job site.
- 5) The **fifth level** of protection is the workers themselves. Workers removing the materials should be trained with risks and removal techniques for the job at hand. The appointed contractor should be certified and or experienced with such removal projects as far as possible.



**Suggested Safety Equipment:**



**Eye Protection:** Each person should wear non-fogging goggles or safety glasses.

**Respirator:** Each person should wear a dual cartridge respirator equipped with two HEPA (high efficiency particulate air) filters. The HEPA cartridges are color-coded purple or magenta. Make sure that a respirator fit test is carried out or a disposable P2 respirator (94% removal efficiency)

**Gloves:** Each person should wear gloves which should be disposed after use.

**Coverall:** Each person should wear a “Tyvek” coverall to keep dust off your clothing and then dispose of it (with the asbestos-containing material) after the project is complete.

**Boots:** Use a lace-less, pull-on type of rubber boot to protect your feet from sharp edges and nails and then wash to remove asbestos contamination.

**Tools Needed:**

- Garden type water sprayer or a garden hose with spray nozzle
- Wide flat “L” shaped pry bar
- Nail puller, vise grip, pliers, or others means of removing nails
- Heavy duty wire cutters
- Shovel or flat scraper for lifting tiles/ roofing panes
- 3 to 6-mm thick plastic sheeting
- Leak-tight containers, such as plastic bags, barrels or plastic wrapping

**The Work will be Difficult:**

Even under the best conditions these projects are physically demanding and potentially dangerous. Following are some of the problems one can be faced with:

- Breathing through a respirator is difficult and places extra stress on the heart and lungs.



- Coveralls can be hot and hard to move around in.
- Work will involve the use of ladders to get to roof areas.
- Goggles and safety glasses reduce visibility and field of vision.
- Care must be taken around electric wires because water is being used to keep asbestos wet.
- The work area will be slick from wetting and become a slipping hazard.

### Procedures for removing non - friable asbestos-containing materials:

Asbestos-containing materials must be removed, handled and disposed of in a manner that keeps the material in non-friable condition. Sanding, sawing, grinding, chipping, or the use of power tools is not allowed.

**Step 1** - Keep the material wet while you remove it. Wetting minimizes asbestos fibers from being released during removal. The material should remain wet during removal until waste disposal occurs.

**Step 2** - Put plastic sheeting on the ground under the work area to contain pieces that may fall. Never reuse drop sheets.

**Step 3** - Gently pry up material using a flat bar or similar tool so that the nail heads are exposed and can be pulled out, or clipped off with heavy-duty wire cutters.

**Step 4** - Take roofing/ tile materials off in as many whole pieces or sections as possible. Do not damage material on purpose, do not drop material, do not throw material from ladders or roof and do not drive over material. The method of removal cannot shatter, crumble, pulverize, or reduce the material to dust. Place the material on the ground in a non-work area or in separate containers. All asbestos dust and waste must be cleaned up regularly and frequently by damp mopping or wet sweeping. All disposable PPE must be destroyed and disposed as asbestos waste.

**Step 5** –Respirators must be wet wiped before taking them off. A dedicated clean up facility must be provided for workers so that they can wash their hands and faces upon leaving the work area. This must be standard procedure before eating, drinking, smoking or any such activities to prevent secondary exposure to asbestos.

**Step 6** – Contact Yangon City Development Committee (YCDC) who entrusts the Pollution Control and Cleansing Department (PCCD) to collect industrial waste at the request of respective establishments concerned and dispose of along with domestic wastes. This will be carried out for the ACM waste as well.

**Contact:** YCDC Office (Pabedan Township Waste Disposal) –U Than Htike Aung – 973153237 or Ko Khin Mg Oo – 98618906.

The main goal for this project will be to ensure safe removal and ensure a clear worksite with regard to ACM and provide safe packaging for transport of ACM waste as per international best practices Client liability will be limited till this stage due to lack of better local disposal measures.

### If the material becomes friable:

If the asbestos containing materials become shattered, damaged, is badly weathered, hard, dry or brittle it is considered friable and may release asbestos fibers. If materials become friable; **stop work immediately.** Friable asbestos materials must be removed by **PROFESSIONAL ASBESTOS ABATEMENT CONTRACTORS.**



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## APPENDIX B

### SMF Exposure Control Plan

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Procedures to be applied for removal depend on the form of the original SMF insulation installed. The two basic forms of SMF insulation are bonded and unbounded:

The *bonded form* is where adhesives or cements have been applied to the SMF before delivery and the SMF product has a specific shape.

The *unbonded form* has no adhesives or cements and the SMF is loose material packed into a package. The unbonded form can be packed loose or mixed with adhesives or cements before, or during, installation.

**Removal of bonded material** is easier and less hazardous. Any physical abrasion, including cutting, should be kept to a minimum during removal. Such removal can be performed in a dry condition if there is minimal physical abrasion. Only in circumstances where heat or other causes have made the bonded SMF attach itself to the substrate should physical abrasion take place. If this occurs, removal should be performed as for unbonded SMF removal.

**Removal of unbonded material** is difficult and more hazardous. The unbonded material should be thoroughly wetted before removal takes place. Dry removal may be necessary when there are electrical and heat considerations. Increased respiratory protection may be necessary when working in enclosed or poorly ventilated spaces or where the SMF insulation has undergone physical change.

#### Precautions:

- The work area should be designated by using ropes and signs where workable.
- People not involved in the removal should not be within 3 metres of the designated area
- Using gloves, remove rock wool from zones and place into waste bags;
- Avoid unnecessary disturbance, for example, tearing, of the product;
- **Hand tools** are preferred for cutting SMF material. If power tools need to be used, they should be fitted with local exhaust ventilation at the point of dust generation.
- A regular clean up should be done to remove any build-up of fibres and/or dust. Wet mopping and wiping or an industrial vacuum cleaner is recommended. Never do dry sweeping or use compressed air or high pressure water jets for cleaning.
- SMF waste must be collected in plastic bags to prevent fibre and/or dust emissions and disposed of according to regulations.
- Adequate washing facilities for workers should be available on site.
- SMF material should be stored in intact containers or under sheet covers.

#### Personal Protective Equipment (PPE):

The following **PPE** should be used by personnel directly involved in the removal work:

- (a) Long sleeve, loose fitting clothing and gloves;
- (b) Where overhead work is involved, goggles and head covering should be worn; and
- (c) A half-face (Class L or M) respirator or P2 disposable dust mask.