



**Environmental & Social Impact Assessment
Landmark Project
Yangon, Myanmar**

Prepared for:

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List of Abbreviations

AAGR	Average Annual Growth Rate
ACM	Asbestos Containing Materials
ADB	Asian Development Bank
AN	Ammoniacal Nitrogen
ASR	Air Sensitive Receivers
ASTM	American Standard for Testing Methodology
Bgs	Below ground surface
BOD	Biological Oxygen Demand
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Fauna
CNL	Corrected Noise Level
COC	Chemical of Concerns
COD	Chemical Oxygen Demand
CTS	Conservation Technical Specification
DIV	Dutch Intervention Values
DOS	Degree of Saturation
DTV	Dutch Target Values
E.Coli	Escherichia Coli
ECC	Engineered Cementitious Composite
EMP	Environmental Management Plan
EMSP	Environmental and Social Management Plan
ESA	Environmental Site Assessment
ESCP	Erosion and Sedimentation Control Plan
ESIA	Environmental and Social Impact Assessment
ET	Environmental Team
FMI	First Myanmar Investment Co. Ltd
FRP	Fiber Reinforced Polymer
GBV	Ground-borne Vibration
GDP	Gross Domestic Product
GFA	Gross Floor Area
HKAQO	Hong Kong Air Quality Objectives
IAIA	International Association for Impact Assessment
ICA	Inner City Area
IEC	Independent Environmental Consultant
IFC	International Finance Corporation
IFC PS	International Finance Corporation Performance Standards
ISCST3	Industrial Source complex Short Term
ITTA	International Tropical Timber Agreement
JICA	Japan International Corporation Agency
LBP	Lead Based Paints
L _{max}	Maximum Sound Level
LOS	Level of Service
LPG	Liquefied Petroleum Gas

MBR	Membrane Bioreactor System
MIC	Myanmar Investment Commission
MIHL	Meeyahta Interntional Hotel Ltd.
MOECAF	Ministry of Environmental Conservation and Forestry
MRB	Myanmar Railways Building
MSDS	Material Safety Data Sheets
MSL	mean sea level
MTL	Meinhardt Thailand
MW	Monitoring Well
NAAQS	National Ambient Air Quality Standards
NCEA	National Commission for Environmental Affairs
NLA	Nett Lettable Area
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
NSR	Noise Sensitive Receivers
ODS	Ozone depleting Substances
PCB	Polychlorinated Biphenyls
PCCD	Pollution Control and Cleansing Department
PE	Project Engineer
PM	Particulate Matter
PM ₁₀	Particulate Matter less than 10 micron
PNL	Predicted Noise Level
PP	Project Proponent
PPV	Peak Particle Velocity
PS	Performance Standard
SMF	Synthetic Mineral Fiber
SO ₂	Sulfur Dioxide
SO _x	Sulfur Oxides
SPDC	State Peace and development Council
SPP	Stand Pipe Piezometers
SPT	Standard Penetration Test
WWTP	Wastewater Treatment Plant
SWL	Sound Power Level
TIA	Traffic Impact Assessment
TSP	Total Suspended Particles
TSS	Total Suspended Solid
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USCS	Unified Soil Classification System
VOC	Volatile Organic Compounds
VSR	Vibration Sensitive Receiver
WHO	World Health Organization
YCDC	Yangon City Development Committee

YHT Yangon Heritage Trust
ZOI Zone of Impact

Executive Summary

1. Introduction

Meeyahta International Hotel Ltd. (MIHL) intends to redevelop the company's existing 3.9-hectare (9.64-acres) plot in the Yangon city center into a premium mixed 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 and First Myanmar Investment Co. Ltd (FMI). The regional location of the Project site is presented in **Figure 1.1.1**.

Information and contact details pertaining to the Project are to be directed to:

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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 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 City 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 Requirements

The National Environmental Conservation Law, under Section 42 (n) gives the responsibility to the Ministry of Environmental Conservation and Forestry (MOECF) 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 MOECF for approval prior to project commencement is a legal requirement.

4. ESIA Scope and Methodology

The goal of an ESIA is to identify potential environment and socio-economic impacts, and evaluate the risk of these impacts during the phase of project implementation, namely, the pre-construction, construction and future operation of the Project. As part of this process, the positive effects on the surroundings will be maximised and best practices will be employed to avoid, mitigate and minimize any possible negative impacts.

The ESIA has been undertaken by applying the best practices and guidelines currently exercised among ESIA practitioners, development and regulatory agencies including the International Finance Corporation Performance Standards (IFC PS) and the International Association for Impact Assessment (IAIA).

The EIA approach followed, which is responsive to international guidance, consisted of:

- Screening;
- Scoping;
- Examination of alternatives;
- Impact assessment;
- Mitigation and impact management;
- Residual impacts;
- Preparation of the ESIA report, and
- Public Involvement.

Although MOECAF has recently promulgated the EIA Rules and Regulations (2013) under the National Environmental Conservation Law, there are no specific guidelines on the methodology to be used in the EIA process and, there are no prescribed limits or standards for environmental quality.

In the absence of such guidelines and standards, the **applicable elements** and sections of the International Finance Corporation (IFC) Performance Standards and Environmental Health and Safety Guidelines have been used for purposes of this ESIA. Each element of compliance has been analyzed according to the nature and scale of Project. Specifically, some elements of the following Performance Standards (PS) are applicable to the Project:

PS1: Social and Environmental Assessment and Management Systems
PS2: Labor and Working Conditions
PS3: Resource Efficiency
PS4: Community Health and Safety
PS8: Cultural Heritage.

5. Project Description

Project Location

The proposed Project involves the establishment of a premium mixed development comprising residential, commercial, retail and hospitality components on an existing 3.9-hectare (9.64-acres) plot located at 372, Bogyoke Aung San Road, Pabedan Township, Yangon, Myanmar. Upon completion of the Project, the total Gross Floor Area (GFA) will be approximately 200,000 m² (2.15 million ft²). The site location map is presented in **Figure 4.2.1**.

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 the 1994s;
- 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 was used as a restaurant until April 2014;
- v. Two residential scale two-storey brick buildings aged approximately 50 years old which were served for temporary accommodation and storage purposes (recently demolished), and

- vi. A variety of smaller supporting structures associates with the previous land use.

Proposed Layout

The proposed Project will comprise several main components, namely:

- Peninsula Hotel, converted from the existing MRB. The hotel will provide 92 suites, associated front of house facilities including lobby, retail, restaurant and swimming pool. The Gross Floor Area (GFA) of approximately 14,000 m² will be divided over three-storeys, and a basement level;
- Peninsula Residence Tower consisting of 24 storeys with a total of 82 residences and two basement levels;
- Business Hotel with common facilities including a pool provided at L4 podium. Covering a total GFA of approximately 42,000 m², the hotel has 250 hotel rooms and 89 apartments divided over 25 storeys (20 storeys above the retail podium). It will include a restaurant, bar and pool;
- Two office towers of 21 storeys with a total GFA of approximately 70,000 m² ;
- Retail Podium with a total GFA of approximately 38,000 m² will accommodate for a supermarket and other retail, and
- A basement car parking with approximately 1,130 parking bays.

6 Project Development Activities

It is proposed that the Project will be developed in phases, and the detail below provides an estimation of the programme as of June 2014:

- Works of MRB (Luxury Hotel):
 - Early works including general cleaning, removal of heritage items, masonry repair, wall strengthening and piling work for supporting external walls – 17 months (October 2013 – February 2015);
 - Main works including design submission and approval, MRB's restoration work, underpinning, internal structure demolition, excavation and basement and superstructure works – 18 months (August 2014 – January 2015).
- Demolition of Grand Mee Ya Hta Executive Residence - 14 month (January 2016 – August 2016);
- Demolition of FMI Centre – 3 months (December 2016 – February 2017)
- Superstructure works at all areas except the MRB site – 34 months (June 2018 – August 2018); and
- Application for occupation permits – 31 months (March 2019 – April 2019).

It is anticipated that the entire project will take approximately 72 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 re-use within the MRB, prior to the commencement of construction works. The dismantled elements shall be restored at a later stage, or to be re-installed and re-used in the development 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 TIA, and
- Landscape and re-vegetation.

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

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

Table ES1: Summary of the Existing Environment

Item	Description
Physical Environment	
Site Setting	<p>The Project is located in the city of Yangon within the Yangon Region, Union of Myanmar. Located in the heart of Lower Myanmar, Yangon city 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. 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, 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 m² (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 associates with the existing site.</p>

Item	Description
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 hill is 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 the Meadow and Meadow Alluvial Soil. Meadow soil is soil which occurs near the river plains with occasional tidal floods, non-carbonate and usually contain large amount 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 where 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.
Natural Hazards	<p>Myanmar is exposed to multiple natural hazards including cyclones, earthquakes and floods:</p> <p>A. Earthquakes</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. Cyclones and Strom Surges</p> <p>Myanmar is exposed to a threat of cyclones and associated storm surges from the Bay of Bengal. Previous frequency of cyclones that made landfalls at Myanmar coast was</p>

Item	Description
	<p>once in about three years. However, since the year 2000, cyclones 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>C. Flood</p> <p>The monsoonal/rainy season in Myanmar is mostly from May to October which 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>
Land Use within the ZOI	
	Existing landuse pattern within the Zone of Impact (ZOI) of 2 km is predominantly a mixture of commercial and residential purposes.
Landscape Character & Visual Amenity	
	<p>The existing landscape character and visual amenity are characterized by the colonial-style MRB, the FMI Centre, the two old double storey buildings, the Zawgyi restaurant 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.</p>
Air and Noise Quality	
	<p>Secondary data obtained from a monitoring station located around the Sule Shangri-La Hotel in December 2008, monitored over an averaging period of 24 hours including Total Suspended Particulate (TSP), PM₁₀, SO₂ and NO₂ showed that most parameters were well below the UESPA standards. Both air quality and noise environment were dominated by vehicular traffics and occasionally by construction works. Noise was not regularly monitored as it is largely location specific.</p>
Soil and Groundwater	
	<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 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>
Biological Environment	

Item	Description
	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.
Socio-Economic Environment	
Population Density, Population Growth and Distribution in Yangon City	The Yangon Division is the smallest but the most densely populated area in Myanmar with population density of 635 persons per sq. km. 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 due to low fertility level and improvement in life expectancy. 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 from 2010-2015 and 1.6 from 2015-2020 (Myanmar Information Management Unit of the United Nations Development Programme, July 2013).
Employment by Sector	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 with a share of more than 70 percent of total employment. About one fifth of the total population employed was in secondary sector and about 5 percent in the primary sector, particularly agriculture.
Labour Supply and Demand	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 corresponds 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. Tertiary sector is expected to remain dominant and its share to the total employment increase from 75.4 percent in 2005 to 78 percent in 2020 while primary and secondary sectors are expected to decline in their share to the total employment.
Traffic and Transportation	
Existing Access	Existing access to the site is from Bogyoke Aung San Road with one entry and exit to serve the FMI building and one entry and exit to serve the Grand Mee Ya Tha apartments. There are other kerb cuts and access points that are no longer in operation and were historically used to access the Myanmar Railways Headquarters.
Existing Road Characteristics	<p>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 an west-east direction and connects Shwedagon Pagoda Road in the west to Lower Pasunduang Road in the east.</p> <p>Alan Pya Pagoda Street / Zoological Garden Road is another major road with two way traffic in a north-south direction.</p> <p>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.</p> <p>Shwedagon Pagoda Road is a four-lane two-way road with stripe median. The road runs in north-south direction and connects U Htuang Bo Road on the north and Strand Road to the south.</p>
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. The traffic volume and surveyed junction is shown in Figure 5.8.3 .
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 Tha access. This is an uncontrolled pedestrian crossing with striping. The latter is regularly used and the development 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 total trips are undertaken by bus and 3% by rail.

Item	Description
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 counts for over 80% of daily trips. Plans to improve Yangon Circular Railway and implement Bus Rapid Transit or other mass rapid transit system are still in the early stages, and implementation is unlikely to happen within the next 5 years before development opens.
Heritage Assessment	
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. For details of the main issues and the mitigation measures reference is made to the relevant sections in Chapter 6 and to **Table 7.1**.

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. PM₁₀). 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 vehicle and machinery engine exhaust emissions will contain NO_x, SO_x, 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 details 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, one NSR location (N2-Church) will have noise exceedance by a maximum of 4 dB(A) during the 13 months of construction activities. By implementing the proposed mitigation measures (**Table ES.2**) it is expected that the noise exceedance at N2 will be reduced by 1 dB(A). If mitigation measures are implemented the number of months of noise exceedance will be shortened by 3 months.

Vibration

Construction vibration will be dominated by demolition activities associated with the Grand Mee Ya Hta and the 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 intermittent. 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 phase 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 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 described under 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 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 wastewater treatment plant (WWTP) 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 releases 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 are 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 waste: e.g. demolition debris, excavated soil, construction spoil from the construction works, general waste, and

- Hazardous wastes: demolition waste of old structures potentially contain 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 hotel 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 the 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. In line with some good practices of hotels and embassies in Yangon, a waste separation system may be implemented within the Project site and options for waste recycling be considered to minimise the volume of wastes to be disposed to the landfill. The operators of different parts of the site will manage the small quantities of waste as per their corporate policy requirements.

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 proposed 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 & Alteration work with building's heritage significance and character;
- **interior remodeling** of 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 immediate setting of 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 a low impact method and sequence for basement construction, and apply active protection, instrumentation and monitoring of the adjacent buildings.

The visual impact on immediate vicinity and adjacent buildings such as the St Gabriel's Church is considered to be moderate, whilst the visual impact on 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, however the podium façade in this location will be designed taking into account these adjacent buildings.

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 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 site. Wherever possible the existing trees which contribute most to the landscape of the site will be retained. The 10 trees and 41 palms identified for transplantation have been 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 dilapidated condition comprises largely of sparsely distributed secondary vegetation including common species of grass, shrubs and isolated trees. The existing vegetation around the FMI Centre and the Grand Mee Ya Hta building 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, jack fruit and coconut trees.

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

8.10 Traffic and Transportation

Currently, the existing access to the site is from Bogyoke Aung San Road with one entry and exit to serve the FMI building and one entry and exit to serve the Grand Mee Ya Tha apartments. There are other kerb cuts and access points that are no longer in operation and were historically used to access the Myanmar Railways Headquarters.

8.10.1 Construction Phase

The existing access to Grand Mee Ya Tha on Bogyoke Aung San Road will be used during construction. During construction of Phase 2 the FMI centre access will be used. During construction of Phase 1 the FMI centre will operate as exit.

The construction is expected to take 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 to 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.

8.10.2 Operation Phase

Future Base Year Analysis

According to project development plan, project development will be open in year 2018 which is 5 years from 2013 (existing year). Regarding 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 Sule Shangri-La Junction has been undertaken for 2018 with The Landmark 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 development, as well as altering the signal timings, the developer proposes to improve the pedestrian facilities and flow of traffic along the site frontage.

The Landmark 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 has been developed to achieve the objectives of PS 4, as applicable to the environmental and social setting of the Project.

SPA 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 receive health and safety training.

8.11.1 Construction Phase

Issues of concern during the construction phase are as follows:

- The Project site will be organised 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 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 handling of hazardous materials, paints, oils, etc. 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.

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 development, i.e.

the construction and operational phases of the Project and provides a framework upon the Project Developer will set environmental and social management requirements for the Project via its contractual documents with relevant parties amongst others, 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, upon receipt of feedback from the regulatory agencies, any ESIA approval conditions and completion of the detailed construction methodology and the detailed 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.

The elements of the ESMP to be implemented for the Project are summarised in **Table ES.2**.

10. Public Consultation and Disclosure

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 government agencies such as the Yangon City Development Commission, MOECAAF, Ministry of Transportation and Myanmar Railways, Ministry of Tourism; NGOs active in Myanmar on heritage conservation and management; tenants currently occupying the site – at the FMI centre and Zawgyi House; customers and corporate clients of the Grand Mea Ya Hta Executive Residence; employees of Grand Mea Ya Hta Executive Residence; communities in the vicinity of the site, including the St Gabriel's Church and Bogyoke Aung San Market; and tourist operators and real estate professionals in Yangon.

At the corporate level, MIHL will develop its corporate level Environmental and Social Management System (ESMS), including the development of Standard Operating Procedures 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 ESMS will be in place by mid-2014.

As part of the due diligence exercise, the 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.

11 Conclusion

This ESIA study has assessed the potential environmental and social impacts arising from redevelopment of MIHL's existing 3.9-hectare (9.64-acres) plot in Yangon into a premium

mixed development scheme comprising residential, commercial, retail and hospitality components. Mitigation measures to manage and control the predicted impacts have also been recommended.

The findings of this report indicate that the predicted impacts arising from the construction and operational phases of the Project can be effectively mitigated and minimised to meet regulatory limits with the implementation of appropriate mitigation measures. The recommended mitigation measures include technologically sound practices as well as good international industry practice. The findings also show that there are no long-term detrimental or harmful impacts that cannot be mitigated.

To ensure the effectiveness of the mitigation measures, an Environmental and Social Management Plan which includes requirements for periodical environmental monitoring and audits for the construction and operational phases of the project will be developed and implemented. This is to ensure that all recommendations of this ESIA and the requirements of the relevant government agencies, upon approval of the ESIA, will be executed by MIHL as the Project Proponent.