Environmental Impact Assessment (EIA)

For Proposed

Marino Tower Hotel Colombo

652 Roomed City Hotel Complex

November 2021

Project Approving Authority:

Coast Conservation and Coastal Resources Management Department
(CC&CRMD)

Prepared By:

AmPark Consulting Services (Pvt) Ltd.
Hatchworks, No. 14, Sir Baron Jayatilaka Mawatha, Colombo 01

On behalf of:

Damro Leisure (Pvt) Ltd.,
No 361, Kandy Road, Nittambuwa, Sri Lanka

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Submitted To:

Coast Conservation and Coastal Resources Management Department (CC&CRMD)

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Abbreviations

CMC – Colombo Municipality Council

dB – Decibels

DMC – Destination Management Center

Leq/LAeq – Equivalent Continuous Sound Pressure Level

MCSCDP – Metropolitan Colombo, Strategic City Development Project

TA – Travel Agents

UDA – Urban Development Authority

EXECUTIVE SUMMARY

The following Environmental Impact Assessment (EIA) has been carried out in accordance to the Terms of Reference dated 3rd March 2020 provided by the Coast Conservation and Coastal Resources Management Department (CC&CRMD) as the Project Approving Agency (PAA). The Environmental Impact Assessment (EIA) was carried out to ascertain the potential environmental and social impacts associated with the construction and operation of the proposed Marino Tower Colombo, a 652 roomed City Hotel located in Colombo 3, so that construction may commence upon obtaining permission from the PAA.

Sri Lanka is presently experiencing a tourism boom, which started with the conclusion of the 30-year war the country was waging against LTTE terrorism. With the dawning of peace, tourism arrivals in the country grew rapidly, resulting in almost 400% growth in 6 years, making Sri Lanka the fastest-growing tourism destination in the world prior to the COVID-19 pandemic. This has also boosted foreign investments and despite the COVID-19 pandemic, real estate is presently booming with lower interest offered by banking institutions along with loans and facilities being provided.

The proposed luxury city hotel development will be located in the bustling commercial capital of Sri Lanka, Colombo and located adjoining the existing Marino Beach Colombo Hotel and Marino Mall on Galle Road, with access from Marine Drive as well. The project in question is justifiable and is in line with the tourism development strategy of the Colombo city (Capital City Development Plan 2019-2030) which calls for a rapid increase in tourist-based facilities and properties that offers short-term/long-term accommodation.

The land of the project has been purchased by the project proponent, Damro Leisure (Pvt) Ltd., which is a subsidiary of Damro Group, and has clear titles. Considering the nature of the surroundings, the ecosystem prevalent at the time of the study is very much under human influences. That is, the natural setting of the site has been influenced by urban developmental pressures and indicates the impacts of continuous disturbances. The proposed site, is made up of several plots that were purchased and had several is buildings with bare patches of land (that have since been cleared) with sparse growth of decorative trees and grass/weeds.

The proposed site for the new luxury city hotel development is situated within the Bambalapitiya Grama Niladari Division of Thimbirigasyaya Divisional Secretary Division in the Colombo district. A majority of lands adjoining to the proposed project area have been utilized for commercial and residential purposes, tourism and commercial establishments, etc. Therefore, no negative impacts such as resettlements and relocation programs could be expected due to the new project.

The footprint of the main structures covers approximately 50.7% of the land area and has been designed to provide guests with luxurious and satisfying experience. The main structure, will be 46 storeys high, with 3 basement, ground floor, and rooftop levels. The basement levels and ground floor will house parking and MEP facilities, whilst the 1st floor will act as the hotel entrance and the 2nd floor as the hotel lobby. The proposed Marino Tower Colombo will provide 652 rooms of luxury hotel accommodation with rooms located between the 11th and 41st floors (except for the 22A and 33A floors which act as refuge/service floors). The hotel will have 2 restaurants located on 9th and 43rd floors respectively, and a rooftop garden restaurant and bar alongside the swimming pool. The gym and changing rooms are located

on the 44th floor. BOH, offices, laundry, stores, and staff changing rooms/facilities are located between 3rd and 8th floors.

The study has given priority to the social importance and ensuring that the project will not contribute to any significant environmental or social degradation. The socio-economic assessment has identified the impacts of the proposed project on the existing conditions. The anticipated environmental impacts, during both construction and operational phases, have been considered in the study as stipulated in the TOR and suitable mitigation measures to both environmental and social impacts have been indicated.

The water requirement is to be obtained from the National Water Supply and Drainage Board (NWSDB) through town supply. Any shortfall will be acquired through 3rd party water contractors, and harvested rainwater will be utilized for gardening. The location of the site is over 120m away from the coast located parallel to Marine Drive, and thus no construction is planned within the beachfront setback distance stipulated by Coast Conservation and Coastal Resources Management Department. Also, the closest coastal belt is not used for fisheries activities, with the presence of breakwater placed on the beachfront as means of erosion prevention due to the close proximity of the railway line. Therefore, no significant impact on the coastal zone is anticipated from the construction of the proposed project.

The privately-owned land will be used for the construction of luxury city hotel and related components. From a sociological point of view, there could be some temporary social concerns during the construction phase. Air pollution, noise pollution and vibration effects could lead to such concerns, which could be minimized by the use of proper and standard methods of construction. A proper transport system also should be in place to control traffic along the accesses road from the main road during the construction period due to increased material transportation. Inappropriate behaviour of migrant workers during the construction phase could also lead to social unrest, and the project proponent should take steps to avoid such possibilities. No other sociological impacts could be expected in addition to the above.

More positive social impacts such as improving the hotel room capacities for tourists and holiday-goers, increased employment opportunities, increased commercial activities and improved infrastructure facilities, which would benefit the surrounding communities could be expected from the proposed project. In addition, the project would lead to increased land values in the area. It would boost the tourism industry also in the area, benefiting the communities in turn.

It is recommended that a Safety & Environmental Officer be appointed to oversee the implementation of the various Monitoring Plans. A well-structured program will ensure both Compliance Monitoring and Impact Monitoring to a high degree of efficiency, both during the construction and operational phases. A Disaster Management Plan has also been formulated to mitigate the impacts of natural disasters and prevent/reduce the loss of life in such an event.

Based on the analysis of these elements, and on the assumption that the recommendation for the mitigation of identified impacts is adopted and adequately implemented, the EIA has concluded that there are no major negative structural, environmental and social impacts associated with the construction and operation of the proposed Marino Tower Colombo hotel development.

1 INTRODUCTION

Damro Leisure (formerly called D.R. Leisure (Pvt) Ltd. is the tourism and entertainment subsidiary of the Damro Group, which was responsible for the development of the existing Marino Beach Hotel. The proposed project would be the project proponents, second foray into the hotel development market at a much larger scale.

The project is located within the commercial capital of Sri Lanka, in Colombo (zone) 3 which is the Bambalapitiya Grama Niladhari Division . The project is located adjoining the existing Marino Beach Hotel and Marino Mall property, with access from Galle Road and also the 10th Circular Road that connect to Marine Drive. The project offers 652 hotel rooms to cater to local and foreign tourists.

The project is currently in planning and envisioned for completion in 5 years, with construction expected to begin in November 2021, and be completed by March 2025. In response to the application for the development permit, the project proponent has been requested by the CC&CRMD to submit an Environmental Impact Assessment (EIA) report carried out under the requirements and regulations set by the Coast Conservation and Coastal Resources Management Department, which has been designated as the Project Approving Authority by the CEA.

The Environmental Impact Assessment and its findings are presented in this report.

The details related to the project proponent, location and the extent of the project site are as below:

Table 1-1: Project Details

Project Name:	Marino Tower Colombo 652 Roomed City Hotel Complex		
Project Proponent:	Damro Leisure (Pvt) Ltd (formerly D.R. Leisure (Pvt) Ltd.)		
Proponent Address:	No.361,Kandy Road,Nittambuwa.		
Extent of Project Site:	0A, 2R, 35.4P (0.29187952 hectares)		
Project Location:	Address Grama Niladhari (GN) Division Divisional Secretariat (DS) Division Local Authority District Province	: : : : : :	No. 594, Galle Road, Colombo 03 Bambalapitiya Thimbirigasyaya Colombo Municipal Council Colombo Western

1.1 AIM AND SCOPE OF THE EIA

1.1.1 AIM OF THE EIA

The main objective of the Environmental Impact Assessment (EIA) study is to identify all environmental impacts which would be expected because of constructions and operations of the luxury Marino Tower Colombo project and the specific objectives to propose mitigating measures with a view to minimizing the identified and predictable impacts to acceptable levels and to implement monitoring programs to follow up the proposed mitigating measures.

1.1.2 SCOPE OF THE EIA STUDY

The Terms of References (TOR) (**ANNEX I)** for the Environmental Impact Assessment (EIA) study, dated 03-09-2020, was issued by the Coastal Conservation and Coastal Resources Development Department (CC&CRMD) which is also the project approving agency (PAA) of the proposed project. The requirement of the TOR for the preparation of EIA report will be submitted to the PAA for approval of the project.

In general, the scope of the EIA study is to ensure that development options under consideration are environmentally sound and sustainable and that ecological, sociological and physical consequences are recognized and considered early in project design. The EIA process is conducted to help public officials make decisions that are based on the understanding of the potential ecological, sociological and physical consequences which may arise and to take actions that protect, restore, and enhance the environment.

1.1.3 METHODOLOGY OF THE EIA

A multi-disciplinary team of consultants undertook the preparation of the EIA report as per the guidelines set forth in the TOR. After discussion with the client, the scope of work to be carried out and reporting formats were finalized. A work plan was then prepared, methodology defined, and the work schedule of individual consultants were determined according to their specialty. Then, the identified impacts were evaluated, and suitable mitigating measures would be applied to each sector such as ecology, hydrology, sociology etc. Proper monitoring plans would be adopted as described in the report.

The study area is defined by the TOR as a 500m demarcated from the project site's boundaries and is indicated in **Figure 1.1** below.

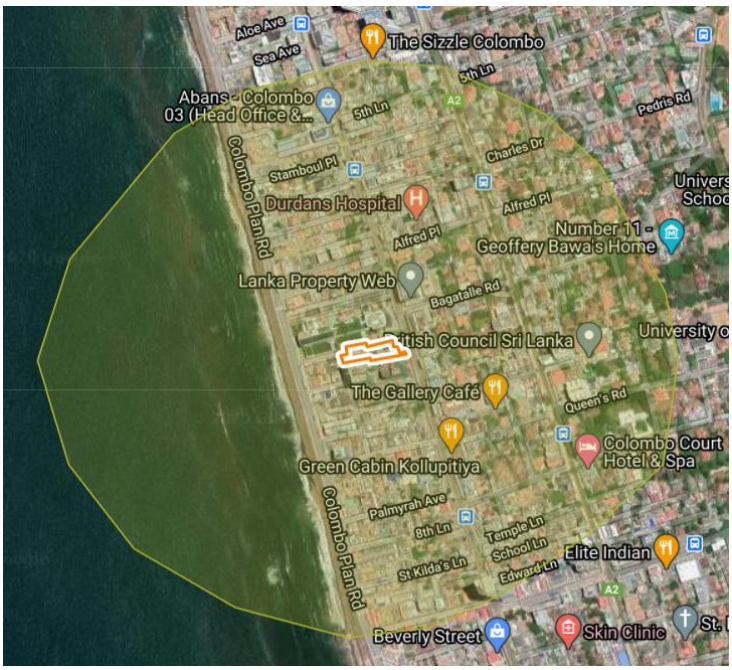

Figure 1.1: 500m Scope of Project Study

1.1.3.1 METHODS ADOPTED FOR THE SOCIOLOGICAL STUDY

As a part of the study, data of the socio-economic and cultural environment, including existing settlements, public assets, commercial establishments, development trends, frequency of disasters in the area and anticipated impacts due to proposed Marino Tower Hotel development project were studied. The following techniques were used for data collections.

- Observations through site visits.
- Collected the secondary data mainly Socio-Economic Profile prepared by the Divisional Secretariat Thimbirigasyaya for the year 2019. In addition, project-related study reports were reviewed.
- Interviews conducted with prominent people in the area, including Householders, persons from business establishments, priests in religious places in the area, officials who are working at grass root level specially, Grama Niladari, key informants, and the residential dwellers in the vicinity.
- Divisional officials and the Divisional Secretariat (DSs) have been visited and their views regarding the proposed project were collected.

1.1.3.2 METHODS ADOPTED FOR THE ECOLOGICAL STUDIES

To identify the inhabitant faunal and floral species, a rapid biodiversity assessment covering terrestrial and aquatic ecological habitats was carried out in the project site and its 500m surrounding study area. The field studies were mainly carried out during the daytime, but indirect observations too were taken into consideration, especially concerning fauna, to cover overall species diversity to prepare a detailed species inventory.

Direct observations were carried out to record biodiversity by adopting A Line Transact Methodology. In addition, the data and information were sought using recently published papers and reliable unpublished records. Relevant secondary information was also collected through the discussions with the community of the area. Discussions were made with relevant authorities as FGDs.

The floristic survey mainly concentrated on the identification of higher plants in the project site and surrounded area. To determine the floristic diversity of the area, the direct recording method was used. Observed floral species were identified using descriptions and keys published in “Handbook to the flora of Ceylon” and the conservation status of species was assessed according to the 2012 Red List of the Threatened Fauna and Flora of Sri Lanka (IUCN and Ministry of Environment, 2012) and Wijesundara et al., (2012).

1.1.4 CONSTRAINTS EXPERIENCES IN COMPLYING WITH THE TOR

As the project is presently in the design and pre-construction stage, changes to the design and eventual functionality may ensue beyond the timeframe of this EIA examination. Architectural plans and the range of facilities may still be slightly altered, which will result in difficulties in the accurate quantitative assessment of certain impacts. Time constraints have prevented the extensive, long-term study of certain aspects of the physical site such as the subsidence of the ground due to high rise structures and more direct observations of fauna on site due to the highly urbanized nature of the site and its surroundings. In such circumstances, the experience of the EIA team and comparison of similar EIAs and literature research

data were consulted to make informed decisions on potential cumulative impacts and other matters impacting this assessment.

1.2 Approvals And Permits Required To Implement The Proposed Project

Although the CC&CRMD is the final Project Approving Authority (PAA), a project of this nature requires the approvals from various governmental agencies and institutions as per the requirements laid out in various acts, regulations, and laws of Sri Lanka.

For the operation of the hotel, an Environmental Protection License (EPL) as per the provisions of the National Environmental (protection and Quality) Regulation No.01 of 2008 published in the Gazette Extraordinary No.1534/18 dated 01.02.2008 shall be obtained. The following **Table 1.2** illustrates the approvals required for this project and the progress made towards obtaining same at the time of submission of this EIA.

Table 1-2: Approvals/Permits

Approval/Permit		**Required stage**	**Current Status**
1	Development Permit from the Coast Conservation and Coastal Resource Management Department (CC&CRMD)	Pre-operational	Pending
2	Preliminary Clearance from Sri Lanka Tourism Development Authority (SLTDA)	Pre-operational	Received
3	Preliminary Planning Clearance from the Urban Development Authority (UDA)	Pre-operational	Received
4	Clearance from National Water Supply and Drainage Board (NWS&DB)	Pre-operational	Conditional
5	Clearance from Ceylon Electricity Board (CEB)	Pre-operational	Conditional
6	Colombo Municipal Council Consent to discharge waste water into the municipal waste water line during Operations Phase	Pre-operational	Pending
7	Clearance from Fire Services Department (FD)	Pre-Operational	Conditional
8	Preliminary Planning Clearance from National Building Research Organisation	Pre-Operational	Conditional
9	Agreement for Solid Waste Removal - Solid Waste Management from CMC	Pre-operational	Conditional
10	Height Clearance from Civil Aviation Authority	Pre-operational	Received
11	Security Clearance from Defence Ministry	Pre-operational	Received
12	Environmental Protection License from the Central Environmental Authority (CEA)	Operational	Pending
13	Clearance from Road Development Authority (RDA)	Operational	Received
14	Planning Clearance from the Disaster Management Centre (DMC)	Operational	Pending

2 DESCRIPTION OF THE PROJECT

The proposed 652 Roomed City Hotel Complex will act as an extension to the neighbouring Marino Beach Hotel and Marino Mall complex also owned by the project proponents Damro Leisure (formerly called D.R. Leisure (Pvt) Ltd – please refer to Name Change Certificate in **ANNEX VI**). The following **Table 2.1**. includes a snapshot of the project as well as the consultants involved in its development.

Table 2-1: Project Summary, Source: Damro Leisure (Pvt) Ltd Project Proposal

Project	Marino Tower Hotel - 652 Roomed City Hotel Complex	
Location	Address: Grama Niladhari (GN) Division*:* Divisional Secretariat (DS) Division*:* Local Authority: District: Province:	No. 594, Galle Road, Colombo 03 Bambalapitiya Thimbirigasyaya Colombo Municipal Council Colombo *Western*
Extent of Project Site	0A, 2R, 35.4P (0.29187952 hectares)	
Project Proponent	Company Name: Address:	Damro Leisure (Pvt) Ltd (formerly D.R. Leisure (Pvt) Ltd.) No.361,Kandy Road, Nittambuwa.
Architectural Consultant	Company Name: Address:	DPlus Architects (Pvt) Ltd Arch. Ranjan Wettasinghe No. 24A, Vijayaba Mw, Nawala Road, Nugegoda
Structural Engineers		Eng. R.M.A. Senerath
MEP Engineers		Eng . G. B. Nanayakkara
Project Description	Total Site Extent: Total Gross Floor Area: F.A.R. Total No of Floors: Total No of Rooms: Total No of Parking Provided: Total Height: Plot Coverage:	115.40 perch (2918.79m^2) 57415m^2 19.6 50 Floors, (3 basements, Ground and 46 Floor including rooftop) 652 Rooms 151 Parking Bays (142 Standard, 5 Disabled, 2 Lorry, 2 Bus) 179m 50.7%
Total Project Cost	Sri Lankan Rupees	Rs. 15,300 million

2.1 NATURE AND SCOPE OF THE PROJECT

2.1.1 DESCRIPTION AND MAIN FEATURES OF THE OF THE PROJECT

The proposed project, the 652-Roomed High-rise Marino Tower Colombo Hotel complex, is spearheaded by the prestigious Damro Group's hospitality division, named Damro Leisure (Pvt) Ltd formerly called D. R. Leisure (Pvt) Ltd prior to their decision to change its name to align to the parent group's branding strategy. The proponent's vision is to create a statuesque high-rise tourism and hospitality project on the available land adjacent to the existing Marino Mall and Marino Beach Hotel complex, which will be accessible from the Galle Road in Colombo 03.

The proposed project, named Marino Tower Hotel Colombo, is a luxury high-rise hotel complex, to offer 652 rooms for luxury accommodation within the city of Colombo, in different layouts and choices of bedroom arrangements. With the changes made to the concept and design, the proposed project will sprawl through 50 levels, which is encompassed of 3 basements, ground floor with parking and MEP facilities, and 46 floors offering leisure and accommodation facilities, including the rooftop swimming pool. The project will be located on 115.4 perches, which will accommodate 622 sophisticated standard room, 24 rooms outfitted with disability features, 4 executive rooms, and 2 luxury suites. The property offers a variety of amenities and 4-star hotel related services available to its guests, targeting local and foreign long stay, high-end tourists and business travellers. The concept of the design is to develop a high-rise complex that offers pristine and panoramic views of the Sri Lankan cityscape and Indian Ocean views.

The project proponents have envisioned the development to be one that is modern and luxurious with extensive amenities to meet the expectations of foreign and local business and tourist travellers. The options of accommodation will vary between sea view and city view rooms, with choices of suites, standard and executive rooms. The unique location of the project offers expansive views of the Indian Ocean and the city skyline of Colombo. The project is spearheaded by Damro Leisure (Pvt) Ltd, previously known as D.R. Leisure (Pvt) Ltd prior to their name change to align itself with the Damro Group branding strategy, along with the architecture concept and design done by Architect W.A. D. U. Ranjan Wettasinghe (of Dplus Architects (Pvt) Ltd.).

The new property will be developed as four (04) star luxury city hotel with 652 rooms and located adjoining its sister hotel, Marino Beach Colombo. Total investment of the project is US$ 70 million and the construction is expected to be completed within 5 years. The development consists of many attractions as a star class city hotel with modern amenities and comfort.

The site and study area is located within Colombo City, in the Colombo 03 area also known as Kollupitiya, and is posittioned between Galle Road and Marine Drive (with access from the 10th Lane Circular Road). The property is made up a variety of plots, with a flat terrain, with the a majority of the land flattened after the demolished and was most recently used as a car parking lot. Whilst the majority of the land is vacant, there had been 3 abandoned, delapidated buildings which have since been demolished.

The main entrance of the hotel is from the Galle Road and built fronting to the picturesque Marine Drive and the Indian Ocean. It's less than 3 kilometres from all the 5-star city hotels in Colombo and close

proximity to shopping malls, banks and business & entertainment centres in the city. The hotel is just less than 40 minutes away from Bandaranaike International Airport and easily accessible from all part of the tourist destinations in the country. The following **Figure 2.1** includes some computer-generated renderings of the project courtesy of the architect.

Figure 2.1: Concept of Proposed High-Rise Hotel Complex Alongside the Existing Marino Beach Hotel

2.1.1.1 MAJOR COMPONENTS OF THE PROJECT

The 652 Roomed 46 Storey high Marino Tower Colombo Hotel Complex will be an iconic addition to the Colombo Skyline, whereby the proposed hotel development was designed to complement and benefit from the neighbouring Marino Mall complex and the Marino Beach. Guests however, will have easy access to the various entertainment, shopping and food facilities offered at the mall, with a simple walk next door.

The following **Figure 2.2** is an aerial computer rendering of the proposed development for better understanding of the outlay of the proposed project site.

Figure 2.2: Rendering of Ariel View of Property

2.1.1.1.1 AMENITIES

There are a variety of amenities and components that are being featured in the project, including the three restaurants on the 9th, 43rd and 45th (rooftop) floors, the fully equipped gymnasium, yoga area with steam rooms on 44th floor (allowing guests to workout with great expanse views of the city and the ocean), and the rooftop restaurant and garden bar and infinity-type swimming pool (both adult and kids pool) offering both city and ocean views.

Figure 2.3: Rooftop View of Proposed Project

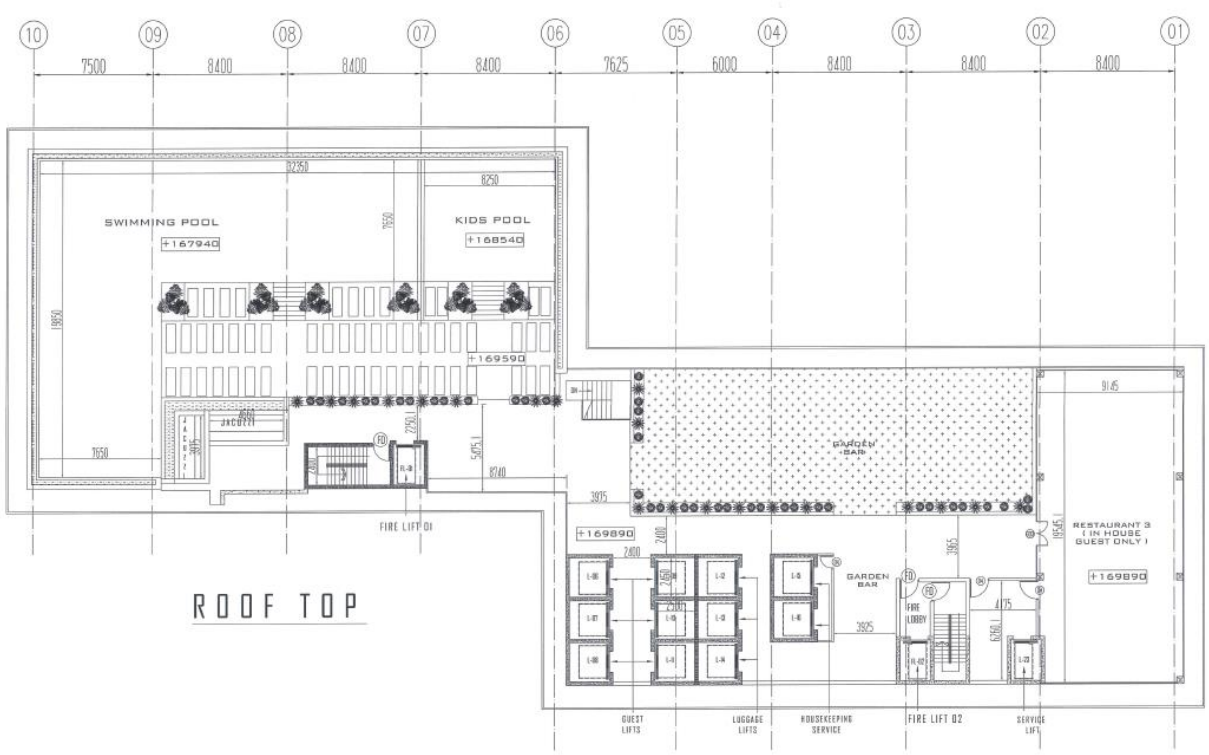

Figure 2.4: Rooftop Layout

2.1.1.1.2 Floor Layouts

There are dedicated floors for guest rooms, whereby the floors 11th to 33th include 462 Standard Rooms and 22 Rooms with Disability Features, floors 34th to 41st include 160 Standard Rooms, 2 Rooms with Disability features, 4 Executive Rooms, and 2 Suites (located on the 40th and 41st floors). Floors 10, 22A, 33A, and 42 are dedicated Service and Refuge Floors in case of any disaster emergency. Staff changing rooms and facilities are located on floors 3rd to 5th, and with the Hotel Offices on the 6th floor, Laundry on the 7th and Stores on 8th floors respectively. Car parking is located in the 3 basement (B-3, B-2, and B-1) and ground floor (GF) along with various MEP facilities. The hotel entrance and lobby is located on 1st floor and 2nd floor, whereby access is provided on the Ground Floor driveway via Steps and Lift Access for Disability/Wheelchair Access as depicted below in **Figure 2.5**.

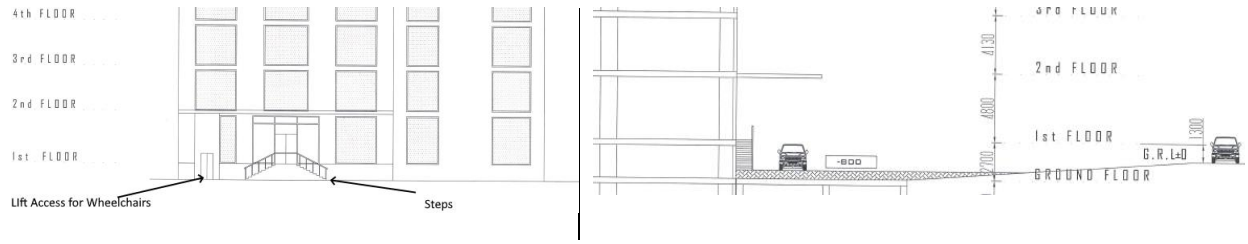

Figure 2.5: Side Elevation of Hotel Entrance

The following **Table 2.2** highlights the breakdown of components across various levels.

Table 2-2: Project Component Breakdown according to Floors

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
1	Basement 03	B-3	2180m^2	# of Standard parking = 42	66 m^2 Sewage Pit 2 Car Lifts 1 Passenger Lift 2 Fire Lift 2 Fire Stairwell Water Tank Chiller Room Plant	AR-2
2	Basement 02	B-2	1698m^2	# of Standard parking = 40 # of Disabled Parking 01	66 m^2 Sewage Pit Rain Water Tank 2 Car Lifts 1 Passenger Lift 2 Fire Lift 2 Fire Stairwell Water Tank Chiller Room Plant 2 Lift Wells	AR-2
3	Basement 01	B-1	1898m^2	# of Standard parking = 34 # of Disabled Parking 01	2 Car Lifts 3 Passenger Lifts 2 Fire Lifts Toilet Generator Transformer Area 2 Fire Stairwell 8 Lift Wells	AR-2
4	Ground	GF	1482m^2	# of Standard parking = 26 # of Disabled Parking 03 # of Bus Parking 02 # of Lorry Parking 02	2 Car Lifts Dry Garbage Room Garbage Freezer Guest Lifts (L01, L02, L03) Staff Lifts (L04, L05) 2 Service Shafts 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (L17) 2 Housekeeping Lifts (L15, L16) 7 Lift Wells 2 Fire Lifts 1 Disabled Lift (L19) Toilet 2 Fire Stairwell 7 Lift Wells	AR-2

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
5	Level 1	1	1482m^2	Hotel Entrance	Entrance Lobby Car Lift Machine Room Baggage Room 1 Disability lift (l19) 9 Guest Lifts (L02, LO3, L06, L07, L08, L09, L10, L11, L18) 3 Luggage Lifts (L12, L13, L14) 1 Service Lifts (L17) 2 Housekeeping Lifts (15, L16) 2 Staff Lifts (L04, L05) 2 Fire Lifts Toilets (3 Male, 3 Female), 1 Disabled Toilet 2 Service Shaft 2 Fire Stairwell	AR-3
6	Level 2	2	1364m^2	Hotel Lobby	Hotel Lobby 9 Guest Lifts (L02, LO3, L06, L07, L08, L09, L10, L11, L18) 3 Luggage Lifts (L12, L13, L14) 1 Service Lifts (L17) 2 Housekeeping Lifts (15, L16) 2 Staff Lifts (L04, L05) 2 Fire Lifts Toilets (4 Male, 4 Female), 1 Disabled Toilet 2 Service Shaft 2 Fire Stairwell 1 Lift Wall	AR-4

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
7	Level 3	3	1364m^2		2 Staff Lifts (L04, L05) Toilets (2 Male, 2 Female) 2 Fire Lifts 2 Fire Stairwells 2 Service Shafts 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) Staff Kitchen Staff Cafeteria AHU Room	AR-4
8	Level 4	4	1364m^2		2 Service Shafts 2 Staff Lift (L04, L05) 2 Fire Lifts 2 Fire Stairwell 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) Changing Rooms Kitchen Staff Changing Room Executive Changing Room (Male) Executive Changing Room (Female) Kitchen Staff Changing Room (Male) F&B Changing Room (Male) Staff toilets AHU Room TV Room Rest Room F&B Changing Room (Male) Housekeeping Changing Room Maintainer Changing Room Changing Room	AR-4

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
9	Level 5	5	1364m^2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) Rest Room TV Room F&B Dormitory (Male) Housekeeping Dormitory Maintainers Dormitory Gym AHU Room Staff Toilets 2 Service Shafts Executive Dormitory (Female) F&B Dormitory (Female) Kitchen Staff Dormitory (Female) Executive Dormitory (Male) Kitchen Staff Dormitory (Male) Dormitory 2 Staff Lift (L04, L05) 2 Fire Lifts 2 Fire Stairwell	AR-4
10	Level 6	6	1364m2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) 2 Fire Lifts 2 Fire Stairwells AHU Room 2 Staff Lifts Hotel Office 2 service Shafts 4 Male Toilets 4 Female Toilets Lunch Room 5 Toilets	AR-5

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
11	Level 7	7	1373m2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) 2 Fire Lifts 2 Fire Stairwells AHU Room Laundry 2 Male Toilets 2 Female Toilets	AR-5
12	Level 08	8	1364m2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) 2 x Ahu Room 2 Fire lifts 2 Fire Stairwells Store 2 Male Toilets 2 Female Toilets 2 Lift Walls	AR-5
13	Level 09	9	1364m2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) 2 Fire Lifts Restaurant 1 (n House guests Only) 2 Male Toilets 2 Female Toilets 2 Fire Stairwells 2 Service Shafts Kitchen 2 Male Toilets 2 Female Toilets	AR-5

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
14	Level 10 Service and Refuge	10	1349m^2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 1 Service Lift (l17) 2 Housekeeping Lifts (L15, L16) 1 Staff Lift (L20) 2 Room Service Lift (lL22, L21) 2 Fire Lifts 2 Fire Stairwells AHU Room 2 Male Toilets 2 Female Toilets Refuge Area 1 Refuge Area 2 2 Male Toilets 2 Female Toilets	AR-6
15-24	Levels 11-21	11-21	1364m^2 x 10 21 Rooms per floor 1 Disabled Room per floor		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Fire Lifts 2 Fire Stairwells AHU Room Electrical room Housekeeping Pantry	AR-6
26	Level 22A Service and Refuge [23rd Storey]		1364m^2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Fire Lifts 2 Fire Stairwells Refuge Area 1 Refuge Area 2	AR-6
25, 27, 28	Level 22-24	22-24	1364m^2 x 3 21 Rooms per floor (6 Interconnecting) 1 Disabled Room		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Fire Lifts 2 Fire Stairwells AHU Room Electrical room Housekeeping Pantry	AR-6

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
29-35	Level 25 – 31	25-31	1364m^2 21 Rooms per floor (2 Interconnecting Rooms) 1 Disabled Room per floor		2 Fire Lifts 2 Fire Stairwells AHU Room Electrical room Housekeeping Pantry 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21)	AR-7
38	Level 33A Service and Refuge [35th Storey]	33A	1364m^2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Fire Lifts 2 Fire Stairwells Refuge Area 1 Refuge Area 2	AR-7
36, 37, 39, 40	Level 32nd – 35th	32-35	1364m^{2}x 4 21 Rooms per floor 1 Disabled Room per floor		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Fire Lifts 2 Fire Stairwells AHU Room Electrical room Housekeeping Pantry	AR-7
41-44	Level 36th to 39th	36-39	1364m^2 x 4 20 Rooms per floor 1 Disabled per floor		2 Fire Lifts 2 Fire Stairwells AHU Room Electrical room Housekeeping Pantry 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) Executive Room Living & Dining	AR-7

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
45-46	40th-41st Floors	40-41	1364m^2 x 2 19 Rooms per floor 1 Suite per floor		2 Fire Lifts 2 Fire Stairwells AHU Room Electrical room Housekeeping Pantry 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) Suite Room Living & Dining	AR-8
47	42nd Service & Refuge [43rd Storey]	42	1364m^2		2 Fire Lifts 2 Fire Stairwells Refuge Area 1 Refuge Area 2 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 x AHU Rooms 2 Service Shafts 6 x Rain Water Tanks	AR-8
48	43rd Floor	43	1364m^2		Restaurant 2 (O house guests only) 2 Service Shafts 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Male toilets 2 Female Toilets Kitchen 1 Male toilet 1 Female Toilet 2 Fire Lifts 2 Fire Stairwells	AR-8

Floors	Level	Marino Lift #	Size	Parking	Components	Arch Drawing Sheet #
49	44th Floor	44	1364m^2		6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) 2 Service Shafts Male Toilets Female Toilets AHU Room Gym Pool Pump Room Yoga Area 3 Steam Rooms Male 3 Steam Rooms Female 1 Steam Generator Female Changing Rooms and Lockers Male Changing Rooms and Lockers 2 Fire Lifts 2 Fire Stairwells	
50	45th Floor (46th storey - Rooftop)	45			2 Service Shafts 6 Guest Lifts (L06, L07, L08, L09, L10, L11) 3 Luggage Lifts (L12, L13, L14) 2 Housekeeping Lifts (L15, L16) 2 Room Service Lift (lL22, L21) Swimming Pool Kids Pool Jacuzzi Garden Bar Restaurant 3 (In House Guests) 2 Fire Lifts 2 Fire Stairwells	

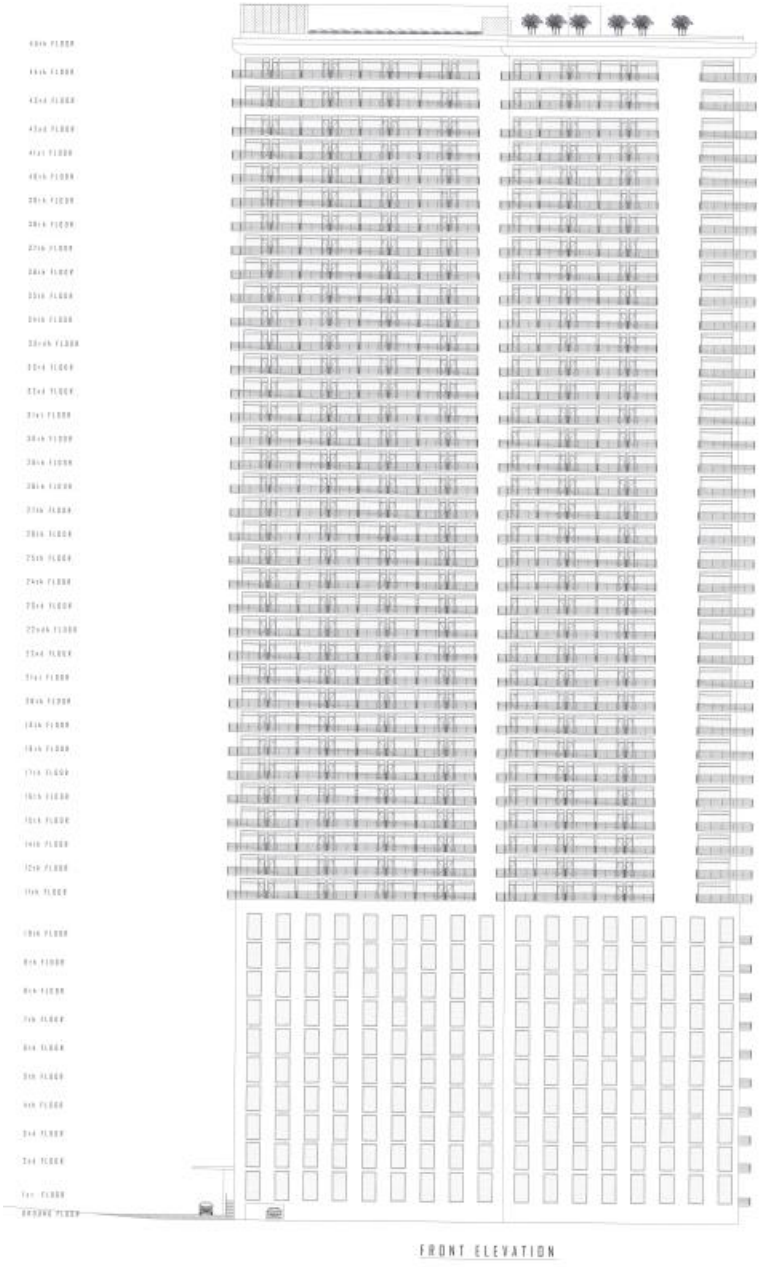

Figure 2.6: Front Elevation of Project

2.1.1.1.3 CAR PARKING

Parking floors are located on the ground floor and the 3 basement levels (B-1 to B3), with car slots measuring at 2400mm x 4800mm, whereas disabled car parking slots are measured at 3600mm x 4800mm. Parking levels are supplemented by 2 car lifts to save on space and these lifts connect the gound floor to the 3 basement car parking floors as indicated in **Figure 2.7** below.

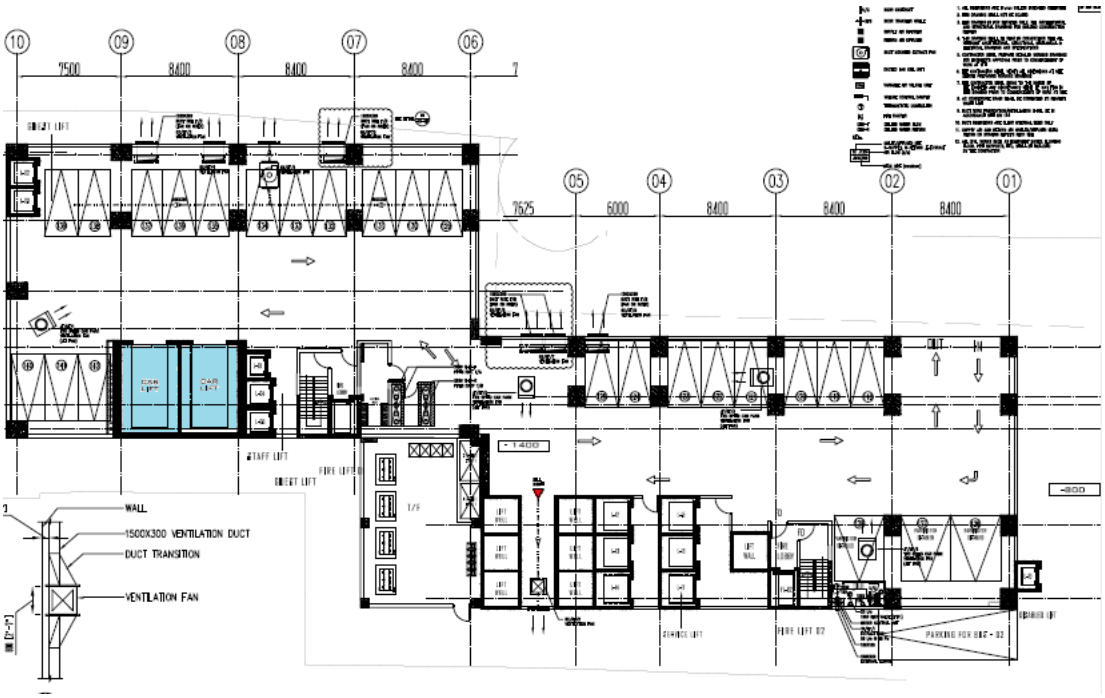

Figure 2.7: Car Lift Location

2.1.1.1.4 VENTILATION

The basement areas, which are not naturally ventilated, will be supplemented with mechanical ventilation to provide sufficient air exchange to dilute any vehicular exhaust fume accumulation and for potential smoke exhausting in the event of a fire. Each basement floor is fitted with air inflow and outflow ducts to flow in fresh air into the sub-structures of the building and evacuate used air. Exhausted air will be channelled to the ground floor and vented out of the structure as indicated in green as shown in the figures below. Basement 3 is fitted with 6 air inflow vents (marked in green and 2 air exhaust vents (Marked in Orange) which connect directly to the ground floor as indicated in **Figure 2.8** below.

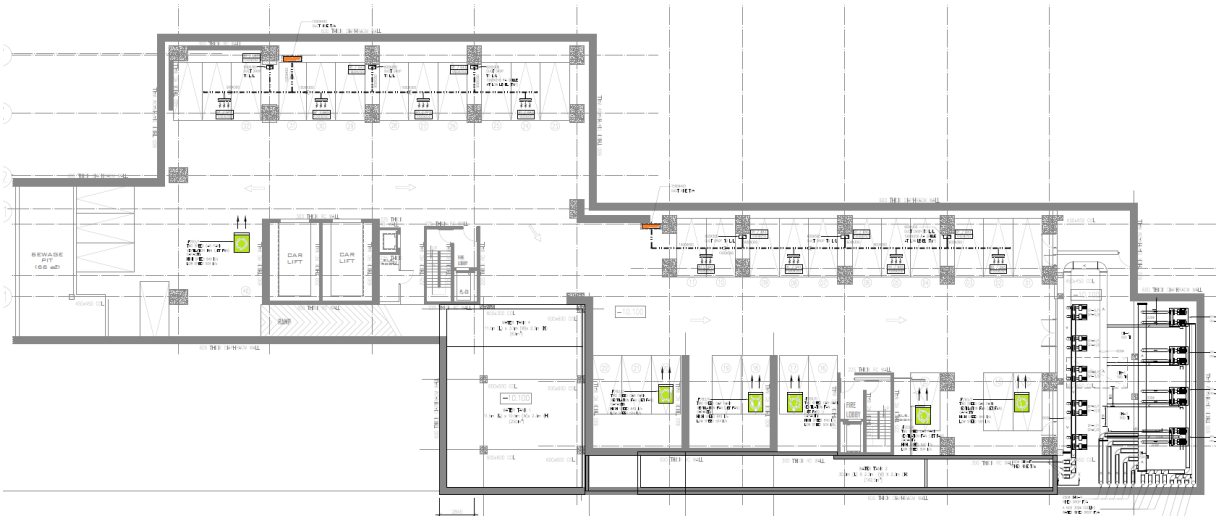

Figure 2.8: Basement 3 Air Inflow (Green) and Exhaust Vents (Orange)

Basement 2 is fitted with 6 air inflow vents (marked in green and 4 air exhaust vents (Marked in Orange) which connect directly to the gorund floor connecting to the vents from B3, as indicated in **Figure 2.9** below:

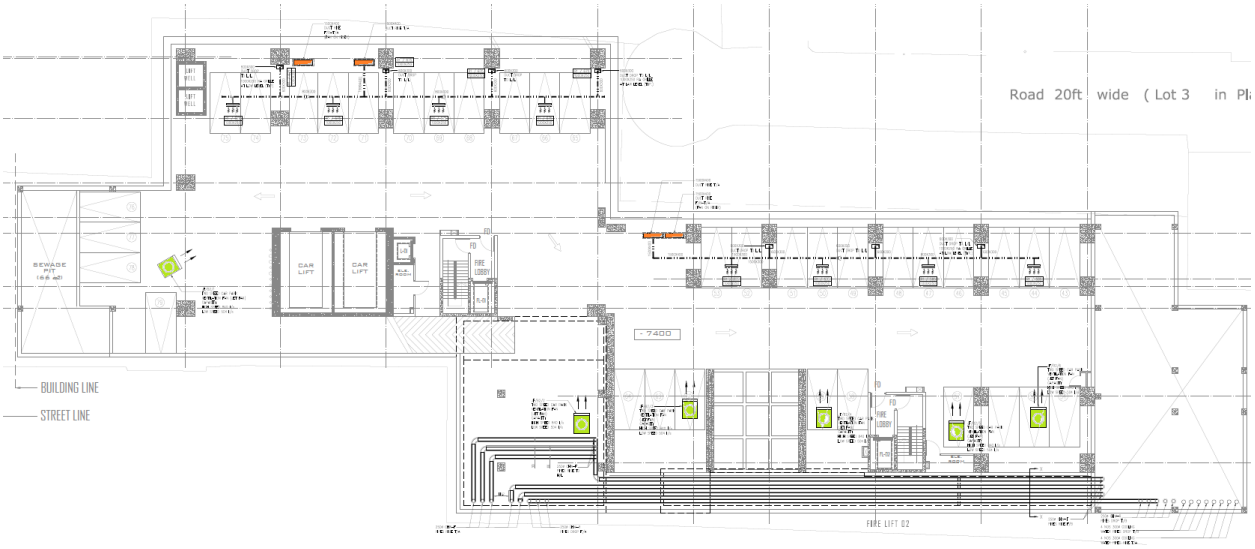

Figure 2.9: Basement 2 Air Inflow (Green) and Exhaust Vents (Orange)

Basement 1 is fitted with 6 air inflow vents (marked in green and two air exhaust vents (Marked in Orange) which connect directly to the gorund floor as well as provision for the vents from B3 & B2, as indicated in **Figure 2.10** below:

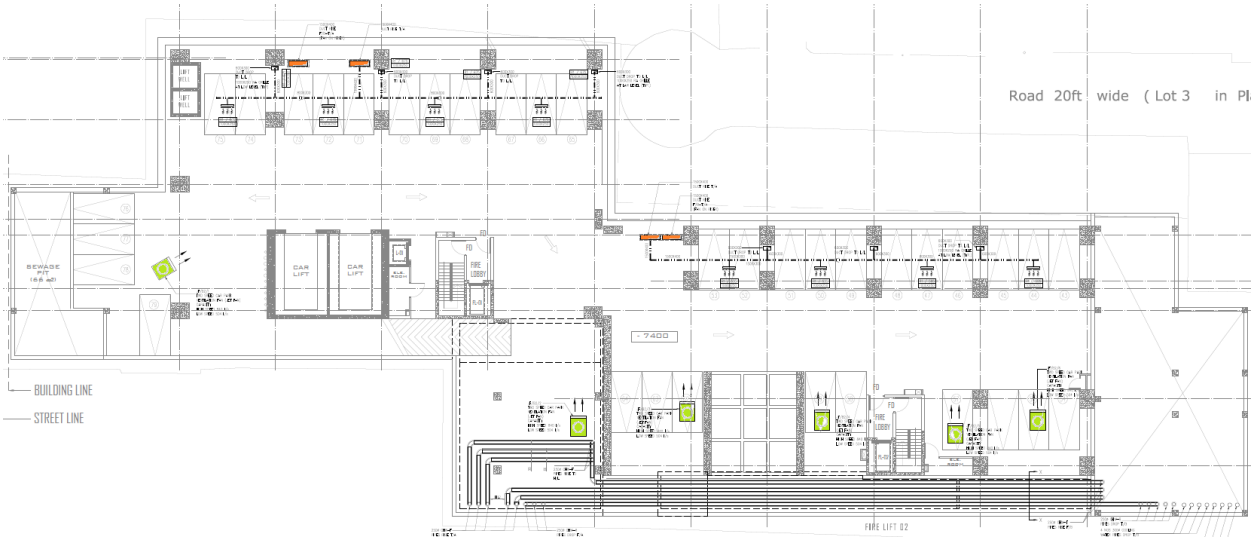

Figure 2.10: Basement 1 Air Inflow (Green) and Exhaust Vents (Orange)

The Ground Floor is fitted with 4 air inflow vents (marked in green) and 8 air exhaust vents (Marked in Orange) which connect directly to all the basement floors, as indicated in **Figure 2.11** below:

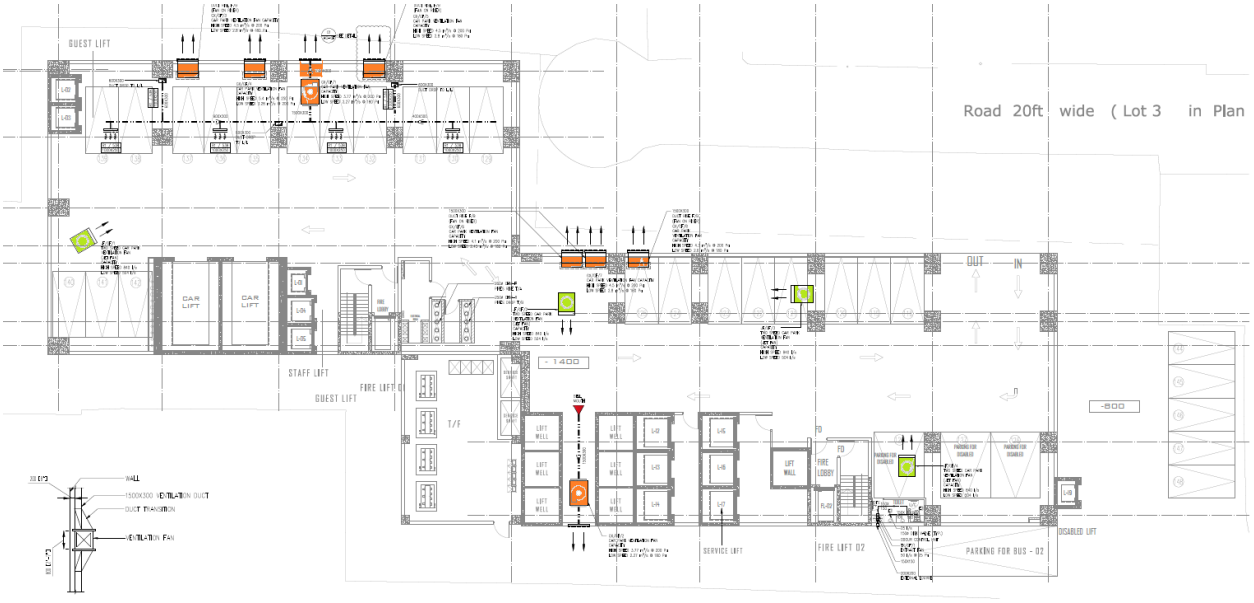

Figure 2.11: Ground Floor Inflow (Inflow) and Exhaust (Orange) Vents

The above ventilation arrangement is in compliance of industry and fire safety regulations.

2.1.1.2 COASTAL RESERVATION

The western boundary of the property is located approximately 120m away from the coastal PVL/erosion prevention barriers along the sea shore, with a Railroad and the Marine Drive is located in between the sea and the proposed structure as well. The proposed structure is located within Segment No, 15 of the Coastal Zone Management Plan 2018, which includes a total setback of 35m (10m Reservation, 25m Restricted) as per the Extraordinary Gazette No. 2072/58, 25th May 2018, prepared under Section 12(1) of the Coast Conservation and Coastal Resource Management Act, No. 57 of 1981, and the area is considered Low Vulnerability. The project location is outside the coastal reservation indicated. For more details, please refer to **ANNEX IV**.

2.1.2 SITE LOCATION AND INFORMATION

2.1.2.1 SITE LOCATION MAP

The site is located on several plots some bare whilst some presently have vacant buildings (which has been demolished). The site is connected via two locations onto Galle Road and is adjacent to the existing Marino Mall Shopping Complex and Marino Beach Colombo. The Site can be accessed via Galle Road or via 10th Lane, which connects to Marine Drive.

Figure 2.12: Site Location

It is bordered on the North by the Marino Mall complex and existing Marino Beach Colombo Hotel, in the West by 10th Lane, to the South by the '606' Mixed Development project and the West by the Galle Road and Fuel Station.

The following **Figure 2.13** is the 1:50,000 TOPO plan of the region indicating the site location.

Figure 2.13: 1:50,000 TOPO Plan of the site area

2.1.2.2 LAYOUT PLAN WITH FACILITIES

2.1.2.2.1 SITE PLAN

As displayed in **Figure 2.14** below, the Ground Floor has a plot coverage of 50.7% with entrance and exit for vehicles from the Galle Road with a service entrance from the 10th Lane located on the Western boundary of the site.

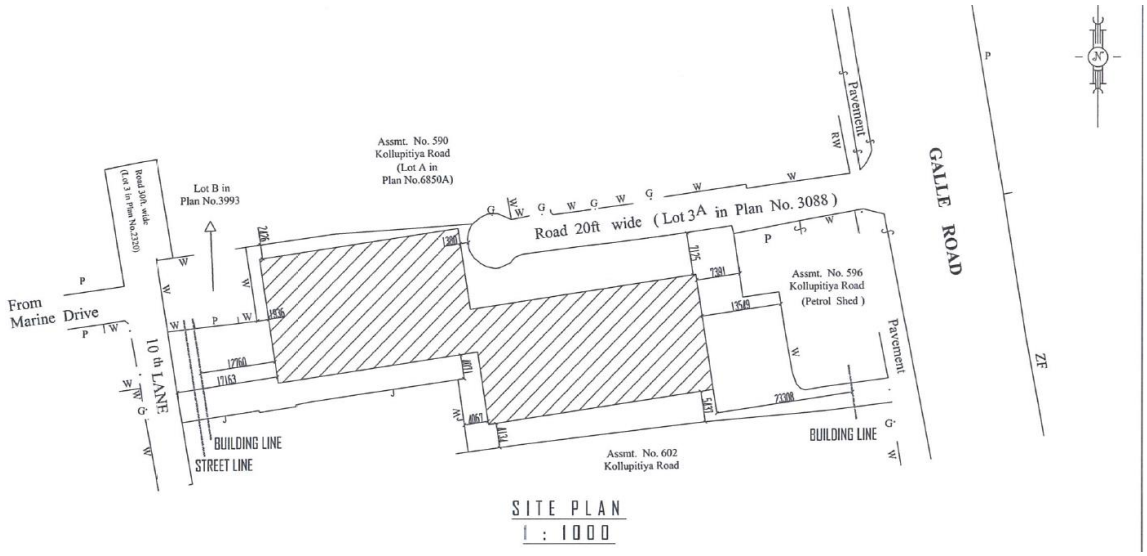

Figure 2.14: Site Plan

2.1.2.2.2 CAR PARKING

The Ground Floor and 3 Basement Levels have dedicated parking for 151 vehicles, which include allocated parking for 142 standard and 5 disabled vehicles, 2 bus and 2 lorry parking allotments. The parking floors are serviced via tow car lifts which provide access to the 4 car parking floors from the ground floor. The location of the acar lifts is indicated in **Figure 2.15** below and morefully described in **Section 2.1.1.1.1** above.

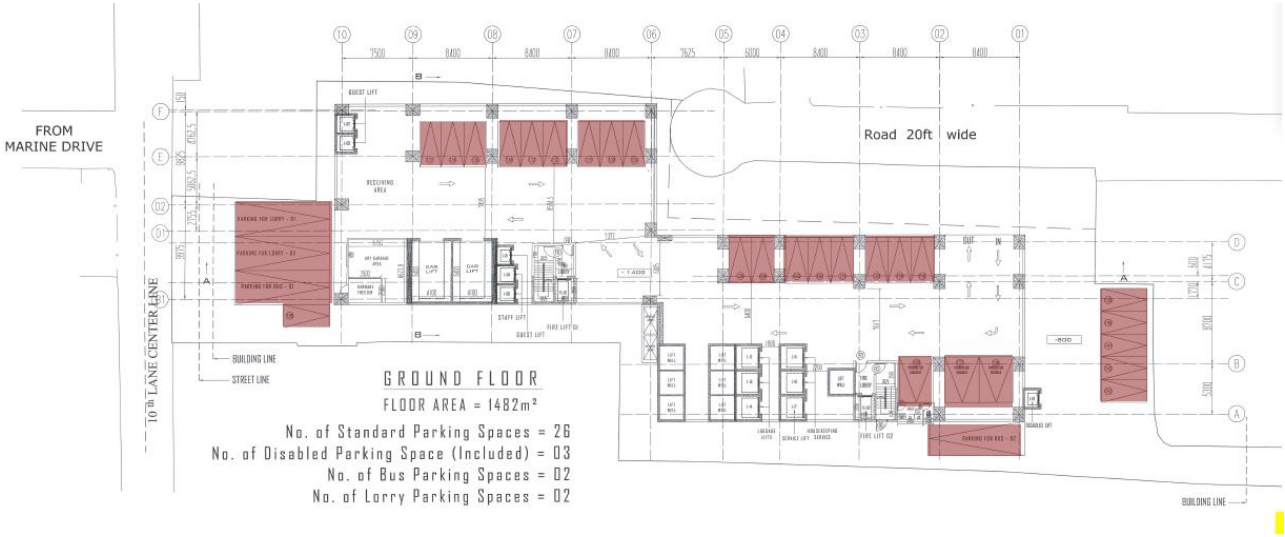

Figure 2.15: Car Parking Bays Arrangement on Ground Floor

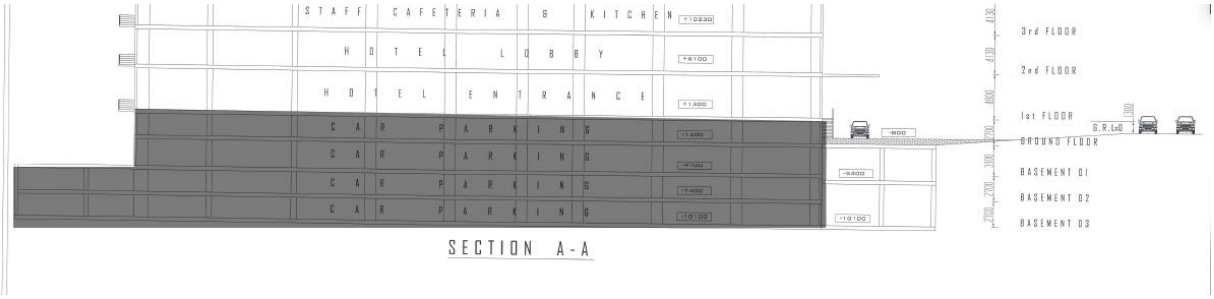

Figure 2.16: Sectional View of the Basement and Ground Floor Car Parking Floors

2.1.2.2.3 Support Services (BOH)

The building area within also will include various Back Of House (BOH) areas to facilitate the smooth running of this high-rise hotel complex which include rooms allocated for the transformer, pump rooms as well as dry/wet solid waste collection areas on the ground floor. For a detailed breakdown of the different facilities, refer to **Table 2.2** in **Section 2.1.1.1**.

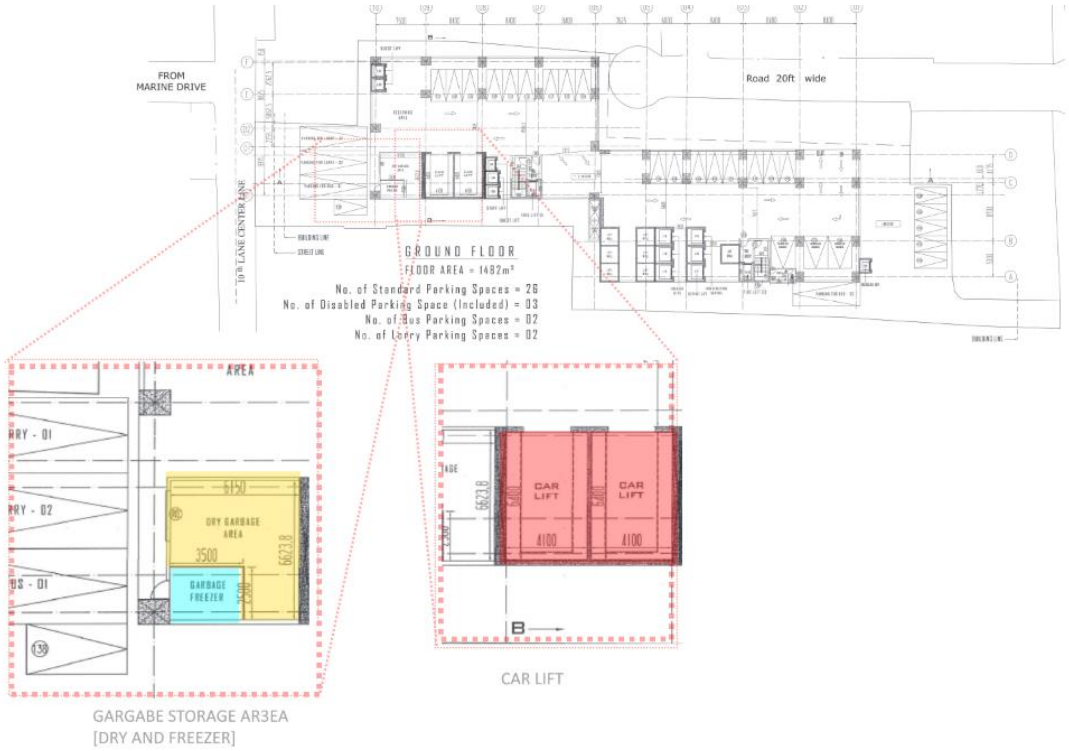

Figure 2.17: Temporary Garbage (Dry and Freezer) Storage on Ground Floor

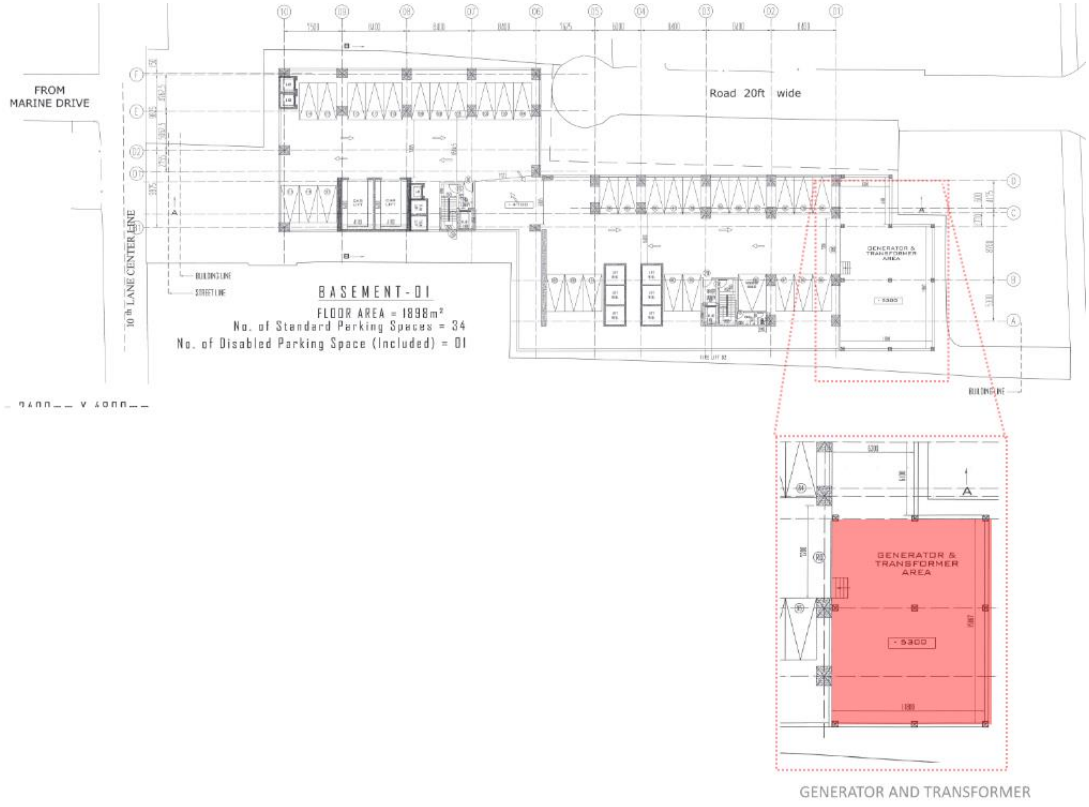

Figure 2.18: Basement 1 (B-1) BOH and MEP

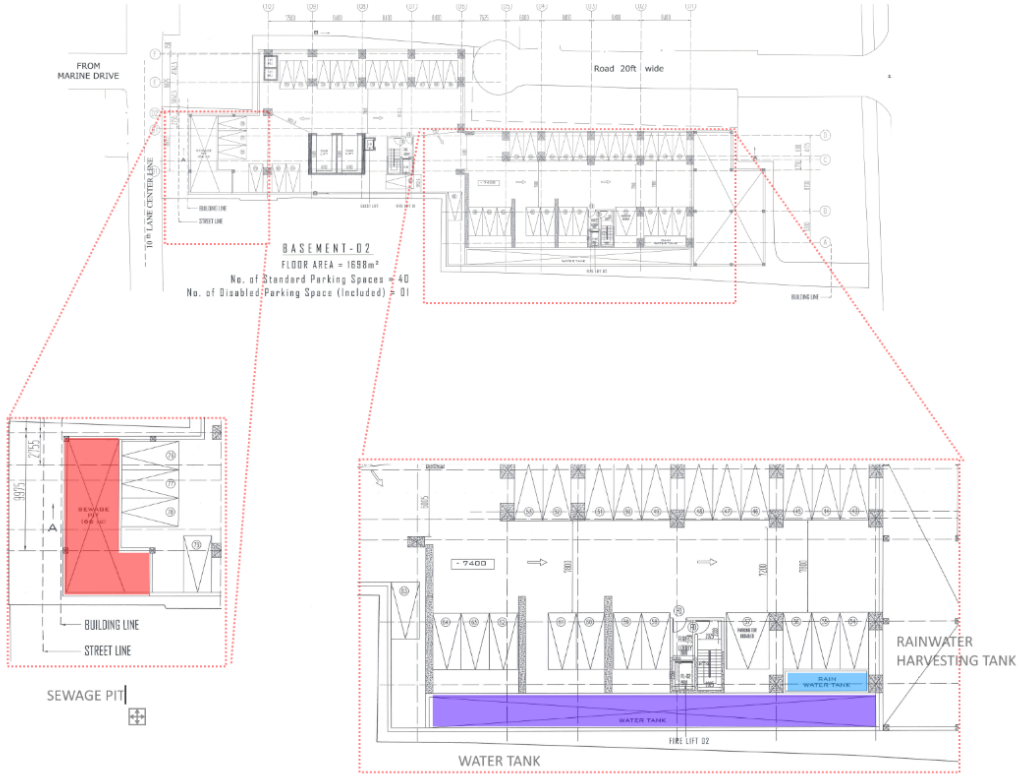

Figure 2.19: Basement 2 (B-2) BOH and MEP

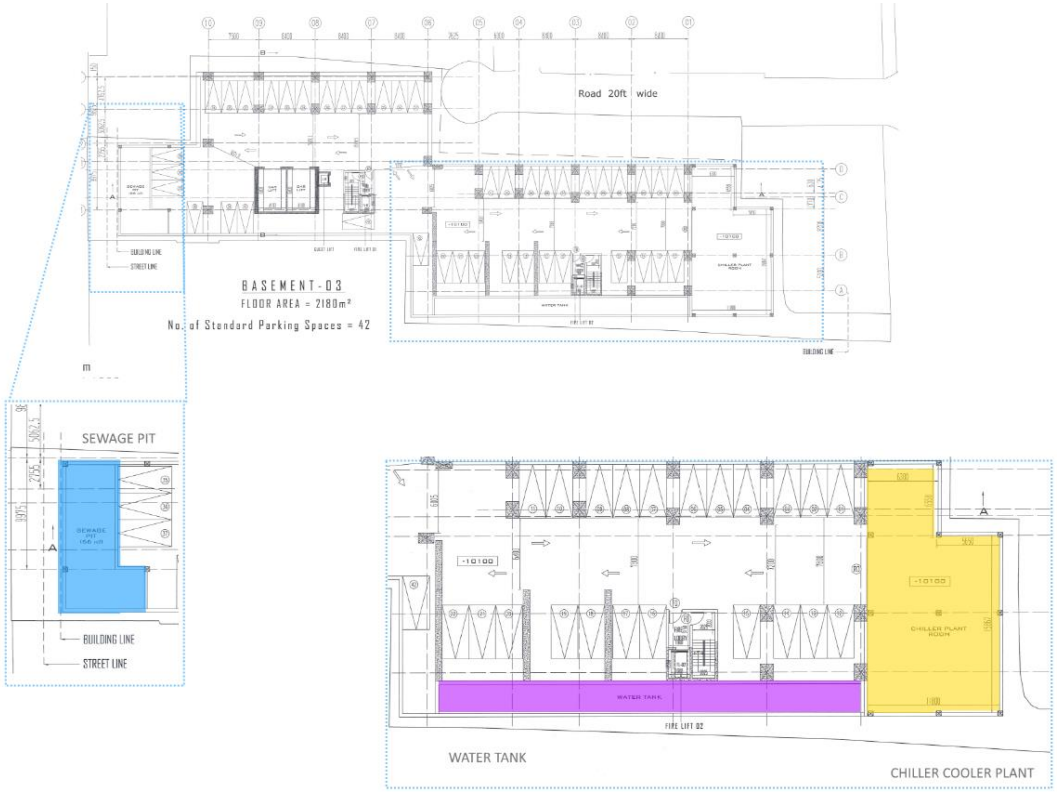

Figure 2.20: Basement 3 (B-3)

2.1.2.3 CONTOUR PLAN

A 0.5m interval contour survey was undertaken on site to determine the topography and hydrological aspects of the site. The project site is flat in profile but exhibits a slight gradient incline from West to East resulting in a height differential of approximately 3.66m between the two latitudinal boundaries.

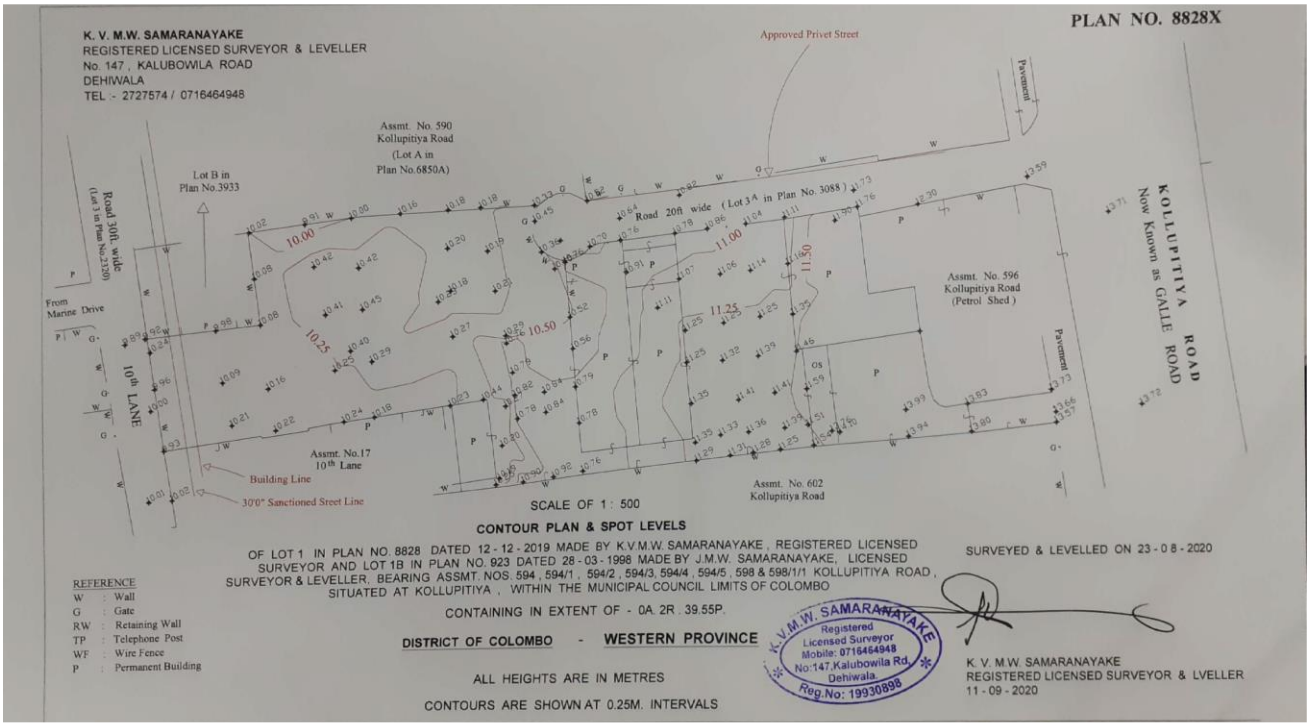

Figure 2.21: Contour Plan

It is important to note that the site was previously constructed upon and had several buildings on it which have subsequently been demolished. Thus, the present contour can be considered artificial and not reflective of the original, undisturbed terrain profile in the past.

2.1.2.4 SURVEY PLAN OF THE PROJECT SITE

Survey plan of the proposed development location, Plan 8828, was prepared by licensed surveyors shown in **Figure 2.22** (also available for perusal in **ANNEX VI**, along with the UDA Approval letter)**.**

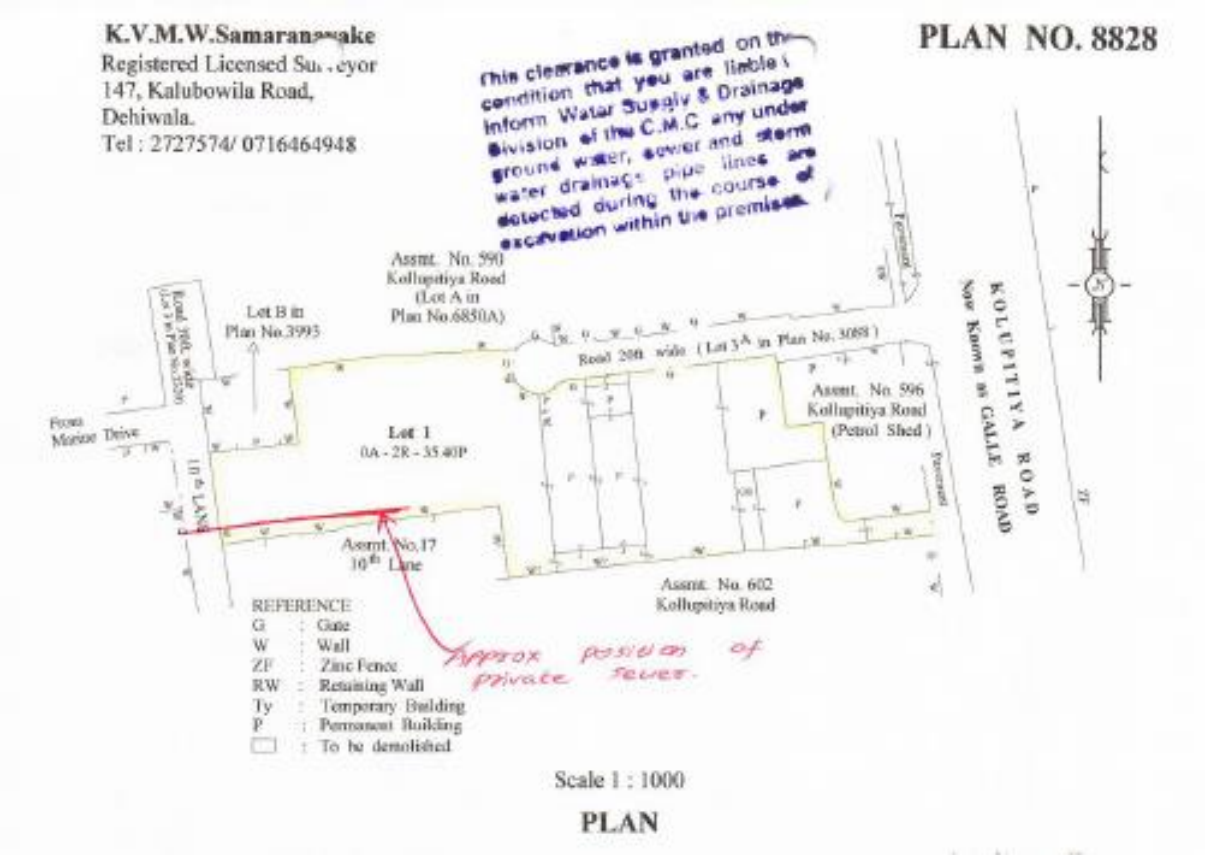

Figure 2.22: Survey Plan

2.1.2.5 PROOF OF OWNERSHIP

The land of the project site is privately owned by Damro Leisure (Pvt) Ltd (previously known as D.R. Leisure (Pvt) Ltd – please see ANNEX VI for Name Change Certificate) as evidenced by the Title Deeds No 411, No. 1805, No. 1806, No. 1688, No. 1692, No. 348, and No. 374 attached In **ANNEX VI**. Damro Leisure (Pvt) Ltd is a private limited liability company incorporated under companies act no.07 of 2007 bearing registration no. PV 130152.

2.1.3 WASTE MANAGEMENT AND INFRASTRUCTURE COMPONENTS

Waste management during the construction phase and operation phases of the project are described below in brief. These facilities are described in detail within the relevant **Sections 2.3.2.2 (Waste Water)** and **2.3.2.3 (Solid Waste).**

2.1.3.1 SEWERAGE AND WASTE WATER

Wastewater generated from the temporary kitchen and washing (Grey Water) during the construction phase will be minimal (Less than 30m^3 per day) when full work force is employed) and can be safely disposed of through ground absorption at the site itself. Temporary wastewater absorption pits will be constructed at the site that will be closed once the construction phase is over. Temporary mobile toilets

will be rented by the contractors during the construction phase and the wastewater and sewage from these toilets will be removed by these 3rd party contractors for treatment and disposal as per CEA regulations.

During the operational stage, wastewater will be of the domestic type, since the complex will be used for hospitality accommodation with restaurants.

Comprehensive wastewater management plans have been prepared for the complex during the operation stage. The building complex has been divided in to 5 zones (as per **ANNEX IX**) to attend waste water management separately in each zone. Waste water will be treated in three types of methods as shown in the table below.

Table 2-3: Waste Water Treatment Methods

Item	Type of waste	Generate from	Treatment method
01	Grey water	Bathing and Washing	Primary treatment Biological treatment Filtration Disinfection (Chlorination)
02	Black water and kitchen waste water	Toilet flushing and kitchen waste	Primary treatment, FOG Filter, Biological treatment plant
03	Grey water	Laundry waste Boiler blow down Cooling tower bleed off Swimming pool back wash Water treatment plant back wash	Chemical treatment plant

Waste water from washing and bathing waste of each zone will be collected into the collection tanks located in treatment plant installation area in each zone. Collected waste water will be pumped via lifting stations into the treatment plant and then treated water will be pumped into the treated water collection tanks located in upper flow of the respective zone. Please see **Figure 2.23** below for the layout of the Wastewater collection tanks located on the 42nd floor, each wate water zone will have a similar or identical layout.

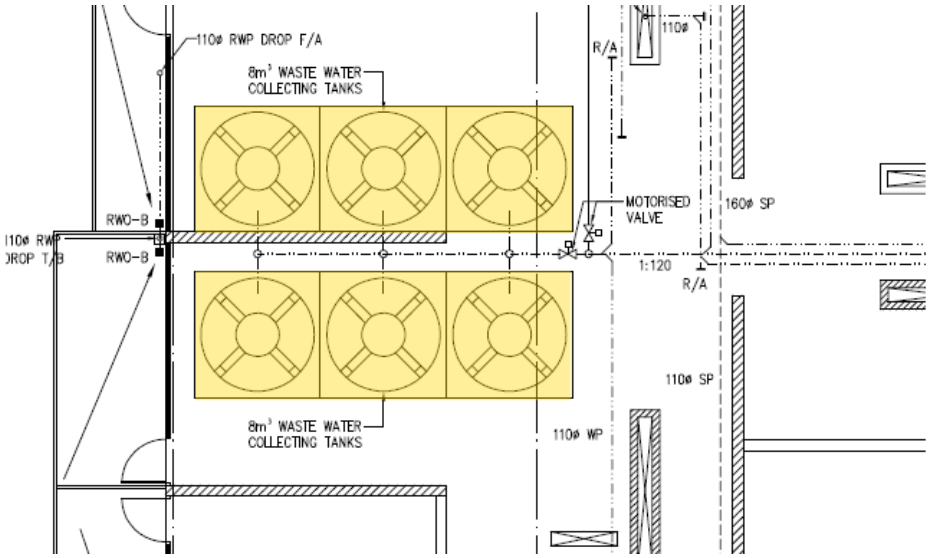

Figure 2.23: Wastewater Collection Tanks on 42nd Floor

Sewerage will be directed to the swerage treatment plant at the basement 3 for treatment before discharge into the Municipal sewerage line. Refer **to Sections 2.3.2.2.** and **2.3.2.3.** for further information.

2.1.3.2 SOLID WASTE

A Solid Waste Management Plan has been prepared by the project proponents which has been submitted to and approved by the solid waste management division of the Colombo Municipal Council. This details the types and quantities of waste expected to be generated as well as the sorting, transportation and storage of said segregated solid waste for removal by the CMC vehicles. Refer to **ANNEX X** for the comprehensive Solid Waste Management Plan. Actions are proposed to take maximum feasible measures to minimize waste generation by introducing the 3R concept; Reduce, Reuse and Recycle. Comprehensive descriptions of the proposed Solid Waste management of the project are given in **Section 2.3.2.3.**

2.1.3.3 AIR EMISSIONS

Air emission from a project of this nature predominantly occurs during the construction phase with the usage of heavy machinery. It is essential to ensure the machinery used shall be maintained in high standards to ensure the least air emissions.

Air emissions during the operations phase are negligible with the identified sources being from the vehicular exhaust from the basement car parking area, exhaust from the backup generators to be used only in the event of power failure and boilers using in the laundry service. Please see **Section 2.3.2.4.** for more information.

2.1.3.4 DISPOSAL AND CONTROL MECHANISM

The solid waste generated during construction shall be sorted out into metal, glass, paper, wood, plastic, and chemicals and stored in demarcated locations close to the main entrance of the site for easy removal.

The separated solid waste stockpiles will be maintained under cover to minimize any potential impacts on surface runoff water and discourage rodent proliferation. The contractor will strictly adhere to the current regulations of CMC pertaining to solid waste management, the collection of solid waste and hand over to the removal trucks according to the set rules.

Solid waste management in terms of collection, sorting, transportation and storage as well as disposal during the operation stage is explained in detail in **Section 2.3.2.3.**

2.1.3.5 SURFACE WATER AND EXISTING DRAINAGE CHANNELS

The only surface water body in the study area is Indian Ocean, located 120m towards western side of the site. There are existing storm water drains bordering the premises along 10th lane connecting toward the main storm water drains along marine drive, as shown in **Figure 2.24.** below.

Figure 2.24: Photograph of Existing Interceptor Manhole on Site

2.1.3.6 ACCESS ROADS

Access to the proposed project location is available from several locations, two entrances from Colombo-Galle Road (A2), which are located on either side of the existing fuel station, as depicted in **Figure 2.25 & 2.26** below.

Figure 2.25: Access Roads from Galle Road

Figure 2.26: Access Road from 10th Lane, off Marine Drive

The other access road provides access to Marine Drive along 10th Lane as shown in **Figure 2.27**. above.

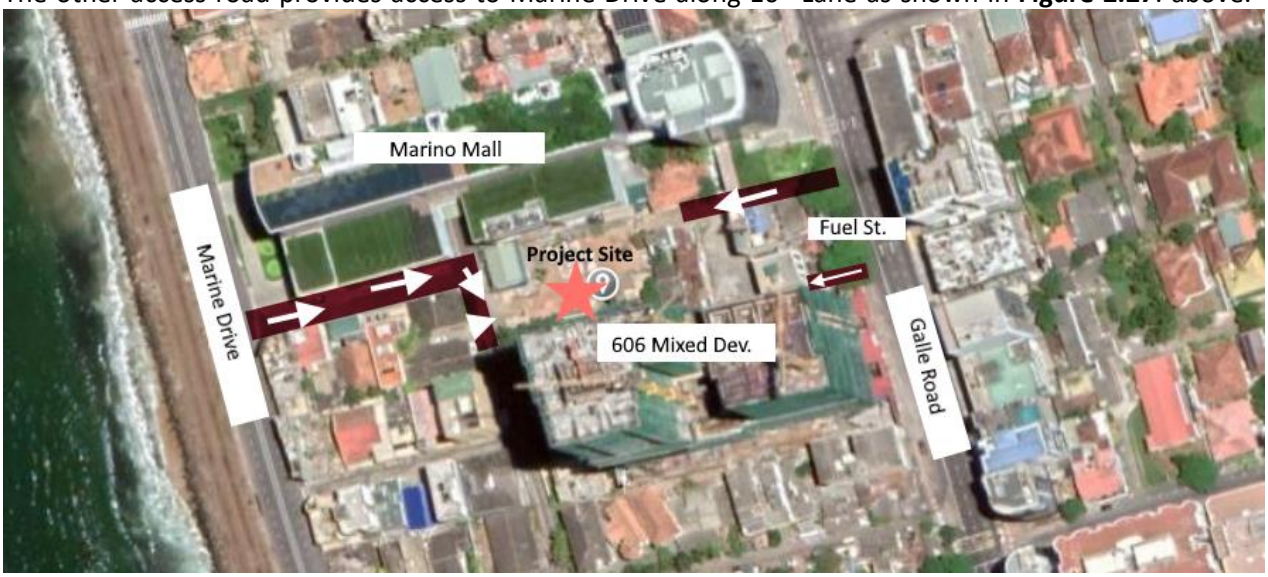

Figure 2.27: Access Roads

The Sothern Railway Line runs close to the project location parallel to Marine Drive along the coastal stretch. Tourists of the proposed hotel complex may use the existing road facilities or Kollupitiya Railway station (Located 600m away, to reach coastal destinations, markets, and other public and private utilities, etc., very easily.

Marino Mall is a perfect one-stop destination for Fashion, Lifestyle, Appliances, and Specialty Stores together with Multi-Cuisine Dining & Entertainments. It strives to offer an international shopping experience for both local and foreign buyers. The potential customers of the new development will be benefited from the shopping, instruments, and other facilities in the mall, including the VR gaming centre, 9D cinema, food emporium, etc.

2.1.4 TIME PERIOD FOR DEVELOPMENT AND CONSTRUCTION

The period for the proposed project from inception is a total of 60 months, from receipt of development permits to completion.

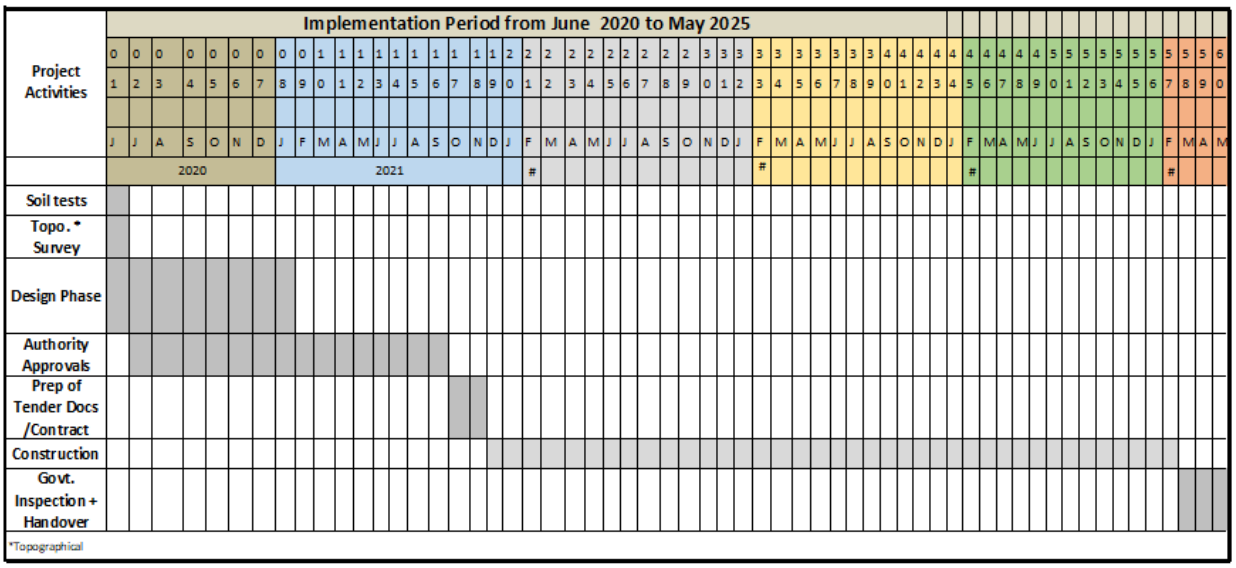

Figure 2.28: Project Timeline

2.1.5 FINANCIAL ALLOCATION AND INVESTMENTS

Please refer to **Section 2.5** for further information.

2.1.6 DETAILS OF ALL RECREATION AND EXPECTED CONSERVATION ACTIVITIES RELATED TO THE PROJECT

2.1.6.1 LAND BASED RECREATIONAL ACTIVITIES

Leisure and recreation activities offered by the proposed hotel development include bars, restaurants, spa, gym, TV rooms and lobby spaces in line with the 4-star nature of the development. The hotel development is situated adjacent to the Marino Mall at which hotel guests can enjoy the many state-of –the-art entertainment options such as a 9D cinema, a video game arcade, kiddies play area as, a food court well as a superlative shopping experience.

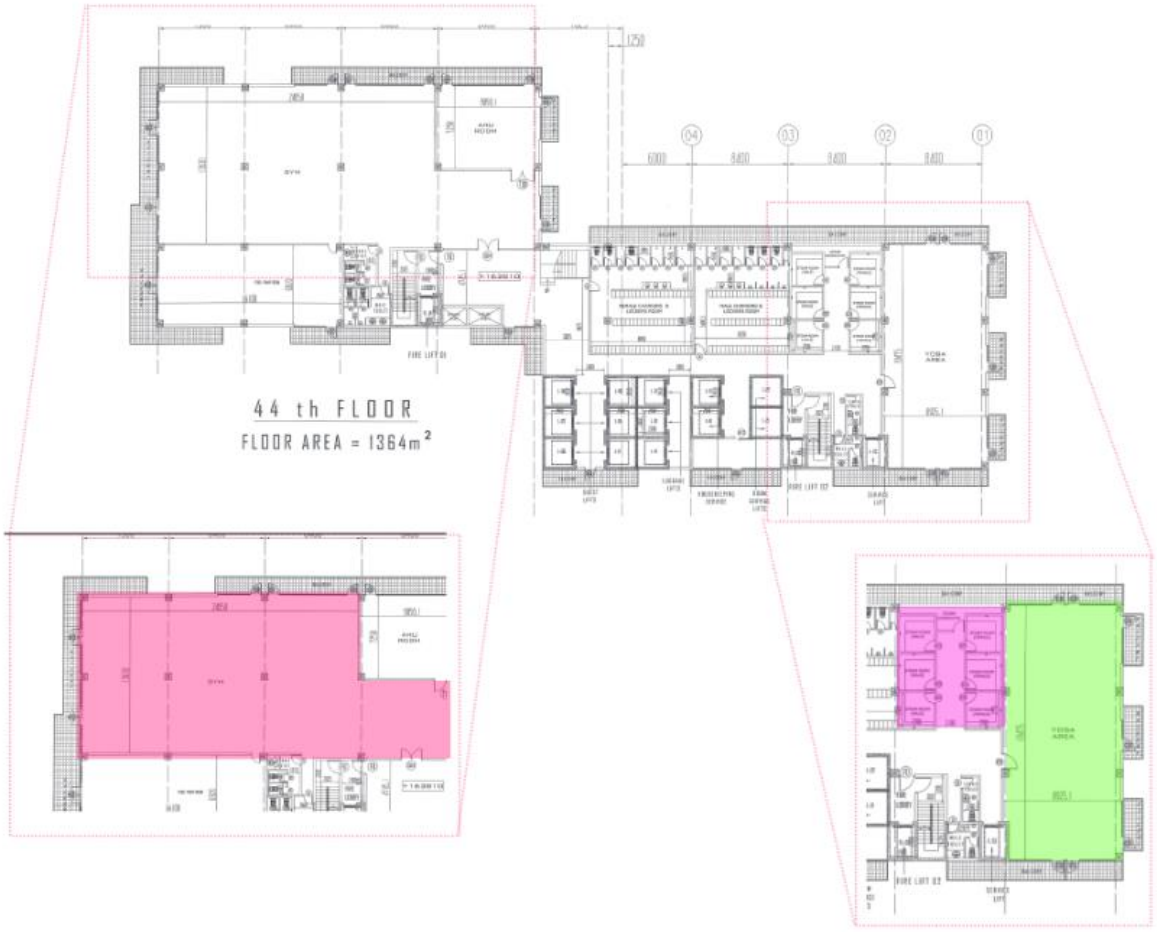

Figure 2.29: 44th Floor's Recreational Zones – Gymnasium and Yoga Area

2.1.6.2 WATER BASED RECREATIONAL ACTIVITIES (IF ANY)

The hotel has a rooftop swimming pool on the 45th Floor for the use of hotel guests. This includes an adults and kids swimming pools respectively, and also has on offer 2 Jacuzzis as well. Being a city hotel, the project proponents have not planned to offer any other water-based recreational activities.

Figure 2.30: Rooftop Water-Based Recreational Activities

2.1.6.3 CONSERVATION ACTIVITIES

This project is composed of many activities related to construction of buildings and other related structures. However, in all of these activities which include i.e., pre-construction, construction and operational, the minimal impacts to the natural environmental setting in the area will be ensured. The site and its surroundings are highly urbanized and the project is to be built on a site which previously housed 3 buildings and a car park and as such as very low natural biodiversity or natural features suitable for conservation. All necessary steps and careful monitoring will be taken to make sure to conserve of the natural environment in the area with due fulfilment of all legal requirements according to the laws of Sri Lanka.

2.1.7 ALL OTHER NATURAL RESOURCES CONSUMPTION

This project involves different activities that may require the consumption of natural resources to varying degrees. In the area, accumulated surface water or water bodies do not exist. The only natural water body is the Indian Ocean, and it will not be directly utilized by the project. Thus, no water resources will be influenced by this project.

In relation to the natural resource consumption, the total water requirements will be fulfilled through re-use of treated waste water, rainwater harvesting and via the 6” connection of the National Water Supply and Drainage Board town water supply.

Excavated soil shall be deposited in a demarcated area and the portion that is unused for landscaping purposes shall be disposed of at a CMC designated land fill by the contractor. If a different grade of soil is deemed necessary for backfill or landscaping purposes, such materials will be procured through certified suppliers.

2.1.8 GREEN BUILDING DESIGN ON NATURAL RESOURCES CONSERVATION AND GREENER PRODUCTION METHODOLOGIES

The project proponent intends to adopt methodologies aimed for green practices through efficient use of raw materials including water and energy, reducing the volume of wastes and improving waste management, adopting a more ecological purchasing policy and improving logistics, improving the quality of internal environment and making the maintenance staff aware of the importance of environmental issues.

The designers have introduced many features to maximize the operational efficiency while minimizing the carbon and water footprints during the operational stage. Those measures will be combination of.

- Opening arranged to receive good daylight to reduce artificial light.
- Arrange balconies to provide shades from sun to ground floor.
- Refuge spaces are on Floors 10, 22A, 33A and 42.
- Use of low flow taps and dual flush toilets to save water.
- Balcony flooring on pedestals to reduce heat transfers at balconies.
- Re-use of treated water for toilet flushing to reduce consumption of water.
- Use of rainwater for gardening to reduce consumption of town water supply.
- Usage of energy efficient light fittings and equipment.

2.1.8.1 GREEN MATERIALS

Building materials typically considered to be 'green' include lumber from forests that have been certified to a third-party forest standard, rapidly renewable plant materials like bamboo and straw, dimension stone, recycled stone, recycled metal, and other products that are non-toxic, reusable, renewable and/or recyclable.

In this construction, priority has given to green materials as much as possible. However, in this type of high-rise construction the use of green material is minimal. In such situations, normal building materials suitable for a high-rise hotel project are used. The following Green Materials will be incorporated into the project by the project proponents.

- Energy efficient light fittings shall be used in all the building areas.
- Solar powered light fittings shall be used in gardening areas.
- Inverter type AC units be provided wherever air conditioning been provided.
- Dull lighting will be provided towards seaside.

2.1.8.2 RAINWATER HARVESTING

Rainwater intercepted on the rooftop of the building will be collected for gardening purposes. Provisions are made for storage of 60 m^3 tank and distribution of same as shown in **Section 2.3.2.1.4**.

2.1.9 NUMBER OF EMPLOYMENT TO BE CREATED

Employees are the most valuable and important resource in the success of any business. The project proponents, and its parent company, Damro Group, currently employs over 12,000 local youth in its operation in Sri Lanka without considering their exposure in the plantation sector.

During the construction phase temporary employments opportunities for supervisory level, skilled and unskilled labour categories will be opened up for nearly 300 personnel. Refer to **Section 2.3.1.10** for more details.

According to the project proposal, with this proposed 652 Roomed City Hotel Complex, the Damro Group expect to provide over 750 direct employments to the locality during operations. It's further expected to provide many indirect employment opportunities connected to the operation of the Hotel. The projects of this nature will also help in developing and upgrading the workforce in the country increasing the competency and expertise of the employees in the industry.

2.1.10 MODE OF TRANSPORT OF GUESTS AND STAFF

2.1.10.1 MODE OF TRANSPORT FOR GUEST

Mostly, Destination Management Centres (DMC) or Travel Agents (TA) are responsible for organizing tourist programs for foreigners, whereby the DMCs or TAs will arrange transport for foreign tourists. Individuals, couples, or groups of tourists who use public or private transport facilities can reach the hotel either along Galle Road or Marine Drive. Furthermore, they also have an opportunity to use locally available transport facilities such as taxies, three-wheelers, motorbikes, and foot cycles to reach the hotel from the said road along with access by road. The guests of the new hotel can use the new highways depending on where they are travelling from as well as utilise the railway system to reach the new hotel, and through these alternatives, they can reduce their travel times. Presently, there are no barriers in terms of the use of any transport modes to reach the proposed hotel destination.

2.1.10.2 MODE OF TRANSPORT FOR STAFF

According to the development plan of the project, there are specific facilities that are included, such as a staff cafeteria & a kitchen on the 3rd floor to facilitate the hotel staff with their food requirements and refreshments, and staff changing rooms, gym on the 4th and 5th floors. Staff will be employed from within the community and city. There will be a security station for 24/7 manned security at the entrance. Therefore, staff members are to use public transport facilities and locally available services such as three-wheelers, or their privately owned motor vehicles and access via the service or main entry.

2.1.11 SAFETY AND DISASTER REDUCTION PLAN

2.1.11.1 SAFETY MEASURES DURING THE CONSTRUCTION PHASE

During the construction phase, appropriate occupational health, safety, and environmental/social safety measures are to be taken according to the standard regulations. To reduce potential risks/ accidents associated with various construction activities, workers are to be made aware and trained on such risks, measures, and responsibilities during daily safety meetings undertaken by the Safety & Environment officer (SEO). First aid facilities and transport facilities for urgent medical attention in an emergency is to be provided at the site. A well-trained SEO will be employed by the contractor as the responsible focal person to implement the Environmental Management and Disaster Management Plans (refer to **Section 6**) during the construction phase.

As per the conditions stipulated by the Civil Aviation Authority, cranes and similar equipment that will project above the building will be painted inconspicuous colour and shall be illuminated with low intensity (Type C) obstacle lights.

Suitable display boards will be placed at appropriate locations. Safety equipment to the workers will be made available. Under the current COVID-19 pandemic situations the government-approved health precautions and safety measures will be followed strictly at the site providing handwashing facilities, masks and sanitisers suitably.

2.1.11.2 SAFETY MEASURES DURING THE OPERATIONAL STAGE

In high-rise buildings, safety becomes a very important factor to be considered. The risks need to be mitigated and proper emergency plans need to be developed to be practised by the operation staff.

It is estimated that up to 2,000 guests (inclusive of hotel and restaurant guests) and 750 staff may occupy the premises. To avoid calamitous events, several measures will be implemented.

The risk of fires is the most important aspect to be cautioned with. The Fire Service Department of Colombo Municipal Council (Refer their letter dated 15th June 2020 of FP/BP/MH/68/20) has given specific instructions over the facilities to be in place in the building complex for them to confirm the availability of their services, as mentioned in ANNEX IV. The architectural and structural features specified in the letter will be accommodated during the planning, design and construction stages. Confirmation against each item by the Architects/ design engineers are given in ANNEX XI.

Necessary hardware facilities will be installed after obtaining specifications from the F&RD of CMC. All the necessary conditions stipulated will be fulfilled to obtain the Certificate of Conformity from this authority.

The complex will be equipped with fire detection and warning systems, as well as firefighting equipment as well as refuge floors for residents to escape to. Those will be installed covering all floors and first-aid facilities will be made available in appropriate locations. Regular safety drills will be performed with all staff members. Emergency exits and meeting points will be identified, and signs will be provided in compliance with relevant standards.

As instructed by Civil Aviation Authority, the following items will be installed and maintain in proper working order to identify the topmost level of the building by the pilots.

- A red colour medium intensity obstacle light with 2000cd and 20-60fpm at the topmost point of the highest structure of the building (eg; water tank, antennas, motor room etc)
- Red colour low intensity fixed obstacle lights with 32cd shall be installed at the topmost four outer edges of the building.

Management will facilitate authorised inspectors of all the organisations by which approval was given to inspect the site and installation at any moment.

The management authority will provide sufficient guidance for using the swimming pools. Lightning arrestors will be installed in the building to protect against direct lightning attacks.

2.1.12 IN CASE OF TSUNAMI, SEA SURGE, FLOODS AND CYCLONE

The proposed project is located 110m away from the sea, at an elevation of approx. 4m above the MSL. The shoreline adjacent to the hotel development is defined by the erosion prevention measures (consisting of a granite boulder embankment), which traverses the length of the dual carriage railway line. There are 5 single and dual floor structures situated between the shoreline and the proposed development alongside 10th Lane. The potential impact of a Tsunami at this location will be determined by its point of origin and magnitude. The 2004 Indian Ocean Tsunami approached the country from the East and only deflection waves generated by the Tsunami impacted southern Colombo with an inundation of approximately 30cm. Should another similar Tsunami originate, no conceivable risks to the structure are envisioned. However, should a Tsunami originate in the Western Indian Ocean, of significant magnitude, the resultant wave may reach up to 10+m in height and thus pose a significant risk to all coastal structures.

The project proponents have incorporated Tsunami impact mitigation measures into the design of the structure through globally accepted practices. These include reinforcement of the superstructure at the ground to 3rd floors, establishing low resistance walls at these floors (which are designed to give way to water pressure and thus create channels for the force of the Tsunami to be transmitted through the building rather than be absorbed by it). Storm surges generated by inclement weather and cyclones are of significantly less force than Tsunami's and thus no structural impacts are anticipated from them.

The Colombo 03 area has a stormwater management system that has been successful in preventing any occurrences of significant flooding in the vicinity of the project site for the past few decades. The gradient of the project site declines towards the sea by approximately 1.5m. The proximity of the seashore and the stormwater management system makes the likelihood of flooding very low.

Further, the potential impacts of gale-force winds and potential minor earth tremors on the topmost floor structure have been considered in the design of the building.

It can be safely assumed that there will be a sufficient lead-time for evacuation, in the case of cyclones and tsunamis with tested advance-warning systems by the Disaster Management Centre and the Dept. of

Meteorology. Such warning systems generally exceed more than 90 minutes. In the event of such a warning, residents and the staff are to be evacuated to pre-identified safe locations. For these disasters, the precautions are given in **Section 6**, under Disaster Management Plan.

A Rapid Response Team (RRT) will be constituted and trained to handle crises and detailed evacuation plans will be developed within the Disaster Management Plan (DMP) to handle emergencies during fire, cyclones and tsunami. Evacuation paths and assembly points outside and in the refuge floors will be indicated and instructions will be provided to guests and staff on the evacuation procedures. Detailed Disaster Preparedness and Response Plans will be developed by the project based upon the recommendations of the Disaster Management Plan and the project management should implement the required measures in the event of any disaster situation.

2.2 JUSTIFICATION OF THE PROJECT

Sri Lanka is ranked as one of the best travel destinations in Asia as well as in the world. Apart from diverse cultural & historical values and natural resources, travel products have also vastly evolved in the country. New developments are in progress in current and planned infrastructure, which is expected to open up new activities and destinations throughout the country. Therefore, a wide array of new hotels will be required to accommodate the potential increase in visitors expected to the island.

With the restoration of peace in the country in 2009, the tourism of the country emerged in a rapid space. The quantum of tourists visiting Sri Lanka has increased substantially in past years. Tourist arrivals to Sri Lanka during the year 2019 amounted to 1.9 million and 2.3 million arrivals recorded in 2018. The country received several international endorsements for the year 2019, highlighting its potentials in the tourism industry. Sri Lanka's tourism sector performed extremely well after the end of the war which lasted for 30 years. **Section 2.2.2** below refers to statistics on how the tourism arrivals and figures were consecutively improving up until 2019. Experts in the country are optimistic that once the world overcomes the COVID-19 pandemic and the global tourism industry returns to normal, that the demand for travel in Sri Lanka will return and thrive once more. Based on the natural resources, cultural values and capabilities, Sri Lanka has a great potentiality in the tourism industry to achieve its economic objectives and growth.

This project would have a positive contribution to the country's economy using foreign exchange earnings, in particular, amounted to more than US$ 20 Mn per annum to the country. Further, other correlated businesses such as travelling and transport, fashions, entertainments and also hotel suppliers will have added benefits from this new development. The project proponents expect to provide over 750 direct employment opportunities to the locality as per their Project Proposal (ANNEX VII) along with many indirect employment opportunities connected to the operation of the Hotel, thus helping in developing and upgrading the workforce in the country increasing their competency and expertise in the hospitality industry.

The project proponents and their parent company (Damro) are in the process of implementing its marketing and promotional activities in India for Marino Beach Hotel - Colombo, to channel Indian business and leisure travellers. The campaign has been highly successful and the hotel is performing well with average occupancy in between 80% to 90% in the existing property (which is located adjacent to the

project site). Based on this data, the project proponents are optimistic that there would be a significant improvement in Indian visitors since they could reach the Hotel within few hours and enjoy the stay with luxury and comfort at a competitive rate while satisfying their entertainment, business or other requirements. Furthermore, the project proponents are highly focused on the standard of our guest services and customer satisfaction. Loyalty programs, special promotions will also be implemented in collaboration with group related companies and business partners including financial institutions. Accordingly, the project proponents expect to increase the number of repeat guests and channel new reservations in future perspectives.

The management envisages that the expected level of occupancy would be maintained as highest as considering the actuals of Marino Beach Hotel which is tremendous in achieving over 80% during more than one year in its operation. Together with massive marketing and promotional campaign to be undertaken especially in India, it's expected to enjoy steady demand from foreign business and leisure travellers.

Given the growth in visitor arrivals up until 2019 when the Easter Bombings and the COVID-19 pandemic hampered growth, the government target of achieving 10 billion U.S. dollar income per year from the tourism sector by 2025 was achievable due to the expected projections. The government believes that if the adequate infrastructure is also developed at the same time in the form of suitable hotel rooms to accommodate the increased number of visitors that this target is achievable. The government hopes to develop Arugambay, Hambantota, Alpitiya, Dedduwa, Galle, Panama and Negombo areas and intend to support the construction of large-scale private sector-led recreational and hotel projects. The reason for the project is that the business and MICE (Meetings, Incentives, Conferences and Exhibitions) trade is being identified as a lucrative business segment within the leisure sector, one that has shown steady growth over the past few years. Currently, Colombo CBD is only equipped with just over 3,000 registered hotel rooms which are mostly catered to the high-end clientele.

In addition, most of the new ventures into hotel projects, mixed development projects and luxury apartment projects are focused on the high-end niche. Hence, strong demand has cropped up for more affordable accommodation within the Colombo CBD.

2.2.1 SOCIAL AND ECONOMIC STATUS OF COMMUNITY PRIOR TO PROJECT

The following shows some selected socio-economic characteristics and their behaviour in the vicinity of the proposed project area.

2.2.1.1 POPULATION BY AGE GROUPS

The age distribution data of the population in the GND give an idea about the population categories such as minors, labour force, and elders, as shown below in **Table 2.4**.

Table 2-4: Population by Age Groups, Source-Socio-economic Profile, Bambalapitiya GND, Year 2019

Age Group	Population	%
Below 19 years	1,820	23
20-60 years	4,712	59

Over 61 years	1,433	18
Total	7,965	100

As per **Table 2.4**, the 20 -60 age group represents the dominant labour force of the population at 59%. The child population represents 23% of the population. The elderly population is around 18% in the Bambalapitiya GND. These details indicate that the proposed project has the opportunity to find employees from the area itself.

2.2.1.2 LEVEL OF EDUCATION OF THE POPULATION

The level of education is one of the basic social parameters in recognizing the overall social status of the people living in the area. **Table 2.5** below factors the level of education of all the people in the study area.

Table 2-5: Level of education of the population, Source-Socio-economic Profile, Bambalapitiya GND, year 2019

Educational level	**Population**	**%**
Primary	1,027	13
Secondary	2,198	28
G.C.E.(O/L)	2.120	27
G.C.E.(A/L)	1,641	21
Degree and above	853	10
No schooling	126	01
Total	7,965	100

According to the above details, except for 1% of the population, all others are educated. The literacy level of the study area is very high.

2.2.1.3 PRINCIPAL METHOD OF SOLID WASTE DISPOSAL

According to the Colombo Municipality Council (CMC) records, about 97% of housing units utilise services provided by the local authority towards the disposal of their garbage. Only 3% of housing units that are living in the slums/shanties are not using proper methods to dispose of their garbage.

Table 2-6: Principal Method Of Solid Waste Disposal, Source- Records of Colombo Municipality Council, year 2019

Method Of Waste Disposal	**Number Of HH**	**%**
Collected By Local Authority	1411	97
Burn /Composting By Occupants	04	0
Dispose By Occupants In To Water Bodies, Forest Or Open Air	48	03
Total	1457	100

2.2.1.4 HOUSEHOLDS BY PRINCIPAL TYPE OF COOKING FUEL

Accordingly, a great majority of households (HH) utilise gas a cooking fuel and also a considerable percentage utilise kerosene oil as an energy source for cooking.

Table 2-7: Households by principal type of cooking fuel, Source-Socio-economic Profile, Bambalapitya GND, year 2019

Type Of Cooking Fuel	Number Of HHH	%
Firewood	14	01
Kerosene	211	15
Gas	1194	82
Electricity	38	02
Total	1457	100

2.2.1.5 PRINCIPAL TYPE OF LIGHTING

The following table shows the type of energy being used for electricity/light sources for houses and compounds in the study area. A great majority of dwellers use electricity for lighting for domestic uses.

Table 2-8: Principal type of lighting, Source-Socio-economic Profile, Bambalapitya GND, year 2019

Type Of Lighting	**Number Of HHH**	**%**
Electricity	1442	99
Other	15	01
Total	1457	100

2.2.1.6 PRINCIPAL SOURCE OF DRINKING WATER

Piped water supply is provided by the National Water Supply and Drainage Board is available in the area. However, some dwellers still utilise bowser-based supply and bottled water for domestic purposes. Nevertheless, the project activities will not disturb the existing domestic water consumption pattern of the area. Further, the proposed project is able to connect to the pipe water supply system during the construction as well as during the operation stage. The following table shows the type of drinking water supply a facility using for domestic purposes in the study area.

Table 2-9: Principal source of drinking water, Source: Source-Socio-economic Profile, Bambalapitiya, GND, year 2019

Type Of Water Supply	**Number Of HHH**	**%**
Tap Within House Unit	1102	76
Tap Outside To House Unit	223	15
Bottle Water	117	08
Bowser And Other	15	01
Total	1457	100

2.2.1.7 HOUSING UNITS BY TYPES

According to the following table, a large majority of houses are permanent houses and only 3% of houses are semi-permanent types. No temporary types of houses are located in the study area.

Table 2-10: Housing units by types, Source-Socio-economic Profile, Bambalapitiya GND, year 2019

Type of houses	Number of houses	%
Permanent	1414	97

Semi permanents	43	03
Temporary	-	-
Total	1457	100

2.2.1.8 HOUSEHOLDS BY TENURE

The following table shows the types of ownership of the houses in the study area.

Table 2-11: Households by tenure, Source-Socio-economic Profile, Bambalapitiya, GND, year 2019

Type of tenure	**Number of HHH**	**%**
Owned	1005	69
Rent /lease	379	26
Rent free occupied	58	04
Encroached and other	15	01
Total	1457	100

Accordingly, a great majority of the dwellers (69%) reside in their own houses. The next major category of dwellers lives in rented or leased houses. Meanwhile, few dwellers are still living in unauthorized settlements.

2.2.1.9 TYPE OF TOILETS

According to the available records, the greater majority of households have satisfactory sanitary latrines in the study area. The following table shows the type of latrines available in the study area.

Table 2-12: Type of Toilets, Source-Socio-economic Profile, Bambalapitiya, GND, year 2019

Type of toilet	Number of HHH	%
Water seal and connected to the piped sewer system	932	64
Water seal and connected to the septic tanks	510	35
Pour flush toilets and direct pit latrines	15	01
Total	1457	100

A great majority of the households are connected to the piped sewerage system which is maintained by the Colombo Municipal Council. The proposed hotel complex also has an opportunity to connect with this existing piped sewerage system. However, no one uses the proposed project area for sanitation purposes. Therefore, no negative impacts can be expected on existing sanitation in the area by the proposed project.

2.2.2 IMPACTS OF TOURISTS ARRIVALS

As per **Section 2.2** and according to the master plan to increase tourism in the country, the Government of Sri Lanka had planned to increase room capacities in star grade hotels by 5,000 by the end of the year 2020. With the end of the civil war in 2009, the influx of foreign tourists to the country had been increasing rapidly.

Despite the Easter Bombings, Sri Lanka is claimed to be one of the most peaceful and stable countries in the South Asian region and the most attractive tourist destination in the world at present. With this background, according to the country's Tourism Development Master Plan, the government has given many incentives to investors to improve capacities and business ventures for tourist hotels and related infrastructure in the country.

However, in this backdrop, the government has given the priority to improve the infrastructure facilities in the tourist field with special emphasis on foreigners. The following table shows the achievements of the country's development by increasing avenues for foreign tourists during the period of the year 2010 to 2016.

Table 2-13:Some indicators related to increase of foreign

Category	2010	2011	2012	2013	2014	2015	2016
Arrivals	575.000	700.000	910.000	1.183.000	1.537/900	1.999.270	2.500.000
Direct and indirect employments	115.000	140.000	182.000	236.600		399.854	500.000
Average duration (Nights)	8.9	8.6	8.3	8.0	7.7	7.4	7.0
Rooms capacity	14.932	15.000	21.960	28.920	35.880	42.840	48.236
Foreign Ex earning (USD Mn)	506.1	600.0	980.0	1360,.0	1740.0	2120.0	2500.0
Average spending per tourist per day(USD)	90.0	97.1	103.9	110,7	117.5	124.3	130.0

Source – Annual Publication of Ministry of Tourism 2017

The above table highlighted an increase in foreign tourists to the country during the period of the year 2010 to 2016. The following **Table 2.14** shows the trends in tourist arrivals from 2017-2019 showing a drop attributed to the Easter Bombings that occurred in April 2019.

Table 2-14: Tourist Arrivals Statistics 2017-2019

Item	2017	2018	2019
Tourist Arrivals (No)	2,116,407	2,333,796	1,913,702
Pleasure	1,744,149	1,907,060	1,592,212
Business	70,683	92,134	70,068
Others	301,575	334,602	251,422
Tourist Guest Night ('000)	23,068	25,205	19,902
Room Occupancy Rate (%)	73.27	72.77	57.09*
Gross Tourist Receipts (Rs.Mn)	598,356	712,027	646,362*
Tourism Revenue (USD Mn)*	3,924.9	4,380.6	3,606.9
Total Employment (No.)	359,215	388,487	398,865*
Direct Employment	156,369	169,003	173,592*
Estimated Indirect Employment	202,846	219,484	225,273*

*Provisional Source: SLTDA (2021)

With the improvement of infrastructures facilities such as new expressways, sea air taxi facilities, and development of the road networks, the average duration of stay by foreigners has gradually increased.

These details show the government's expectations and interventions to improve tourism in the country with the fulfilment of immediate development goals. Moreover, in the country's master plan for the development of tourism, it has been identified four zones to develop as tourist attraction areas. Those areas are listed below.

1. North -eastern coast
2. North- western coast
3. East coast
4. South-east coast

The current government also has given priority to the development of tourism in the country as one of the main sources of income to earn foreign exchange. Therefore, this new hotel project definitely will positively impact achieving the government's tourist development targets. With the Easter Bombings in 2019 and the impacts of COVID-19 in 2020, many hotels also promoted heavily to locals offering great offers and discounts to promote holidays and maintaining the local economy. The Government of Sri Lanka has plans to reinitiate tourism under strict COVID-19 guidelines and with the hope that it will improve the economic situations in tourist-centric cities.

2.3 DETAILS OF CONSTRUCTION AND OPERATIONAL ACTIVITIES

2.3.1 DETAILS OF CONSTRUCTION ACTIVITIES

Construction works will be executed by a reputed construction company which the project proponents are in the process of selecting, while the architects and engineers prepared plans and detailed drawings will supervise and monitor the construction works to ensure the contractor adheres to the specifications.

2.3.1.1 SITE PREPARATION ACTIVITIES

Site preparation activities comprise of demolition of an existing building (which has already been carried out as per the **ANNEX XIII** which includes the Method Statement and Shoring Earthworks Support document) and excavation for basement area and installation of shoring mechanisms.

Extra care needs to be taken to prevent damages to any underground installations such as water supply lines, sewage lines or other public infrastructure.

The geotechnical soil investigation report (**ANNEX VIII**) shows top layer consists of 0.4-0.9 m thick building debris. The extent of this debris layer must be assessed and suitable machinery to be used to remove the same.

Erection of watcher huts, temporary accommodation for workers, cabins for a site office building, sanitation facilities (mobile toilets), and stores too will be attended by the contractor to suit the construction activities.

2.3.1.1.1 Method of Cutting, Filling, Pilling, Levelling and Grading, Filling Activities & Materials Used

According to the contour map (**Section 2.1.2.3**), nearly 16,350m^3 of soil in the basement will be excavated (with total soil excavations volume approximating at 16,350 m^3, and topsoil volume is 5450 m^3). Suitable soil thus removed will be reused for landscaping where necessary and the balance will be moved from the site with the support of an Earth Removal contractor.

2.3.1.1.2 Excavation Activities

The ground slopes from Galle Road towards the 10th lane leading off from Marine Drive and the level difference of the ground is about 4.6m elevation. The average depth of excavation for the basement be around 13m with identified sections reaching a depth up to 14.5m. The total estimated excavation quantity is 16,350m^3.

The structural engineer has prepared a methodology statement (**ANNEX XIII)** for shoring and dewatering during the excavation for the basement. Accordingly, earth retaining structure around the building to a depth of 10.1m has been identified. A 600mm thick Diaphragm wall system was introduced as the permanent shoring system to eliminate any water seepage during the construction phase too.

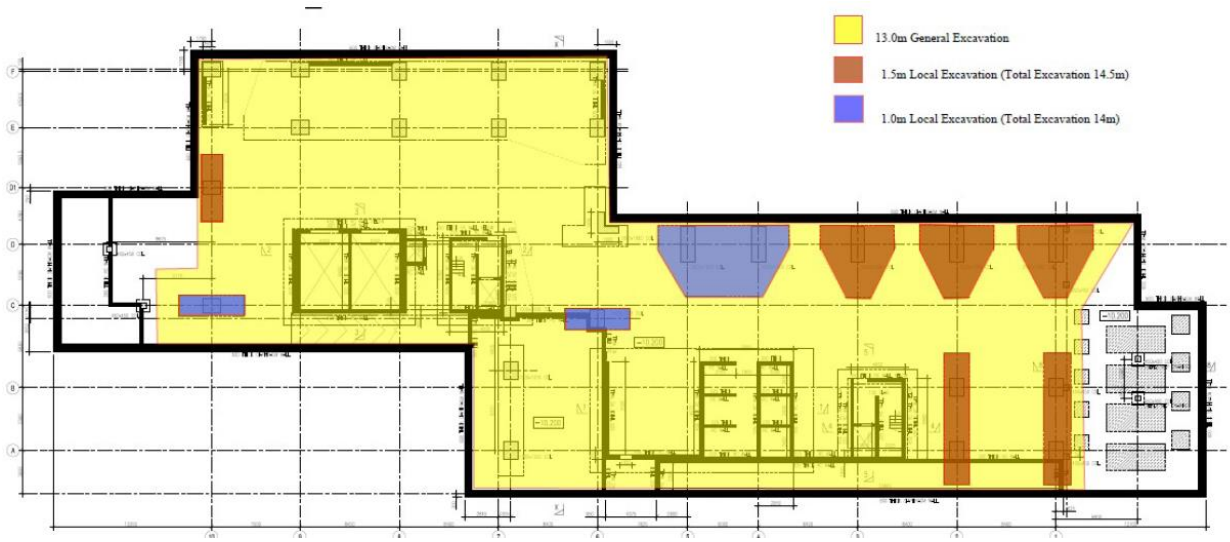

Figure 2.31:Project Excavation Depths, Source: Method Statement for Shoring & Dewatering

Four levels of temporary support system will be used for excavation as described in the above report. The excavation sequence has also been explained in the report with the use of internal props at intervals of 4m.

Further, the structural engineer suggests studying the alternative proposals submitted by the contractor for shoring and excavation to select the best suitable method, before the commencement of excavation work. The proposed Method Statements for the Excavation, Dewatering and Shoring Earthworks Method Statements have been submitted to and approved by the NBRO, for which conditional approval has been provided and necessary amendments have been made to the existing plans (Refer to **ANNEX V**).

2.3.1.1.3 Demolition of Existing Buildings

Demolition and removal of debris of 3 existing buildings and structures as per **ANNEX XIII** had been already done through an experienced contractor at the time of undertaking the EIA.

2.3.1.1.4 Residue Disposal

All the excavated materials and debris have been removed from the site by using covered trucks and disposed of at an approved location by the CMC. Services of a third-party contractor for the removal of the earth also will be obtained during the construction phase.

2.3.1.2 Report on Pre-Crack Survey Study

A pre-crack survey has been conducted in August 2020 by Orcus Solutions (Pvt) Ltd, a consulting company for the client, and it is presented in **ANNEX XII**. The report recorded the existing condition of 08 adjoining buildings, including infrastructures before the commencement of excavation, piling, construction, renovation work. It will be easy to verify if structural damage occurred during the construction of the adjoining property or was already pre-existing. The report strongly recommends conducting a post-construction survey to identify the impacts of construction.

2.3.1.3 Demolition Plan of Existing Building

Three buildings (5-storied, 4-storied and 2-storied) at the premises were demolished before the engagement of the EIA perpetrators. **Figure 2.32** below demarcates three buildings that were demolished by a reputed service provider and the debris disposed of with the consultation of CMC. The reusable materials, equipment and fittings were removed carefully before demolition, which was taken over by a sales centre of second-hand building material.

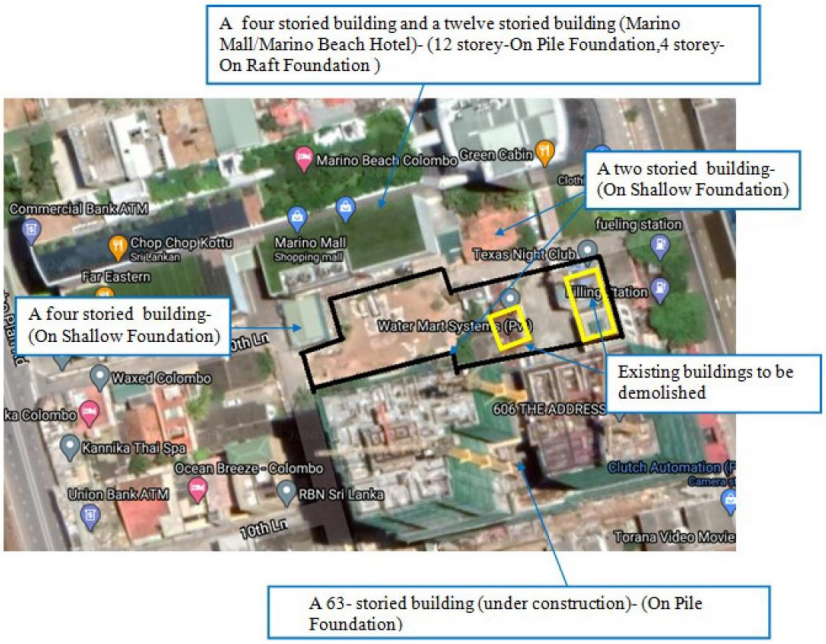

Figure 2.32: Demolishing of pre-existing buildings (Yellow)

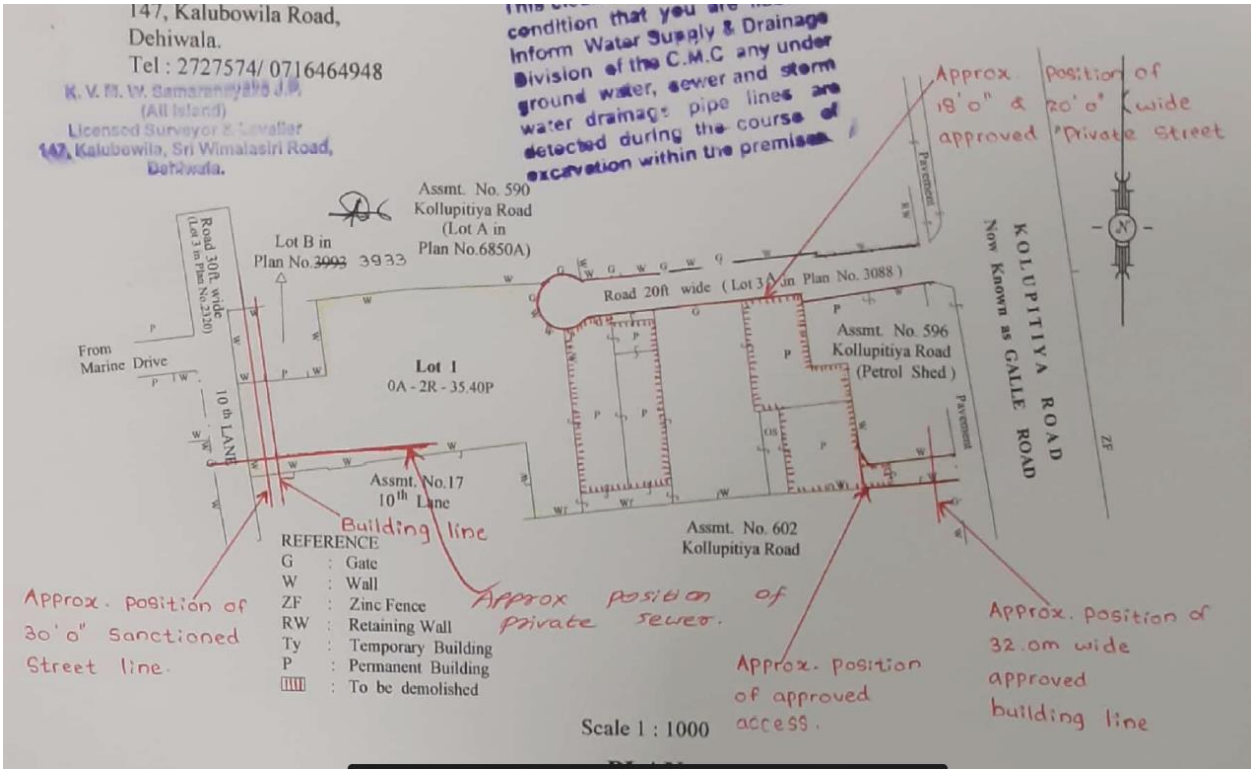

Figure 2.33: Pre-existing buildings which were demolished

2.3.1.4 METHOD OF CONSTRUCTIONS

2.3.1.4.1 DETAIL REPORT ON PILLING PROCESS, DEWATERING SYSTEM

It is recommended in the geotechnical report that a full-scale pile load test be carried out to verify the geotechnical design parameters to be adopted in the rock mass of pile design. Reputed contractors' service will be obtained for piling the foundation.

Due to heavy loads associated with 50 floors, the bored and cast-in-situ Reinforced Concrete Piles will be installed as the foundation and will be socketed into the bedrock layer. At the initiation of the project, few test piles have been performed as recommended in the geotechnical report to ensure the safety and reliability of the foundation.

Dewatering would be required for the basement construction and the groundwater level within the cut will be lowered to the bottom of the excavation (-11m) until the basement work is completed. It is proposed to achieve this with proper shoring and controlled dewatering measures as described in the respective method statements (Please refer to **ANNEX XIII**).

2.3.1.4.2 CONSTRUCTION MATERIALS REQUIREMENT, TRANSPORTATION

Selection of the best suitable materials will be done once the detailed drawings are finalized. The quantity of material will be estimated at that stage. However, considering constructions of similar developments following material requirements can be identified:

Cement, sand, aggregates, rubble, bricks/cement blocks, steel, imported timber, aluminium, glass, formwork materials, PVC pipes, steel pipes, tiles, aluminium items, bathroom fittings, electrical fittings, paints etc. As the site is located within the Colombo city limits transportation will be directly from the hardware depots to the sites with the use of full-bodied or covered trucks.

2.3.1.4.3 IF ANY FILLING MATERIALS TO BE USED – SOURCES AND AMOUNTS

As per the present excavation and compaction requirements and the available soil types on site, as indicated by the geotechnical soil investigation, no external filling materials are deemed to be necessary for the construction of the project.

2.3.1.4.4 TYPE OF MACHINERY TO BE USED DURING CONSTRUCTION

The proposed project is considered a heavy construction site, many varieties of machinery such as pile-driving machines, earthmoving equipment, construction vehicles, material handling equipment and construction equipment need to be used from the inception. Dozers, excavators, pile driving machines, cranes, trucks, tamping machines, hoists, forklifts, concrete mixers, electric drills, carpentry tools and spraying & plastering guns, vibrators and different types of masonry tools will be used at different stages.

2.3.1.5 PROPOSED LANDSCAPING PLAN

There will be minimal landscaping within the ground floor of the project, with decorative floral placements in the entrance driveway and only on the rooftop, whereby a 1,000mm thick layer of lightweight soil fill will be used for landscaping on the rooftop. The project proponents have planned to only introduce decorative native plants and trees that will be planted on the rooftop as depicted below in **Figure 2.34** and the main entrance of the building complex.

Figure 2.34: Rooftop Landscaping

2.3.1.6 DRAINAGE NETWORK/PLAN

Natural stormwater accumulation will be channeled to the two stormwater drains which run parallel to the Northern and Southern boundaries of the site. These covered RCC drains will discharge rainwater into the municipal stormwater drainage system. **Figure 2.35** below for details for connection points to the public drains, refer to **ANNEX XI**.

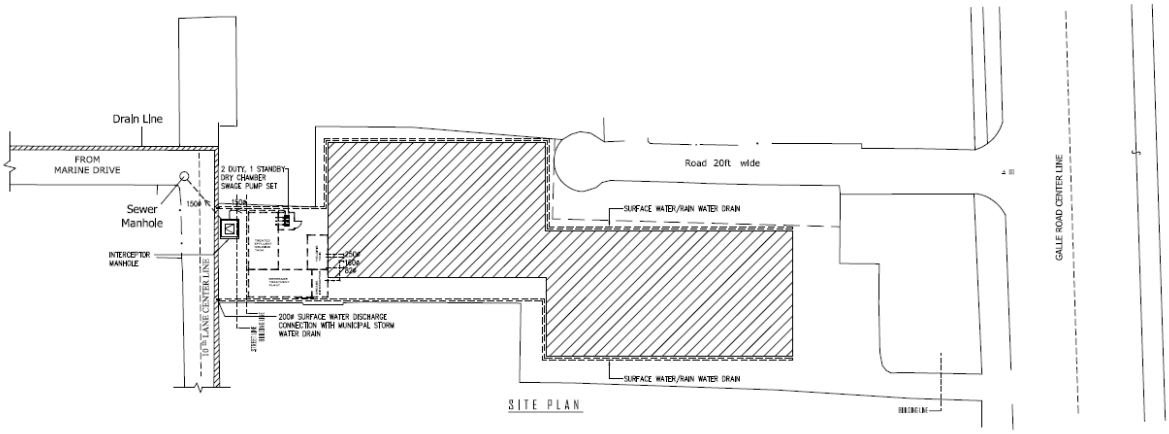

Figure 2.35: Storm Water Drainage Plan

2.3.1.7 CONSTRUCTION OF PERMANENT AND TEMPORARY STRUCTURES

The permanent structure to be constructed is the 50 storied main building to be used as a hotel, which is shown in the site plan. During the construction period, temporary cabins will be erected for office, staff rest, residential facilities for labourers, baths, and toilets for construction staff. These temporary buildings will be removed once construction is over.

2.3.1.8 OCCUPATIONAL HEALTH AND SAFETY

The client will ensure that the ISO 14001 standard of safety measurements are practised during the construction period. During construction, occupational health and safety will be looked after by the Safety & Environment Officer (SEO) who is employed by the contractor. This officer is assigned to make all the arrangements to take preventive and mitigation action against any hazards and direct the working force for health care when necessary. The contact details of the closest private and government medical centres and hospitals will be made available on the display. Emergency first aid facilities will be available at the site while transport facilities are also available.

Every effort is made through briefings and safety signs hung throughout the construction site to minimize accidents and injuries. Some of the measures to be employed are:

- The safety officer will be having all the emergency telephone numbers of ambulance services, hospitals, fire brigade etc.
- Standard safety signs will be displayed in appropriate locations
- Staff safety standards will be maintained.
- Regular safety meetings and checks will be carried out
- Protective wear to be worn in site the project site

Health and Immunity Enhancement Guidelines for COVID-19 & Dengue published by Construction Industry Development Authority (edited version August 2020) on Occupational safety measures shall be followed.

During the operation phase, fire safety signs and clear instructions to the visitors will be displayed. Instructions for swimming pool usage will be displayed. Safety guards will be employed to look after these visitors against water hazards.

The client will make suitable arrangements to adhere to the guidelines issued by Fire Department for safety against fire. It is expected that Tsunami warnings issued by Disaster Management Centre will be conveyed to the occupants with sufficient advance time.

During the operation stage, the investor provides emergency health support through their management office.

2.3.1.9 WASTE TREATMENT SITES

Solid Waste treatment will not be done at the site as it is within CMC limits.

The solid waste generated during construction shall be sorted out into Metal, Glass, Paper & Wood, Plastic, and chemicals and stored at the rear border of the site close to the entrance. The contractor will follow the current regulation of CMC in the collection of solid waste and hand it over to the removal trucks according to the set rules, during construction.

Wastewater generated during the construction period from the temporary kitchen (if any) and in the washrooms and toilets will be directed to the temporary septic tanks that will be constructed close to the office and labour huts.

For the treatment of wastewater and sewerage during the operation stage, suitable plants will be installed. Details are given in **Sections 2.3.2.1.** and **2.3.2.2.** for Solid Waste and wastewater management plans respectively.

2.3.1.10 DETAILS OF LABOUR REQUIREMENT DURING CONSTRUCTION

The workforce requirement during the construction phase varies with the ongoing activities, techniques adopted, activity schedule, total duration allocated etc. During the construction phase, human resources will be obtained from the contractor and there will be about 300 workforces for the entire construction period. Some of the staff members are permanent employees of the contractor, while the majority of the workforce are on a contract or casual basis.

Table 2-15: Construction Stage Expected Staff/Labour Requirement

Position	Status	Required No
Consultants	Visiting	6
Project Manager	Visiting	1
Project Engineer	Full Time	1
Site Managers	Full Time	1
Site Engineers	Full Time	3
Technical Officers	Full Time	8
Site Supervisors	Full Time	10
Skilled Labour	Full Time	100
Ordinary Labour	Full Time	150
Security Officers	Full Time	2
Drivers	Full Time	5
Storekeepers	Full Time	2
Caretaker/watcher	Full Time	4
Contractors	Visiting	10
Total per day (Average)		**300**

2.3.2 DETAILS OF CONSTRUCTION AND OPERATIONAL ACTIVITIES

2.3.2.1 WATER (WATER REQUIREMENTS/WATER SUPPLY SYSTEM, RAINWATER HARVESTING [IF ANY])

2.3.2.1.1 AMOUNT OF WATER REQUIRED

During Construction Phase

Water requirement during construction includes the water demand of the workers and water for construction activities. The water requirement for construction activities varies depending on the stage of construction.

Potable water requirements of the staff and labour force will be obtained from the existing water connection of the National Water Supply & Drainage Board. Daily water requirements during the construction phase will be as follows.

Table 2-16: Estimated Daily Water Requirement during Construction Phase

Item	Demand
No of workers/staff	300 persons
Daily water consumption per worker	100 litres
Total Daily water demand for workers (Max.)	30 m^3
Maximum water requirement for construction activities	60 m^3
Total water demand during construction	90 m^3

Hence maximum water requirement for construction activities (at peak period) is about 90,000 litres/day.

During Operation Phase

Table 2-17: Estimated Daily Water Requirement during Operation Phase

Area	Water requirement (m^3/Day)
For guests (1300 of residents @240 l/d/head)	**312**
Staff residential) 350 nos @200 l/d/head)	70
Staff (non residential) 350 @100 l/d/head	35
Restaurants (600 guests), Common areas including kitchen	100
Daily water demand for car parks (no washing)	2
Daily water demand for swimming pool	8
Daily water demand for gym and changing room	20
Estimated **total** water requirement	547

NWS&DB (**ANNEX IV**) has informed that it is mandatory to construct a ground storage facility having a minimum of 2435 m^3 which is accommodated in the architectural drawings (as seen in **Figure 2.36** highlighted in blue) on the Basement 2 Level).

2.3.2.1.2 Surface Water And Ground Water Extraction

No surface of groundwater will be used during the construction and operation phases.

2.3.2.1.3 Pipe Born Water Supply

The source of water during the operation stage is expected from NWSDB. According to the communique received from NWS&DB (approval letter in **ANNEX IV**), full water requirement during the operational stage is expected to be supplied through a 6" connection once the improvements to water supply projects are completed by end of 2022.

2.3.2.1.4 Rainwater Harvesting System

Rainwater will be harvested and stored in a 60m^3 capacity tank as given in **Figure 2.36** and will be stored in the storage tanks and this will be used for gardening at Basements Level 2 and the 42nd Floors.

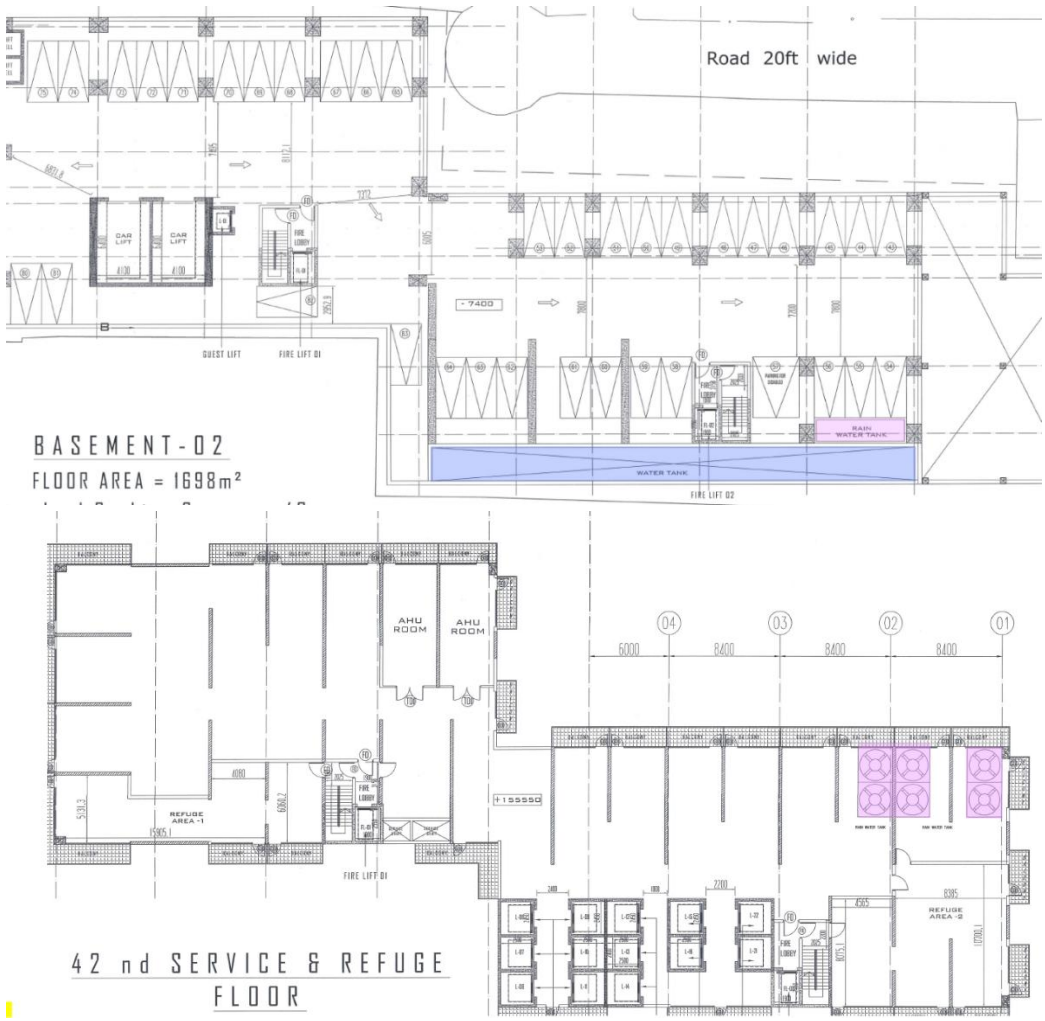

Figure 2.36: Rainwater Harvesting Tank Locations (in Purple), Ground Water Tank (in Blue)

2.3.2.2 WASTE WATER

2.3.2.2.1 QUANTITY & QUALITY OF WASTE WATER TO BE GENERATED

Construction Stage

Construction workers will have access to temporary mobile chemical toilets provided at the site which will accommodate the black water generated during this period.

Around 30m^3/ day of wastewater (Grey Water) is anticipated from washing and canteen areas, which will be directed to temporary soakage pits on site.

Operational Stage

During the operation stage, wastewater collection and treatment is partitioned into **5 zones**, each consolidating the wastewater generated within approximately 8-9 floors of the structure. Each of these 5 zones has a dedicated wastewater treatment facility which will process 3 separate waste water streams.

1. Discharge from bathing, sink and kitchen will constitute the First Wastewater Stream (**TP1**)
2. Black water from toilet flushing will constitute the Second Wastewater Stream (**TP2**)
3. Discharge from the Laundry service is cwonsidered the Third Wastewater Stream (**TP3**)

Quantity of Wastewater Generation

The anticipated waste water generation of each of these streams are quantified below and will undergo different degrees of treatment in order to conform to the required CEA standards.

Table 2-18 Quantity of treated water anticipated

No	Area	Population	Population factor	Per capita liter/ d. Person Black	Per capita liter/ d. Person Grey	Black water m^3/ day	Grey water biological m^3/day	Grey water chemical m^3/day	All waste Total m^3/day
A.	**Guest Bed room**								
A1	ZONE 05 (42-45)	0	**n/a**	**n/a**	**n/a**	**- n/ a**	**n/a**	**n/a**	**n/ a**
A2	ZONE 4 (33A-41)	168 x 2 = 336	0.85	60l/ d	180l/ d	17.2	51.4		68.6
A3	ZONE 3 (22A-33)	242 x 2 = 484	0.85	60 l/d	180l/ d	24.7	74.1		98. 8
A4	ZONE 2 (10-22)	242 x 2 = 484	0.85	60l/d	180l/d	24.7	74.1		98.8
B	**Other Users**								
B 1	ZONE 01 Residential staff	200Nos.	1	50	150	10	30		40

	ZONE 01 Nonresidential Staff	100 Nos.	1	50	50	5	5		10
B 2	Main Restaurants and staff dining (Kitchen waste)	1600 No. x 3meals/d	0.7	-	15	-	50.4		50.4
B 3	Other Restaurants Kitchen waste	400	0.7		15	-	4.2		4.2
B 4	Laundry	1600	0.8		25	-		32.0	32.0
B 5	Pool Back Wash							10	10
	Total					**81.6**	**289.2**	**42.0**	**412.8**

WWTP (grey water recycling) = 199.6m^3 /d (TP1)

STP (17.2+24.7+24.7+10+30+5+5+50.4+4.2) =171.2m^3 /d (TP2)

Chemical treatment (32+10) = 42.0m^3 /d (TP3)

Quality of Wastewater Generation

Wastewater of each of the streams (TP1, TP2 & TP3) will be treated in three different methodologeis prior to discharge or re-use, which are described in more details in **Section 2.3.2.2.2** .

Table 2-19: Methodologies for Discharge of Waste Water

Type of wastewater	Type of wastewater treatment process	Final Point of Discharge
TP1 - Gray water (Bathing and washing)	Biological treatment, Sand Filter, Activated Carbon Filter & Chlorination	Reuse for toilet flushing & Excess to Municipal Sewers
TP2 - Black water, toilet flushing (zone 4 + zone 3 + zone 2+ zone 1) + Staff Residential + Main restaurant Other restaurant + Kitchen waste	Bar Screen, Grease Trap & Biological Treatment	Municipal Sewer System
TP3 - Laundry waste & Pool back wash	Chemical treatment	Municipal Sewer System

Wastewater Stream TP 1

The BioKube (Compacted biological Treatment) plant is the primery treatment process followed by sand filtration, activated carbon filtration and the resultant effluent is chlorinated to ensure sterile water which

is safe for re-use. The resultant treated effleunt is in complience of the the relavent standards established by the CEA for this purpose.

Table 2-20: Quality of influent and treated water in tretament plant type I

No	Parameter	Unit	Raw water (Bathing and Sink)*	CEA requirement for discharge treated effluent for irrigation	Characteristic of Treated Effluent
01	pH at ambient temperature		6.5-8.5	6.5-8.5	6.5-8.5
02	BOD_5, 5days at 20 ^0C or BOD_3, 3 days at 27 ^{0} C)	mg/l max	200	30	< 30
03	COD	mg/l max	400	250	< 200
04	TSS	mg/l max	50	30	< 25

* Ref. (Arceivala-1981-water board reference) and industrial best practice

This treated water will be re-used for toilet flushing purposes, gardening at the roof top and A/C cooling tower makeup water.

Wastewater Stream TP2

This stream constitutes a mixture of sewage from toilets as well as waste water from the various kitchens. The quality of the black water (Sewage) generated from toilets in all 5 zones of the building is expected to exceed the permissible limits for discharge to municipal severs as prescribed in List VII of Gazette no 1534/18 2008.02.01. Therefore, this blackwater will be treated using the BioKube biological treatment process prior to discharge. The resultant treated effluent is expected to conform to the relavent standards and as such as safely be discharged into to the municipal sewerage system.

Table 2-21: Characteristics of untreated Wastewater and Tolerance Limits for Discharging to Municipality Sewers

No	Parameter	Unit	Raw water (Sewerage + kitchen waste) *	Tolerance limit values **	Characteristic of Treated Effluent
1	pH		6.5-8.5	6.5-8.5	6.5
2.	BOD_5, 5 days at 20 ^0C or BOD_3, 3days at 27^0 C	mg/l max	500	350	< 100
3	Chemical oxygen demand (COD)	mg/l max	1000	850	< 600
4	Total suspended solids	mg/l max	500	500	<200
5	Oil and grease	mg/l max	150	30	< 30

6	Total Kjeldahl Nitrogen	mg/l max	600	500	< 250

*(Arceivala-1981 - Water board reference and industrial best practice)

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Wastewater Stream TP3

This stream consists of grey water generated by the on-site Laundry and the resultant wastewater will undergo pH stabilization and flocculation, biological filtration and mechanical and chemical treatment using activated carbon and reverse osmosis prior to generate 'Soft water' for use as boiler feed water and cooling tower makeup water. Any excess volume of said water not required for re-use in the building will be discharged into the municipal sewers.

Table 2-22: Characteristics of Raw Laundry Waste Parameters and Quality of Treated Water

Raw Water Parameters of Laundry Waste	**Unit**	**Raw water (Laundry)***	**Standard specification of boiler feed water**	**Standard specification of cooling tower make-up water**	**Quality of treated water**
pH		9.0 - 10.0	10 - 11	7.5 – 8.5	7.5 – 8.5
BOD_5, 5 days at 20 ^{0} C or BOD_3 3days at 27 ^{0}C	mg/l max	100-250			< 30
Chemical Oxygen Demand (COD)	mg/l max	475-1200			< 200
Total Suspended Solids (TSS)	mg/l max	500-600			< 100
Oil and Grease	mg/l max	10-15			< 10
Total Kjeldahl Nitrogen (N)	mg/l max				
TDS	mg/l max	1200-1500	100-120	150-200	< 100
Chlorides	mg/l max		5-10	10-25	< 5
T/Hardness	mg/l max	200	0.00	120	0
Alkalinity	mg/l max	200	30-50	60-150	30
Phosphate, mg/L	mg/l max	25-30	5-20		< 5
EC, µS/cm	EC, µS/cm	190-1400	100		< 40
Silica	mg/l max		0.02	10-25	Nil

Source: Arceivala (1981) Water Board and Industrial Best Practices

2.3.2.2.2 ARRANGEMENTS FOR TREATMENT AND DISPOSAL OF SEWAGE (BOTH DURING CONSTRUCTION AND OPERATION), LAUNDRY WASTE WATER, AND KITCHEN WASTE WATER

Construction Phase

Temporary mobile chemical toilet facilities comprising a built in septic tank will be provided to the construction staff and labour force during construction. The sludge from the same would be extracted via bowser by the 3rd party service providern for disposal accordning to proper methods.

Operational Phase

As illustrated previously, it is proposed to have 5 waste water treatment zones within the structure, each of which will process 3 separate waste water streams.

i. **Treatment Process - TP-1 -** Grey water (bathing and washing) Recycling systems
ii. **Treatment Process - TP-2 -**Black Water and Grey Water Treatment System before Discharging to the Municipal Sewerage System
iii. **Treatment Process – TP 3** Laundry wastewater treatment and recycling systems

These processes are decribed below.

Treatment Process - TP-1 - Grey water (bathing and washing) Recycling systems

[Treatment for grey water for recycling purposes. (Zone 2, Zone 3 and Zone 4)]

The wastewater (bathing and washing) discharged from the guest rooms in Zone 2, Zone 3 and Zone 4 will be treated using separate treatment system for each zone and designed to reuse for flushing purposes. Treated water will also be used for gardening at the roof top, cooling tower makeup water. If any excess water is set to directly discharge into the municipal sewerage network lines.

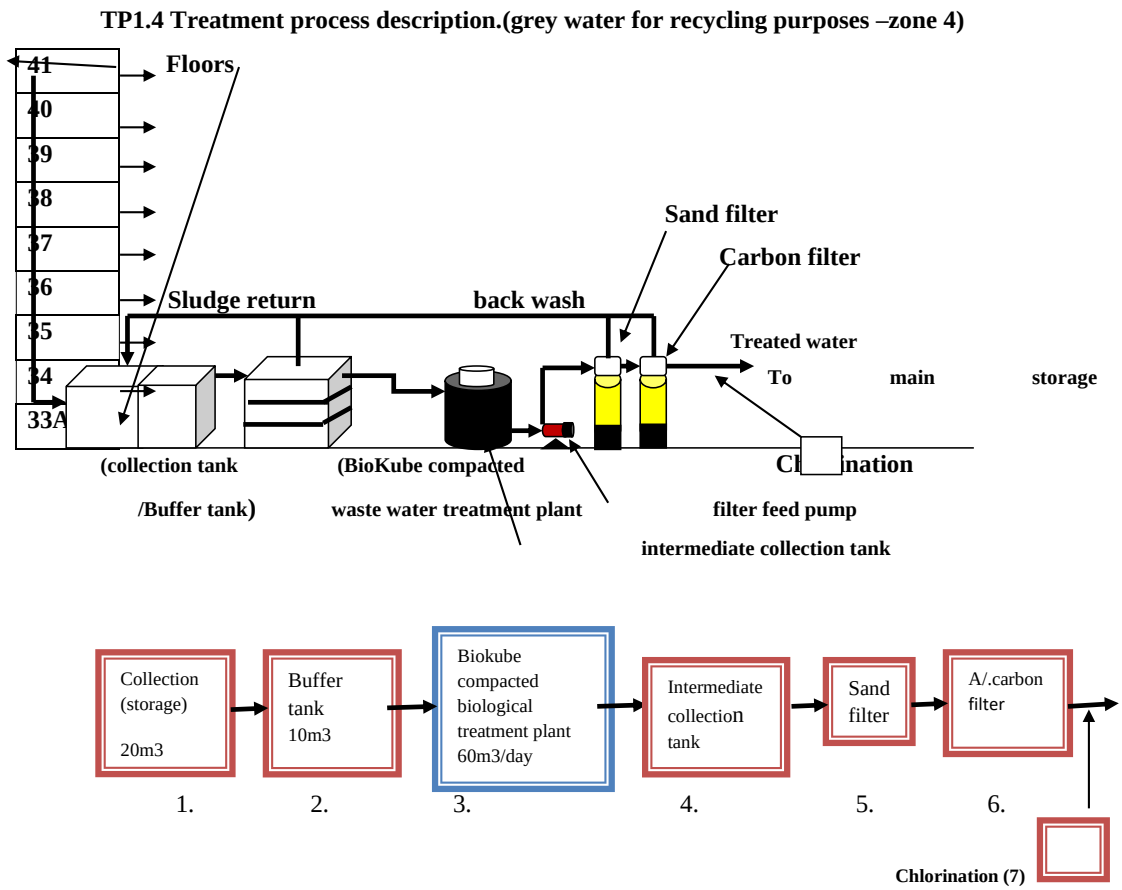

Figure 2.37:Treatment Process

Treatment Process TP1 is described as below. (Case study for Zone 4)

1. *Collection/ Equalization tank*

Waste water from 8 No. floors will be collected into a collection (equalization) tank. Total net capacity of the tanks will be 35m^3. At least half day storage capacity of tanks should be available for convenient of the maintenance and repair works during the operations and also for equalize the water influent characteristics.

2. *Buffer tank*

Pumps are installed in the buffer tank and wastewater pumping into the compacted waste water treatment plant with programmed time duration

3. *Compacted Biological Treatment plant (BioKube)*

BioKube compacted biological treatment plant will be treated wastewater by aeration process. Improve the dissolve oxygen rate in wastewater, and thereby activated sludge generation taken place in bio reactor in certain extent and also aerobic bacteria growing inside the bio blocks will increased with aerations. Thereby the BOD levels of the wastewater reduces by significant levels. Activated sludge produced inside the bio reactor will be transferred into the collection tank with the help of air lifting method by the air

blower with setting time intervals by the PLC unit. (More details of BioKube operation and their process attached herewith for your reference.) The activated sludge return process will be helped to initiate treatment process from the collection tank and extended aeration will takes place during this process.

4. *Intermediate collection tank*

Treated wastewater will be flows in to the intermediate collection tank prior to the sand and activated carbon filtration. This tank will also act as settling tank. It allows to settle the suspended particles which comes from the treatment plant's effluent discharge water.

5. *Sand filter*

This will remove the suspended particles up to the 50 micron and also certain Bactria as activated sludge floating in effluent water. Cleaning of filter beds can be done automatically with the help of automatic multiport valve system install to the filter. Back washing and rinsing of filters will be the method to remove particles from the filters.

6. *Activated carbon filter*

This will remove the organic matters in the water and improve the water quality by removing bad odor and color. Cleaning of filter beds can be done automatically with the help of automatic multiport valve system install to the filter. Back washing and rinsing of filters will be the method to remove particles from the filter.

7. *Chlorination and Disinfection*

It is very essential to chlorinate the final discharge water to remove pathogenic bacteria contamination from the effluent. Chlorination can be done at the final treated water storage tank. This process will be needed at least 3 hours storage time for the disinfection purposes to take place effectively. It also needed some storage time for the de-chlorination activity by evaporating.

Note:

The three zones (i.e. Zone 2 and Zone 3) will be undergone with the same treatment process (as described for Zone 4) before recycling treated wastewater for toilet flushing, gardening and cooling tower make up water etc.

Treatment Process – TP 2 -Black Water and Grey Water Treatment System before Discharging to the Municipal Sewerage System

[Includes treatment of black water of the complete building, kitchen waste and grey water of Zone 1]

In designing this system, the tolerance limits stipulated in the gazette no 1534/18 issued by the government of Sri Lanka in 2008 for discharge of effluent into public sewers with central treatment plants under List VII was taken into account. The treatment plant is selected to achieve the following quality in effluents water.

Table 2-23:Quality of Effluent Water

No	Parameter	Unit	**Raw water** (Sewerage + kitchen waste)*	**Tolerance limit values****
1	pH		6.5-8.5	6.5-8.5
2.	BOD_5, 5 days at 20 ^{0}C or BOD_3, 3days at 27^0 C	mg/l max	500	350
3	Chemical oxygen demand (COD)	mg/l max	1000	850
4	Total suspended solids	mg/l max	500	500
5	Oil and grease	mg/l max	150	30
6	Total Kjeldahl Nitrogen	mg/l max	600	500

* (Arceivala-1981 - Water board reference and industrial best practice)

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The schematic diagram of the Treatment Process 2 is given below. The process is a continuous flow system and the volumes indicated are daily capacities. The collection tank has a capacity of 75m3 but will be continually collecting and discharging the influent to the treatment plant.

TP2.2.Treatment process description

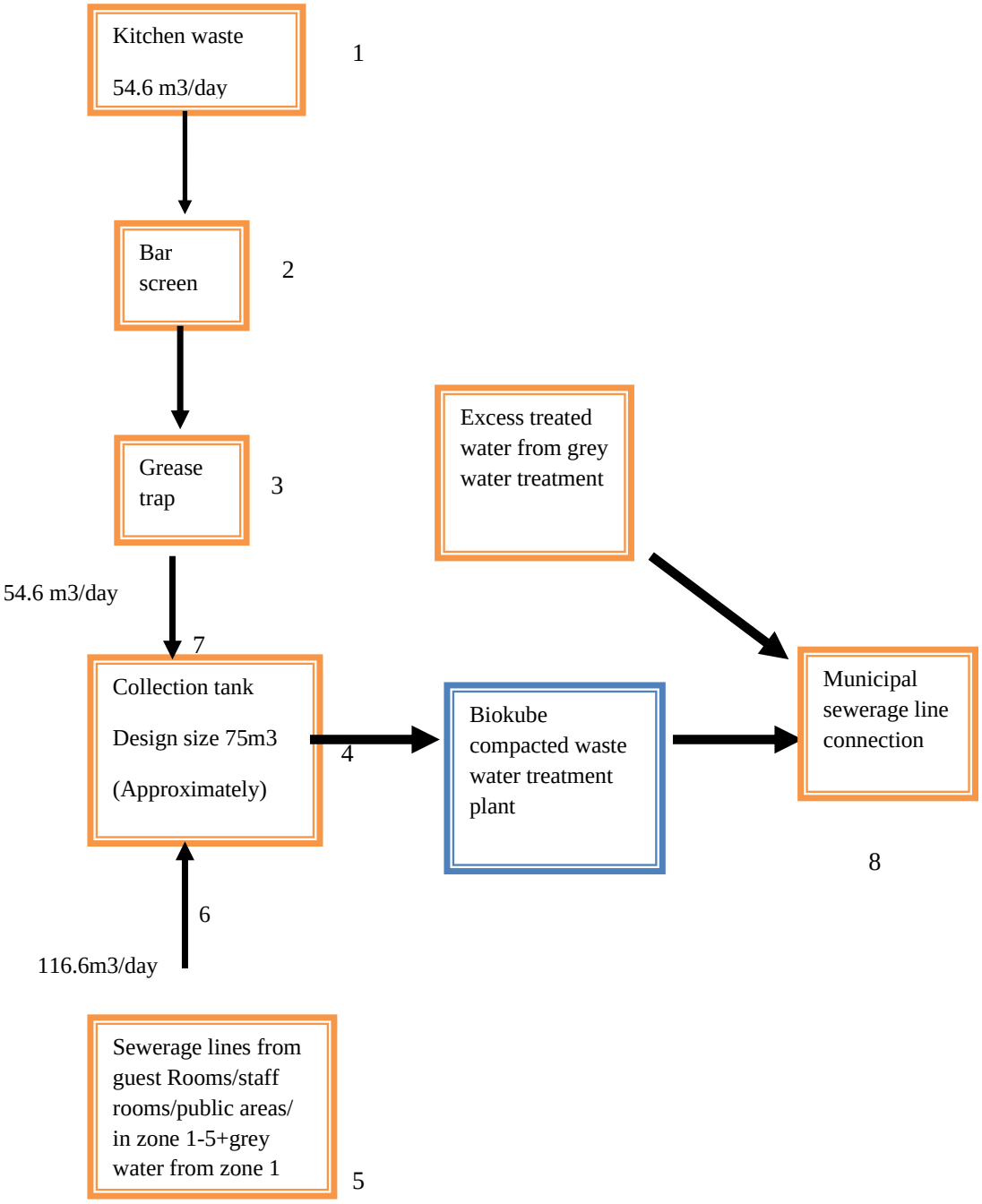


Figure 2.38: Schematic Diagram of the Treatment Process 2

Treatment Process TP2 is described as follows.

Although the kitchen waste is identified as grey water, it is mixed with black water and therefore contains high BOD, COD values and which cannot be legally discharge into sewerage network untreated. Therefore,

several essential treatment process should be undergone before it releases to the main sewerage treatment plant.

1. *Bar screen*

Bar screen contain two steps with different mesh sizes screen .this will remove large particles and small particles of different size of cooked or un-cooked, which will disturbed for treatment process or not allowed to discharge into the drainage lines. Periodical cleaning of bar screen is required to avoid blocking water flow by the screen. In addition to that this bar screen will be prevent blocking piping network and damage pump and other mechanical devices.

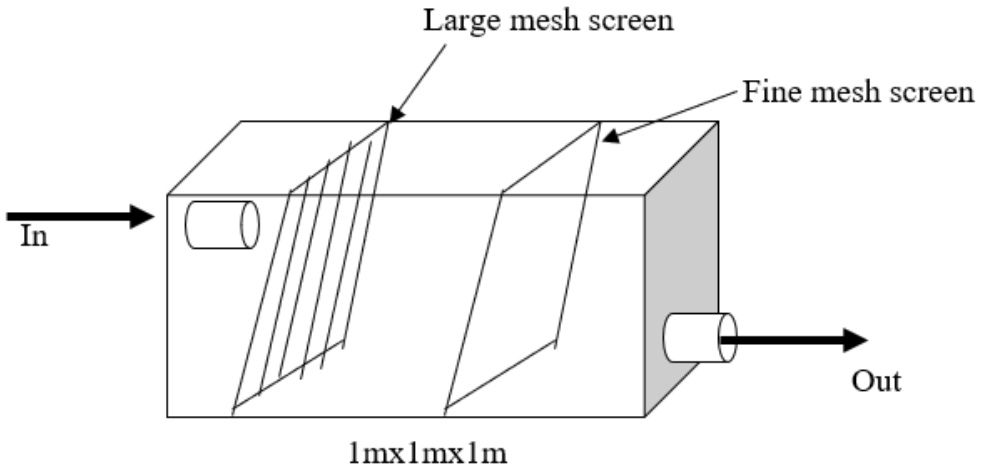


Figure 2.39: Bar Screen

2. *Oil and Grease trap*

This will contain three chamber pits with 1mx1mx1m capacity each. Each pit will be separated with concrete walls and connected with 3-inch diameter pipes as shown in the picture below. Floating oil and grease particles will be retained in the 1st two tanks at the top layer.

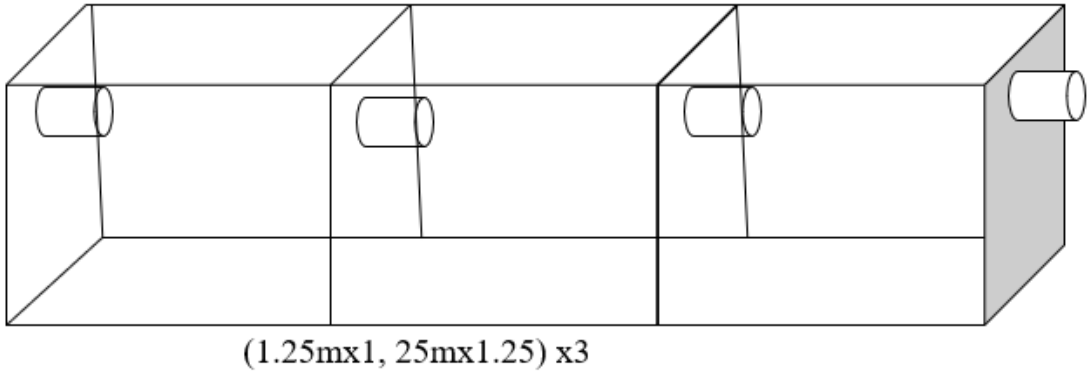


Figure 2.40: Oil and Grease Trap

3. *Collection tank*

Equalization tank or holding tank (of RCC) will act as an intermediate storage location for black water and kitchen wastewater and will continually feed the effluent into the treatment process. The volume of the collection tank is 75 m^3.

4. *Compact wastewater treatment plant (Trademark-BioKube-Denmark)*

The proposed WWTP is an aerobic biological treatment plant which reduces BOD and COD, TSS , levels of influent water up to the tolerance limits reached in to the required discharge of effluent into public sewers with central treatment plants.(parameters and their required values attached in **ANNEX IX**).

Treatment Process – TP 3 - Laundry Wastewater Treatment and Recycling Systems

Laundry waste is to be treated before re-cycling or discharging to municipality sewers. This development intends to re-cycle treated laundry waste water for purposes like cooling tower make-up, boiler feed etc. After the chemical treatment process, the properties of laundary waste will be reduces significally. However, before use it for cooling towers and boilers it should undergone with ion excange process and ultra filtration.

Further, chlorination and de-chlorination should be done prior to the ultra filtration and softening plants for removal of pathagenic bacteria in treated waste. Microne filter system and softening plant should introduced for the removal of suspendard matters and total hardness (calcium and magnicium hardness) before using for boiler feed application.

Schematic diagram of Treatment Process System for Laundry Wastewater is appended below.

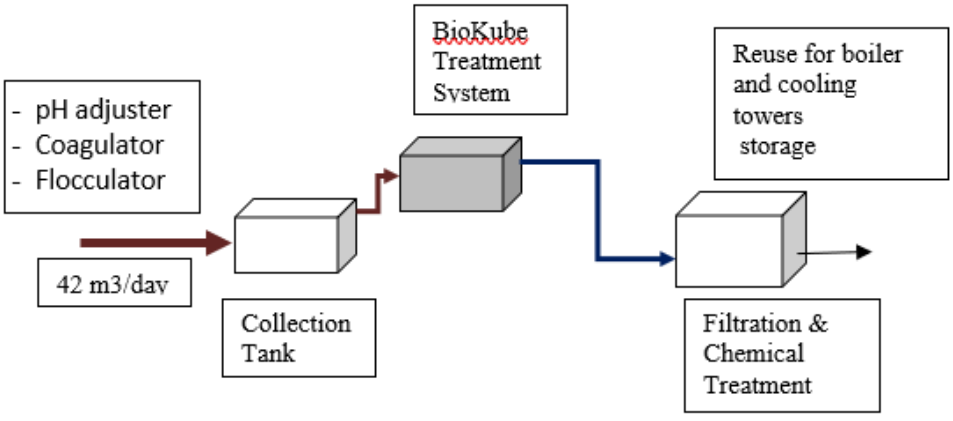


Figure 2.41: Schematic diagram of Treatment Process System for Laundry Wastewater

Schematic diagram of Treatment Process Block Diagram - (TP-3) is given in **Figure 2.42** below

Treatment plant process flow (grey water recirculation) TP3

17

Figure 2.42: Schematic diagram of Treatment Process Block Diagram - (TP-3)

2.3.2.2.3. Conceptual Designs For Waste Water Management Plan, Waste Water treatment Plant, and Pre-Treatment System

The conceptual design of the three different types of wastewater treatment plants are described in **Section 2.3.5.1.1** .

The location of Sewerage Pits at B-2 and B-3 are illustrated in **Figure 2.43** below.

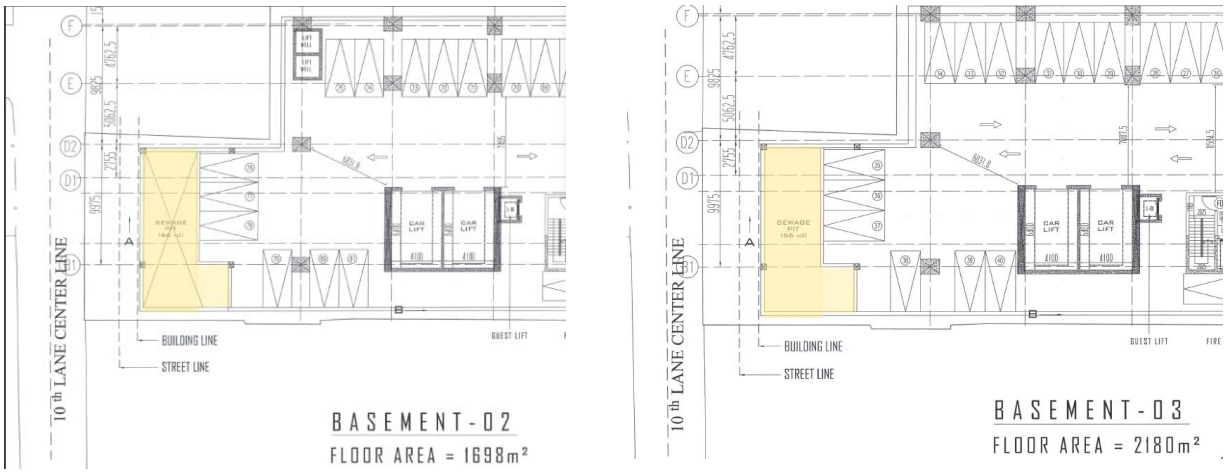


Figure 2.43:Basement Sewage Pits at B-2 and B-3

Figure 2.44 below illustrates the layout plan for a typical WWTP in each of the 5 Zones of the building

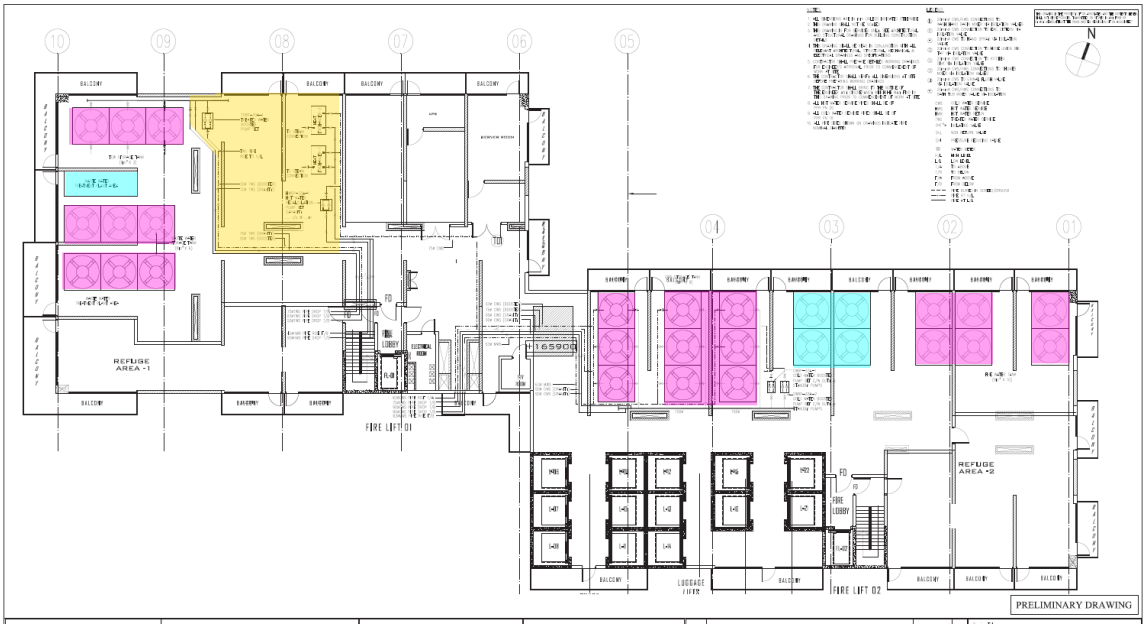


Figure 2.44: 33A Service and Refuge Floor MEP WWTP Arrangement

The schematic diagram of the operating system is shown in **Figure 2.45** below.

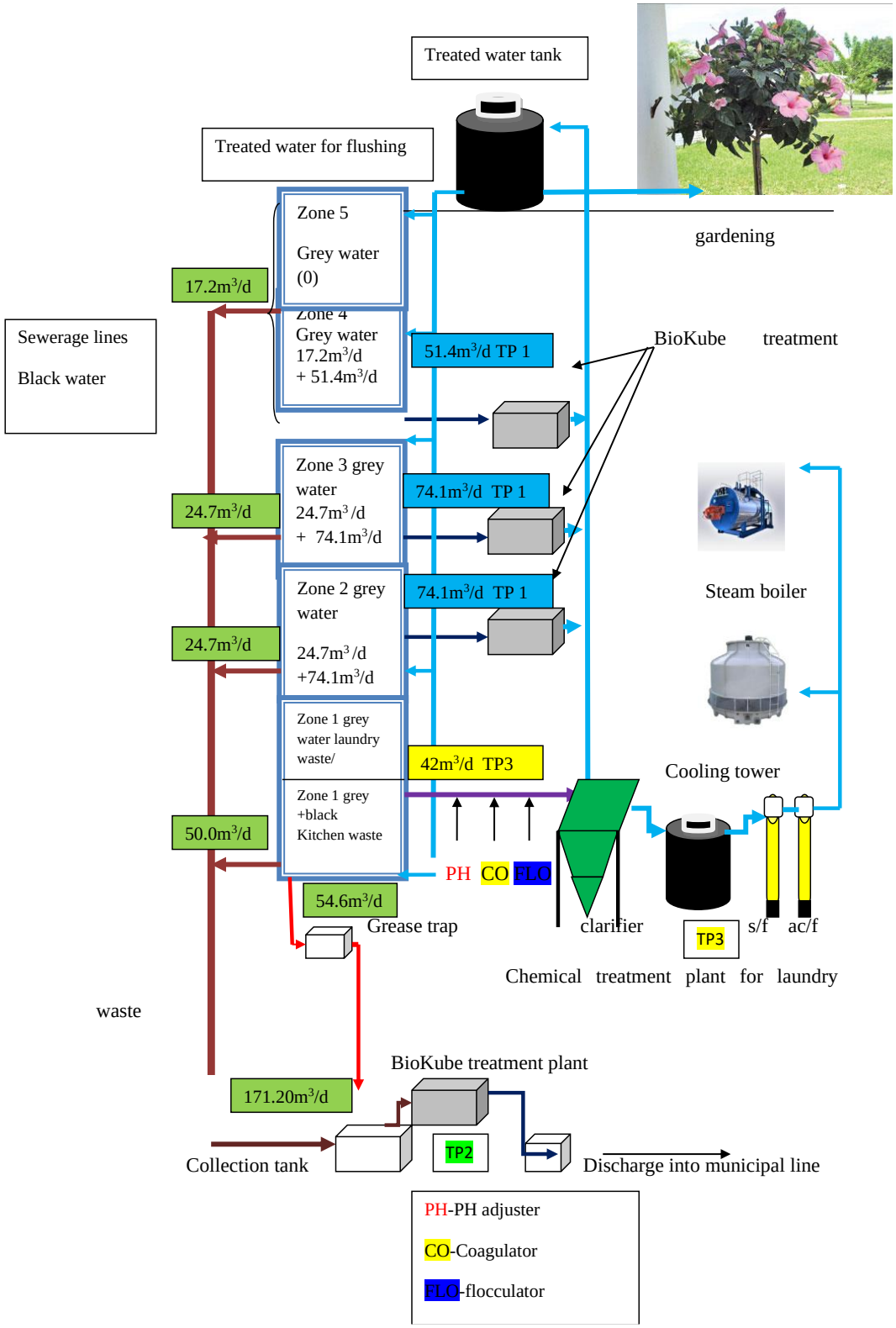


Figure 2.45: Waste water treatment Process through the proposed technology

2.3.2.2.4. CLEARANCES THROUGH MUNICIPAL SEWAGE LINE [IF RELEVANT]

Since the building complex will have its water treatment plants, only treated effluent is designed to discharge into the municipality sewerage system. The Director (Engineering) for Drainage and Water Supply of CMC in his letter dated 20-06-2020 (**ANNEX IV**) has informed the developer can obtain new sewerage and stormwater drainage connection to the existing CMC network once the construction is completed. Application has been made for said connection.

The sewerage pit and the proposed connecting line with man-holes are shown in the following **Figure 2.46**.

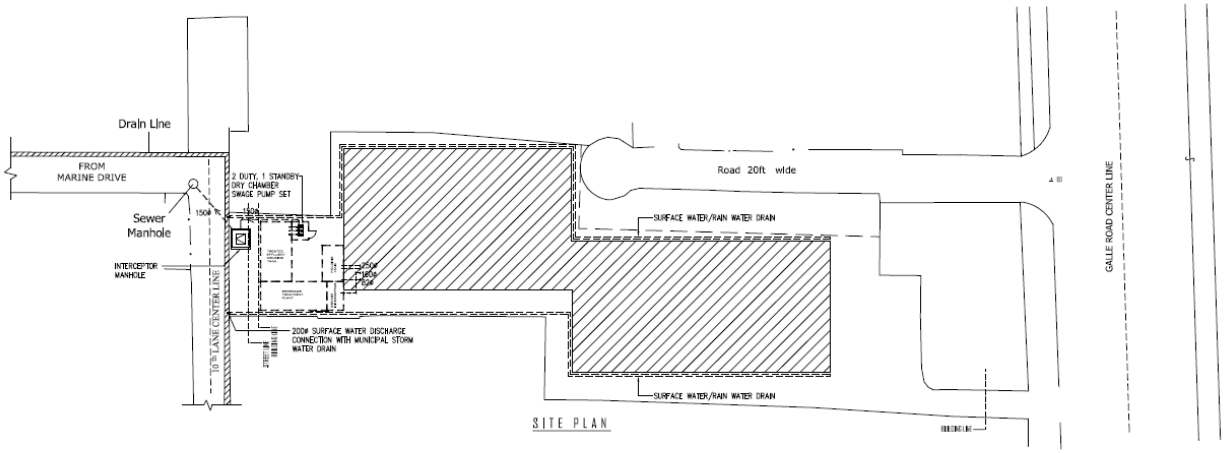


Figure 2.46: Drain Line & Sewer Manhole

Further, the above letter has given clearance that the proposed building plan is not affected by Municipal Council Sewers, Municipal Council Stormwater Drainage, private sewers and private stormwater drainage. Refer to **ANNEX IV** for the CMC clearance letter.

2.3.2.2.3 METHODOLOGY OF DISCHARGE OF TREATED WASTE WATER ACCORDING TO NATIONAL STANDARD

As described in **Section 2.3.2.2.2**, waste water will be re-used or discharge to municipality swerage ines as follows.

1. Sewerage (black and grey water) will be treated before it is discharge into the municipal sewerage lines
2. Grey water collected from Bathing and Washing- will be partially re-used for toilet flushing, gardening, floor washing, cooling tower makeup water, Boiler feed water
3. Grey water collected from Laundry waste, Boiler blow down, Cooling tower bleed off, Swimming pool back wash, Water treatment plant back wash - will be used for cooling tower makeup water, ,Boiler feed water, Floor washing

2.3.2.2.4 Final Point Of Discharge of Treated Waste Water

Part of the treated wastewater will be re-used within the project for toilet flushing, cooling tower make-up water, gardening etc and the remainder will be discharged to the Municipal sewer system as described in **Sections 2.3.2.2.2** and **2.3.3.1.3.**

2.3.2.3 Solid Waste

Proposal for solid waste management for the building complex has been prepared for the client by an expert and recommended for installations, practices and operating mechanisms. The full report is attached in **ANNEX X**.

2.3.2.3.1 Type & Quantity & Quality Of Solid Waste To Be Generated

The type of solid waste is domestic as the building is comprised of guest rooms, a cafeteria and other services. Waste categories can be identified as paper, plastics/polythene, glass, organic matter, coconut shells and other mixed type.

The total waste generated will include the following.

* Bio-degradable component suitable for composting
* Non-biodegradable component consisting of materials having a commercial value
* Component which is non-biodegradable and non-recyclable as non-descriptive waste

Comparing with the composition of similar urban development works, the consultant has estimated the following quantities of waste that may need to be treated.

Total quantity of domestic biodegradable solid waste generated per day =1409 kg/day

According to the report of Solid Waste Management, the quantities are as follows.

Table 2-24: Computation of Domestic Waste

Total Quantity of solid waste generated per day	**1409kg/d**
Total to allow for disruption of collection, allow a design rate for 7 days	9863 kg/7days
For daily generation;	
Volume of solid waste per day @ 200 kg/ m^3	7.05 m^3/d
Volume of solid waste per day @ 300 kg// m^3	4.7 m^3/d
For 7 day design rate generation;	
Volume of solid waste @ 200 kg/ m^3	49.32 m^3
Volume of solid waste @ 300 kg/ m^3	32.88 m^3
-do- biodegradable component for 7 days of 63% @ 300 kg/ m^3	20.71 m^3
-do- non recyclable solid waste for 7 days , @ 300 (27%)kg/ m^3	8.88 m^3
-do- nondescript solid waste for 7 days @ 300 kg/m^3 (10%)	3.29 m^3

The total volume provided on the ground floor for 7 days of storage of biodegradable waste.

87 nos. 240-litre green plastic wheeled bins in the garbage room in the ground floor = 20.88 m^3 > 20.71 m^3 required.

Domestic bio-degradable component of total Project waste generation;

The total volume required in ground floor level garbage rooms for 7 days storage of recyclable waste = 8.88 m^3

Consider the portion viz.

The volume of solid waste as above for at 300 kg/m^3 will be used to determine the volume/area of bin storage space provided; Apportion non-biodegradable of each category waste of 8.88m^3 in the ratio, plastics: paper: metals: glass as 20:5.5:0.5:1;

Volume of paper = 1.81 m^3

Volume of Plastic =6.58 m^3

Volume of glass = 0.33 m^3

Volume of Metal = 0.16 m^3

Non-descript waste : The volume of non-descript waste = 3.29 m^3

Provide following facilities

a) 6100 mmx6400 mm cool room to accommodate 87 nos. wheeled 240-litre plastic bins of size 640mmx640mm x910mm height for biodegradable waste
b) 1480 mmx 6900mmx 640mm high waste store room + 2020 mmx 7200 mmx 2600 mm x 910 mm height for recyclable waste

2.3.2.3.2 PROPOSED METHOD OF DISPOSAL OF SOLID WASTE

Since the building is located at the prime location in Colombo city it is not possible to have an on-site waste treatment plants service and hence of CMC has to be obtained for waste disposal.

Accordingly, a request was submitted by the developer, with the solid waste management plan to CMC, for which approval has been given for the plan with some stipulated conditions. Refer to **ANNEX IV** for CMC's approval.

Colombo Municipal council will collect waste on the following schedule

- Biodegradable waste- 3 collections per week
- Recyclable waste- one collection per week

Solid waste will be segregated according to the following colour code system given by CMC.

Paper, cardboard	- Blue
Plastics & Polythene	- Orange
Glass & Bottle	- Red
Metal	- Brown
Organic matter	- Green

The solid waste arising from various locations will be made to move through a pre-identified stream of events until the waste is finally removed by the Council.

The waste stream will be operated by competent janitorial staff appointed by the management of the building complex. The biodegradable waste shall be placed into the bins by the users/staff and managed by the janitorial staff beyond the receiving point. The recyclable/non-biodegradable waste shall be collected and delivered by the janitorial staff/occupants and thereafter also handled by the janitorial staff. The management will implement an awareness program consisting of regular meetings of the stakeholders, notice boards and notices to individual premises etc and will communicate with the council staff if and when necessary. The need for Source Separation, colour-coded storage in sacks or bags will be given constant attention.

2.3.2.3.3 Locations Identified For Temporary Collection

The location of the temporary wet and dry garbage storage locations are shown in **Figure 2.47** below.

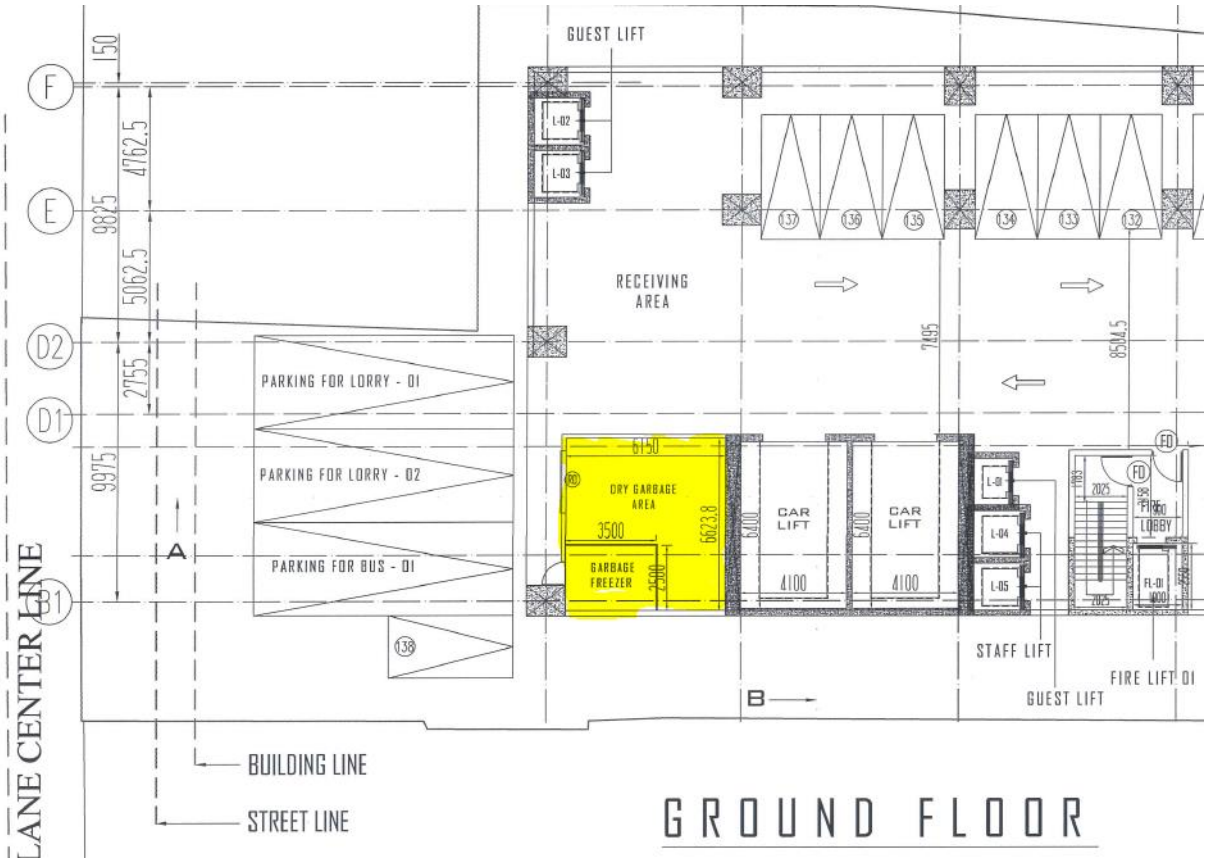


Figure 2.47: Temporary Garbage Collection Location

Features of the ground floor garbage room will be as follows.

- 10^0C temperature control
- Ventilation with moisture control
- Panelled walls and floor for cool rooms and tiled floor and walls for other waste stores to facilitate mopping and disinfection.
- Ramped step down to avoid leachate spill into corridor, gully.
- Internal lighting
- Airtight doors with key/card lock, sliding gear with or w/o automatic operation.
- Ramped access to match loading height of the garbage compactor
- 10ft wide 28 ft long open to sky parking areas for trucks to collect waste from the storage area.
- Distance of truck from store 3m
- Special wastes such as batteries, CFL bulbs, computers, and electronic parts shall be disposed to the recycling trade.

2.3.2.3.4 Sludge Disposal Method

There could be a minimum amount of sludge to be removed from the wastewater treatment plant. This will be discharged occasionally, into the black water discharge system of the premises (which is being discharged into the municipality sewerage system.

2.3.2.3.5 Proposal for Reduce, Recycle, or Reuse of Solid Waste

It is recommended that the project attempt to reduce the use of materials as much as possible during construction. The workers are continuously given awareness on how to use minimum quantities for respective works. The refuses are re-used as much as possible, and the balance is sold to vendors for re-use and re-cycle. Timber, reinforcement, aluminium, and empty cement bags belong to solid waste.

The 3R requirement will be addressed through awareness promotion.

(a) the practice of source separation with awareness building

(b) reuse of waste containers and use of degradable plastic green bags

(c) providing conformity to municipal recyclable waste collection exercise.

2.3.2.3.6 Agreement for Solid Waste Disposal through Local Authority System [if Relevant]

The Director (Engineering) for Solid Waste Management of CMC had approved {vide his letter dated 27.10.2020 0f ME/SWM/12/2004/2020 (68)} for the Solid waste management plan submitted by the client (refer **ANNEX IV**). Accordingly, Garbage Collection will be done thrice a week on a payment basis.

2.3.2.3.7 Disposal Of Construction Waste

Construction waste will consist of timber parts, empty cement bags, parts of bricks and plaster materials, plastic wrappings, empty plastic and metal containers etc. These will be stacked according to the CMC guidelines and will be handed over to the trucks for removal.

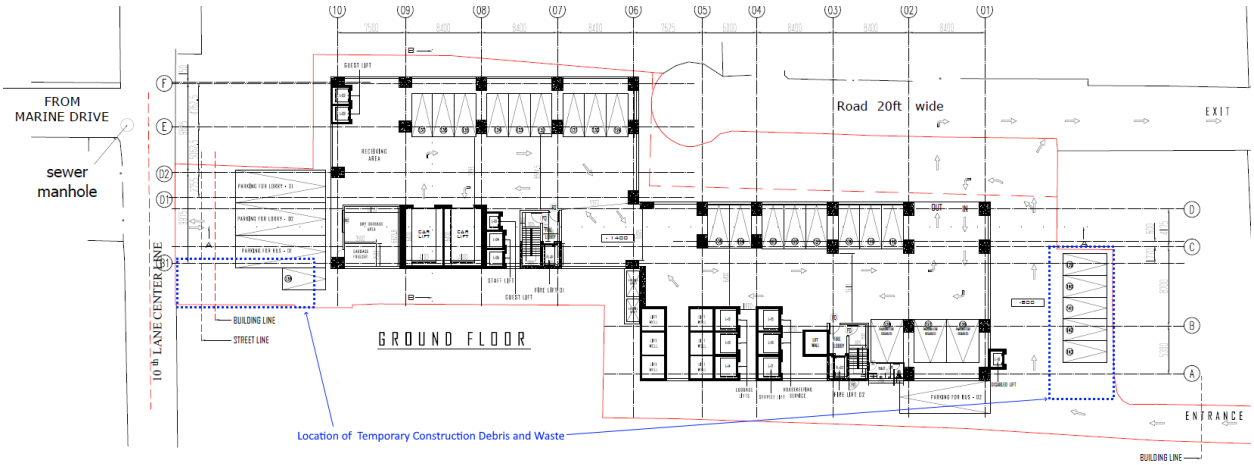


Figure 2.48: Locations of Temporary Construction Debris/Waste Collection

Excavated earth will be transported out of the premises according to the instructions in covered vehicles.

Details of dumping site with necessary approvals from CEA & Local Authority is not applicable as Removal will be done by the contractors having licenses for same.

2.3.2.4 AIR EMISSIONS

Air emissions during the construction phase may occur due to machinery in use.

Air emissions during the operations phase are minimal with a boiler and a muffled silent backup generator. Baseline Air Quality testing has been carried out by the Project proponent (Refer **ANNEX XII**).

2.3.2.4.1 DETAILS OF USE OF GENERATOR/BOILERS OR ANY OTHER MACHINERY WHICH GENERATES EMISSIONS

There will be generators and boilers installed at the premises as below.

- Standby generators will be located in the basement no noise will break out outside or to ambient spaces. However, they comprise remote radiators and radiator fans which generates noise. Thus, the radiators are fitted with sound attenuators. Exhaust pipes are extended to discharge in the service area at a height complying with standards.
- Boilers are located in the service area, where Flue gas will be discharged at a high level.

2.3.2.4.2 EMISSIONS MANAGEMENT CONTROL FACILITIES

During the construction phase, the contractor needs to maintain the machine fleet in good order.

2.3.2.5 PROVISION OF INFRASTRUCTURE

2.3.2.5.1 ELECTRICITY REQUIREMENT/ELECTRICITY SUPPLY

Source

During both Construction and Operations Phases, electricity from the CEB connection will be made use.

Availability

Already available connection will be converted to fulfil the requirements during the construction phase, while Commitment of CEB connection for operation phase has received the letter no. CLR-03/028/2020 dated 16.11.2020. Refer to **ANNEX IV** for CEB clearance. It is anticipated that an electrical connection with a 250 kVA Transformer will be needed at the site.

Estimated daily electrical consumption would be in the order of 350 kWh (units) per day, during the peak of construction.

As per the load calculation, the calculated total demand during the operation phase will be 3.48 MW, thus 4MVA, Medium Voltage connection for the premises will be needed.

Estimated daily electrical consumption would be in the order of 29300 kWh (units) per day

CEB will supply power to a substation at the premises for which a separate 9.6m x 5.2m x 3.5m space will be allocated for transformer and service connections. The conditions stipulated by CEB will have to be followed up to get the connection after the construction phase.

Alternative Source

Back-up generators will be made available at the site for use during both construction and operation phases.

2.3.2.5.2 Storm Water Drainage System

The storm water drainage plan is shown in **Section 2.3.1.6**.

2.3.2.5.3 Soil Erosion Preventing Measures

Soil erosion may occur during the excavation of the basement if proper preventive measures during excavation are not taken or the excavated materials are not properly disposed of. Earth removal during piling too may cause soil washing away the premises if not suitable preventive measures are taken.

Due to heavy loads associated with 46 floors, the board and cast-in-situ Reinforced Concrete piles will be installed as the foundation and will be socketed into fresh rock. At the initiation of the project, few test piles will be cast and tested to verify geotechnical parameters used during the design. This will ensure the safety and reliability of the foundation. Hence washing away soil during these operations have to be controlled.

The basement depth is around 10.1m and the height should be restrained by any type of economical design by the contractor according to the geotechnical investigation report. The stability for the sides will be provided by the retaining system. Since it is required to minimize the excessive vibration during the installation of the shoring system, the geotechnical consultant has advised installing a secant pile wall system, that is. large diameter RC bored piles adjacent to each other. The geotechnical consultant has recommended terminating the piles at -11m to -12m concerning the TBM.

The methodology statement provided by the structural engineer has briefed the process of shoring which is explained in **Section 2.3.1.1.2**.

Dewatering would be required for the basement construction and the groundwater level will be lowered to the bottom of the excavation (-11m) until the basement work is completed. Extra care needs to pay during dewatering too to avoid loosening soil at the premises as well as in adjoining lands.

2.3.2.5.4 Access /Parking Facilities

Access and parking facilities are shown in detail in Traffic Impact Assessment Report conducted for the proposed project. Refer to **ANNEX XII** for details

Availability of Access Roads

Access to the site is available through Galle Road and 10th lane off the Marine Drive. Refer to **Section 2.1.3.6**.

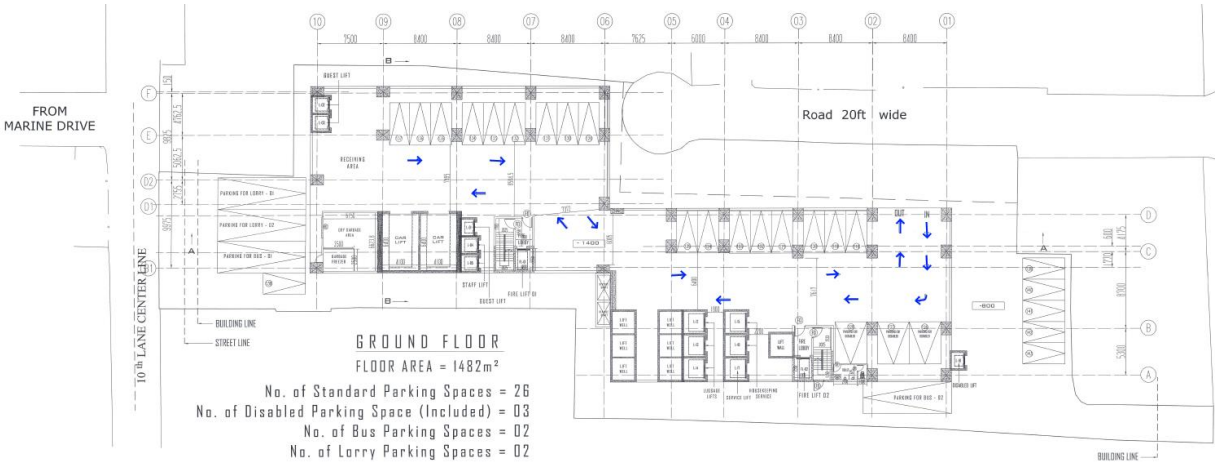


Figure 2.49: Vehicle Movement within Ground Floor Of Property

Details of Beach Access

Access to the beach will be through 10th Lane and crossing Marine Drive.

Details of Parking Facilities and Traffic Management Plan

According to the Regulations in Colombo City Development Plan, the parking requirement for this building be a standard of 120 Nos. (including disabled parking) 2 Nos. for buses and 1 space for a lorry. In the Architectural Plan 151 Parking Bays (142 Standard, 5 Disabled, 2 Lorry, 2 Bus) have been provided, which are more than the above requirement.

Fire Safety (Certified by Qualified Personnel)

Fire safety standards are stipulated by the Fire Department of CMC are discussed in **Section 2.1.11.** Once the requirements are fulfilled fire safety certificate will be issued by the Chief Fire Officer after a fire drill and inspection. Refer to **ANNEX IV** for fire protection requirements given by the CFO of CMC. Refer to **ANNEX XI** for fire conditions compliance by the project proponents.

Safety Standards For Building Accessibility And Disabled Access

Safety standards for building accessibility are defined in the fire safety guidelines issued by the Fire Department of CMC, which are fulfilled in architectural and structural drawings, as briefed in **ANNEX XI**.

Details of Lift Facilities

This is a 46-storied building includes the ground and three basement floors which are used for parking and MEP. The parking floors are supplemented with car, passenger and fire-rated lifts. The floors from 1st floor to the 10th floor have been used for hotel services and functional departments and from 11th floor to 41st floor, there are 652 hotel rooms. Vertical circulation is done by a series of lifts and two stairways

also proposed for the building. The lifts in questions are divided as per **Table 2.25.** and highlighted in **Figure 2.50** below.

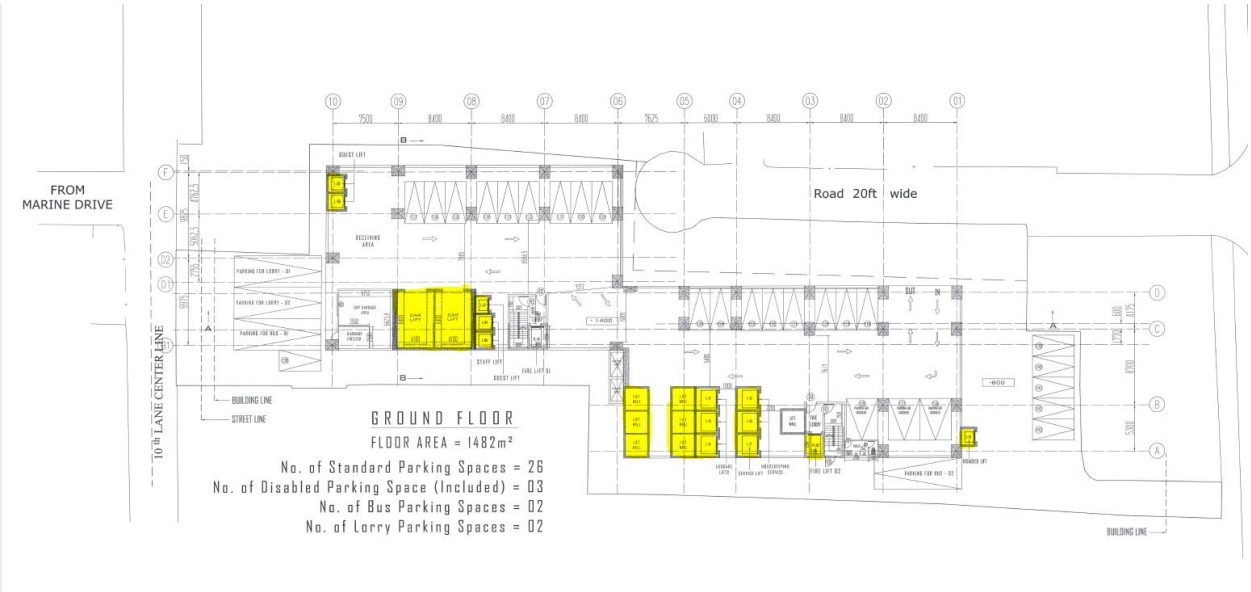


Figure 2.50: Lift Locations (on Ground Floor Servicing)

Table 2-25: Lift Arrangement

Level	Car Lift	Passenger Lift	Fire Lift	Fire Stairwell	Luggage Lift	Guest Lifts	Service Lifts	Staff Lifts	Housekeeping Lifts	Disabled Lift	Room Service Lift
Basement 3	2	1	2	2							
Basement 2	2	1	2	2							
Basement 1	2	1	2	2		2					
Ground Floor	2	1	2		3	2	1	2	2	1	
Level 1			2	2	3	9	1	2	2	1	
Level 2			2	2	3	9	1	2	2		
Level 3			2	2	3	6	1	3	2		
Level 4			2	2	3	6	1	3	2		
Level 5			2	2	3	6	1	3	2		
Level 6			2	2	3	6	1	3	2		
Level 7			2	2	3	6	1	1	2		
Level 8			2	2	3	6	1	1	2		
Level 9			2	2	3	6	1	1	2		
Level 10			2	2	3	6			2		2
Level 11-21			2	2	3	6			2		2
Level 22-24			2	2	3	6			2		2
Level 22a			2	2	3	6			2		2
Level 25-31			2	2	3	6			2		2
Level 32-35			2	2	3	6			2		2

Level 33a			2	2	3	6			2		2
Level 36-40			2	2	3	6			2		2
Level 40-41			2	2	3	6			2		2
Level 42			2	2	3	6			2		2
Level 43			2	2	3	6		1	2		
Level 44			2	2	3	6		1	2		
Rooftop			2	2	3	6		1	2		

2.3.3 TRAFFIC IMPACT ASSESSMENT

As the site is located in a prime urban area in the capital city there is a concern about increased traffic during construction and operation stages. Hence, a project-specific Traffic Impact Assessment study has been conducted and recommendations have been obtained. Refer to **ANNEX XII** for the TIA report.

The existing road network around the site is shown in the area map below.

Some highlights in the report are;

- Both Entrance and Exit are proposed from Galle Road. Additionally, a service entrance is proposed at the rear side of the building, directly from the 10th lane.
- An additional increase in traffic due to this development would be an average of around 1800 vehicles per day with a peak period flow of around 180 vehicles.
- Considering attraction due to the proposed development and existing traffic condition at Galle Road the impact created by new traffic will be less than 5% of the total traffic on Galle Road.
- The 4-lane of the one-way road at this stretch of Galle Road can accommodate this increase and an increase in the next five years.
- Since Marine Drive is a 4-Lane Road, and Maximum increase is just only 45 Vehicles per hour and it can be easily accommodated

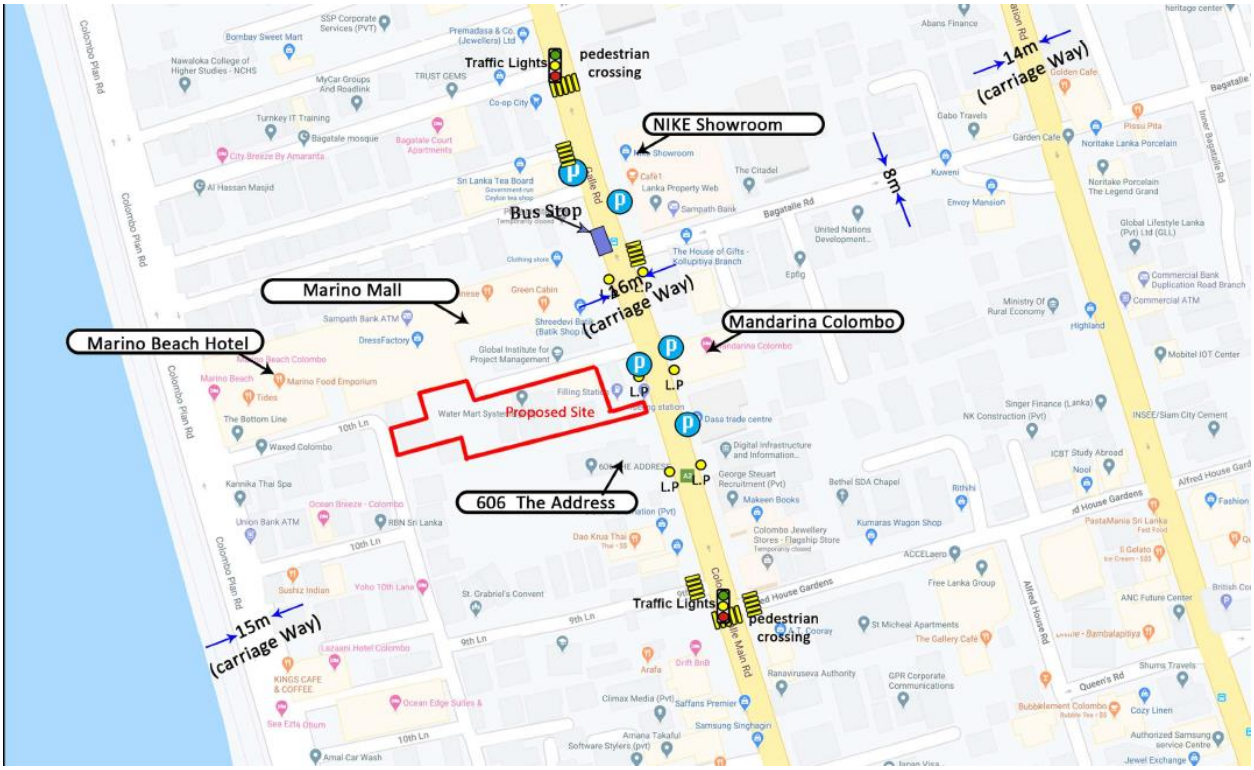


Figure 2.51: Existing Road Network

2.3.3.1 EXCISING TRAFFIC FLOW ALONG THE GALLE ROAD AT THE PROJECT LOCATION

Manual classified traffic flow counts were carried out near the site on Galle Road on Wednesday, 4th March 2020. As per the TIA, available in **ANNEX XII**. Distributed traffic flow conditions can be seen on this section of the Galle Road and a clear mid-day peak can be seen, whereby the morning peak is relatively higher than the evening peak. The daytime traffic flow (06:00-19:00) is 43,728. On average 3,363 vehicles per hour can be seen on Galle Road during the daytime. The standard deviation of hourly traffic flow is 534 vehicles per hour. Based on this information the average daily traffic is estimated to be around 61,200 vehicles. This flow could increase to about 76,200 vehicles per day by the year 2025 assuming a 4-5%average annual increase. The majority of the vehicles on Galle Road are 3-wheelers (32%) and around 26% of cars and 12% of vans & jeeps can also be seen. Motorcycle category is relatively less on this road, and are around 17%, whereas 3% freight vehicles can be seen and around 9% are buses and less than 1% other vehicles can be observed in this section of the road.

2.3.3.2 EXCISING TRAFFIC FLOW ALONG THE MARINE DRIVE AT THE PROJECT LOCATION

The Manual classified traffic flow counts were carried out near the site on Marine Drive on Wednesday, 4th March 2020, as per the TIA (**ANNEX XII**). The Morning peak is relatively higher than the Evening peak. The daytime 12-hour traffic flow (06:00-18:00) is 42,188. On average 3,516 vehicles per hour can be seen on Marine Drive during the daytime. The standard deviation of hourly traffic flow is 1,007vehicles per hour. Based on this information the average daily traffic is estimated to be around 57,000 vehicles. This flow could increase to about 62,250 vehicles per day by the year 2025 assuming a 4-5% average annual increase.

The detailed Traffic Impact Assessment report is annexed to this report, in **ANNEX XII**.

2.3.4 AVAILABILITY OF LOCAL LABOR FORCE, EMPLOYMENT OF LOCAL PEOPLE, METHODS OF TRAINING & ENHANCEMENT OF REQUIRED SKILLS

2.3.4.1 2.3.4.1. AVAILABILITY OF LOCAL LABOURER FORCE, AND EMPLOYMENT OF LOCAL PEOPLE

According to the GND level data on the socio-economic resource profile of the Thimbirigasyaya DS division, comparatively, a high percentage of inhabitants represent the employed category at over 57%. Meanwhile, the percentage of unemployment is lesser at 2%from the population). However, the economically inactive population is 41% and this category is led by elders and women.

The above analysis shows the difficulties in finding the required labour forces for the construction work from the study area. However, during the study, it was observed that migrant labourers are common in this area and they are engaged in construction work in the existing construction sites. High salaries with other benefits such as target-based allowances, etc., for the workers, were the factors that attracted those migrant workers to engage in labour works in the capital city. Therefore, the project proponent has an opportunity to find workers from outside the area for the construction work on the site with an assurance of giving attractive salaries and other benefits.

According to the project development plan of the proposed project, there is a special training program that uses appropriate training methods, such as, prevention from COVID 19, on the Job training and demonstrations of work, especially in safety measures, traffic control, and adherence to norms in keeping the surroundings safe.

2.3.4.2 METHOD OF TRAINING AND ENHANCEMENT OF REQUIRED SKILLS

According to the project development plan of the proposed project, the project proponent has an action plan to train and enhancement of the capacities of the recruited staff for the new hotel in different ways as follows.

1. Experienced persons to be required for the key positions

2. Trainees to be recruited from recognized hotel schools in the country

3. Giving required training opportunities for the staff to match the requirement of the new hotel.

4. Organized exosphere visits to the staff for a similar type of hotel to get experiences.

2.3.5 AESTHETIC & VISUAL ENVIRONMENT

The project proponent of this proposed hotel project has designed the exterior of the proposed buildings and associated compounds in harmony with the architectural style of the urban landscape of the area.

The proposed land extent for the new hotel complex is around 0.2919 hectares (115.4 perch). The construction of the new hotel will commence once site preparation works are carried out, i.e., clearing of the vacant land and demolishment of the buildings.

This proposed location is also situated about 200m away from the coastline. Except for the access road to the new hotel site, all the other three faces are covered by multi-story buildings. And also, the surrounding areas are occupied by taller buildings. Only a very few lands are vacant at the moment without buildings in the vicinity.

During the study, it was discovered that there were proposals for nearby vacant lands to be used for the construction of high-rise buildings in the near future.

According to the project development plan of the proposed hotel complex, the designs of the buildings and other components were designed to suit the existing physical environment in the area with environmentally friendly and green concepts. At present, the proposed land for the project is isolated from the view of the sea and coastline due to surrounding high-rise buildings. According to the architectural designs of the hotel, it will set up attractive backgrounds with the new hotel complex in the area. This new high rise building and compound of the proposed hotel will provide the opportunity to the visitors to see scenic beauty in the vicinity. Also, a new hotel complex with well-designed components will create an attractive view of the surrounding after completing the construction of it.

No lighthouses, religious places, historically or archeologically significant places are situated in close vicinity to the project location. Therefore, this project will help to improve the scenic beauty in the area. No negative impacts could be expected on asthmatic and visual values in the area due to this project.

2.3.5.1 THE TALLEST HEIGHT OF ANY PROPOSED STRUCTURES

The proposed hotel is a 46-storey (including the ground floor) high building constructed in a 115.4 perch land situated on No.594, Galle Road, Colombo 03. The total floor area of the building is estimated to be 57415sqm^2. The heights of the proposed highest high-rise main building are 178.790m (179m) and is 46 storeys high.

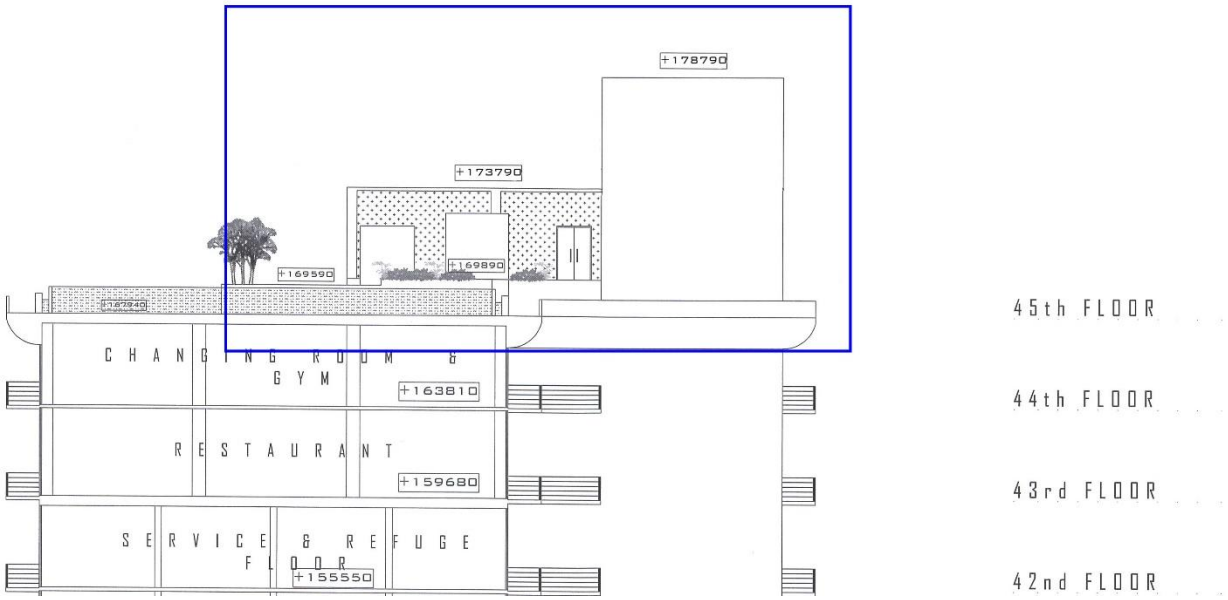


Figure 2.52: Highest Point of Building

2.3.5.2 WHETHER THE VIEW IN THE IMMEDIATE VICINITY WOULD BE ALTERED OR IMPAIRED OR OBSTRUCTED AS A RESULT OF THE PROPOSED STRUCTURES

The proposed land extent of the new hotel complex is 115.4 perches. And also it has planned to construct a new hotel in a vacant area. This proposed location is also situated about 200m away from the beach line. There are no lighthouses, religious places, historically or archeologically significant places situated in close vicinity of the project location. Further, the shadow of the proposed high-rise building will not cover the external areas of the hotel premises due to the availability of the large extent of the land for the project. Therefore, it is seemingly evident that there is no possibility for the existing scenic beauty or the aesthetic view of the area to be impaired or obstructed due to the new project.

2.3.6 DETAILS OF PHASED IMPLEMENTATION PLAN

2.3.6.1 PHASED IMPLEMENTATION SCHEDULE

No phased implementation has been envisaged.

2.3.6.2 ENVISAGED FUTURE EXPANSIONS

No future expansion is envisaged.

2.4 EVALUATION OF REASONABLE ALTERNATIVES

Despite the present economic downturn due to the COVID-19 pandemic, and the impacts of the Easter Sunday Attacks, Sri Lanka had been performing very well in tourism growth since the end of the war. This has resulted in the growth of the tourism service sector on all the coastal belts of Sri Lanka. The resultant rise in disposable income and localized economic activity is creating demand for high-end residential offerings along the picturesque coastline. Whilst the COVID-19 pandemic has resulted in a global dip in

tourism, due to travel restrictions, once travel restrictions lift there will be a need to meet the demands that were forecasted and required before the onset of the pandemic.

2.5 FINANCIAL COMMITMENTS

It is estimated that total investment would be LKR 15.3 billion (USD 70 Million), which will be part-internally funded by Damro Leisure (Pvt) Ltd and part borrowed-financed as per **Table 2.26**. Below.

A budgetary allocation of LKR. 1,000,000/- has been allocated for the implementation of the Environmental Management Plan during the construction period with a contingency budget allowance for a further LKR. 5,000,000/- for potential impact mitigation measures should such become necessary.

Table 2-26: Project Financial Allocations

Proposed Financing Information for the Project

Financing Method	Total Amount (In USD)
Share Capital	
Foreign	$
Local	$ 5,500,000
Loan/Debt Capital	
Foreign	$
Local	$ 26,500,000
Other Sources	$ 38,000,000
Total	$ 70,000,000

Type of Financing	Total Amount (In USD)
Own Financing	$ 43,500,000
Borrowed Financing	$ 26,500,000

Proposed Cost Estimates for the Project

Cost Items	Cost (In USD)
a . Land (based on current market value)	$ 10,500,000
b. Construction	$ 45,750,000
c. Equipment and Machinery	$ 6,870,000
d. Other (Fixtures/ furniture/ etc.)	$ 1,380,000
e. Estimated Capitalized Interest on Costs (If applicable)	$ 5,500,000
Total Investment	$ 70,000,000

3 DESCRIPTION OF EXISTING ENVIRONMENT OF THE STUDY AREA

3.1 PHYSICAL FEATURES

3.1.1 TOPOGRAPHY

3.1.2 GEOLOGY/SOIL CONDITIONS

The island of Sri Lanka consists of crystalline and foliated metamorphic rocks of Pre-Cambrian age Geologically, the Colombo area belongs to the Wanni series as shown in **Figure 3.1**.

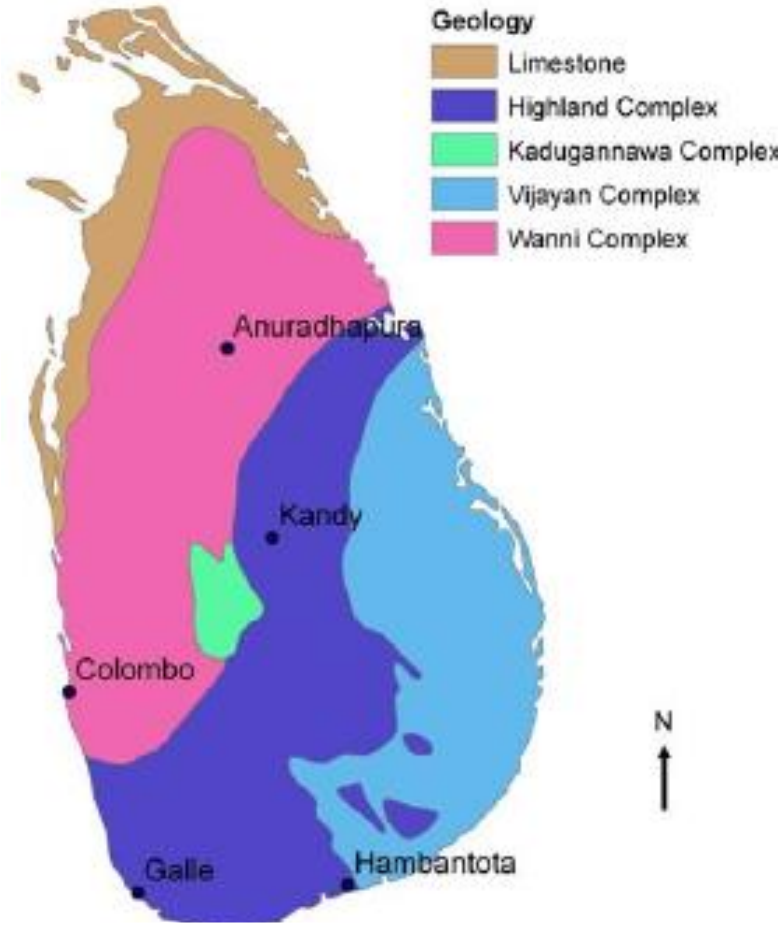


Figure 3.1:: Geology Map of Sri Lanka

3.1.2.1 GENERAL GEOLOGY OF THE AREA

The proposed development site is located in Colombo, in the Western coastal part of Sri Lanka According to geo-morphological Units as per **Figure 3.2** below, the area has been categorized as a Low-planation surface, with fewer Inselbergs and more soil cover with Charnokite and Charnockitic gneiss. It consists of

a few peat bogs. The project area mainly comprises sandy soil in outer layers and weathered rock underneath.

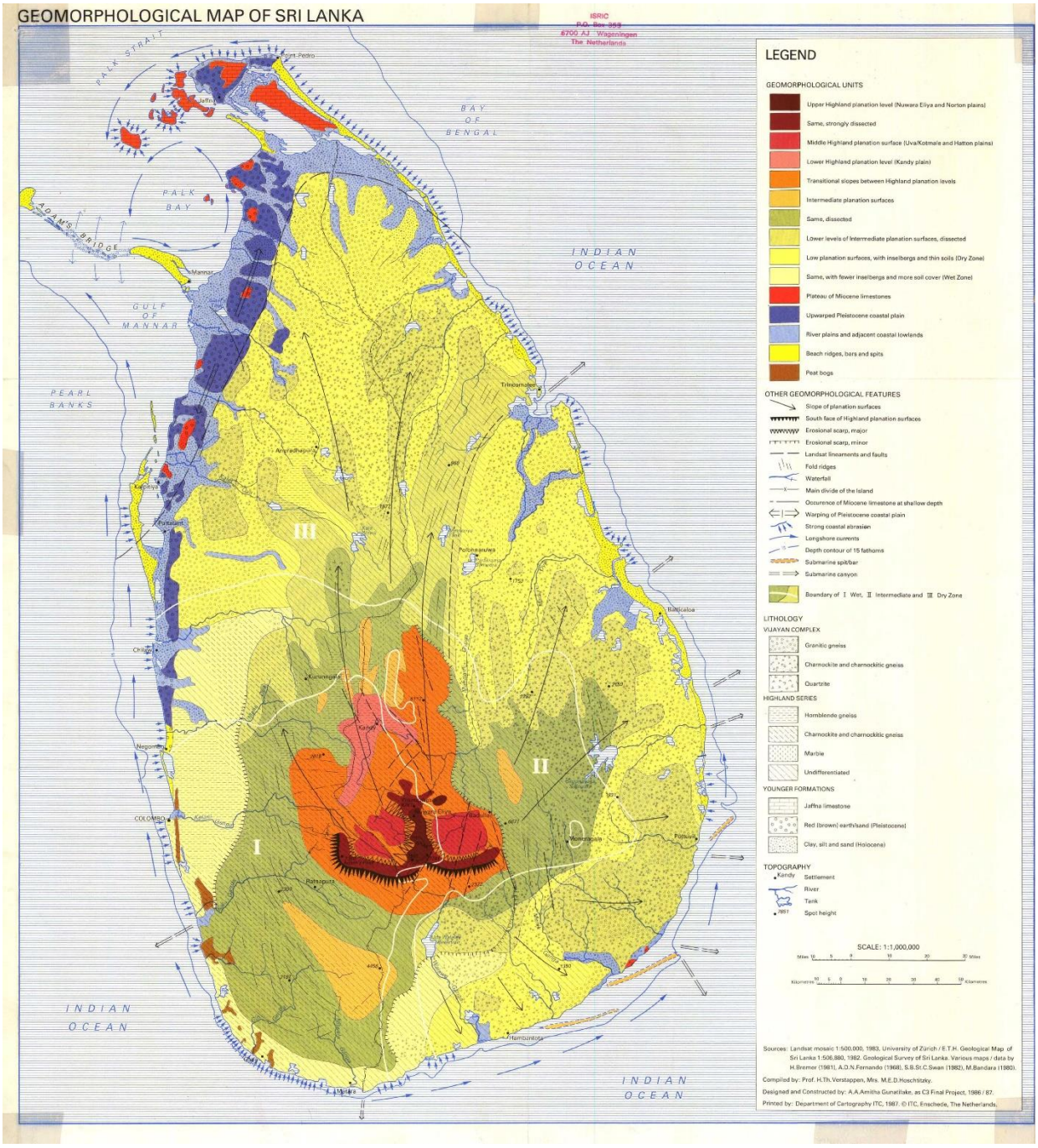


Figure 3.2:: Geomorphological Map of Sri Lanka, Source: Joint Research Centre European Soil Data Centre (1987)

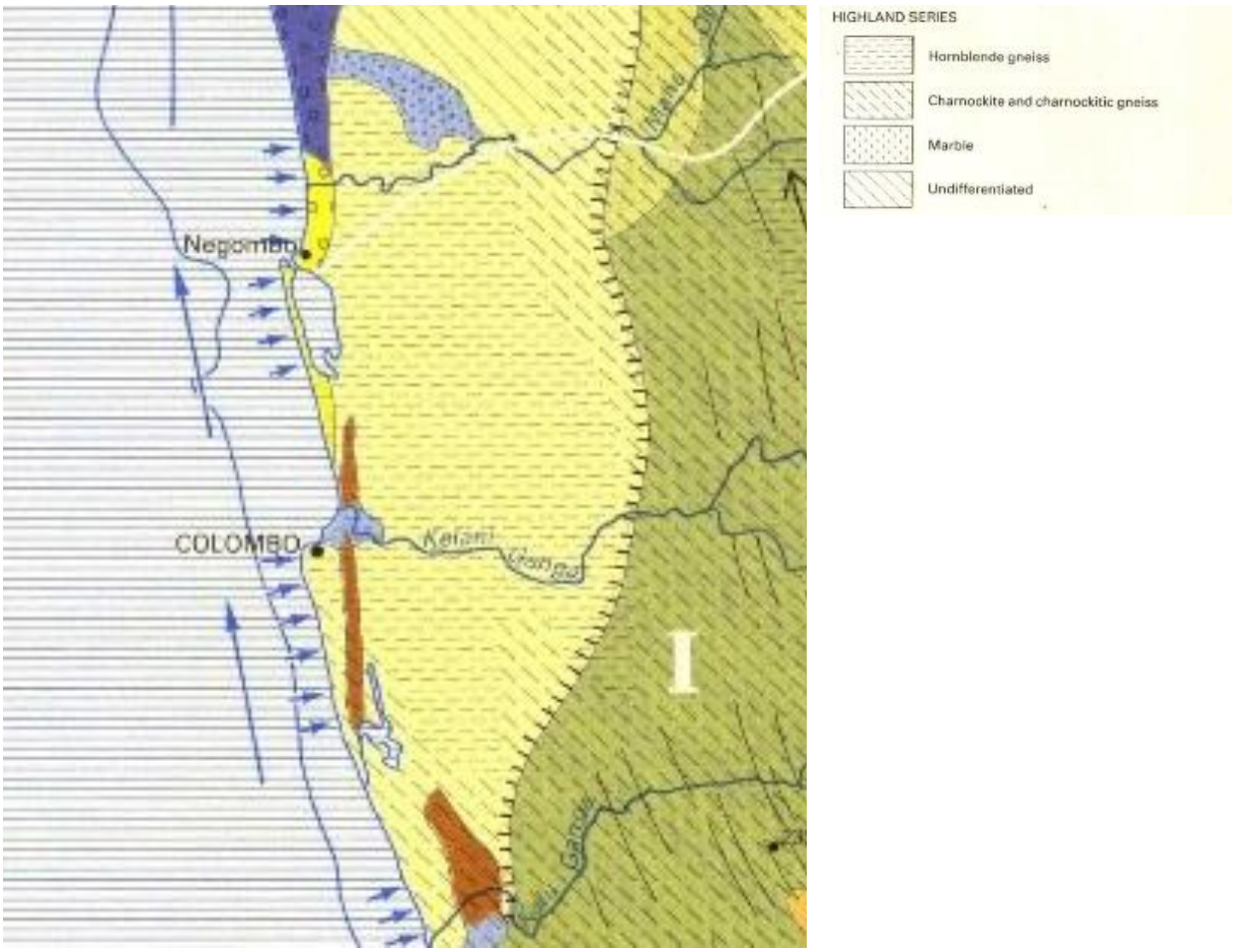


Figure 3.3: Extract of Geomorphological Map of Sri Lanka in the project area

3.1.2.2 SOIL TYPES / SOIL PROFILE

The proposed development comprises 46 levels as well as the ground floor and 3 basement levels which will be located on a sloping terrain from the western to the eastern direction. Therefore, it is essential to see the soil profile variation up to the rock level as a requirement of designing a foundation.

Four boreholes were advanced up to the hard rock. The borehole logs confirm that the topsoil is a fill of 0.4-0.9m depth with building debris. The next layers are loose silty sand to very dense silty sand up to about 16-17m depth. With the next 8-10m depth, the basement rock is encountered.

This building falls on “Geotechnical Category 3” according to EC7 due to its height and will require dynamic analysis during structural design. The geotechnical investigation report gives design parameters sufficient only for static analysis for structures that fall into “Geotechnical Category 2”. Therefore, a full-scale pile load test is recommended by the Geotechnical Consultant to verify the appropriate design parameters of rock mass in designing pile foundation.

The client has already attended to this and Structural Engineers have interpreted the test results for their design calculations.

The Geotechnical Investigation Report is given in **ANNEX VIII**.

3.1.3 LAND USE

The area is predominantly residential with a ribbon type commercial development. Along Galle Road, which is one of the major roads in the area, some new commercial development has also taken place in various parts of the area. According to the Urban Development Authority, the various types of land uses in the Bamabalapitya municipality ward are as follows.

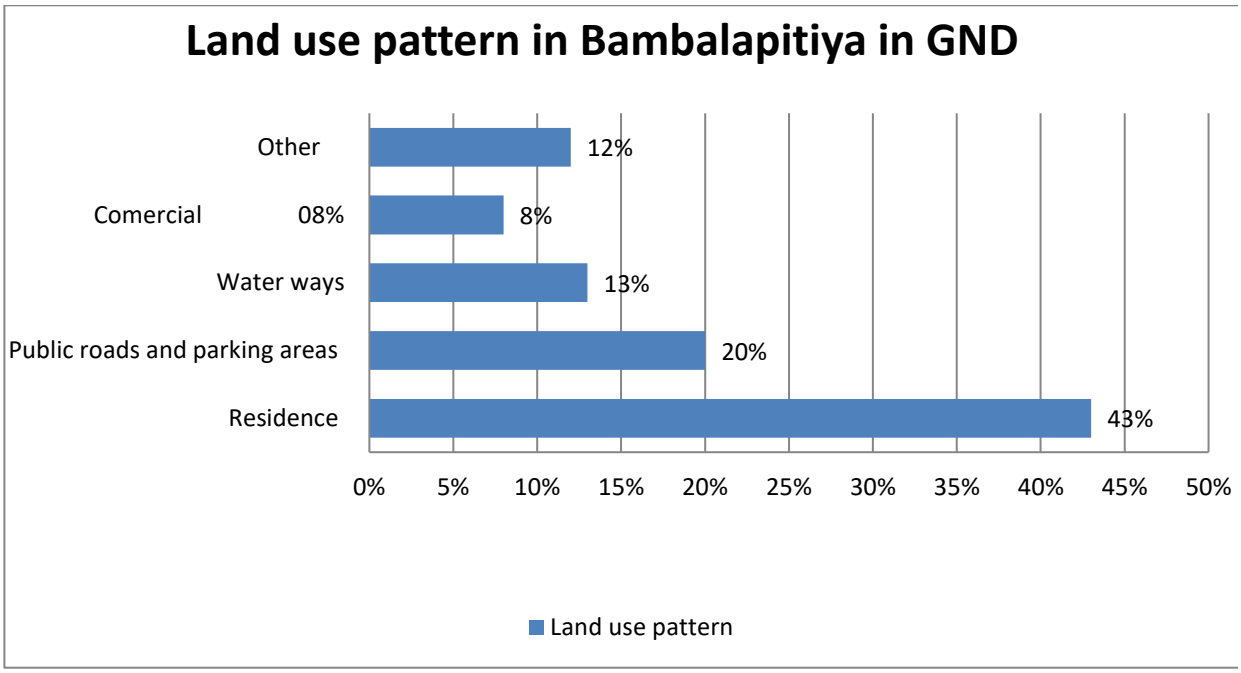


Figure 3.4: Land use pattern in Bambalapitaya Municipality Ward, Sources - Urban Development Authority, 2018

The above figure highlights that the land use pattern in the said area dominating the residential areas. This figure also shows that the future potential to develop housing and hotel facilities in this area.

3.1.3.1 PRESENT LAND USE OF THE AREA

Currently, over 43% of the land area have been used for residential purposes, and 20% is covered by roads and parking areas. Meanwhile, 08% of lands have been used for commercial purposes and the rest covered by waterways and others, etc.

Figure 3.5: Site Location, Adjacent to Existing Marino Beach Hotel Colombo

3.1.3.2 OTHER DEVELOPMENT PROJECTS ENVISAGED IN THE AREA / ZONING (IF ANY)

The proposed project area and the vicinity has been identified by the UDA and the CMC as high potential areas for commercial development, residential and recreational facilities within the Colombo municipality limits.

Under the Metropolitan Colombo, Strategic City Development Project (MCSCDP), many development initiatives have been introduced and among them, the following sub-project definitely will help to improve the infrastructure facilities and built up environmentally friendly and convenient backgrounds to live and enjoy in Bambalapitiya.

These proposed development initiatives could be summarized as flows.

1. Pedestrian Overhead Bridge from Kollupitiya to Bambalapitiya,
2. Walkability and parking improvements Kollupitiya to Bambalapitiya
3. Marine Drive Storm Water Drainage Improvement,
4. Improvement of the public convenience,
5. Improvement of roads in the city such as Galle road, Marine drive, R.A.de.Mel Mawatha and byroads etc.,

On the other hand, according to the Tourism Development Master Plan of the country, the government of Sri Lanka has planned to increase room capacities in star-grade hotels by 5000 before the end of the year 2020. Currently, the influx of foreign tourists to the country had been increasing rapidly up until the pandemic, with a slight dip in 2019 due to the Easter Bombings in April of 2019. Whilst, the demand was

present, there are limited spaces are available along the beach and Marine Drive in the city area of Colombo which are potential areas that could be used for the construction of star grade hotels. Thus, many newly built hotels and upcoming developments can be seen along this stretch of Colombo.

The above highlighted that the factors such as the development of infrastructure facilities and expanding the rooms' capacities by establishing new hotels are positive contributions to the government and private sector development projects in the metropolitan city area. Therefore, the proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city.

According to the amended Section No. 7.25 in CCDP 2008, the following factors have coincided with the construction of houses in the Bambalapitiya area.

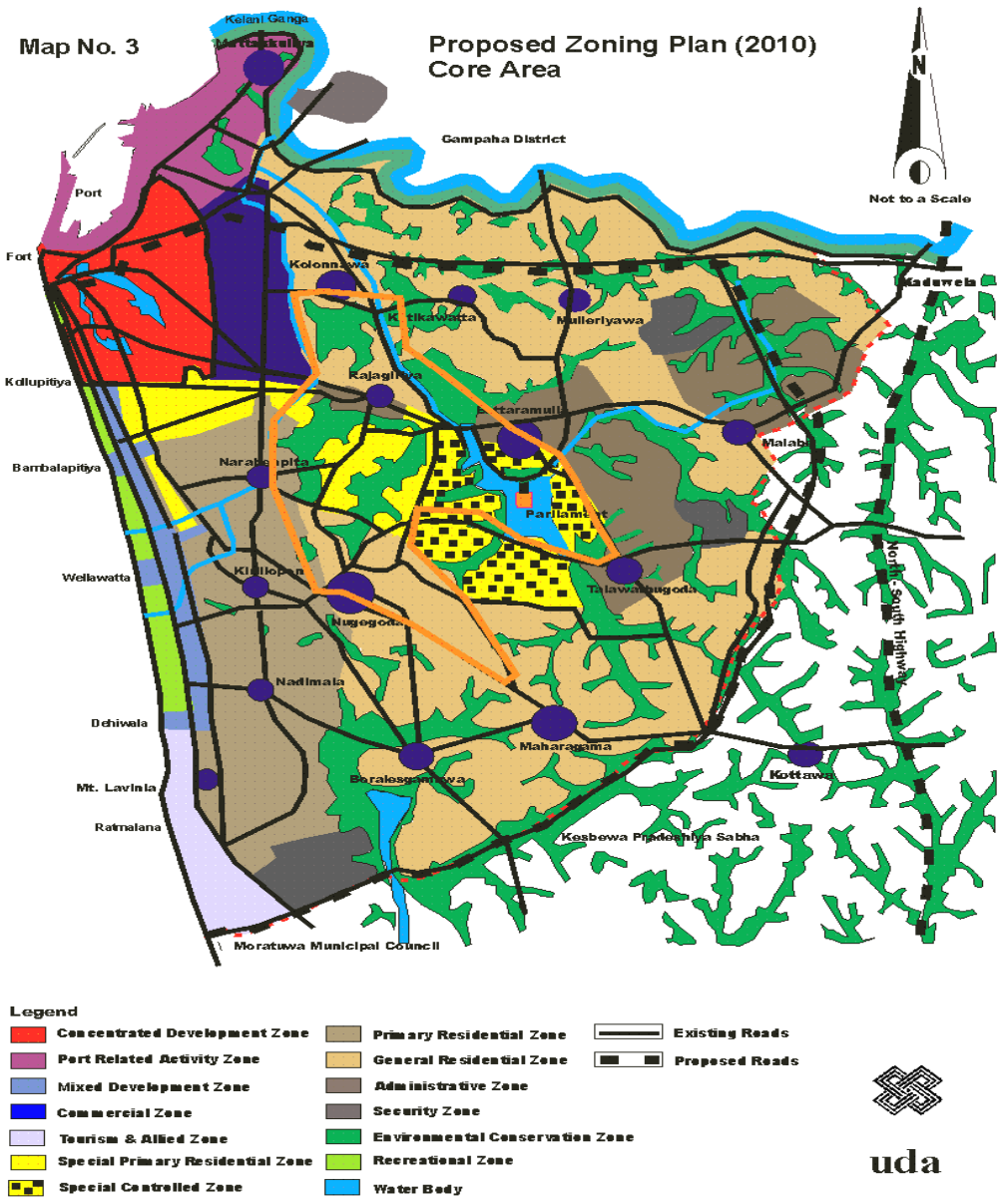
1. Residential development having a maximum of two units shall have a clear minimum width of 1.0 meter.
2. All other developments except condominium developments shall have a clear minimum width of 1.2 meters.
3. In Condominium Developments, the width of an entrance passage in any housing unit shall be not less than 1.5 meters.

3.1.3.2.1 ZONING

The Metropolitan Colombo Strategic City Planning Project (MCSCDP) with the collaboration of the Colombo Municipality Council (CMC) has been divided the city area into 14 strategic planning zones based on their features. The following map (**Figure 3.6**) shows the identified planning units in the CMC area, whereby the two identified planning units belonging to the vicinity (Bamabalaptiya) of the proposed project location is as follows,

1. Recreational areas
2. Commercial development area
3. Mixed development zone
4. Special Primary Residential zone

Accordingly, the proposed project area has been identified by the UDA and the CMC as a high potential residential area within the municipality limits. The proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city.



Each Zone will be detailed out by the Urban Design Guide Lines prepared under the Development Guide Plans. (Building & Planning Regulations 39)

Figure 3.6: Proposed Planning Zones in CMC area

3.1.4 HYDROLOGY

Colombo city area is located in the tropical climatic zone, receives significant rainfall. The area receives approximately 2,500 mm annual rainfall (**Figure 3.7**). The area receives rainfall both in South-West Monsoon (and North-East Monsoon and the inter-monsoonal periods. Long term monthly average rainfall in Colombo is given in **Figure 3.7**. The driest weather is in January-March.

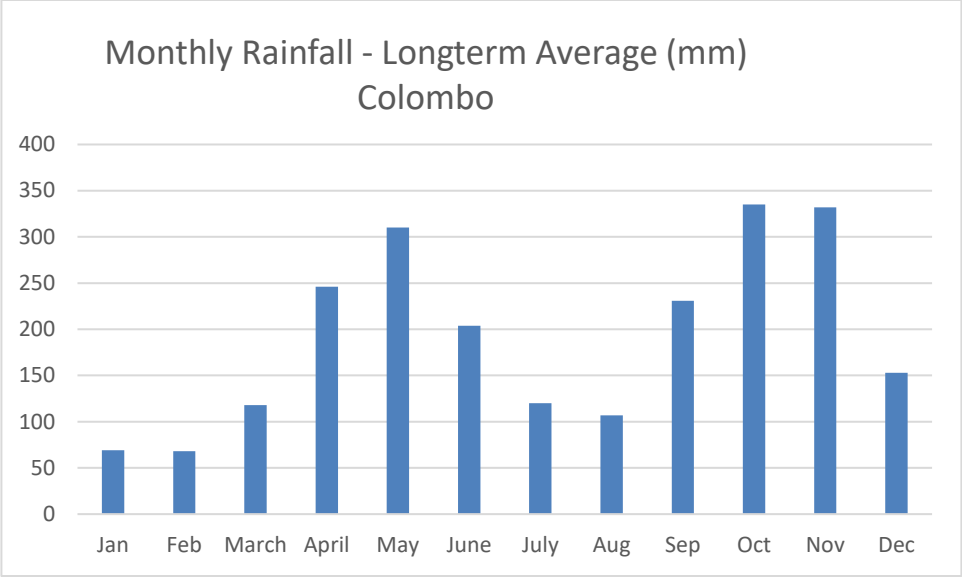


Figure 3.7: Monthly Rainfall – Long-term Average (Colombo), Source Hydrological Annual 2015/16, Irrigation Department

During the year, the variation of the average temperatures is shown in **Figure 3.8**. The maximum temperature of 32^{0}C records in April and the minimum temperature of 23^{0}C records in January. The average sunshine hours per day is between 7 and 9 (**Figure 3.8**).

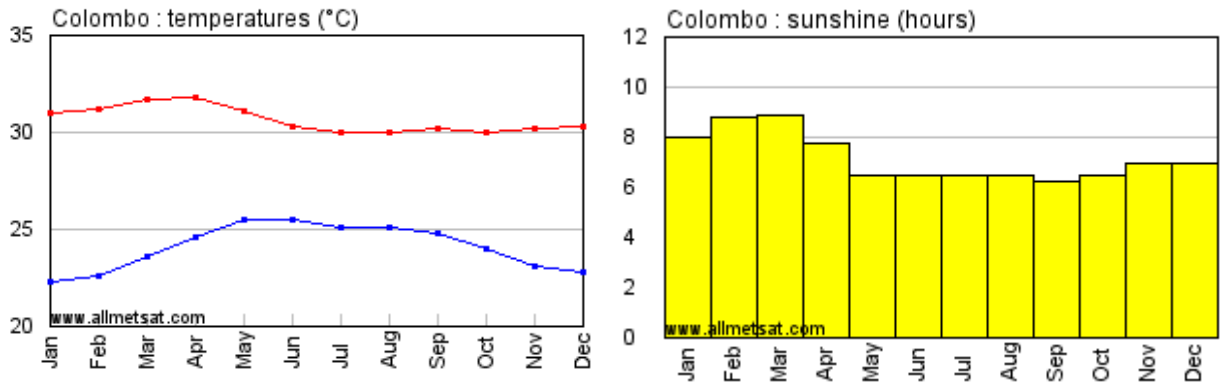


Figure 3.8: Annual Average Temperature (Max and Min) and Average Daily Sunshine Hours in Colombo

3.1.4.1 SURFACE DRAINAGE PATTERNS OF THE AREA

The project site is located in the Metro Colombo area. **Figure 3.9** shows the canal network of the Metro Colombo area. The project location lies about 2km North of the Wellawata Sea Outfall, and the area is free from drainage problems. At this location, the drainage takes a natural path towards the sea as the land is in the vicinity of the coastline.

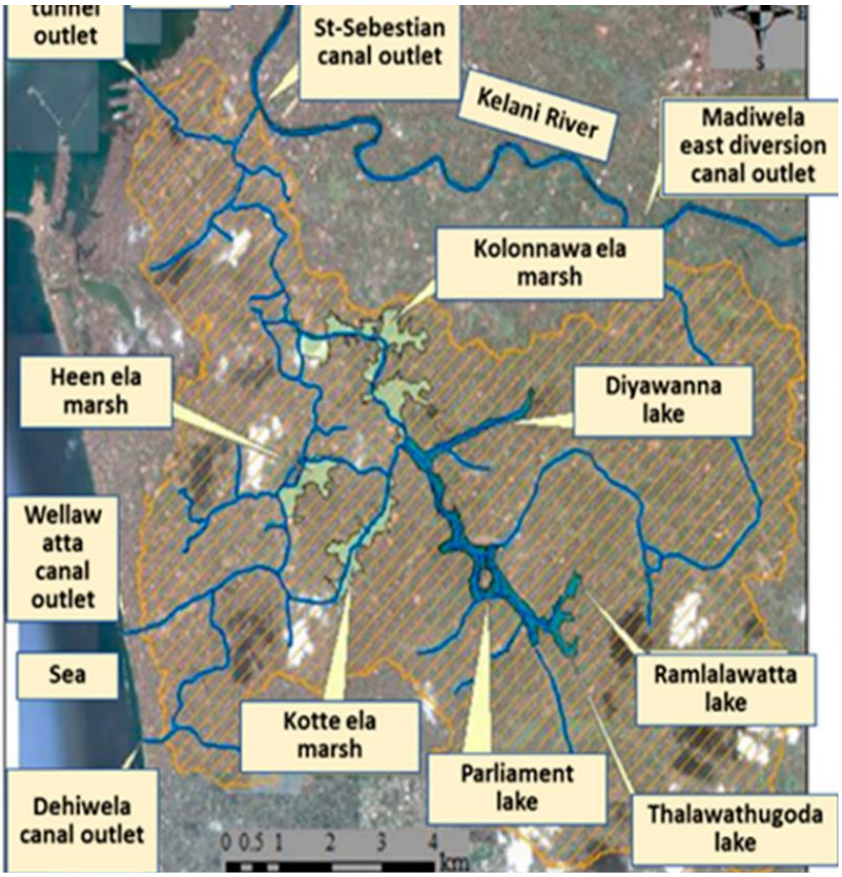


Figure 3.9:Metro Colombo Canal Network, Source: MDPI (2017)

3.1.4.2 Present Use Of Ground Water, Ground Water Quality and Ground Water Levels

Groundwater at the development site is not being used for any activity currently. During the Geotechnical investigations (**ANNEX VIII)**, it was observed that the groundwater level varies around 4- 5m below the existing ground level.

At the three boreholes, groundwater levels have been observed at the following levels

- BH 01- 2.8m
- BH 04-2.2m

The water sample collected at Borehole 02 has been tested for quality. The results were as follows.

- Average pH Value - 6.9 at 31.2 0C
- Chloride content - 53.175 mg Cl-/L
- Sulphate Content 21.4032 mg SO4 - 2/L

According to the above results, the groundwater sample shows almost neutral based on its pH value. Therefore, the corrosion effects due to groundwater acidity or alkalinity is not susceptible. Similarly, the chloride content and the sulphate content are well within the allowable limits.

3.1.5 NOISE INVENTORY OF EXISTING NOISE SOURCES AND NOISE LEVELS

A baseline study for noise level has been conducted at the site by NBRO in September 2020 (**ANNEX XII**). Sound level measurements have been carried out in accordance with ISO 1996 (part 1,2,3) and BS 4142;2014 as stipulated in National Noise Control Regulations stipulated under Extraordinary Gazette no. 924/12, 23rd May 1996 by CEA. During investigations, it was noted that road and vehicular noise, as well as noise from nearby construction sites, and sea breeze were the main contributors to daytime noise levels.

Noise levels have been measured at four locations, whereby the measured Noise level (Leq), ie equivalent continuous baseline noise level over the measuring period is noted as varying from 64 to 77, while background noise level, that is, "equivalent continuous baseline noise level over the 90% measuring period" had been varied from 62- 71 at the four locations.

The NBRO report concluded that the noise level during the construction period should be lower than the following maximum permissible level stipulated under Section 4.6 in Extraordinary Gazette no. 924/12, 23rd May 1996 by CEA, are as follows;

- 75 dB leq (A) during daytime
- 50 dB leq (A) during nighttime

3.1.6 AIR QUALITY

At the request of the developer, NBRO has conducted a study on "Total suspended particulate matter (TSPM) at the site on 20th October 2020 (**ANNEX XII**). Two locations have been selected in the western boundary and eastern boundary of the site for measurements. The results will be used as the baseline for air quality level concerning Total Suspended Particulate Matter (TSPM) at the site.

3.2 COASTAL FEATURES (ENVIRONMENT)

The site location is over 120m away from the coastal MSL and therefore is in the 300m coastal zone but not directly related to it. The PVL is highly built up and has erosion prevention barriers along the seashore, with a Railroad, Marine Drive and several buildings located in between the seashore and the project site.

The bathymetry of the seafloor in the nearshore region off Colombo is gradually shelving and consists of a sandy sea bed interspersed with granite rock formations. Several reef formations are evident in this nearshore region which runs parallel to the coastline at depths of 2-4m, 10-14m and 20-30m depth. The distance to the shore of these concentric reefs varies from 60m up to 1.2km in some places.

The reef formations consist of fractured granite layers with predominantly soft corals, leather corals and various species of sponges as well as various reef-associated marine species such as lobster, reef fish and commercially harvested fish varieties.

3.3 DETAILS OF DISASTERS

The most frequent disaster reported in the proposed project area is coastal erosion. However, comparatively, Bambalapitiya GND has fewer disaster effects. The main reason behind this situation is the

geographical setting of the area. As a result, the Indian Ocean - Tsunami that hit our island in 2004 is considered one of the most horrible historical disasters.

However, the common disasters in the area are floods and coastal erosion.

3.3.1 COASTAL EROSION

Coastal erosion is one of the major disasters occurring gradually in the nearby area of the sea. In addition to natural factors, man-made factors have also affected coastal erosion. Among these, the constructions especially hotels and related compounds are the main effects that could be identified as the main reasons for the coastal erosion. However, the Coastal Conservation Department has established a set of norms and regulations to minimize the negative effects on natural coasts in the country.

3.4 ECOLOGICAL RESOURCES

The study site is located in the Centre of Colombo, the economic capital of Sri Lanka. The environment of the proposed site is located in the area between Marine Drive and Galle Road in Colombo 03. The land ends up 100m away from the coast and is demarcated by the Marine Drive next to the railway that extends from Colombo to Beliaththa.

The proposed hotel site is situated next to the Marino Mall complex which also houses the existing Marino Beach Hotel, and the land is barren with a few floristic species.

All surrounding landscapes are invaded by anthropogenic activities, investiture, and buildings. The entire coastal stretch is also used by communal activities such as tourism and leisure activities by local people. Most of the area is famous for tourism and economic activities such as business meetings, and conferences. Due to the closeness to Colombo, this area is highly attracted by both local and foreign tourists. There are hundreds of hotels and guesthouses of all sizes and standards, which provide accommodation and coastal entertainment activities, leisure activities in this area. Since the area is heavily being used for tourism and other related commercial activities for many decades, the natural environment has been highly altered, changed, and is under heavy anthropogenic influences. All such natural ecological components, except for the sea, exhibit signs of anthropogenic pressure in different degrees.

Components of marine ecosystems including the shallow coast which then continue to the deep Indian Ocean. The beach stretch is relatively healthy and protected from sea waves by protective structures in some places. The reef formations in the near shore area consist of fractured granite layers with predominantly soft corals, leather corals and various species of sponges as well as various reef-associated marine species such as lobster, reef fish and commercially harvested fish varieties.

It was also evident that pollution from other areas causes degradation of the beach environment especially due to plastic pollution where many rubble, plastic wastes, and other debris accumulates on the beach.

Most of the plants and animal species found in the premises are common to the wet zone in Sri Lanka. Some common vegetation found on the beach including *Pandunus* (Wetakeyya) and coconut trees. Parts of the sandy beach sometimes is covered by runners of *Ipomea* (Bim thamburu).

3.4.1 FAUNAL SURVEY

The shallow coast is home to many invertebrates and vertebrates such as various molluscs, insects, and fish. Bare lands with vegetation are found to be accommodated butterflies, dragonflies with many species of vertebrates that include reptiles, birds, and mammals.

This area is highly urbanized as this proposed project is in the economic capital of Sri Lanka. The area is covered with buildings and the number of trees and available habitats for terrestrial animals are very rare. Few butterfly species are found in the habitat and the common ones include *Euploea core*, *Pachliopta hector*, *Eurema hecabe*, and *Leptosia nina.*

Several bird species are found in the habitat and the common birds include *Accipiter badius* (Shikra). *Haliastur indus* (Brahminy Kite), *Columba livia* (Rock Pigeon), *Sterna hirundo* (Common Tern), *Turdoides affinis* (Yellow-billed Babbler), *Passer domesticus* (House Sparrow), *Pycnonotus cafer* (Red-vented Bulbul) and *Acridotheres tristis* (Common Myna). Out of all bird species both House Crow and Rock pigeons have the highest abundance. The Green Turtle has been recorded in this area but due to the human influences and marine pollution in the area, the available habitats for turtles are very low.

Marine pelagic habitats are rich in biodiversity. The primary producers include algae, diatoms, and dinoflagellates. Marine food webs are rich in zooplanktons namely larvae of crustaceans, molluscs as well as tiny floating crustaceans such as copepods. The pelagic waters are home to some invertebrates (molluscs, crustaceans) as well as vertebrates (fish and turtles).

3.4.2 FLORAL SURVEY

Most of the plants and animal species found in the premises are common in the wet zone of Sri Lanka. Some common vegetation found on the beach including *Pandunus* sp. (Wetakeyya), *Terminalia catappa* (Kottan), and *Coccus nucifera* (coconut). Parts of the beach are covered by the *Ipomea* species (Bim Thamburu).

3.4.3 ECOLOGICAL ASSESSMENT

3.4.3.1 STUDY METHODOLOGIES

The status of the terrestrial flora and fauna of the study area was determined by a rapid biodiversity assessment covering terrestrial and aquatic ecological habitats was carried out in the project area and surrounded the area. The field studies were mainly carried out during the daytime, but indirect observations too were taken into consideration, especially concerning the fauna, to cover overall species diversity in to prepare a detailed species inventory.

The direct observations were carried out to record biodiversity by adopting the line transect method. Besides, data and information were sought using recently published papers and reliable unpublished records. Relevant secondary information was also collected through discussions with the community in the area.

3.4.3.2 FAUNAL DIVERSITY

The results of the faunal survey reveal that the area under the study consists of common faunal species that are found in the wet zone of the country which is presented in **Table 3.1**. The area hosts both invertebrates and vertebrates. However, this area hosts few near threatened and endangered animals.

Invertebrates found in the project site and the surroundings were dominated by butterflies where no endemics were encountered. There were several species of reptiles, birds, and mammals yet again all of them were indigenous species.

Table 3-1: Faunal Species Recorded In The Study

Butterflies					
No	Family	Scientific Name	Common Name	Species Status	National Conservation Status
1	Nymphalidae	*Euploea core*	Common crow	Indigenous	LC
2	Papilionidae	*Pachliopta hector*	Crimson rose	Indigenous	LC
3	Pieridae	*Eurema hecabe*	Common grass yellow	Indigenous	LC
		Leptosia nina	Psyche	Indigenous	LC
Reptiles					
No	Family	Scientific Name	Common Name	Species Status	National Conservation Status
1	Cheloniidae	*Chelonia mydas*	Green sea turtle	Indigenous	Endangered
2	Agamidae	*Calotes calotes*	Green garden lizard	Indigenous	LC
		Calotes versicolor	Common garden lizard	Indigenous	LC
3	Gekkonidae	*Hemidactylus frenatus*	Common house-gecko	Indigenous	LC
4	Scincidae	*Eutropis carinata*	Common skink	Indigenous	LC
5	Varanidae	*Varanus bengalensis*	Land monitor	Indigenous	LC
		Varanus salvator	Water monitor	Indigenous	LC
6	Colubridae	*Ptyas mucosa*	Rat snake	Indigenous	LC
7	Elapidae	*Naja naja*	Indian cobra	Indigenous	LC
8	Viperidae	*Daboia russelii*	Russell's viper	Indigenous	LC
Birds					
No	Family	Scientific Name	Common Name	Species Status	National Conservation Status
1	Accipitridae	*Accipiter badius* (Gmelin, 1788)	Shikra	BR	LC
		Haliastur indus (Boddaert, 1783)	Brahminy Kite	BR	LC
2	Alcedinidae	*Alcedo atthis* (Linnaeus, 1758)	Common Kingfisher	BR	LC

3	Charadriidae	*Vanellus indicus* Boddaert, 1783	Red-wattled Lapwing	BR	LC
4	Columbidae	*Columba livia* Gmelin, 1789	Rock Pigeon/ Rock Dove	BR	LC
		Spilopelia suratensis (Gmelin, 1789)	Spotted Dove/ Western Spotted Dove	BR	LC
5	Corvidae	*Corvus splendens* Vieillot, 1817	House Crow	BR	LC
6	Cuculidae	*Eudynamys scolopaceus* (Linnaeus, 1758)	Asian Koel/ Western Koel	BR	LC
7	Dicaeidae	*Dicaeum agile* (Tickell, 1833)	Thick-billed Flowerpecker	BR	NT
		Dicaeum erythrorhynchos (Latham, 1790)	Pale-billed Flowerpecker	BR	LC
8	Dicruridae	*Dicrurus caerulescens* (Linnaeus, 1758)	White-bellied Drongo	BR	LC
9	Estrildidae	*Lonchura punctulata* (Linnaeus, 1758)	Scaly-breasted Munia	BR	LC
		Lonchura striata (Linnaus, 1766)	White-rumped Munia	BR	LC
10	Laridae	Chlidonias *hybrida* (Pallas, 1811)	Whiskered Tern	M	LC
		Hydroprogne caspia Pallas, 1770	Caspian Tern	BR & M	LC
		Sterna hirundo Linnaeus, 1758	Common Tern	BR & M	LC
11	Leiotrichidae	*Turdoides affinis* (Jerdon, 1845)	Yellow-billed Babbler	BR	LC
12	Meropidae	*Merops philippinus* Linnaeus, 1766	Blue-tailed Bee-eater	BR & M	LC
13	Monarchidae	*Terpsiphone paradisi* (Linnaeus, 1758)	Asian Paradise-flycatcher	BR & M	LC
14	Nectariniidae	*Cinnyris asiaticus* (Latham, 1790)	Purple Sunbird	BR	LC
		Cinnyris lotenius (Linnaeus, 1766)	Loten's Sunbird	BR	LC
15	Passeridae	*Passer domesticus* (Linnaeus, 1758)	House Sparrow	BR	LC
16	Pelecanidae	*Pelecanus philippensis* Gmelin, 1789	Spot-billed Pelican	BR	LC
17	Picidae	*Dinopium psarodes* (Lichtenstein, 1793)	Sri Lanka Lesser Flameback	E	LC
18	Pittidae	*Pitta brachyura* (Linnaeus, 1766)	Indian Pitta	M	LC

19	Psittacidae	*Psittacula krameri* (Scopoli, 1769)	Rose-ringed Parakeet	BR	LC
20	Pycnonotidae	*Pycnonotus cafer* (Linnaeus, 1766)	Red-vented Bulbul	BR	LC
		Pycnonotus luteolus (Lesson, 1841)	White-browed Bulbul	BR	LC
21	Rallidae	*Zapornia fusca* (Linnaeus, 1766)	Ruddy-breasted Crake	BR & M	VU
22	Sturnidae	*Acridotheres tristis* (Linnaeus, 1766)	Common Myna	BR	LC
Mammals					
No	Family	Scientific Name	Common Name	Species Status	National Conservation Status
1	Soricidae	*Suncus murinus*	Common musk shrew	Indigenous	LC
		Megaderma spasma	Long-eared vampire bat	Indigenous	NT
2	Pteropodidae	*Rousettus leschenaulti*	Fulvous fruit bat	Indigenous	LC
		Pteropus giganteus	Indian flying fox	Indigenous	LC
3	Canidae	*Canis aureus*	Jackal	Indigenous	LC
4	Felidae	*Prionailurus viverrinus*	Fishing cat	Indigenous	VU
5	Herpestidae	*Herpestes edwardsii*	Grey mongoose	Indigenous	LC
6	Viverridae	*Paradoxurus hermaphoditus*	Palm civet	Indigenous	LC
7	Muridae	*Bandicota bengalensis*	Mole rat	Indigenous	LC
		Bandicota indica	Malabar bandicoot	Indigenous	LC
		Rattus rattus	Common rat	Indigenous	LC
8	Sciuridae	*Funambulus palmarum*	Palm squirrel	Indigenous	LC

Table 3-2: Summary Of The Fauna Of The Study Site

Faunal Group	Total number of recorded species	Number of endemic species	Status of the Species	Number of invasive species	Number of endangered species	Number of near-threatened species	Number of Vulnerable species
Invertebrates							
Butterflies	4	None	Indigenous	None	None	None	None
Vertebrates							
Reptiles	10	None	Indigenous	None	1	None	None
Birds	30	1	Indigenous	None	None	1	1

Mammals	12	None	Indigenous	None	None	1	1

Abbreviations:
BR- Breeding resident
M- Migratory
E- Endemic
LC – Least Concerned
NT – Near Threatened
VU – Vulnerable In

In addition to the above species, a few amphibians were recorded as sporadic and they too were rare.

The study area is in the western margin of the country and is adjacent to the Indian Ocean. There is a possibility to have migratory pathways of the birds over this land due to the human disturbances these migratory pathways have changed over a period. During the study period of the rapid biodiversity survey, there was no bird migration has been identified.

There were invertebrates as well as vertebrates in the study site.

Invertebrates were represented by mainly insects and butterflies. Following are recorded butterfly species; *Euploea core*, *Pachliopta hector*, *Eurema hecabe*, and *Leptosia nina* All of the butterfly species recorded are indigenous species and were very common in abandoned lands.

Among vertebrates, birds were the dominant faunal species recorded from the area and the following includes the most common birds: *Accipiter badius* (Shikra). *Haliastur indus* (Brahminy Kite), *Columba livia* (RockPigeon), *Sterna hirundo* (Common Tern), *Turdoides affinis* (Yellow-billed Babbler), *Passer domesticus* (House Sparrow), *Pycnonotus cafer* (Red-vented Bulbul) and *Acridotheres tristis* (Common Myna). The House Crow and the Rock Pigeons showed the relatively highest number of abundances. All are breeding residents and *Merops philippinus (*Blue-tailed Bee-eater), *Pitta brachyura* (Indian Pitta), *Zapornia fusca* (Ruddy-breasted Crake), *Terpsiphone paradisi* (Asian Paradise Flycatcher), *Sterna hirundo* (Common Tern), *Hydroprogne caspia* (Caspian Tern), *Chlidonias hybrida* (Whiskered Tern) recorded as winter visitors (Migrants). The *Dicaeum agile* (Thick-billed Flowerpecker) observed in the study area is under the near-threatened category while *Zapornia fusca* (Ruddy-breasted Crake) is under the vulnerable category according to the national conservation status. There were Green Turtles have been recorded in the area but due to direct human disturbances such as marine pollution, sound and light pollution the activity of the turtles has been declined. Some common reptiles can be observed in the wet zone such as *Calotes versicolor* (Common garden lizard), *Hemidactylus frenatus* (Common house gecko), and *Ptyas mucosa* (Rat Snake) Mammals were also recorded but they were not very common due to the urbanized landscape structures.

3.4.3.3 FLORISTIC DIVERSITY

The floristic survey mainly concentrated on the identification of higher plants in the project site and surrounded area. To determine the floristic diversity of the area, a direct recording method was used. Observed floral species were identified using descriptions and keys published in “Handbook to the flora

of Ceylon" and the conservation status of species was assessed according to the Red List of the Threatened Fauna and Flora of Sri Lanka (IUCN and Ministry of Environment, 2012) and Wijesundara et al., (2012).

The study location is highly urbanized, and the amount of tree cover is very less. There were only a few species of trees were recorded and all of them were indigenous.

Table 3-3: Recorded Floral Species In The Study

Family	Species	Common Name	Status	National Conservation Status
Apocynaceae	*Pandunus*	Wetakeyya	Indigenous	LC
Asteraceae	*Vernonia cinerea*	Monara Kudumbiya	Indigenous	LC
Clusiaceae	*Calophyllum inophyllitm*	Domba	Indigenous	LC
Combretaceae	*Terminalia catappa*	Kottan	Indigenous	LC
Convolvulaceae	*Ipomoea pescaprae*	Mudu Bin Thamburu	Indigenous	LC

Abbreviations:

LC – Least Concerned

The project site, as well as the surroundings, do not represent a high diversity of plants and animals and if present, they represent the typical faunal and floral profile on the wet zone of Sri Lanka.

The structure and distribution of plants reflect high human pressure and disturbances during the past. The vegetation not only provides landscape characteristics in an area but also a home for almost all faunal species found in the area. However, with the construction of the buildings such as hotels and residences, this is a lack of large trees, bushes, shrubs. Therefore, floral diversity is considerably low in the area (**Table 3.3**).

The vegetative structure is composed of species of different heights. Terminalia catappa (Kottan) and Calophyllum inophyllitm (Domba) is the only large tree species that were recorded on site. Climbers or Creepers are not common and only Ipomoea pes-caprae (Mudu Bin Thamburu) is recorded. Ipomoea creepers were one of the most common vegetation types on the beach and they were common along the transient line where the beach meets the land.

Apart from the isolated trees in the site, Pandunus sp. can be observed in the sea belt. However, these trees were not so common as the railway is located along the sea belt.

3.5 HISTORICAL AND ARCHAEOLOGICAL SIGNIFICANT SITES

The first Portuguese to arrive at Colombo Port almost by accident was Lourenco de Alameda in 1505. Since then, Colombo was under the influence and domination of the Portuguese till 1656. Subsequently, the Dutch occupied Colombo and other parts of Maritime Provinces of the country from 1656 to 1796, a

period of 140 years. Thirdly and finally, Colombo was captured by the British in the year 1796. The British dominated the country till 1948. For nearly five hundred years, the Colombo city area was under foreign influences.

In the past, so many establishments had been set up for the administration, religious purposes, livelihood, commercial and entertainments etc., by particular ruling parties and those establishments showed historical and archaeological values. In this study, only the historically or archaeologically significant sites situated within a 2km radius from the project location in the Bambalapitiya ward of the Colombo MC area for this study was considered.

3.5.1 LANDMARKS OR EVIDENCE OF HISTORIC, RELIGIOUS, ARCHAEOLOGICAL, SCIENTIFIC OR CULTURAL IMPORTANCE KNOWN TO BE WITHIN THE PROJECT AREA AND THE STUDY SITE

Except for Bambalapitiya Railways station and Kollupitiya post office no landmarks of archaeologically, religiously or historically important places are situated in the close vicinity. Therefore, no negative impacts could be predicted on significant or valuable places in the area due to the new project.

3.5.2 STATUS OF THEIR CONSERVATION PROGRAMS (IF ANY)

Colombo is the Commercial Capital and one of the major cities in the country. Urban Development Authority (UDA) as the pioneer institution in urban development in the country has taken steps to conserve and manage the historical properties in Colombo by way of regulations and development projects along with the other stakeholders like the Department of Archaeology and Colombo Municipal Council. As there are archaeologically significant sites in Colombo city, the Ministry of Urban Development has taken initiatives to conserve and develop the city under the Metropolitan Strategic City Development Project. However, there are still many issues and challenges faced by the authorities in the conservation and management of historical properties in the context of urbanization and urban development.

3.6 SOCIAL AND ECONOMIC ENVIRONMENT

At present, the proposed project area for the new hotel complex is located in the Bambalapitiya Grama Niladari Division of the Thimbirigasyaya Divisional Secretary Division within the Colombo Municipality (CM) limits in Colombo district.

3.6.1 GENERAL SOCIO –ECONOMIC ASPECTS OF THE STUDY AREA

Bambalapitiya is a multi-religious and multi-ethnic area. The major ethnic communities in Bambalapitiya are Sinhalese. There are also three various minorities as Burghers, Tamils, Arab descendants, and others. Religions include Buddhism, Hinduism, and Islam, Christianity, and various other religions and beliefs to a lesser extent.

According to the historical evidence, in the early part of the 19th century, Colombo city was a "Green City". Each of its zones resembles a mini village, consisting of cinnamon or coconut plantations through which narrow cart roads ran. In colonial times, Mutwal, Hultsdorp, Grandpas, the Pettah, and Fort, in

Colombo, were the main urban residencies and business areas where leading citizens lived, loved, and traded.

In, the latter part of the 19th Century people had begun to move south towards Kollupitiya and Cinnamon Garden and even further to Slave Island, Bambalapitiya, Havelock Town, and Wallawatta. Real in all these small towns of Colombo started booming with the demand for land and housing.

3.6.1.1 POPULATION BY GENDER

Only 1457 house units are located in the vicinity of the proposed project area. The following table shows the population living in the study.

Table 3-4: Gender Composition of the Population, -Socio-economic Profile, Bambalapitiya, GND, year 2019

Gender compassion	Population	%
Male	3,813	48
Female	4,152	52
Total	7,965	100

Accordingly, a total of 7,965 inhabitants lives in 1457 house units in the Bambalapitiya GND where the proposed land parcel for the new project is located. The above table also shows that the gender composition of the population and the fact that the male population is slightly dominated by the female population.

3.6.1.2 POPULATION BY ETHNICITY

The following table shows the existing ethnic composition of the population in the Bambalapitiya Grama Niladhari division. These figures highlight that the multi-ethnic population is living in the vicinity of the proposed project area. The major ethnic group living in the area is Sinhalese, and Sri Lankan Moor and Tamil represent the second and third majority of the population receptively.

Table 3-5: Population by Ethnicity, Source-Socio-economic Profile, Bambalapitiya, GND, year 2019

Ethnicity	Population	%
Sinhalese	3,156	40
Moor	2,161	27
Sri Lankan Tamil	1,683	21
Indian Tamil	647	08
Other	318	04
Total	7,965	100

3.6.1.3 POPULATION BY RELIGIONS

The following table and figure show the existing religious composition of the population in the Bambalapitiya Grama Niladhari division.

Table 3-6: Population by Religions, Source-Socio-economic Profile, Bambalapitiya, GND, year 2019

Ethnicity	Population	%
Buddhists	2,628	33
Islam	2,389	30
Hindu	1,593	20
Roman Catholic	717	09
Christian	558	07
Other	80	01
Total	7,965	100

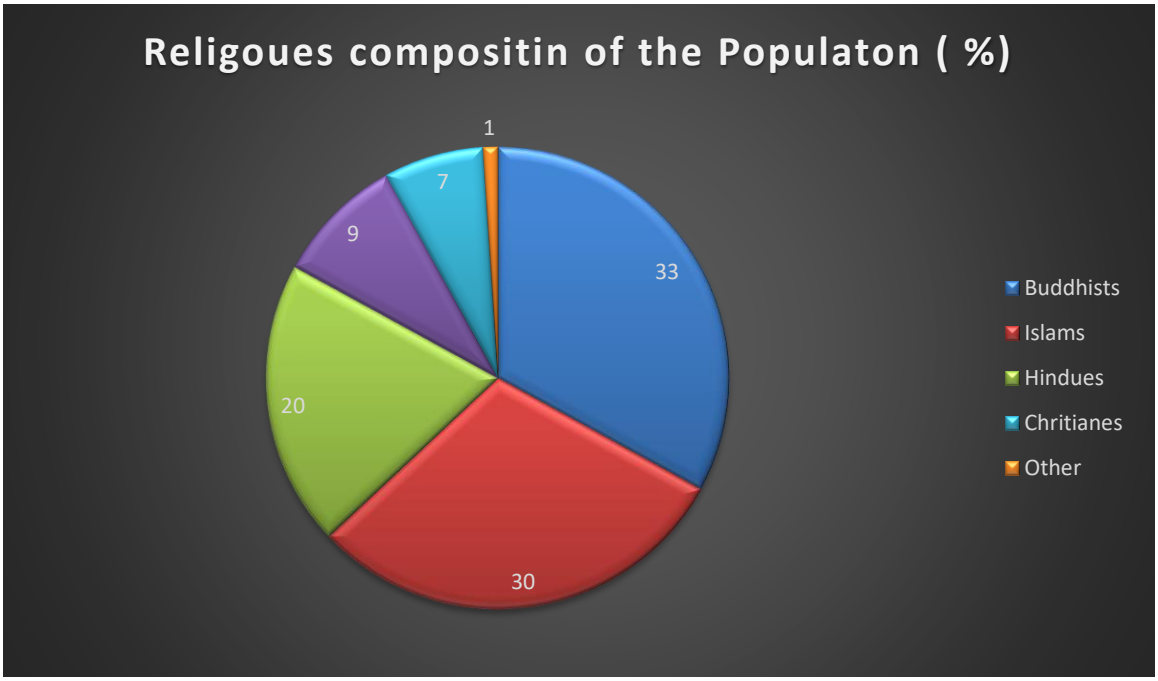


Figure 3.10: Population by Religions, Source-Socio-economic Profile, Bambalapitiya, GND, year 2019

Accordingly, the multi-religious population live in the Bambalapitiya GND. Based on this background multi-cultural rituals, norms and customs which are identically owned to the particular ethnoreligious groups could be observed in the study area.

3.6.2 URBAN /COMMERCIAL/RESIDENTIAL ACTIVITIES

Many lands adjoining to the proposed project location for the new hotel complex has been utilized for residential purpose and commercial establishments. The proposed site for the project is located adjacent to the 10th lane and it is situated between Galle Road and Marine Drive. The following table shows the type of housing unit structures using by dwellers in the Bambalapitiya GND.

Table 3-7: Housing units by type of structure, Socio-economic Profile, Bambalapitiya, GND, year 2019

Housing unit by structure	Number of HH units	%
Single one story	612	42
Single two story	423	29
Single 2+story	73	05
Attached house /Annex	15	01
Flats	58	04
Condominiums	130	09
Twin houses, line rooms and Shanties	146	10
Total	1457	100

Accordingly, out of 1457 householders, 1296 (89%) are living in house units which are contained more than one store. In addition, 13% of families are living in flats or condominiums in the study area. Meanwhile, 10% of families are living in shanties or line rooms. This analysis highlighted that the existing living conditions of the dwellers in this project area.

Bambalapitiya ward of the Colombo MC is one of the most convenient areas to live and engage in day to day activities of the inhabitants. Accordingly, the proposed project area has been identified by the UDA and the CMC as a high potential for commercial development, residential and recreational activities within the municipality limits. The proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city.

3.6.3 EXISTING INFRASTRUCTURE FACILITIES (ROADS/POWER/TELECOMMUNICATIONS)

3.6.3.1 ROADS

Access to the proposed project location is available from both entrances of the main roads. The main access road is available from the Colombo - Galle Road (A2) next to the existing fuel filling station which is located near the Marino Mall and it is a narrow road, whereby the other access road is available from Marine Drive via the 10th Lane (Circular Road) at Bambalapitiya. The Southern Railway Line also runs close to the project location parallel to Marine Drive along the coastal stretch. Tourists of the proposed hotel complex will benefit through the existing road facilities in the vicinity, and it will help them to reach the coastal line, markets, and other public and private utilities, etc., very easily.

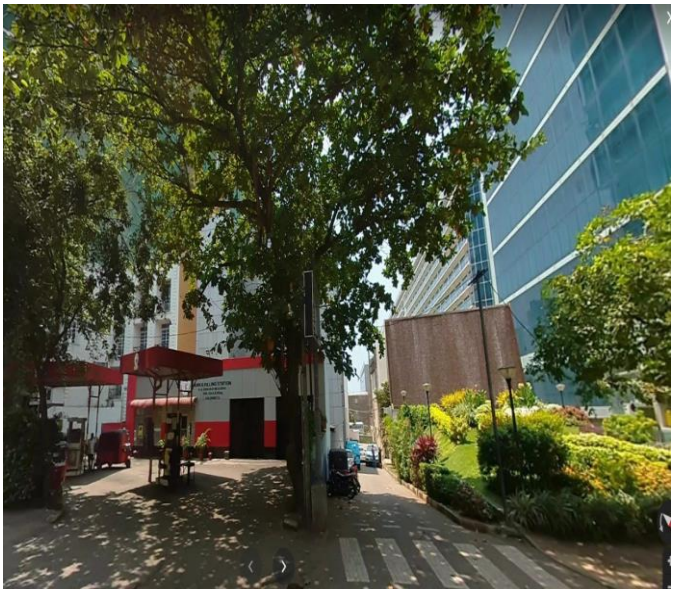


Figure 3.11: Entry Points to Project

3.6.3.2 TRANSPORTATION

Prospective tourists of the proposed hotel complex at Kollupitiya have an opportunity to use various kinds of transport facilities, such as buses, trains, privately owned vehicles, and hiring cabs and three-wheelers etc. The existing transport infrastructure in the vicinity provides an opportunity for the people to select their transport options according to their requirements and choices. The main Bus stand and Colombo Fort railway station are situated only 6km away from the project location and the closest railway station is situated 800m away from the proposed site at Bambalapitiya.

3.6.3.3 POWER SUPPLY

The majority of the households, institutions and commercial establishments are using electricity as the main energy source for lighting and other purposes. Gas is a commonly used domestic energy source for cooking purposes. In some localities, solar power is used for domestic purposes. For further information, refer to **Section 2.2.1**.

3.6.3.4 COMMUNICATION

Many dwellers use telephones as the main communication facility. The majority use mobile phones and some have landlines. Bambalapitiya and Kollupitiya Post offices are also situated in close proximity to the proposed project location.

3.6.3.5 PIPE BORN WATER SUPPLY FACILITIES

According to the available records of the Colombo Municipality Council, a great majority of dwellers and institutions have been connected to the common pipe water system managed by the National Water Supply and Drainage Board, as highlighted in **Section 2.2.1.6**. The proposed hotel complex also has an opportunity to connect to the existing water supply system and fulfil their domestic water supply requirement.

3.6.3.6 PIPE BORN WASTE WATER MANAGEMENT FACILITIES

The area proposed for the new hotel complex is situated within an area where pipe born sewerage facilities are available. Therefore, the proposed hotel complex has an opportunity to connect to the common sewerage pipe network managed by the Municipal Council. In addition, the proposed hotel has an opportunity to connect with stormwater pipelines of the proposed stormwater management project which will be implemented under the Metropolitan Colombo Strategic City Planning Project (MCSCDP) in near future.

3.6.4 SOCIO-ECONOMIC SENSITIVE AREAS (SCHOOLS, HOSPITALS, RESIDENTIAL AREAS)

The Colombo city area, including the study area, is a sensitive area for tourism, commercial, and residential activities. Also, The City area and the surrounding area are culturally and socially significant. Especially some religious places, schools, houses, and buildings used for various purposes are historically significant. Dutch and British architectural buildings could be seen yet. The following table shows the socially, economically, and culturally sensitive establishments situated within 2km radiuses from the project location respectively to the distances. Due to the nature of this project and the long distance from the project location, no negative impacts could be expected on these sensitive establishments.

On the other hand, the tourist who will occupy the proposed hotel during the project operational period will benefit from the proximity of the attractions in the surroundings of the hotel. According to historical accounts, all historically significant sites were established in the 19th and 20th Ccenturies. Among them, the majority were educational institutions.

Table 3-8: Socially, Economically and Culturally Sensitive Establishments In The Vicinity. Source: Field Study, Bambalapitiya August, 2020

Name of the place	Category	Tentative distance from the project location
University Collage House	Education	over1.5km
Mahanama Collage	Education	Over 18km
Thurston collage	Education	Over1.8km
Colombo Medical Collage	Education	Over 2km
Nawarangahala	Entertainment	Over 1.9km
Railway Station Bambalapitiya	Transport	Over 1km
Post Office, Kollupitiya	Communication	2km

However, the closest place which is historically significant was the Bambalapitiya Railway station and which is located over 1km away from the proposed project location. Therefore, no negative impacts could be expected on it due to the project. All other historically sensitive places were situated over 1.2.km away from the proposed project location for the hotel complex.

3.6.5 EXISTING ENVIRONMENTAL PROBLEMS AND ISSUES, AND ANY SOCIAL CULTURAL CONFLICTS THAT MAY HAVE BEARING ON THE PROJECT

3.6.5.1 EXISTING ENVIRONMENTAL PROBLEMS AND ISSUES

The following existing environmental issues were noted during the survey:

- Water Pollution due to Solid and Liquid Waste– It was observed that existing water bodies in the area have already been polluted by mixing with liquid and solid waste.
- Solid Waste Dumping – If the local authority has a regular mechanism to collect solid waste from the households, sometimes it could be seen garbage along the footpaths.
- Soil erosion – Various construction activities in the area are causing soil erosion.
- Coastal erosion – Various human activities in the area are causing soil erosion.

3.6.6 SOCIAL CONFLICTS THAT MAY HAVE A BEARING ON THE PROJECT POSSIBILITY OF CREATING SOCIAL CONFLICTS

The proposed land for the hotel project is situated in an area of human settlements and business establishments. During the construction period of the project, some construction impacts could be created. Vibration, sound pollution, air pollution due to dust generation and flowing, and increases traffic due to material transportation during the construction period will be the short-term impacts. Therefore, the project proponent should address these issues by using proper and standard construction and transportation mechanisms to mitigate those issues and to avoid social conflicts.

3.6.7 MAIN ECONOMIC ACTIVITIES IN THE AREA

3.6.7.1 EMPLOYMENT

The following table shows the existing employment pattern in the study area. The study area is located close to the commercial and tourism-based economic area and therefore the dweller's economic status arranged accordingly.

Table 3-9: Employment, Source: Socio-economic Profile, Bambalapitiya, GND, year 2019

Type of employment	Population	%
Employed	4,779	60
Unemployed	79	01
Economically Not active	3,107	39
Total	7,965	100

Accordingly, 60% of inhabitants living in the area are engaged in some kind of income generation activity. 39% of the inhabitants in the study area represent the economically inactive category and this group is dominated by children and/or elder populations and also housewives who are not engaged in income generation activities. However, those engaged in business and permanent employment opportunities

which are available in the private sector jobs with fixed monthly income are the dominant sources of income in the study area.

4 ASSESSMENT OF ANTICIPATED ENVIRONMENTAL IMPACTS

4.1 CONSTRUCTIONAL IMPACTS

4.1.1 ANTICIPATED IMPACTS DUE TO LAND PREPARATION ACTIVITIES

The 46-storied high-rise building is planned to be constructed on a site with a slight gradient of approximately 1.5m delineation towards the western (seashore) side.

4.1.1.1 DEMOLISHING OF EXISTING STRUCTURES AND REMOVAL OF DEBRIS.

Three buildings were previously situated on-site and have already been demolished and the resultant debris removed before the commencement of the Environmental Impact Assessment.

4.1.1.2 CUTTING AND SHORING OF EXCAVATION

The project consists of 03 basements that require earth retaining structure around the building to a depth of 10.1m. The general excavation depth is around 13m considering the 800mm thick slab.

Earth removal will take place to allow 3 basements and filling of the earth will be needed in the foundation. Hence disturbance to the soil will take place during removal of topsoil and foundation excavation, which includes a total soil excavations volume of 16350 m^3, and topsoil volume of 5450 m^3.

Out of the thus removed earth, suitable material will be used for filling the foundation and balance will be arranged to remove from the site. According to the soil investigations done there is a remote chance of re-using the excavated material for re-filling.

It is estimated that total soil excavations volume is approximated at 16350m^3 and topsoil volume is approximated at 5450m^3 which will be removed during foundation excavations. It is recommended to handle the excavated soil until it is fully disposed of without allowing it to generate dust during dry weather and soil erosion during rains.

A proper place for stacking needs to be identified by the contractor and the client. Removed material needs to be properly covered and remove out from the site on a priority basis.

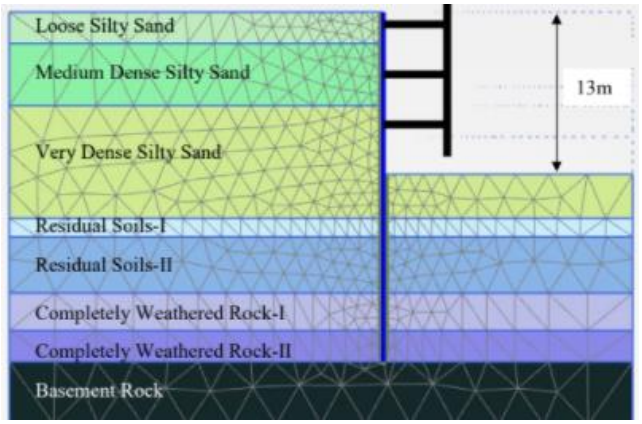


Figure 4.1: Plaxis 2D Analytical Section

Refer **Figure 4.2** below for projected excavation depths.

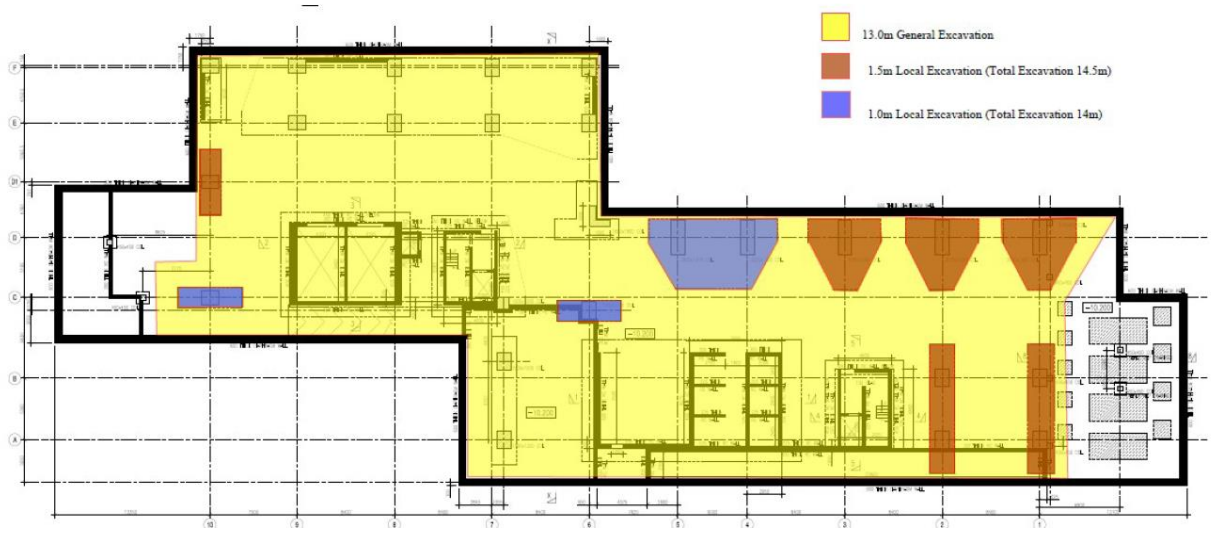


Figure 4.2: Projected Excavation Depths

It is recommended to have earth retaining structures around the building area to a depth of around 10.1m to accommodate 3 basements since there is a danger of slips/collapse of slopes. As the shoring method, driving sheet pile is not recommended due to vibration which may lead to problems of adjacent buildings. Secant pile wall system with larger diameter RC bored piles adjacent to each other is recommended as the shoring method by the geotechnical consultant.

The structural engineers have proposed a 600 mm thick continuous Diaphragm wall system out of the many commonly used methods, considering need of a permanent shoring system to eliminate any water seepage during the construction as well as operation stage. It is a cast in situ reinforced concrete wall. Four levels of temporary support system will be used for excavations. Refer **Figure 4.3** for projected temporary supporting system.

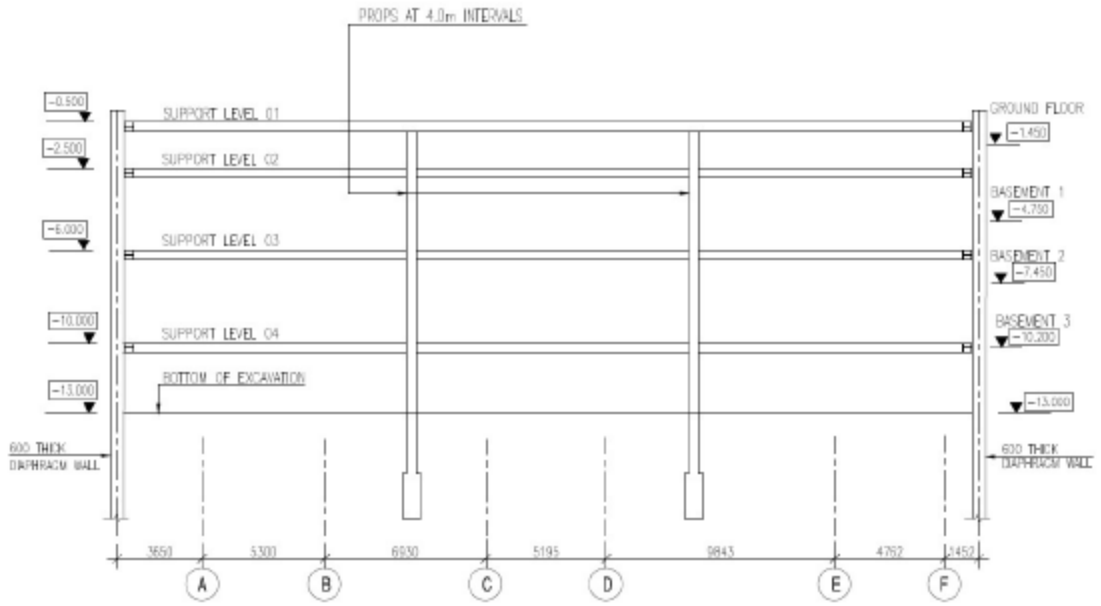


Figure 4.3: Projected temporary supporting system.

The following Excavation Sequence will be followed according to the recommended method.

1. Installation of internal props at intervals of 4m to an adequate depth considering 13m total excavation depth.
2. Excavation up to 1m from existing ground level
3. Installation of 1st level of support system (waler beams and horizontal steel beams) at -2.5m.
4. Excavation up to 3m from existing ground level
5. Installation of 2nd level of support system (waler beams and horizontal steel beams)at -6m.
6. Excavation up to 6.5m from existing ground level
7. Installation of 3rd level of support system (waler beams and horizontal steel beams)at -10m.
8. Excavation up to 10.5m from existing ground level
9. Installation of 4th level of support system (waler beams and horizontal steel beams)at -13m.
10. Excavation up to 13m from existing ground level

A Method Statement for shoring and dewatering submitted by Structural engineers are attached as **ANNEX XIII**.

The report recommends to invite the contractor too to submit their method statement for shoring, so that the structural team can compare and evaluate the proposals further and recommend the most suitable one during the construction stage.

4.1.1.3 DEWATERING METHODOLOGIES

The proposed dewatering system to be used on site is to commence at a depth of 5m below ground. As the Diaphragm wall system is planned to be pre-installed, no seepages are expected. However, when progressing excavation to a depth of 13m, some seepage under the diaphragm wall is expected. Lowering of the groundwater table around the site would be reached to a significant level. It is proposed to have observation wells to monitor the groundwater table variation along the Galle Road-side and several other observational wells shall be installed in areas where existing structures are present. This should be done

under the guidance and supervision of an experienced engineer. Dewatering to be implemented under control measures to prevent slope failures due to sudden drawdown.

Further, it will endanger the surrounding high-rise buildings due to ground settlements.

Hence if the lowering of the groundwater table is significant, recharging with few recharge wells have to be arranged immediately. The settlements and lateral movements due to the construction process will be regularly monitored by control points established on and outside the diaphragm wall. Several points at around 5m horizontal intervals will be established along the wall for this purpose.

4.1.1.4 PILING METHODS

There will be piling involved in the construction as the building will be on a pile foundation. The depth of rock is approximately 20-30 m below the existing ground level as per the geotechnical Report.

In the same report, it was recommended to carry out pile load tests to review the pile design parameters (allowable end bearing capacity and Ultimate skin Friction Coefficient). Testing piles have been carried out and the structural engineers have finalised the site-specific values for both parameters.

According to the Structural Engineers' design report, there will be a total of 85 piles of three types 800mm, 1500mm and 1800mm diameter.

4.1.1.5 DISPOSAL OF CUTTING EARTH AND LOCATION

Removal of earthworks will cause dust during dry weather and mud and erosion during rain at the site and in the vicinity, if not properly managed. Arrangements for Earthworks support for shoring and dewatering has been detailed in **ANNEX XIII**.

Piling will cause vibrations and cracks in the buildings in the vicinity.

4.1.2 IMPACTS ON NATURAL DRAINAGE PATTERN AND HYDROLOGY OF THE STUDY AREA

4.1.2.1 IMPACT ON EXISTING DRAINAGE PATTERNS (FLOW PATTERN)

Drainage from Galle Road is directed by the municipal stormwater system to the designated outflow canals in the vicinity and does not traverse through the site. Surface flow rainwater presently traverses the site and is absorbed by the stormwater drain on the 10th lane to the West of the site. It is vital that the project proponents are prepared for managing drainage water without disturbing the current seaward drainage paths during the construction phase until the stormwater drainage system of the development is operational. Stormwater drainage system plans have been factored in to accommodate surface water drainage for the proposed project as highlighted in the Storm Drain Plan in **ANNEX XI**.

4.1.2.2 SOIL EROSION AND SILTATION, ETC.

Soil erosion or siltation during construction is a possibility if suitable precautionary measures are not taken during foundation excavation, piling the excavated materials and while handling for transporting. Hence,

materials removed during land preparation need to be stacked carefully to prevent erosion and siltation during stormy weather.

4.1.2.3 IMPACTS ON THE GROUND WATER TABLE

The Geotechnical report indicates that the groundwater level at the site exists at 3.9m- 5.3m on average, below existing ground level according to the Geotechnical report provided. The basement excavation depth will be 13m deep. Dewatering needs to be done by pumping water during basement construction until the full basement construction is over. While dewatering, the groundwater level within the construction area will be isolated through the erection of diaphragm shoring and the water levels within the excavation area will be kept lower.

As described in **Section.4.1.1.3**, dewatering during construction will have an impact on the surrounding buildings as the weak zones in the foundation will get settled. This is critical as the proposed development is surrounded by many high-rise buildings in close proximity. Hence observation wells to monitor the groundwater table variation shall be installed considering the risks to adjoining properties under the guidance and supervision of an experienced engineer.

The condition might arise that recharging of groundwater to be arranged immediately. The settlements and lateral movements due to the construction process will be regularly monitored by control points established on and outside the diaphragm wall.

Since the groundwater is not being used in the area through dug wells, there will be no impact on groundwater extractions. Arrangements for Earthworks support for shoring and dewatering has been detailed in **ANNEX XIII**.

4.1.2.4 IMPACTS ON WATER QUALITY (GROUND, SURFACE) DUE TO WASTE WATER DISCHARGE/SOLID WASTE DISPOSAL

The treated wastewater which is not required for reuse in the structure will be discharged to the CMC drainage lines and solid waste will be disposed of with the support of CMC. The treated waste water will be used for gardening which has fulfilled the quality standards specified by CEA. Hence, there will be no foreseeable impact on surface and groundwater due to wastewater and solid waste disposal as per the proposed methodology.

Potential for groundwater pollution may arise due to leaks in the treated wastewater pipes or storage tanks, which may leak effluents into the water table below and therefore should be monitored regularly.

4.1.3 IMPACTS ON FAUNA AND FLORA OF THE STUDY AREA

The site for the construction of the proposed hotel is located in an area where human population expansion and development activities are considerably high. Due to this very factor, the area is under severe pressure from human activities for several decades. Little flora is evident on-site and the fauna is species associated with Urban environments, therefore no significant environmental impacts are anticipated.

4.1.3.1 IMPACT ON EXISTING VEGETATION IN THE STUDY AREA

The key factors include loss and fragmentation of habitats, growth of artificial environment including roads and buildings, pollution and solid waste disposal to different degrees. With the expansion of commercial activities and high rising buildings, the natural environment has been heavily altered for several decades. The main development activity in the project site includes the construction of buildings, paved roads inside the premises, etc. Due to the development of the proposed project, no significant environmental problems on fauna are expected.

4.1.3.2 IMPACT ON FAUNA AND FLORA

All faunal species found in the proposed site and the surroundings are common in the area and almost all are common to urbanized areas as well as to the western coastal area. Since the adjacent areas of the project site are also highly used for human activities, most animal species are already seeming to tolerate, adapted and otherwise have moved away.

No significant impact could be expected on the floral species as well. Location will be cleared for the construction of different physical structures (buildings, pavements, roads) and the purpose of landscaping. However, there would be no serious overall damage or imbalance to the environment that would occur as a result, since this building and the surroundings are designed in such a way to ensure environmental sustainability and green developments. In summary, it is not unfair to state that no significant impact could be expected on fauna and flora and their natural ecological functioning in the site as well as in the surroundings due to the proposed project. No exotic or invasive plant species will be used for decorative or ornamental purposes.

Yet, sensitive species may face problems adapting to changes in the environment, hence adequate care should be taken to minimize disturbances to the environment.

But more importantly, as high-rise cities grow upwards and outwards, increasing numbers of birds, especially can die by crashing into glass buildings. Birds break beaks, wings and legs or suffer other physical harm. More and more birds migrate in the night-time. The glow from building lights around the cities is known to attract birds, so when they fly over a bright city at night, they are naturally drawn toward it, unaware they are in dangerous territory. A new high rise building at the periphery (near the coast) could potentially act as a barrier on their usual migratory path towards the city. However, this can be mitigated or avoided by good design.

4.1.4 IMPACTS ON NEIGHBOURING RESIDENTS/COMMERCIAL AND OTHER TYPE OF BUILDINGS

The proposed development will establish a luxury hotel complex within Colombo, in a highly urbanised setting, with various other construction developments in the immediate vicinity. The operation of the proposed hotel could potentially generate noise, which may impact the surrounding residences, therefore care has been taken in the design to avoid such situations. Noise and dust pollution are probable impacts to be expected, and the project proponents should take due care to mitigate these impacts through sound operational practices.

4.1.5 NOISE, VIBRATION, DUST AND AIR QUALITY IMPACTS DUE TO CONSTRUCTION ACTIVITIES AND RECOMMENDED NOISE VIBRATION LEVELS ACCORDING TO THE NATIONAL STANDARDS

Impacts of noise due to construction activities can affect the workforce at the site and neighbourhood. People and fauna can feel and become concerned about the vibration and noise of construction equipment and the potential for wind borne object collisions. The possible sources of noise, are vehicles/vehicular movement, material unloading, plant and machinery used in construction and related activities etc.

In a construction site of this nature, generation of noise can be expected during piling, operation of generators, drilling, jackhammering and the operation of heavy equipment which are unavoidable. With the site being in such proximity to an urban area there is a possibility of such noise affecting those who live and work close by in the neighbourhood.

The typical noise levels associated with vehicles/ plant/ machinery commonly associated with construction activities are given in **Table 4.1**. below.

Table 4-1: Typical Construction Equipment Noise Levels

Vehicle/Plant/ Machinery	Noise Level dB(A)
Truck	83-93 (at 16m)
Tractor	78-95(at 16m)
Backhoe/Excavator	70-85 (at 16m)
Concrete Mixer	75-88(at 16m)
Concrete Pump	81-83(at 16m)
Jack Hammer/Drill	82-98(at 16m)
Paver	85-88(at 16m)
Compressor	109(at 7m)
Roller Vibrator	108 (at7m)
Poker Vibrator	113 (at 7m)

Impacts of vibration during construction caused due to movements of heavy machinery transporting materials and during tamping of foundation and road network is expected.

As the site is located closer to the coast, with dynamic-wind patterns, stockpiles of excavations and raw material may cause dust emission which will have impacts on to workforce and neighbourhood. Dust emissions will occur if material transport vehicles are not covered properly.

The risk of dust, larger particulate matter and construction materials and tools being dislodged during high wind scenarios and causing potential injury to pedestrians and vehicles has been recognized and dust netting is to be installed upon each construction floor to address this risk.

During the construction period, the impact on air quality is mainly due to material movement. However, air quality over a small area is affected, though, insignificant levels. There may be an increase in the dust

levels all along the access roads and the site itself. The emissions from the construction machinery are the source of ambient air pollution during the actual construction.

Continuous use of generators, bulldozers, rollers, cranes, trucks etc. gives rise to air emissions as well as noise.

All precautionary measures should be taken to reduce noise pollution by adopting effective noise barriers especially in the areas of generators to minimize the impacts on local fauna and the environment.

To curb the increased fugitive dust emissions in the area due to vehicular movement and raw material transport, provisions should be made for the sprinkling of water on the roads in the area. The sprinkling of water should be carried out at least once a day regularly during the entire construction period excepting rainy days. Daily inspection at roads and construction sites should be carried out to ensure the removal of construction debris to the landfill sites and loose materials are to be stockpiled under tarpaulin coverings

Covered trucks shall be used for the transportation of materials prone to fugitive dust emissions. Special acoustic enclosures should be provided for individual noise-generating equipment as this area is a sensitive area with major economic and social activities. Noise measurement should be conducted during construction to assess the prevailing noise levels.

Tire washes should be installed on-site entrances to prevent siltation of surrounding roads which, once dry, may result in dust generation in a larger area beyond the site.

4.1.6 IMPACT OF TRANSPORTATION OF CONSTRUCTION MATERIALS AND TRAFFIC IMPACTS

The project area is heavily urbanized, residential and commercial. Therefore, especially during the construction phase, effects such as vibration, noise and dust generation could be expected if proper and standard mitigation methods are not used to negate those effects. During the construction phase of the project, the use of heavy machines and trucks for materials transportation is necessary. Hence, there will be an increase in the volume of traffic during the construction phase and it may have some disturbance especially on Galle Road at the access points to the project location. An increase in traffic would result in dust generation. Continuous machine operation and transportation may create noise pollution and it will affect the people working and residing in the study area. Therefore, the project proponent should take action to make appropriate arrangements to avoid transportation-related issues.

The following mitigation measures could be proposed to control the effects.

1. Watering the roads used for materials transportation during the project operation period.

2. Cover the sand/soil loaded truck to avoid the flowing of dust towards pedestrians and human settlements, during the transportation of sand loaded tippers.

3. Keep trained workers with the proper signal system to control vehicles in the byroads during the construction.

4. Install tyre washes at all entrances to the site to avoid siltation and damage to nearby roads and infrastructure.

4.1.7 IMPACT ON EXISTING ROADS, PAVEMENTS & OTHER PROPERTIES IN THE PROJECT AREA DUE TO TRANSPORTATION OF CONSTRUCTION MATERIALS

Transport vehicles will carry heavy loads in and out of the site. If the load exceeds the recommended limits of RDA there is a possibility of occurring damages. Further, reckless drivers will tend to drive the vehicles off the road limits encroaching the pavements and side drains.

4.1.7.1 HEAVY VEHICLE TRANSPORTATION

All trucks will run through Marine Drive and 10th Lane (Circular Road) for material transportation during the period of construction. An impact that can be expected is the additional dust that may increase in surrounding houses due to the movement of construction materials. The project proponent has agreed to establish a mechanism for watering roads with a regular and continuous program during the project operations.

4.1.7.2 DAMAGES TO LOCAL NARROW ROADS DUE TO MATERIAL TRANSPORTATION

Damage to roads and road properties may occur, especially with concern to the Local Authority managed road (10th lane) due to the heavy vehicle running. The project proponents should have an agreement with the CMC to assist to reinstate the road if damage occurs to local road and road properties due to material transportation.

4.1.8 IMPACTS ON THE DEVELOPMENT ACTIVITIES IN THE VICINITY

Ongoing development projects such as the development of infrastructure facilities under the MCSCTP and the proposed new hotel projects to expand the room capacities to cater to tourists in Colombo city are positive contributions to the development activities in the vicinity of the proposed project area. Therefore, the proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city. (Please see **Sections 3.1.3.2. 1**. and **4.1.10** for more details)

As mentioned above the Bambalapitiya area is becoming a popular residential area from the latter part of the 19th century and especially residents of elites have been shifted from the heart of the city (Pettah and Fort) towards the Bambalapitiya area.

Also, the proposed project area has been identified by the UDA and the CMC as a high potential residential area within the municipality limits. The proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city. More information with regards to Development Projects envisaged in the area can be found in **Section 3.1.3.2**. and **3.1.3.2.1**.

Figure 4.4:Architectural View Of The Proposed Pedestrian Overhead Bridge Near To The Project Location, Source: MCSCDP, 2016

The proposed development projects to be implemented in the study area are aimed to minimized existing issues in transportations, floods, incontinence in their day-to-day lifestyle. Among the above subprojects some sub-projects such as road development projects were completed and some of them are in implement stage and the rest are in the planning and waiting for financing etc.,

However, these development activities in the area definitely will help to improve the life patterns of the people within a convenient environment. Therefore, this new development in the project will not negatively impact the people living in the area.

The above highlights that factors such as the development of infrastructure facilities in the area and expanding room capacities by establishing new hotels for tourists etc., are positive contributions to the government and private sector development projects in the Colombo city area. Therefore, the proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city.

4.1.9 IMPACTS DUE TO CHANGES OF LAND USE

The total land extent allocated for the construction of the proposed hotel complex is 115.4 perches. Presently, the proposed land is partially covered by the buildings, and the rest of the area is bare land. According to the project development plan of the proposed 652 Roomed Marino Towerl Hotel, the total land area will be used for the hotel and related components. A buffer zone, stormwater management systems, landscaping, etc., are included in the development plan. However, after completion of the hotel construction, it will cover the total land area by buildings and compounds and landscape, etc., therefore with this proposal, except for the project land, no changes could be expected on the adjoining land areas.

Figure 4.5: Existing condition of the land parcel proposed for the project

4.1.10 OTHER SOCIO-ECONOMIC IMPACTS/BENEFITS (IF ANY)

Refer to Socio-Economic and cultural impacts are described in detail, under **Section 4.2.7** (Human, Social and cultural impacts).

4.2 OPERATIONAL IMPACTS

4.2.1 WATER

4.2.1.1 IMPACTS ON THE SURFACE/GROUND WATER DUE TO EXTRACTION FOR PROJECT ACTIVITIES

During the Construction period, dewatering will be undertaken during excavation of the basement and as such a potential impact of the localized groundwater table is expected. This has been minimized to a greater degree through the utilization of diaphragm methods and industry best practice methods. The theoretical impact on the localized groundwater reserves is expected to be temporary and will equalize with the surrounding levels once dewatering action and containment are concluded.

No surface and groundwater extraction will be done for project activities during the operational period.

4.2.1.2 SALINITY INTRUSION DUE TO WATER EXTRACTION (IF ANY)

The volume of dewatering required before containment of the excavation and the recharge rate of groundwater in the adjacent subsurface layers is presently indeterminant and may result in a potential temporary salinity intrusion into the groundwater adjacent to the sea however such hydrological imbalances are expected to revert and stabilize once extraction is concluded.

There is no possibility of salinity intrusion during the operation stage due to this project and its activities.

4.2.2 WASTE WATER

4.2.2.1 ANTICIPATED ISSUES OF WASTEWATER DISPOSAL

Excess treated wastewater (a significant other portion being reuse for toilet flushing), will be discharged to the CMC sewage network in controlled manner and hence no impact is be anticipated due to wastewater, except the contributory load on the system.

4.2.2.2 IMPACTS ON SURFACE/GROUNDWATER DUE TO WASTEWATER DISCHARGE, SURFACE RUNOFF AND USAGE OF PESTICIDES/ FERTILIZER AND ANY OTHER CHEMICALS

As explained above, surface or groundwater will be affected by wastewater if not properly treated and disposed of. The surface water runoff will be affected if natural paths are blocked. Fuel storage for generators is one identified potential impact zone but the potential hazard is contained in the design through the use of isolation methods.

Over usage of fertiliser, pesticides and any other chemical are not applicable at this project site, since none of these activities will take place as per the project proponent's operational plan. Therefore, the estimated impact on surface and groundwater due to wastewater discharge, surface runoff and usage of pesticides, fertiliser or any other chemicals is deemed to be minimal.

4.2.3 SOLID WASTE

4.2.3.1 ANTICIPATED PROBLEMS OF SOLID WASTE DISPOSAL

Uninterrupted services of the CMC waste disposal services is expected during the operation stage for the removal of solid waste from the premises. Further janitorial services will be obtained to handle solid waste transport from each floor and management until it is removed by the Council trucks. There may be a disturbance to this process due to various lapses of these service providers. Hence close monitoring of the process needs to be ensured.

If food wastes are to be disposed of in an open area, it might attract animals that can cause a nuisance such as crows, stray dogs, rats, etc. This also poses threats to the tourism industry, communities in the area, and will lead to visual pollution and air pollution as well.

Disruptions to the CMC solid waste collection schedule may occasionally occur, as has been evidenced in the past. As such, the project has designated the capacity to store 7 days' worth of solid waste generation for both Wet and Dry solid waste types. Should interruption of services continue, private contractors may be engaged to dispose of the accumulated waste.

Similarly, disposal of untreated sewage and kitchen wastes into the coastal area if any will cause pollution of seawater by eutrophication, accumulation of organic wastes which leads to enhanced microbial growth and generating high oxygen demand. But the proposed sewage management facilities, it is unlikely that such pollution could happen.

4.2.3.2 IMPACTS OF THE PROPOSED METHOD OF SOLID WASTE DISPOSAL ON SURFACE/ GROUNDWATER AND OR AIR

With the proposed solid waste management plan, there is **no impact** on surface/groundwater and air in the vicinity as solid waste will not be disposed of incorrectly nor stored improperly. A cumulative impact of increased solid waste generation in the wider region will be experienced marginally due to the contribution of solid waste from this and other developments in the region. The cumulative impact of increased solid waste generation in the region as a result of population density, the methods of disposal, and its impact on groundwater is beyond the scope of this investigation.

4.2.4 AIR

Solid waste collected from the primary source is separated and stored as wet solid waste in a temperature-controlled, hermetically isolated area and non-biodegradable waste is stored in a dedicated room on the ground floor until removal by the council. Assuming regular collection of solid waste, there will be no anticipated impact on air quality.

4.2.4.1 ANALYSIS OF GASEOUS EMISSIONS DUE TO OPERATIONS

Except for the backup generator, boiler and centralized air-conditioners there will be no other equipment that is expected to generate gaseous emissions during the operation stage.

4.2.4.2 ENVISAGED ODOUR PROBLEMS (IF ANY)

Odour problems are possible if solid waste management does not take place according to the design specifications. Following solid management measures will be followed to prevent odour in solid waste.

- Source separation of waste will be done at the point of origin and taken to hygienic temporary storage until collection by the council.
- Colour-coded containerization to avoid ground contact
- Covering facilities to avoid vector and rodent access
- Temperature control during storage to minimize odour generation due to microbial action in case of delayed collection by the council
- Adequate public awareness measures aimed at the stakeholders

Emissions of odour from the wastewater treatment plans and associated piping is a potential source if not properly maintained and ventilated and should be regularly monitored.

4.2.5 NOISE & VIBRATION

All precautionary measures should be taken to reduce noise pollution by adopting effective noise barriers especially in the areas of generators to minimize the impacts on local fauna and the environment.

To curb the increased fugitive dust emissions in the area due to vehicular movement and raw material transport, provisions should be made for the sprinkling of water on the roads in the area. The sprinkling of water should be carried out at least once a day regularly during the entire construction period. Daily inspection at roads and construction sites should be carried out to ensure the removal of construction

debris to the landfill sites. Covered trucks shall be used for the transportation of materials prone to fugitive dust emissions.

Special acoustic enclosures should be provided for individual noise-generating equipment as this area is a sensitive area with major economic and social activities.

Noise measurement should be conducted during construction to assess the prevailing noise levels.

4.2.5.1 SOURCES OF NOISE AND VIBRATION

Since it is a mainly tourist-centric complex there will be no significant noise except vehicle movements, noise at the cafeteria and common areas at the premises during the operation stage. The noise due to daytime activities and vehicle movement within the building will not be much audible, as there is existing traffic noise along the Galle Road and the railway line.

Vibration may occur during the operation of the Wastewater treatment plant and generator. However, there is no perceptible ground vibration beyond the boundaries associated with the operating equipment as these are lightweight equipment.

4.2.5.2 PREDICTED NOISE LEVELS AT THE TREATMENT PLANT AND IMPACTS

According to the manufacturer's specifications, noise levels due to the WWTP are in the range of 34 dB(A) to 45 dB(A) at the noise-sensitive locations considered. These additional noise levels are all comfortably below the accepted daytime noise limit of 55 dB(A).

4.2.6 ECOLOGICAL RESOURCES

4.2.6.1 IMPACT ON EXISTING VEGETATION IN THE STUDY AREA

The vegetation profile on site is almost zero (no permeate vegetation other than plants used for landscaping and ornamental purposes). No exotic plants other than species that are already established in the country will be used for landscaping and therefore the risk of spreading on invasive species is zero.

4.2.6.2 IMPACTS ON INDIGENOUS SPECIES (IF ANY EXOTIC SPECIES ARE TO BE INTRODUCED FOR LANDSCAPING)

All necessary precautions will be taken not to use plant species that are exotic and possess features that could become invasive to the environment and pose threats to local varieties.

4.2.6.3 IMPACT ON FAUNA, FLORA, NATURAL HABITATS/ ECO SYSTEM IN THE STUDY AREA

Migratory birds are unable to adapt to the urban environment. It has been observed that many have evolved to travel at night when they are safer from predators, and the cooler temperatures enable them to expend less energy. To find their way during these flyovers, birds use natural cues including the moon and stars to navigate. The light emanating from urban areas obscures these natural cues, which disorients and confuses the migrating birds. Light attracts them into the unfamiliar urban environment where they subsequently get trapped, hence the term “fatal light attraction”. Once trapped, birds will attempt to take shelter in whatever habitat they can find.

The urban environment contains a number of hazards to birds, many of which are common and hard to avoid. Unlike humans, birds cannot perceive images reflected in glass as reflections and will fly into windows that appear to be trees or sky. Clear glass also poses a danger as birds have no natural ability to perceive clear glass as a solid object. Birds will strike clear glass while attempting to reach habitat and sky seen through corridors, windows positioned opposite each other in a room, ground floor lobbies, glass balconies or glass corners. The impact of striking a reflective or clear window in full flight often results in death.

Ways in which bird collisions/bird mortality can be avoided include using 25%-40% ratio of glass to wall ratio, fly-through elimination in design, use of awnings and overhangs, use of exterior screens, grilles, shutters, shades, and also creating visual markers. The project proponents have considered such measures as seen in the exterior rendering of the project design as seen below.

Figure 4.6: Hotel Exterior Concept

4.2.7 HUMAN AND SOCIAL, CULTURAL IMPACTS

Impacts of a project on the population of an area could be analysed as positive impacts and negative impacts and also benefits in short term and long term. This section tries to identify those impacts under each category mentioned below.

4.2.7.1 IMPACT ON RESIDENTIAL & COMMERCIAL AREAS

According to the CMC and UDA clarifications, the Bambalapitiya ward of the Colombo MC is one of the most convenient areas to live and engage in commercial activities for the inhabitants. Therefore, this area has an attractive demand for tourist's hotels, residential and recreations facilities, etc., Based on this situation the Colombo MC has been declared the Bambalapitiya area as a separate planning unit that is appropriate for the primarily residential, commercial, and recreational activities. Accordingly, the proposed project area has been identified by the UDA and the CMC as a high potential residential and commercial area within the municipality limits. Therefore, the proposed project will help directly to achieve the planned development goals of the policymakers and planners of the city. All houses and other public/private properties were situated far away from the project location. Therefore, no negative impacts could be expected in the existing residential area due to a new project in the vicinity.

4.2.7.2 IMPACTS DUE TO CHANGES IN LAND USE

The total land extent allocated for the construction of the proposed hotel complex is 115.4 perches. The heights of the proposed highest high-rise main building are 178.790m (179m) and the highest building in the complex consist of the 46-storey high-rise building.

Presently, the proposed land is partially covered by the buildings, and the rest of the area is bare land.

According to the project development plan of the proposed 652 Roomed Marino Tower Hotel, the total land area will be used for the hotel and related components. A buffer zone, stormwater management systems, landscaping, etc., are included in the master plan of the project.

However, after completion of the construction of the hotel complex and the related compounds, the total land area will cover by the hotel complex. Therefore, with this proposal, except for project land, no changes could be expected on the adjoining land areas due to this project.

4.2.7.3 IMPACTS ON OTHER ECONOMIC ACTIVITIES

The shoreline is situated near the project location is a heavily urbanized area and therefore this coastal area is not used for fishery activities by the fishermen. Nevertheless, the closest coastal line is situated far away from the proposed project location and therefore no negative impacts could be expected on fishery activities in the area.

4.2.7.4 IMPACTS ON CULTURAL/ ARCHAEOLOGICAL VALUES

All places of cultural/archaeological value are situated over 1km radiuses from the project location. Refer to **Sections 3.5** and **3.6.4**. for more details. Also, the closest site is situated over a 1km radius from the proposed land for the project. No other archaeologically or historically important places are situated in

the closest vicinity. Therefore, no negative impacts could be predicted on archaeologically and/or historically valuable places in the area due to the new project.

4.2.7.5 PROJECT BENEFITS TO THE LOCAL COMMUNITY AND SOCIO ECONOMIC AND EMPLOYMENT BENEFITS

The area to be used for the proposed project is located in a popular tourist area that is home to such tourist attractions as Mount-Lavinia, Bambalpitiya, Kollupttiya and Pettah. The nearest five-star hotel is located 1.5.km away from the project location.

Therefore, this hotel project definitely will help to provide accommodation and other recreation facilities to these tourists, both foreign and local. It would be beneficial for the tourist industry in our country.

4.2.7.5.1 EMPLOYMENT OPPORTUNITIES FOR THE PEOPLE IN SURROUNDING AREA

Employees are the most valuable and important resource in the success of any business. The project proponent's parent company, DAMRO, currently has employed over 12,000 local youth in its operation in Sri Lanka without considering the plantation sector. With the proposed investment, the DAMRO Group expects to provide over 750 direct employments to the locality. It's further expected to provide many indirect employment opportunities connected to the operation of the Hotel. The projects of this nature will also help in developing and upgrading the workforce in the country increasing the competency and expertise of the employees in the industry.

4.2.7.5.2 INCREASE IN COMMERCIAL ACTIVITIES

The project would require manpower to construct and operate the project. It is expected to employ a significant number of migratory workers and the people in the surrounding area have the opportunity to make use of these employment and commercial opportunities and increase their monthly incomes. Also, workers from outside areas would require board & lodging facilities which in turn would provide new avenues of income to the local people.

In addition, the sales in local boutiques would increase. The economic status of the surrounding area will increase with enhanced income through employment opportunities and related work. Commercial activities in the nearby town canters would also increase during the project implementation period. It will uplift their standard of living, as they will get an extra income.

4.2.7.5.3 INCREASE IN PROPERTY VALUES

Land values of the study area and adjoining areas have already increased in the last decades due to urbanization and tourism. With the implementation of this new hotel project, land values in the study area would increase. Although leasing or renting houses to provide boarding facilities to migratory workers will provide additional income to the surrounding people.

4.2.8 AESTHETIC AND VISUAL ENVIRONMENT

4.2.8.1 WHETHER THE VIEW IN THE IMMEDIATE VICINITY WOULD BE ALTERED OR IMPAIRED OR OBSTRUCTED AS A RESULT OF PROPOSED HIGH-RISE BUILDING

The heights of the proposed highest high-rise main building are 178.790m (179m) which stands 46-storeys high. There are no lighthouses, religious places, historically or archaeologically significant places situated in close vicinity of the project location.

The 60 stories '606' residential development is nearing completion on the adjacent site to the south of the project, and it is anticipated that the northward facing views of this residential development will be partially obstructed by the development of the proposed project. The southern facing façade of the proposed project will similarly have an obstructed view due to the 606 development.

The shadow of the proposed high-rise building will extend beyond the external areas of the hotel premises in the morning and evening which is an unavoidable occurrence with high-density vertical developments. Therefore, the aesthetic view of the area, which comprises multiple high rise developments, is in line with the overall aesthetic addition of the project itself.

4.2.8.2 POSITIVE/ NEGATIVE IMPACTS

4.2.8.2.1 POSITIVE IMPACTS

4.2.8.2.1.1 4.2.8.2.1.1. Increase In Room Facilities In Star Grade Hotels In The Vicinity Of The Colombo City

The proposed hotel complex project will increase room capacity by 652 rooms within the Colombo city limits. It will help to increase the intake of local and foreign tourists to Colombo city. This project will directly contribute to tourism development in the country by adding approximately 238,000 room nights in the 4-star category to Sri Lanka's total room capacity.

4.2.8.2.1.2 4.2.8.2.1.2. Promote High Rise Buildings In The Metropolitan City

Colombo city is rapidly developing into a metropolitan city. With this trend, investors will attempt to construct high-rise buildings for hotels and other business purposes within the city limits. Therefore, this kind of project will help to promote the high-rise building concept in the country.

4.2.8.2.1.3 4.2.8.2.1.3. Increase In Commercial Activities In The Vicinity

The project would require manpower to operate and expects to employ a significant number of workers from outside areas with boarding and lodging facilities. In turn, this will provide new income-generating avenues to the local people. In addition, sales in local boutiques would increase. Commercial activities in the nearby town centres would also increase during the project implementation and operation period. It will uplift people's standard of living as they will get extra income.

4.2.8.2.1.4 4.2.8.2.1.4. Increase In Property Values.

Land values of the study area and adjoining areas have already increased in the last decades due to rapid urbanization. With the implementation of this new hotel complex project, land values in the surrounding

area will increase. Furthermore, leasing or renting houses to provide boarding facilities to migratory workers will provide an additional income to the dwellers of this area.

4.2.8.2.2 NEGATIVE IMPACTS

4.2.8.2.2.1 4.2.8.2.2.1. Socio-Cultural Impacts Due To Migratory Workers

During the construction period of the project, it will need more skilled and unskilled workers to complete work within a short period. And these migratory workers will be involved in the construction activities. They will stay at the construction site or temporarily constructed accommodations near the project premises.

There is a possibility of increasing alcoholism and drug use in the area and related social issues may arise from and within the community. In addition, migratory workers might get involved in clandestine relationships with the ladies in the area, creating problems and conflicts between the permanent dwellers and migratory workers. Therefore, the project proponent should consider this situation and take action to prevent such things from happening.

4.2.8.2.2.2 4.2.8.2.2. 2.Spreading Out Of Illegal Drug Trafficking And Prostitution

As a particular area will be congested with migratory workers during the construction and foreigners during the operations of the hotel and it is most likely that there will be a tendency to create demands for illegal drug trafficking and prostitution. Consequently, it will create social issues in the area as a result of such unacceptable detrimental activities damaging social norms.

4.2.9 CONTINGENCY PLAN FOR EMERGENCY SITUATION E.G. TSUNAMI, FLOOD OR ANY OTHER EXPLOSION (GAS, FIRE)

The project, during development and operations, will implement and adhere to the disaster management plan presented in **Section 6.4**. which details courses of action for a variety of man-made or natural disaster or emergency. Further the fire response plan is to be developed in collaboration with the Fire Services Department of the CMC and is to be implemented diligently. These include adherence to appropriate construction standards as well as conducting fire preparedness drills regularly.

4.2.10 ANY OTHER IMPACTS (IF ANY)

4.2.10.1 POTENTIAL IMPACT FROM EARTH TREMORS

Certain parts of Sri Lanka, infrequently and periodically, experience earth tremors. These are typically low in magnitude and of short duration. No known fatalities or significant damage has been caused by these tremors in the past. The proposed construction conforms to AS 1170.4(2011) Structural Design Actions-Earthquake actions in Australia standards and therefore should be able to withstand moderate tremors. However, the impact of a more significant potential earthquake is possible.

The structural analysis has been done according to the recommendations given in “Minimum Design Loads on Structures-Earthquake Loads as 117-.4-2007” for this project. The following factors were considered to select the earthquake design category of Class III.

- Design life-50 years
- Annual probability of exceedance- 1/1000 years
- Probability factor- 1.3
- Acceleration coefficient- 0.08
- Building height-186.5 m
- Sub soil class Be (rock)

According to the structural engineer's report, both linear static analysis and linear dynamic analysis have been conducted when evaluating the performance of the structure against earthquakes. The structure is made ductile by special reinforcement details to mitigate seismic effects to cater tremors felt from distant earthquakes. These considerations are considered sufficient to resist against seismic effects possible in this location.

4.2.10.2 POTENTIAL IMPACTS DUE TO FIRE

All elements of structure are expected to have a minimum period of fire resistance of at least 120 minutes as recommended by the Fire Department of CMC (both basement floors and superstructure) have been taken into consideration in structural designs. Additionally, fire refuge areas and fire-safe landings for use by firemen and other modern firefighting requirements have been incorporated into the design.

4.2.10.3 POTENTIAL IMPACTS DUE TO WIND LOADS

Being a high-rise building, located in the wind prone coastal zone, there is a need to design the structure considering the wind loads. Recommendations given in "Design of buildings for high winds, Sri Lanka", publication of Ministry of Local Government, Housing and Construction has been followed in calculating design loads as per the designs presented.

5 PROPOSED IMPACT MITIGATION MEASURES

5.1 SOIL STABILITY MEASURES/SOIL EROSION PREVENTIVE MEASURES

5.1.1 DURING CONSTRUCTION STAGE

5.1.1.1 EXCAVATION & SHORING

The construction requires the excavation of 16,350m^3 of soil from the site to a depth of 13 meters. The removal of this soil may result in soil instability in the immediate vicinity and result in soil slippage and horizontal movement which can potentially collapse the excavations and destabilize surrounding structures.

The contractors tasked with excavation work have submitted a Method Statement which outlines the soil stabilization and shoreing methodologies to be used during basement excavation and construction. Secant pile wall system with larger diameter RC bored piles adjacent to each other is recommended as the shoring method by the geotechnical consultant.

The structural engineers have proposed a 600 mm thick continuous Diaphragm wall system out of the many commonly used methods, considering need of a permanent shoring system to eliminate any water seepage during the construction as well as operation stage. It is a cast in situ reinforced concrete wall. Four levels of temporary support system will be used for excavations. Refer **Figure 4.3** for projected temporary supporting system. The proposed mitigation is further described in details in the Excavation & Shoring Method Statements located in **ANNEX XIII**.

Considering the adoption of these industry best practice methods of shoring and soil stabilization, the potential impacts can be deemed to be minimal.

5.1.1.2 DE-WATERING

De-watering is deemed to be necessary during excavations of foundations and basements. All extracted water should be passed through a sedimentation tank for siltation and then allowed to be re-absorbed into the water table through soakage pits.

Other than the piling, foundation excavation and filling, there will be no other activity that soil being exposed during construction.

5.1.1.3 PILING & FOUNDATION

One possible impact due to piling is soil removal. In the excavation of the basement and preparing the foundation too earth removal will take place. Stability of soil mass in the slopes excavated for foundation needs to be dealt with as described in **Sections 2.3.1.4.1.,** and **4.1.1.4**, as well as the Piling Method Statement, included in the Structural Analysis (**ANNEX XIII**).

5.1.1.4 REMOVAL OF EXCAVATED SOIL

If removal of excavated soil is not timely attended there is danger in dust emissions or soil erosion. Hence removal of unnecessary excavated material needs to be planed as per the regulations prevailed for transporting and unloading earth.

5.1.2 DURING OPERATIONAL STAGE

The proposed development has a 50.7% plot coverage and the entire extent of the site will be either paved or landscaped into gardens. No exposed soil is evident in the landscaping plan. Proper maintenance of the landscape area is necessary for soil conservation during the operation stage.

5.2 WASTE MANAGEMENT TECHNIQUES: BOTH WASTEWATER AND SOLID WASTE AND ALTERNATIVE WAYS OF DISPOSAL OF WASTE

5.2.1 DURING CONSTRUCTION STAGE

If solid waste is not disposed of correctly, it will be an environmental and social hazard that will erode the reputation of the developer. Proper instructions are to be issued to the supervisory staff to oversee the handling of construction waste. Separation, stacking and making arrangements for removal by the council or licenced removers to be coordinated in time.

For disposal of wastewater during construction, temporary soakage pits will be used. After the construction phase is over the pits need to be closed permanently.

5.2.2 DURING OPERATIONAL STAGE

Wastewater and solid water management plan to be implemented with the installation of high-quality equipment and accessories of both systems. The operation and management staff to be given proper training. Manuals to be prepared in local languages for anyone to understand and a periodic monitoring plan needs to be exercised.

Disposal of waste will be attended to by the CMC as agreed terms. Continuous dialogue is to be maintained with the Council in this regard and information about alternative service providers have to be maintained in case of disruption of service due to sabotage or unrest of the workers in the council.

5.3 PROPOSED MEASURES TO AVOID/MINIMIZE NEGATIVE SOCIAL AND CULTURAL RESPONSE TO THE PROJECT AND SOCIO-ECONOMIC BENEFITS (OTHER THAN EMPLOYMENT) TO BE PROVIDED TO THE LOCAL PEOPLE

5.3.1 PROPOSED MEASURES TO AVOID /MINIMIZE NEGATIVE SOCIAL AND CULTURAL RESPONSES TO THE PROJECT AND SOCIO - ECONOMIC BENEFITS TO BE PROVIDED TO THE LOCAL PEOPLE

With regards to the negative impacts on the community and the cultural response to the project, there are a number of impacts that could occur, which are highlighted in the following section.

5.3.1.1 TRAFFIC

Effects on traffic due to material transportation may incur inconvenience to the locals, especially to residents down the 10th Lane Circular Road. It is recommended that the project proponents use a proper vehicle control system and signalling systems to warn traffic and pedestrians during the construction period of the project. Also, traffic control mechanisms should be introduced with the consultation of the Motor traffic unit of the Kollupitiya Police Station. Furthermore, the project proponents should avoid material transportations during school hours.

5.3.1.2 COLLATERAL DAMAGE

Another impact would be the impact on private and public properties in the construction stage of the project with the occurrence of possible accidents and damages, though they are deemed either rare or accidental. It should have a reasonable package of compensation to compensate the affected people.

5.3.1.3 VIBRATION & CRACKS

The project proponents have already carried out baseline crack surveys, air/dust, and noise baseline data gathering. Whilst this data may be useful to prove that the construction has not affected or impacted in causing damages to property, project proponents should be aware and include a reasonable package of compensation to compensate the affected people in their financial budget.

5.3.1.4 NOISE POLLUTION

Sound effect or noise pollution is another concern, whereby a sound control mechanism based on the circular issued by the government (CEA) should be implemented. Baseline data has been collected for this purpose and regular monitoring should occur. Disturbances to residents in the area during the construction stage, especially with concern to use of machinery causing noise pollution are the main concerns. The project proponent should consider this situation and take action to avoid noise pollution using control measures and avoid noise pollution during night-time.

5.3.1.5 DUST GENERATION

Another factor is dust generation whereby dust that blows over and settles on the houses during the construction period could occur. Project proponents should consider this situation seriously and take action to cover the construction site by a net totally and water the roads during project constructions.

5.3.1.6 SOCIAL AND LAND USE

Due to the project being constructed on vacant land which was previously used for tourism, no change(s) of the existing land use pattern could be expected.

Cultural impacts on surrounding communities due to migratory workers, especially there being a possibility of an increase in alcoholism within the area and related social issues. The project proponent should consider this situation and take action to control such impacts. Along with this concern, the spreading out of illegal drug trafficking and prostitution in the area may also occur. The project proponent should have a mechanism to minimize such impacts with assistance from the Kollupitiya Police. In terms of impacts on existing ancient archaeological and historically significant places in the vicinity, such places

which are historically, culturally and archaeologically sensitive are situated far away from the hotel location and therefore no negative impacts could be expected.

5.3.1.7 DEVELOPMENT PLANS

The proposed public and private sector development activities in the area, as per information in the public domain, will not be impacted due to the ongoing and proposed development activities due to location. It is expected that existing development activities will positively affect the proposed hotel project.

5.3.1.8 FISHERIES ACTIVITIES

Disturbances to fisheries activities are not foreseen as there are fishing locations located in the close vicinity, therefore, no negative could be expected. Furthermore, the project site is located inland and is situated in a highly urbanized area.

5.3.2 SOCIO-ECONOMIC BENEFITS (OTHER THAN EMPLOYMENT) TO BE PROVIDED TO THE LOCAL PEOPLE

The proposed project is expected to help increase commerce activities in the area. Migrant workers require board & lodging facilities which in turn would provide new income avenues for the local people. The sales in local boutiques would increase, and not to mention, commercial activities in the nearby town centres would also increase during the implementation period.

The project will be constructed on vacant land. With this proposal, no change(s) of the existing land use pattern could be expected. Designs have been done to suit the existing landscape. With the development of this new hotel project, land values in the study area would increase. Further leasing or renting houses to provide boarding facilities to migratory workers will provide an additional income to the surrounding people.

The area planned to construct the proposed hotel complex is located in a high tourist attraction area. The proposed project will be contributing to providing nearly 238,000 room nights to the high-end tourism accommodation capacity of the region annually. This project directly will contribute to the increase of accommodation facilities for the high-end tourists, while increase commerce in the local area and it will help to uplift the living standard of the local people.

5.4 PROPOSED MEASURES TO AVOID/MINIMIZE CONSTRUCTIONAL IMPACTS ACCORDING TO NATIONAL STANDARDS

5.4.1 INCREASED TRAFFIC

Traffic flow close to the site will increase during the construction period due to the removal of excess earth and waste as well as the influx of construction materials and heavy machinery. These might cause congestion and inconvenience to the surrounding inhabitants and should therefore be scheduled at low traffic times, together with the use of proper vehicle control and signalling systems. A proper traffic control mechanism should also be implemented after consultation with the Motor Traffic Unit of the

Kollupitiya Police station. To minimize the impact due to increased traffic in this heavily urbanized area following measures are proposed.

- Establish communication links with local police station and inform them about the anticipated vehicular moments, to get their advice.
- Arrange transport of materials and machinery during traffic volume is low in Galle Road
- The safety officer needs to be vigilant over the disturbances in traffic beyond the site premises and make arrangements to minimize such incidents
- Keep trained workers with proper signal system to control vehicles in the byroads during the constructions.

5.4.2 DUST & NOISE

General air pollution and dust should be minimised through the use of well-maintained machines as well as throttling down machines, when not in use.

5.4.2.1 DUST

The project site should also be regularly watered to minimise dust generation. To minimise the impact due to dust following actions are proposed.

- Cover the soil exposed areas and stockpiles with tarpaulin
- Watering of the exposed area at least thrice a day (in the morning, afternoon and evening)
- Introduction of speed limits for vehicles in access roads and within the construction area
- Keep transport materials under the wet condition as far as possible
- Further, Tire washes should be implemented at all entrances to the site to prevent siltation and dust generation along the roads outside the site.

5.4.2.2 NOISE

Noise due to the operation of machinery and equipment can be mitigated by a selection of low-noise (or silent) equipment. Periodic maintenance of the machinery and equipment is an effective and important activity to mitigate impacts due to noise. The use of power tools needs to be avoided during the night shifts. Mobile sound barriers should be used where possible and noise generating sources should be insulated to stay within the prescribed 63db-50db limit by the CEA, as per Noise Control Regulations published by Extraordinary Gazette Notification No. 924/12.

5.4.3 VIBRATION & AIR POLLUTION

Vibration can occur during piling for foundation and air pollution occur mainly from poorly maintained machinery and vehicles used for construction. A pre-crack survey is undertaken by the project proponents in order to ensure that no structural impacts occur to the neighbouring buildings., as a baseline for future impacts. The pre-crack survey was undertaken on the surrounding buildings and should be closely monitored to avoid adverse effects through activities such as rotary piling. The crack survey report can be found in **ANNEX XII**. Hence following measures are proposed to mitigate the impacts;

- Use of low vibration driven piling machinery

- As recommended in the geotechnical report, shoring consists of a secant pile wall system to be adopted during excavation of the basement
- At the time of selection of vehicles and machinery, proper attention must be given to the emission levels of vehicles (Vehicle should comply with the Vehicle Exhaust Emission Standards gazetted under Extraordinary Gazette No. 1295/11 on June 30, 2003
- Proper vehicular and machinery inspection and maintenance programmes have to be adopted

5.4.4 FALLING DEBRIS

Due to potential high wind conditions, particularly in the upper floors of the construction, the risk of loose or light materials being windswept off the construction floors and posing dander to pedestrians, vehicles and private property ensue. This must be avoided by adhering to construction best-practice methods such as maintaining discipline, proper storage and installation of debris nets on each construction floor of the structure. Further, Tire washes should be implemented at all entrances to the site to prevent siltation and dust generation along the roads outside the site.

5.5 PROPOSED MEASURES TO AVOID/MINIMIZE ECOLOGICAL IMPACTS

During the construction phase, solid or other waster matter should not be disposed of in open areas within or in the periphery of the premises. All should be disposed of in a safe and environmentally friendly manner. Although the proposed hotel construction site is located in an area with negligible existence of biodiversity with no permanent plants are existing and some very common indigenous animals, some corrective measures could be taken to enhance the natural settings to attract faunal species.

- Landscaping should also use native flowering plants to provide habitat and host plants for butterflies.
- The landscape plan should seek to utilize low - maintenance native species tolerant of coastal conditions and attractive to birds and should not include imported and potentially invasive species.

This project is envisaged to use green architectural practices to adopt eco-friendly development to minimize environmental impacts and damage. The designers of this project ensure sustainable building development, energy and water conservation methods, noise management, sustainable solid waste management, recycling and reusing of resources including water. This mechanism will safeguard the existing environment as far as possible while conserving natural vegetation and faunal community in the area. Furthermore, the project proponents have ensured that the following will be implemented.

- Balconies balustrade design is proposed to have a narrow reflective (brushed S/S) capping with a notional slope, in addition, the glazed balustrade will minimise any shade to nest.
- Internal MEP enclosures (that is, for condenser units, grilles) that are open for ventilation will need to have an insect mesh which will stop birds nesting.
- Possible use of faux predator decoys and reflective materials (such as owls)
- Possible use of electronic deterrents (that is, with ultrasonic deterrents for roof areas, assuming solar panels create a nesting issue).

5.6 RECOMMENDED DISASTER MITIGATION MEASURES

Disasters can be defined as situations that may arise with the potential to cause harm to property and injury or death to people. Natural disasters which may potentially affect the Colombo area include Earth Tremors, Cyclones, Storm Surges and Tsunamis. These cannot be avoided and mitigation through the strengthening of structures during the design phase is the only option. However, the after-effects and loss of human life due to such disasters may be greatly reduced or mitigated through the effective implementation of a Disaster Management Plan. The frequency of occurrence of a mega-tsunami such as the Indian Ocean Tsunami in 2004 is very low. Given the infrequency of occurrence of hazard events, but also the high-density occupation of the project, it is prudent to adopt some disaster mitigation aspects into the design of the structure and its operational modality. These include earth tremor resistance; Tsunami impact force dissipation measures and fire safety measures being considered in the design as well as safety and evacuation processes during operations.

In the case of both cyclones and tsunamis, the DMC and the Meteorological Department provide warnings well in advance of the hazard events. For tsunamis arising from earthquakes in the Bunda Arc, the warning time exceeds 90 minutes which provides sufficient time for evacuation to a safe location. Cyclone warnings can also be issued well in advance.

The mitigation or avoidance of potential causes of disasters has been addressed during the design phase of the project as well as during establishing the operational procedures for staff. However, this is largely applicable to man-made disasters such as fire and accidents during the construction and operational phases. A trained fire-fighting and disaster response team with modern equipment will mitigate potential impacts arising from fire hazards.

To prevent any accidents at the site, a high priority should be given to implementing proper health and safety practices. Only those who are directly involved with ongoing work should be permitted within the operational area, which should be marked and barricaded to prevent unauthorized entry. The workers should be provided with safety equipment which is mandatory in construction areas.

Safety and disaster risk mitigation measures are to be introduced during the construction stage and operation stage of the Marino Tower Hotel project. During the construction phase, accidents or naturals disasters such as storm surges, Tsunami or lightning may occur and worker safety must be ensured through planning and awareness among the staff. Some of the contractors cover their construction activities with insurance against fire, accidents or any natural disaster.

A Safety & Environment Officer (SEO), should be employed by the project proponents as the responsible focal person during the construction phase and the role has to be maintained during the operational phase. The SEO needs to adapt, detail and implement the worker safety and disaster management plan presented in **Section 6.3**. The SEO is required to select a team of staff to be trained as a Rapid Response Team (RRT) who will each be assigned specific tasks to undertake in the event of a disaster.

During the construction phase, appropriate warning signs should be displayed throughout the construction site and roads with frequent heavy vehicle movements should be demarcated. Personal

safety equipment such as boots, hard hats, gloves and eye protection should be issued to construction staff as per industry best practice.

Fire drills and clear directions for evacuation routes should be displayed at the site and daily safety briefings should be conducted in the morning. First aid facilities and transport facilities for urgent medical attention in an emergency to be provided at the site.

5.6.1 DISASTER MITIGATION IN PROJECT DESIGN

The superstructure of the main building is designed to allow for channels of discharge should a Tsunami or storm surge wave impact. Non-reinforced block walls on the ground floors are designed to collapse and allow the surge to wash through the lowest floors of the building rather than transmit its full force to the structure, thereby securing the upper floors.

Many other potential disasters have been identified and mitigated through steps such as instituting a comprehensive fire safety plan, access for water, assembly points for staff during a disaster and firefighting infrastructure. Providing easy access to evacuation zones from any location of the project and ensuring that all staff are aware of these is essential for safety. Appropriate warning signs and directions for evacuation will be displayed inside the building and grounds.

Lightning arrestors, circuit breakers and other safety measures will be incorporated in the electrical circuit design to protect against direct lightning strikes or fire due to electrical short-circuits. Smoke detectors should be installed in all apartments and common areas and the provision of firefighting equipment in strategic locations is recommended. The rapid response team should be trained in disaster response and be ready to implement the disaster management plan as required.

Accessibility has been provided as per the safety standards (with specific attention given to fire safety requirements), and disability access has been considered in the design. Disabled access facilities will be provided to reach any location in the premises/building and special car parking facilities.

5.6.2 DISASTER MITIGATION IN OPERATIONAL MODEL

Each floor and structure in the complex shall be equipped with fire detection and warning systems and firefighting equipment will be installed covering strategic locations. Coordination with the Fire Department of the CMC established and regular safety drills should be scheduled and performed with all staff members. Emergency evacuation/exits and meeting points should be identified and signs should be provided in compliance with relevant standards.

In the event of a cyclone, sea surge or tsunami, a prompt warning mechanism shall be implemented within the premises based on the information received from the Disaster Management Centre and the Dept. of Meteorology.

5.6.3 FLOOD MITIGATION MEASURES (IF ANY)

No evidence of flooding in this locality was found through the social survey and in literature. The proximity of the sea and the prevalence of extensive storm water drainage networks in the area make severe flooding unlikely at this site.

6 MONITORING PROGRAM AND DISASTER MANAGEMENT PLAN

6.1 BACKGROUND

A suitable monitoring plan is required for the project to gauge the changes in the localized environment potentially due to project activities and to assess the implementation of mitigatory measures. The Environmental Management Plan should establish a baseline of data and periodic monitoring of the different aspects in order to extrapolate any impacts that may occur as a result of construction and operational activities. A Safety and Environment Officer should be engaged/appointed by the project in order to undertake this task. The EMP is broken down into Construction and Operational sections and outlines the parameters, location and frequency of monitoring. Parameters are as follows:

- Potential Impact
- Parameters To Be Mentioned
- Proposed Location Of Sampling Points
- Frequency Of Monitoring
- Responsible Agent

The following environmental management plans are to serve as a guidance framework for the environmental monitoring parameters for each phase of the project to ensure potentially negative impacts are identified in a timely manner so that appropriate mitigation measures may be undertaken

6.2 CONSTRUCTION MONITORING PLAN

The following EMP is a guideline for the SEO to develop a detailed delivery and documentation methodology and implement same during the construction phase of the project. All results must be tabulated and the data analyzed to determine trends. Appropriate mitigation methods should be developed in consultation with experts should negative impacts accumulate, or the existing mitigation measures are inadequate, to contain such impacts.

Table 6-1: Environment Monitoring Plan during Construction

Aspect Or Activity To Be Monitored	Monitoring Parameters	Location Of Sampling	Monitoring Frequency	Responsible Agent
Soil Erosion On-Site	Visual Inspection	At all active construction and excavation locations	Daily	Safety & Environment Officer
Stability & Integrity of the Shoring system	Visual inspection and measurement of angles/markers	On the shoring system within the excavation and site boundaries	Daily	Site Engineer and SEO
Noise & Air Pollution	Decibel Range & Visual	At boundaries of the construction site & heavy machinery and generator locations	Daily	Safety & Environment Officer

Impacts on adjacent structures	Visual inspection of Cracks or soil subsidence	Adjacent structures	Weekly	Safety & Environment Officer
Site cleanliness & proper use & storage of material and equipment	Visual inspection	Within construction, especially upper floors of structure	Weekly	Safety & Environment Officer & DWC
Transportation Of Equipment/ Materials	Traffic Impact On Local Population	The access to site from the Galle Road & 10th Lane	If Complaints Received	Safety & Environment Officer
Internal Transportation Of Equipment/ Materials	Dust & Noise Generation and maintaining defined pathways	Throughout the site	Weekly	Safety & Environment Officer
Stockpiles of Materials	Ensure all materials and equipment secured	At loose material and solid waste storage areas	Daily	Safety & Environment Officer
Solid Waste Disposal	Ensure no solid waste pollutes the environment and all waste is sorted and stored	At site, particularly near active construction areas and temporary staff canteen/facilities	Daily	Safety & Environment Officer
Solid Waste Storage & Recycling	Proper separation and storage of solid waste	At solid waste collection and sorting location on site	Weekly	Safety & Environment Officer
Worker Safety	Safety Briefing & Equipment check	At Site	Daily	Safety & Environment Officer
Fire Safety	Requirements of the FSD are met on site	Throughout the site	Daily	Safety & Environment Officer

6.2.1 BUDGETARY ALLOCATIONS FOR MITIGATION DURING CONSTRUCTION

A budgetary allocation of LKR. 1,000,000/- has been allocated for the implementation of the Environmental Management Plan during the construction period with a contingency budget allowance for a further LKR. 5,000,000/- for potential impact mitigation measures should such become necessary.

6.3 OPERATION MONITORING PLAN

The continual and long-term monitoring of potential impacts to the Ecological, Social or Physical environment around the project is an important step towards understanding and stopping/reversing negative trends and assessing cumulative impacts within a region. During operations, the Marino Tower

Hotel Colombo project should maintain continuous monitoring of the parameters outlined below in the EMP. The Building Management or Owner's Association should engage the services of an ESO or an external service provider to undertake the proscribed testing and maintain records of findings to submit to the relevant authorities.

Table 6-2: Environment Management Plan during Operation

Aspect Or Activity To Be Monitored	Monitoring Parameters	Location Of Sampling	Monitoring Frequency	Responsible Agency
Soil Subsidence	Measurements of markets & identified cracks	At all site boundaries and adjacent structures	Monthly	Safety & Environment Officer
Flooding	Visual Inspection	Along the car parking areas and basement	During/After Rains	Safety & Environment Officer
Noise & Air Pollution	Decibel Range & Visual	At generator, laundry and vehicular movement locations	Weekly	Safety & Environment Officer
Fire Safety Preparedness	Check Fire Safety Equipment	All fire safety points and equipment	Weekly	Safety & Environment Officer
Guest & staff safety	Lifeguard and emergency equipment & preparedness status	Where applicable	Weekly	Safety & Environment Officer
Rapid Response Team	Check and maintain Emergency response capabilities of RRT	Conduct drills throughout the premisses	Monthly	Safety & Environment Officer
Transportation Of Guests & Materials	Traffic Impact On Local Population	The access road to site from the Galle Road & 10th Lane	If Complaints Received	Safety & Environment Officer
Soil Quality	Changes in PH, Color, COD, Pollutants	Leaks and spillages at Solid Waste Collection Sites, WWTP and Fuel Storage locations	Weekly	Safety & Environment Officer

Solid Waste Disposal	Separation of Solid Waste	At solid waste storage areas	Weekly	Safety & Environment Officer
Evacuation Drills	Evacuations drills and mock response exercises	At Site Office	Monthly	Safety & Environment Officer

6.3.1 BUDGETARY ALLOCATIONS FOR MITIGATION DURING OPERATIONAL PERIOD

A budgetary allocation of LKR. 500,000/- per quarter has been allocated for the implementation of the Environmental Management Plan during the operational period of the hotel and a contingency budget allowance (Floating Fund) of a further LKR. 5,000,000/- should be set aside for potential impact mitigation measures should such become necessary.

6.4 SAFETY AND DISASTER MANAGEMENT PLAN

Accidents and Disasters, by their definition, are unavoidable situations which can have devastating localized on regional impacts and result in personal injury, loss of property or loss of life. The advent of disaster can be categorised broadly into natural and man-made. As such, the nature of the activity, location, environmental conditions and even the procedures and circumstances can define the types of disaster that any given project may be vulnerable to. In the case of the proposed Marino Tower Hotel Colombo project, potential vulnerability to natural disasters includes storm surges, extreme weather inclusive of cyclones and tsunami type disasters. The potential areas of disaster risk relevant to the project during the construction and operational phases can be categorised as:

Natural Disaster Risks:

- Storm/cyclone
- Storm surge
- Tsunami

Man-made Disaster Risks:

- Fire
- Riot & civil unrest
- Explosion
- Electrical failure
- Medical emergency

The mitigation of such risks includes passive and active strategies. Passive strategies will include the accommodation of requirements in the design of the structure including tsunami impact mitigation, fire safety and warning systems, convenient escape paths, availability and accessibility of relevant equipment etc.

Active strategies will consist of rapid response to emergent situations, availability of trained staff, evacuation planning before the event, etc. It is recommended that 10-20 staff members be given additional training to constitute a rapid response team (RRT) that will be in charge of implementing the necessary disaster response under the direction of the SEO.

The following disaster management plans illustrate the means of identification of a potential disaster (natural or man-made), the verification process, primary action to be taken, secondary action to be taken and finally verification of delivery. For example: in the event of a fire, the fire is identified through the warning system, false alarms are ruled out, the RRT is deployed to evacuate all residents, fire brigades and relevant authorities are notified, and a final sweep of the building or headcount is conducted to ensure that nobody is left behind or missing.

Table 6-3: Disaster Management Plan – Man-Made Disasters

Disaster Event	Identification Of Disaster	Verification Of Disaster	Primary Action	Secondary Action	Verification Of Delivery	Comments
Man-Made Disasters						
Structural Fire	Fire Alarm Or Fire Report	Check Fire System Or Obtain Visual Confirmation	Dispatch RRT And Sound Evacuation. Alert Fire Department	Turn Off Fuel and Electricity To Building And Attempt To Dowse The Flames If Safe.	Ensure Total Evacuation Of Personnel And Staff Through Head Count At Fire Assembly Point.	Develop Detailed Action Plan with Step by Step Instructions. Conduct Training Exercises With RRT In Effective Delivery.
Riot & Civil Unrest	Visual Or Verbal Report	Verification By Police Or Visual Reconfirmation	Secure Main Gate, Dispatch Additional Security. Inform Authorities.	Evacuate Personnel and No-Essential Staff From Site	Ensure Total Evacuation Of Personnel And Staff Through Head Count.	
Explosion	Fire Alarm Or Verbal Report	Visual or Verbal Confirmation.	Dispatch RRT To Begin Fire Response and Evacuation. Inform Police and Fire Brigade.	Shut Off Electricity and Fuel. Direct Staff To Fire Assembly Point.	Ensure Total Evacuation Of Personnel And Staff Through Head Count.	
Electrical Failure	Power Failure, Full Or Partial Premises	Inform Maintenance	Dispatch RRT And Take Corrective Measures To Restore Power. Check Elevators	Ensure all emergency lighting & ventilation systems are operational and have light for movement within site	Inform Senior Management	
Medical Emergency	In The Event Of Death Or Severe Injury	Obtain Visual Verification	Arrange Transportation/ Evacuation Of Patient/s.	Inform Nearest Emergency Unit Of Impending Arrival.	Verify That Next Of Kin Or Contact Persons Are Informed.	

Table 6-4: Disaster Management Plan – Natural Disasters

Natural Disasters						
Flooding	Visual Or Verbal Report/ Warning From Persons Or Competent Authority	Await Confirmation From Secondary Source.	Organize Evacuation In Case Of Severe Flood Warning. Inform Staff Of Impending Flood.	Dispatch RRT To Erect Flood Barriers at vulnerable areas and Create Access Paths if Necessary. Check flood pumps	Ensure All Sensitive Materials Are Evacuated To Higher Elevation And No Electrical Equipment Is Exposed.	Develop Detailed Action Plan with Step by Step Instructions. Conduct Training Exercises With RRT In Effective Delivery.
Storm/ Cyclone	Visual Or Verbal Warning Received.	Confirmation/ Warning From DMC Or Competent Authority	Inform Guests & Staff. Evacuate All Non-Essential To Secure Locations Inland. Secure Windows.	Secure Any Loose Equipment Or Loose Materials. Stockpile Essential Supplies.	Ensure Total Preparedness Of Residents & Staff Through Head Count.	
Storm Surge	Visual Or Early Warning	Confirmation/ Warning From DMC Or Competent Authority	Evacuate Staff To High Ground Away From Coastline.	Stockpile Emergency Supplies. Secure The Premises. Shut Off Power And Fuel To Prevent Fire.	Ensure Total Evacuation Of Guests And Staff Through Head Count.	
Tsunami	Visual Or Early Warning	Confirmation/ Warning From DMC Or Competent Authority	Evacuate Staff To High Ground Or Away From Coastal Area	Secure The Premises. Shut Off Power And Fuel To Prevent Fire.	Ensure Total Evacuation Of Guests And Staff Through Head Count.	
Other	Unexpected Accidents Or Events	Verbal Or Visual Confirmation	Inform Relevant Authorities. Evacuate If Required.	At Management Discretion	Verify Safety Of All Residents And Staff	

6.5 FACILITIES TO BE PROVIDED AND REPORTING MECHANISM

The Safety & Environment Officer should undertake the implementation of the EMPs and the Disaster Management Plan and develop detailed deployment plans which should be regularly drilled. The SEO should maintain detailed logs of the data collected and this data should be made available to the respective Government Agencies as deemed necessary by them in order to undertake compliance monitoring. The project should maintain communication with the relevant local and governmental agencies and assist said agencies to carry out the necessary oversight. It is further recommended that the project maintain a monthly mitigation budget as well as a sinking fund of Rs. 5 million to mitigate any future adverse impacts that may arise at/due to the project.

7 CONCLUSION AND RECOMMENDATIONS

The preceding EIA report was conducted, as stipulated in the TOR issued by the CC&CRMD, to ascertain the status of the existing environment, both ecological as well as social, in and around the project site as well as to identify any potential negative impacts that may arise from the establishment of the project.

A detailed assessment was undertaken as to the purpose of the project, construction methodology to be utilized, proposed operational procedures to be implemented, the operational objectives of the project proponents and other parameters of the proposed project. Data pertinent to the project site, its immediate environs of 500m to either side as well as the broader scope of the entire Divisional Secretary Division in which the project is situated were considered.

Data was collected through field studies, samplings, interviews, literature surveys, satellite imagery, and other means to establish accurate baseline data pertinent to this location and its surroundings. A detailed analysis was then conducted on how the proposed construction and operation of the project will impact this baseline in terms of Social, Ecological and Environmental perspectives as well as the severity of each impact. The positive impacts were then illustrated and the negative impacts further analyzed to determine the most effective mitigation method, which should be implemented to ensure that minimal disruption occurs as a result of the proposed development.

The proposed Marino Tower Colombo project is a high-rise city hotel that has been conceptualized on a property adjacent to the existing Marino Beach Colombo Hotel and Marino Mall multi-development site. As per the Coastal Management Plan 2018 issued by the CC&CRMD, the project site is well outside of the required reservation zone, as the site is over 120m away from the permanent vegetation line in the area. The site in question can be accessible from Galle Road, and a service entry is accessible from the byroad 10th Circular Lane that is connected to Marine Drive The property has been acquired lawfully and possesses clear titles.

The project proponents, at the time submitting this report, is still at the planning stage and has proposed a concept and design that aligns with the Colombo City Development Plan 2019-2030, and incorporates green building and environmentally conscious concept, as well the country's tourism plan. They have proposed a design that will facilitate and blend into the urban landscape of the area, with its neighbouring 60-storey high-rise mixed development "606" and the existing Marino Complex to either side. The luxury city hotel is having 50 levels, out of which the ground and 3 basements floors will be primarily used for car parking and MEP facilities, and the 1st floor and 2nd floor will act as the entrance and lobby. The proposed development is 46-storeys high and will include recreation facilities such as 3 restaurants (inclusive of the rooftop restaurant), Garden Bar, adult and kids swimming pools and Jacuzzis located on the rooftop as well, as a fully equipped gymnasium, yoga area and steam rooms too. Further, there will be 4 service/fire refuge floors, and various MEP and Back House facilities. MEP related facilities such as WWTP, water tanks for storage and rainwater harvesting, passenger, fire and automated car lifts, generators and transformers, stores, laundry, chiller plants to name a few.

Proper waste management measures have been taken into consideration, with the Colombo Municipal Council agreeing to collect garbage at the intervals predetermined. Utilities from the National Water

Supply & Drainage Board and Ceylon Electricity Board will be supplied accordingly from town supply, with clearance approvals been received.

The site selected for the proposed development is presently vacant and underutilized land, with a few buildings having already been demolished. No negative impacts such as resettlements and relocation programs could be expected due to the new project.

The mitigation methods will need to be implemented both during the construction and operational phases of the project and effective auditing and compliance monitoring mechanism was devised to ensure that the recommended measures were implemented. This information has been incorporated into a comprehensive Environmental Management Plan (EMP) for the ease of reference of all stakeholders. The establishment of an Safety & Environment Officer (SEO) and a Rapid Response Team (RRT) has also been recommended and its constituent members were identified to ensure proper implementation and compliance monitoring.

Considering the nature of the project, the area is predominantly urbanized with various commercial and residential buildings. A majority of the buildings are multi-storied residential blocks, high-rise buildings, and/or tourist-based commercial buildings

The nearest coast is not using for fishing activities and surrounding people occasionally use the coast for recreation activities. No fishing activities in the coastal zone due to erosion prevention measures being placed. The privately-owned land will be used for the construction of the new luxury hotel complex and related components. From a sociological point of view, there could be some temporary social concerns during the construction phase. Air pollution, noise pollution, and vibration effects could lead to such concerns, which could be minimized by the use of proper and standard methods of construction.

A proper transport system also should be in place to control traffic around Galle Road, and also from the 10th Lane off of Marine Drive in terms of road access during the construction period due to increased material transportation. Inappropriate behaviour of migrant workers during the construction phase could also lead to social unrest, and the project proponent should take steps to avoid such possibilities. No other sociological impacts could be expected in addition to the above.

More positive social impacts such as improve the rooms capacities in star grade hotels for tourism, increased employment opportunities, increased commercial activities, and improved infrastructure facilities, which would benefit the surrounding communities could be expected from the proposed project. In addition, the project would lead to increased land values in the area. It would boost the tourism industry also in the area, benefiting the communities in turn.

No major natural disasters have been affected in the project area other than a tsunami in 2004. Storm surges, floods, and cyclonic storms represent the most likely threat to this region although no significant incidences were evident through the testimony of the sociological survey. Regardless, the formulation and implementation of a Disaster Management Plan (DMP) is also recommended to safeguard human life.

In terms of the ecological impacts of the project, the study has illustrated that no major negative impacts will be experienced due to the establishment of this project. This is mainly because the site was previously a vacant land with a few buildings (which has since been demolished), and with minimal fauna present. The existing flora and vegetation are mainly decorative plants and weeds/shrubs, which will be left unharmed as is with incorporation into the landscaping plan, with only vegetation being removed for the area for the building footprint.

Architectural and structural drawings of this 46-storied high building have been provided and more specific designs of subsurface and surface components are to be developed. Recommendations of Geotechnical study and by the NRBO in terms of earthworks method statement for shoring, dewatering and pilling will be strictly adhered to and provided within the Annexures. Service drawings such as MEP have also been completed for review. Instructions and guidance given by the Fire Services Department and NBRO on certain aspects of safety and management have been incorporated in the architectural drawings, which have to be followed up seriously at the construction phase.

Based on the analysis of these elements and on the assumption that the recommendations included with regards to mitigation of identified impacts are adopted and adequately implemented, the EIA has concluded that there are no serious negative environmental or sociological impacts directly associated with the construction and operation of the proposed Marino Tower Colombo high-rise luxury city hotel.